Archived Ecological Systems and Open Water Field Guide

December 2025

This document is an archive of the Montana Natural Heritage Program's Ecological Systems and Open Water Field Guide. It is provided as a companion reference for the previous versions of the Montana Land Cover dataset, specifically the 2010-17 and 2023 layers, and open water community descriptions.

For more information on the difference between the current and archived datasets, see: https://msl.mt.gov/geoinfo/msdi/land_use_land_cover.

For the most up-to-date Ecological Communities Field Guide, please visit: https://fieldguide.mt.gov/displayEG.aspx.

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Rocky Mountain Mesic Montane Mixed Conifer Forest



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General Description

These forests are generally dominated by western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and grand fir (*Abies grandis*). They are found in areas influenced by incursions of mild, wet, Pacific maritime air masses west of the Continental Divide in Montana. Occurrences are found on all slopes and aspects but grow best on sites with high soil moisture, such as toeslopes and bottomlands. At the periphery of its distribution, this system is confined to moist canyons and cooler, moister aspects. Generally, these are moist, non-flooded or upland forest sites that are not saturated yearlong. In northwestern Montana, western hemlock and western red cedar forests occur on bottomland and northerly exposures between 609-1,585 meters (2,000-5,200 feet) on sites with an average annual precipitation of 635 millimeters (25 inches). These forests are common in extreme northwestern Montana, and extend eastward to the Continental Divide in the Lake McDonald drainage of Glacier National Park. Isolated stands of western hemlock occur in the Swan Valley, but are found most commonly in the Libby and Thompson Falls vicinities, west to the Idaho border. Western red cedar occurs extensively in the Mission Mountain range south to Missoula, and on lower flanks of the Swan Range north of Lion Creek. It is confined to the riparian zone of major streams on the east face of the Bitterroot Mountain Range. Grand fir, being less moisture dependent, occurs in more southerly and easterly sites than western red cedar and western hemlock. This system is similar to Rocky Mountain Dry-Mesic Mixed Montane Conifer Forest, which can be described as a seral phase of this system on appropriate sites west of the Continental Divide.

Diagnostic Characteristics

Forest and woodland; udic soils; *Tsuga heterophylla* and *Thuja plicata*.

Similar Systems

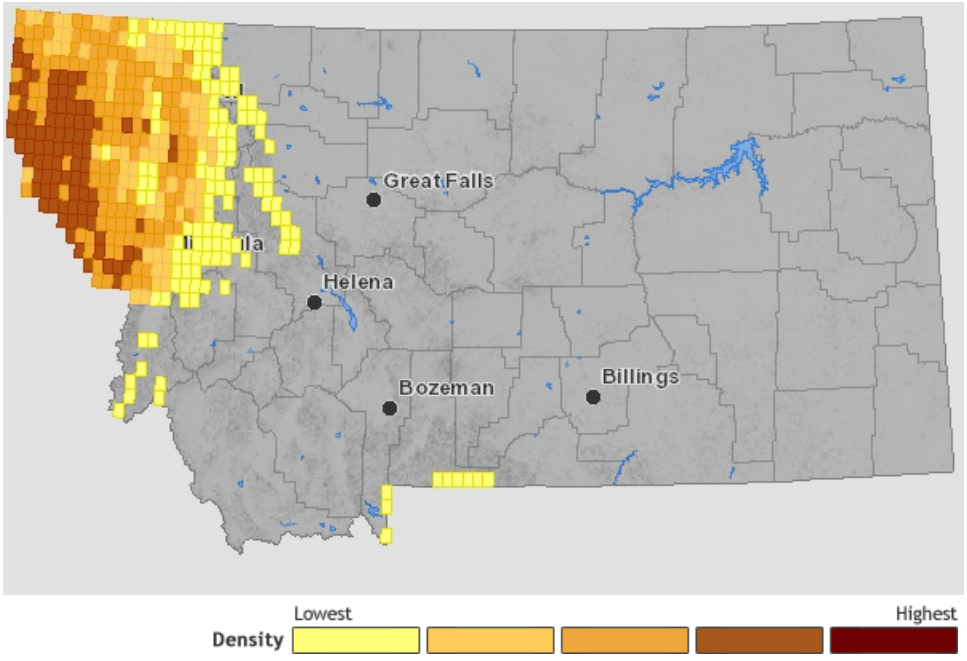
- Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland
- Rocky Mountain Conifer Swamp
- Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest

Range

These forests are common in extreme northwestern Montana, and extend eastward to the Continental Divide in the Lake McDonald drainage of Glacier National Park. Isolated stands of western hemlock (*Tsuga heterophylla*) occur in the Swan Valley, but are found most commonly in the Libby and ThompsonFalls vicinities west to the Idaho border. Western red cedar (*Thuja plicata*) occurs extensively in the Swan and Mission Mountain ranges, south to Missoula, and forms small riparian forests along major streams in the Bitterroot Mountain Range. This system is confined to the riparian zone of major streams on the east face of the Bitterroot Mountain Range as far south as Hamilton. Grand fir (*Abies grandis*), being less moisture dependent, extends to drier sites and occurs in more southerly and easterly sites than western red cedar and western hemlock.

Ecological System Distribution

Approximately 6,521 square kilometers are classified as Rocky Mountain Mesic Montane Mixed Conifer Forest in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Carbon, Flathead, Gallatin, Glacier, Granite, Lake, Lewis and Clark, Lincoln, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Teton

Spatial Pattern

Matrix

Environment

This forest system is found in areas influenced by incursions of mild, wet, Pacific maritime air masses west of the Continental Divide in Montana. Occurrences generally are found on all slopes and aspects but grow best on sites with high soil moisture, such as toeslopes and bottomlands. At the periphery of its distribution, this system is confined to moist canyons and cooler, moister aspects. Generally, these are moist, non-flooded or upland forest sites that are not saturated yearlong. In northwestern Montana, western hemlock and western red cedar forests occur on bottomland and northerly exposures between 609-1,585 meters (2,000-5,200 feet) on sites with an average annual precipitation of 635 millimeters (25 inches) per year.

Vegetation

These forests are generally dominated by western hemlock, western red cedar, and grand fir. Disturbed sites can and occasionally do return directly to dominance by the climax tree species, but other stands are often a mixture of the climax species with seral tree species such as Douglas-fir (*Pseudotsuga menziesii*), western white pine (*Pinus monticola*),

lodgepole pine (*Pinus contorta*), western larch (*Larix occidentalis*) and paper birch (*Betula papyrifera*). Engelmann spruce (*Picea engelmannii*) and subalpinefir (*Abies lasiocarpa*) may be present on the coldest sites,and ponderosa pine (*Pinus ponderosa*) may be present on the warmest and driest sites. In Glacier National Park and the Selway-Bitterroot Wilderness in Montana, western red cedar is dominant in wet ravines, well-drained flats and poorly drained depressions. Both western red cedar and western hemlock are shade-tolerant conifers that occur in similar mesic environments; however, western red cedar extends locally into slightly drier sites and occurs further south and east in Montana. Shade-intolerant grand fir is seral in western hemlock or western red cedar dominated forests and has lower moisture requirements than its associates.

Common shrubs include mountain boxwood (*Paxistima myrsinites*), thinleaf alder (*Alnus incana*), Rocky Mountain maple (*Acer glabrum*), birch leaf spiraea (*Spiraea betulifolia*), common snowberry (*Symphoricarpos albus*), bunchberry dogwood (*Cornus canadensis*), thimbleberrry (*Rubus parviflorus*), rusty leaf menziesia (*Menziesia ferruginea*), and mountain huckleberry (*Vaccinium membranaceum*). Pacific yew (*Taxus brevifolia*) can occur in a tree form in the understory on some occurrences in westernmost Montana and as a prevalent shrub in occurrences in the Swan Valley.

Composition of the herbaceous layer reflects local climate and degree of canopy closure; it is typically highly diverse in all but closed-canopy conditions. Queen's cup beadlily (*Clintonia uniflora*), western foamflower (*Tiarella trifoliata*), pioneer violet (*Viola glabella*), Canadian white violet (*Viola canadensis*), dark woods violet (*Viola orbiculata*) and beargrass (*Xerophyllum tenax*) are most the most common forbs in these forests. Other forbs include baneberry (*Actaea rubra*), pathfinder (*Adenocaulon bicolor*), false sarsaparilla (*Aralia nudicaulis*), lanceleafarnica (*Arnica latifolia*), fragrant bedstraw (*Galium triflorum*), rattlesnake plantain orchid (*Goodyera oblongifolia*), twinflower (*Linnaea borealis*), liverleaf wintergreen (*Pyrola asarifolia*) and western trillium (*Trillium ovatum*). In extreme northwestern Montana, wild ginger (*Asarum caudatum*) is a component on mesic sites with a mild temperature regime.

Ferns and fern allies also form an important component of the understoryand are indicative of the most mesic sites. Species include American ladyfern (*Athryium filix-femina*), western swordfern *(Polystichum munitum*), male fern (*Dryopteris filis-mas*), oak fern (*Gymnocarpium dryopteris*) and horsetails (*Equisetum* species). Bracken fern (*Pteridium aquilinum*) can occur in relatively high coverage (20% or greater) in mature stands, however it can form dense (up to 100%) cover in early seral stands, retarding forest regeneration. Graminoids may be absent or form a very minor component, and may include forest brome (*Bromus vulgaris*), fringed brome (*Bromus ciliatus*), Geyer's sedge (*Carex geyeri*), pinegrass (*Calamagrostis rubescens*), blue wildrye (*Elymus glaucus*), and rough leaf ricegrass (*Oryzopsis asperifolia*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3362 *Abies grandis - Pseudotsuga menziesii* Central Rocky Mountain Forest & Woodland Alliance
- **CEGL000176** *Pinus monticola - Clintonia uniflora* Forest
- **CEGL000269** *Abies grandis - Asarum caudatum* Forest
- **CEGL000272** *Abies grandis - Clintonia uniflora* Forest
- **CEGL000275** *Abies grandis - Linnaea borealis* Forest
- **CEGL000283** *Abies grandis - Taxus brevifolia* Forest

A3367 *Betula papyrifera* Rocky Mountain Forest & Woodland Alliance
- **CEGL000520** *Betula papyrifera* Forest

A3612 *Tsuga heterophylla - Thuja plicata* Cool-Mesic Central Rocky Mountain Forest & Woodland Alliance
- **CEGL000471** *Thuja plicata - Aralia nudicaulis* Forest
- **CEGL000474** *Thuja plicata - Clintonia uniflora* Forest
- **CEGL000493** *Tsuga heterophylla - Clintonia uniflora* Forest
- **CEGL005930** *Thuja plicata - Clintonia uniflora - Xerophyllum tenax* Forest

A3613 *Tsuga heterophylla - Thuja plicata* Warm-Mesic Central Rocky Mountain Forest & Woodland Alliance
- **CEGL000472** *Thuja plicata - Asarum caudatum* Forest
- **CEGL000473** *Thuja plicata - Athyrium filix-femina* Forest
- **CEGL000476** *Thuja plicata - Gymnocarpium dryopteris* Forest
- **CEGL000488** *Tsuga heterophylla - Aralia nudicaulis* Forest
- **CEGL000490** *Tsuga heterophylla - Asarum caudatum* Forest
- **CEGL000494** *Tsuga heterophylla - Gymnocarpium dryopteris* Forest

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Western red cedar and western hemlock are capable of remaining dominant within these forests due to their longevity. Because they are highly shade-tolerant, they can reproduce under their own canopy. In the absence of fire, both species can reproduce vegetatively (Pfister et al 1977; Minore 1990). Closed-canopy conditions generally favor vegetative reproduction, and this strategy is common in old-growth stands (Tesky, 1992b). Western red cedar can reproduce vegetatively by branch layering, rooting of fallen branches, and by branch development on fallen trees (Parker,1979). Trees of this species have reached 2,000 years in northern Idaho (Parker, 1986); trees in northwestern Montana have attained ages of at least 500 years.

Fire return intervals in this system average 80 years and are either moderate or high severity (U.S. Department of Agriculture, 2012). Typically, stand-replacement fire-return intervals are 150-500 years, with moderate-severity fire intervals ranging from 50 to 100 years (Arno, 1979). Western red cedar, western hemlock and grand fir are characterized by having thin bark, shallow root systems, low dense branching habits, and heavy lichen growth, making these species

susceptible to fire damage (Fischer and Bradley, 1987). All but the largest trees are typically killed in fires of moderate intensity. With vigorous fire suppression, longer fire-return intervals are now common, and multi-layered stands of conifers provide fuel "ladders," making these forests more susceptible to high-intensity, stand-replacing fires.

A variety of biotic disturbance agents interact with this system. Defoliation of western hemlock by the western hemlock looper (*Lambdina fiscellaria lugubrosa*) causes mortality in mature and old growth stands, with previous looper outbreaks increasing risk of future defoliation (Tesky, 1992a; McCloskey et al., 2009). Warmer and drier growing season conditions may increase stand susceptibility to looper attack, and outbreaks are expected to be increasingly frequent and severe in the future (McCloskey et al., 2009). Western blackheaded budworm (*Acleris gloverana*) and hemlock sawfly (*Neodiprion tsugae*) also cause western hemlock defoliation, and may cause severe damage to even-aged juvenile stands (Nealis and Turnquist, 2010). The gall midge (*Mayetiola thujae*) infects western redcedar, causing damage to their seeds. Fungi additionally attack western redcedar in the form of root butt and trunk rots. In the eastern portion of western redcedar's range in northwestern Montana, *Poria asiatioa* and *Phellinus weiri* are most damaging, and are increasingly common in old-growth stands. Roots injured by fire may be more vulnerable to fungal infection (Tesky, 1992b).

Wind throw can occur during unusually intense wind storms as the dominant species typically possess shallow, spreading root systems. Trees are particularly susceptible to uprooting in areas with shallow soils or a high water table (Tesky, 1992a). Individual trees that have been damaged by root diseases are especially prone to windthrow. Frost damage also affects western hemlock in northwestern Montana (Tesky, 1992a). In the past, these forests have been priorities for timber production in this region. Today, many old-growth stands occur in protected areas.

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system. Fire is generally infrequent in this system due to moist conditions, however, intense summer drought may lead to severe burning as this system is highly productive with heavy fuel loading (Fischer and Bradley, 1987). Prescribed burning will therefore be most effective following summer drought when fuels are driest. Burning may be a valuable strategy to control dwarf mistletoe outbreaks (Tesky, 1992a), promote nutrient cycling and species diversity, and create mineral seedbeds that favor natural regeneration of the species in this system (Fischer and Bradley, 1987). However, fire may also have consequences when root damage occurs, leading to chronic stress, growth loss, and increased susceptibility to fungal infection (Tesky, 1992b).

When thinning is utilized for silvicultural or fire risk reduction purposes, increased risk of windthrow should be considered. Both dominant species in this system are vulnerable to blowdown, in part due to their shallow rooting systems. Maintaining windfirm borders when thinning is necessary to avoid widespread blowdown (Tesky, 1992a). Thinning may likewise increase susceptibility to insect defoliation, particularly for stands dominated by western hemlock, and vulnerability to insect attack should be considered prior to thinning (Nealis and Turnquist, 2010).

Restoration Considerations

Post-fire restoration strategies will depend largely on the severity of the fire. Early successional stages may be dominated by fireweed (*Chamerion angustifolium*) and other forbs, graminoids and understory shrubs. If seed trees are present, both dominant species are good seed producers and are capable of regenerating well following fire. However, of all conifers in the northern Rocky Mountains, western red cedar and western hemlock seedlings have the slowest growth rates and are highly susceptible to drought. Both species are capable of regenerating well on bare mineral soils if adequate moisture is present during the first two years of growth. Drought and high soil temperatures damage seedlings growing in full sunlight, with western red cedar being particularly sensitive (Tesky, 1992a; Tesky, 1992b).

Intense fires that occur during summer months cause considerable damage to native perennial grasses, forbs and shrubs, and may completely destroy existing seed banks, especially on steep facing slopes. In some cases, severely burned sites will require replanting with seedlings. In the Northern Rocky Mountain region, containerized nursery stock is outplanted in spring. Generally, larger container volume of nursery stock results in higher outplanting success than bareroot nursery stock, especially if spring and early summer precipitation patterns are unpredictable, and exposed mineral soil temperatures are high during the first year of establishment. Generally, 6-8 cubic inch container stock types are used on milder sites with good site preparation, and 10, 15 or 20 cubic inch container stock is used on the hotter, drier aspects or sites. Conifer stocking rates must be developed on a site-by-site basis to meet management objectives.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Yuma Myotis *(Myotis yumanensis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Fisher *(Pekania pennanti)* SOC
Canada Lynx *(Lynx canadensis)* SOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Snowshoe Hare *(Lepus americanus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Pocket Gopher *(Thomomys talpoides)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Western Heather Vole *(Phenacomys intermedius)*
Montane Vole *(Microtus montanus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Marten *(Martes americana)*
American Ermine *(Mustela richardsonii)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*
Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Wolverine *(Gulo gulo)* SOC
North American Water Vole *(Microtus richardsoni)* PSOC
Masked Shrew *(Sorex cinereus)*
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Flying Squirrel *(Glaucomys sabrinus)*
North American Deermouse *(Peromyscus maniculatus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Flammulated Owl *(Psiloscops flammeolus)* SOC
American Goshawk *(Accipiter atricapillus)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC

Black-backed Woodpecker *(Picoides arcticus)* SOC
Boreal Chickadee *(Poecile hudsonicus)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Western Screech-Owl *(Megascops kennicottii)* PSOC
Boreal Owl *(Aegolius funereus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Cooper's Hawk *(Accipiter cooperii)*
Spruce Grouse *(Canachites canadensis)*
Ruffed Grouse *(Bonasa umbellus)*
Great Horned Owl *(Bubo virginianus)*
Barred Owl *(Strix varia)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Vaux's Swift *(Chaetura vauxi)*
Calliope Hummingbird *(Selasphorus calliope)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Cedar Waxwing *(Bombycilla cedrorum)*
Red-eyed Vireo *(Vireo olivaceus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Yellow-rumped Warbler *(Setophaga coronata)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Chipping Sparrow *(Spizella passerina)*
Song Sparrow *(Melospiza melodia)*
Dark-eyed Junco *(Junco hyemalis)*
Pine Grosbeak *(Pinicola enucleator)*
White-winged Crossbill *(Loxia leucoptera)*
Pine Siskin *(Spinus pinus)*
Pileated Woodpecker *(Dryocopus pileatus)* SOC
Brown Creeper *(Certhia americana)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Red-tailed Hawk *(Buteo jamaicensis)*
Dusky Grouse *(Dendragapus obscurus)*
Mourning Dove *(Zenaida macroura)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Olive-sided Flycatcher *(Contopus cooperi)*
Willow Flycatcher *(Empidonax traillii)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Violet-green Swallow *(Tachycineta thalassina)*
Canada Jay *(Perisoreus canadensis)*
Blue Jay *(Cyanocitta cristata)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Golden-crowned Kinglet *(Regulus satrapa)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Bohemian Waxwing *(Bombycilla garrulus)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Townsend's Warbler *(Setophaga townsendi)*
Blackpoll Warbler *(Setophaga striata)*
Northern Waterthrush *(Parkesia noveboracensis)*
Common Yellowthroat *(Geothlypis trichas)*
Canada Warbler *(Cardellina canadensis)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
American Tree Sparrow *(Spizelloides arborea)*
Fox Sparrow *(Passerella iliaca)*
White-throated Sparrow *(Zonotrichia albicollis)*
Rusty Blackbird *(Euphagus carolinus)*
Purple Finch *(Haemorhous purpureus)*
Red Crossbill *(Loxia curvirostra)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Northern Rubber Boa *(Charina bottae)*
Common Gartersnake *(Thamnophis sirtalis)*
Western Skink *(Plestiodon skiltonianus)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Coeur d'Alene Salamander *(Plethodon idahoensis)* SOC
Western Toad *(Anaxyrus boreas)* SOC
Sierran Treefrog *(Pseudacris sierra)*
Idaho Giant Salamander *(Dicamptodon aterrimus)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Mariposa Copper *(Tharsalea mariposa)*

Vascular Plants

Red Alder *(Alnus rubra)* SOC
Yerba Buena *(Satureja douglasii)* SOC
Clustered Lady's-slipper *(Cypripedium fasciculatum)* SOC
Crested Shieldfern *(Dryopteris cristata)* SOC
Peculiar Moonwort *(Botrychium paradoxum)* SOC
Upward-lobed Moonwort *(Botrychium ascendens)* SOC
Michigan Moonwort *(Botrychium michiganense)* SOC
Mountain Moonwort *(Botrychium montanum)* PSOC
Velvetleaf Huckleberry *(Vaccinium myrtilloides)* SOC
Great-spurred Violet *(Viola selkirkii)* SOC
Sparrow's-egg Lady's-slipper *(Cypripedium passerinum)* SOC
Treelike Clubmoss *(Lycopodium dendroideum)* SOC
Wavy Moonwort *(Botrychium crenulatum)* SOC
Stalked Moonwort *(Botrychium pedunculosum)* SOC
Northern Beechfern *(Phegopteris connectilis)* SOC
Northern Twayblade *(Listera borealis)*

Native Species Occasionally Associated with this Ecological System

Mammals

Northern Bog Lemming *(Synaptomys borealis)* SOC
Mountain Cottontail *(Sylvilagus nuttallii)*
Bobcat *(Lynx rufus)*
American Pika *(Ochotona princeps)*
American Mink *(Neogale vison)*

Birds

Lewis's Woodpecker *(Melanerpes lewis)* SOC
American Kestrel *(Falco sparverius)*
White-throated Swift *(Aeronautes saxatalis)*
American Crow *(Corvus brachyrhynchos)*
Mountain Bluebird *(Sialia currucoides)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Lapland Longspur *(Calcarius lapponicus)*
Brown-headed Cowbird *(Molothrus ater)*
American Goldfinch *(Spinus tristis)*
Veery *(Catharus fuscescens)* SOC
Wild Turkey *(Meleagris gallopavo)*
Bank Swallow *(Riparia riparia)*
Northern House Wren *(Troglodytes aedon)*
Lazuli Bunting *(Passerina amoena)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Snow Bunting *(Plectrophenax nivalis)*
House Finch *(Haemorhous mexicanus)*

Invertebrates

Weidemeyer's Admiral *(Limenitis weidemeyerii)*

Original Concept Authors

M.S. Reid

Montana Version Authors

T. Luna, L.K. Vance, S.V. Cooper and M.M. Hart.

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.802, Northern Rocky Mountain Mesic Montane Mixed Conifer Forest

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4234: Northern Rocky Mountain Mesic Montane Mixed Conifer Forest

Literature Cited Above Legend: View Online Publication

Fischer, W. C., and A. F. Bradley. 1987. Fire ecology of western Montana forest habitat types. USDA Forest Service General Technical Report INT-223. Intermountain Research Station, Ogden, UT. 95 pp.

McCloskey, S.P., L.D. Daniels, and J.A. McLean. 2009. Potential impacts of climate change on western hemlock looper outbreaks. Northwest Science 83(3):225-238

Nealis, V.G. and R.Turnquist. 2010. Impact and recovery of western hemlock following disturbances by forestry and insect defoliation. Forest ecology and management 260(5):699-706.

Tesky, J.L. 1992a. Tsuga heterophylla. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

Tesky, J.L. 1992b. Thuja plicata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Northern Rocky Mounatin Montane Mixed-Conifer Communities. In: Fire Effects Information System, [Online]. U.S. Department

Additional References Legend: View Online Publication

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Hoefs, Manfred E. G. 1973. *Birds of the Kluane Game Sanctuary, Yukon Territory, and adjacent areas*. [Ottawa]: [Ottawa Field-Naturalists' Club].

Parker, Tracey. 1979. *Natural regeneration of western redcedar*.

Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.

Minore D. 1990. Thuja plicata Donn ex D. Don western redcedar. In: Burns RM, Honkala BH, editors. Silvics of North America. Volume 1. Conifers. Agriculture Handbook. Washington DC: USDA Forest Service, Washington; p 590-600.

Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland

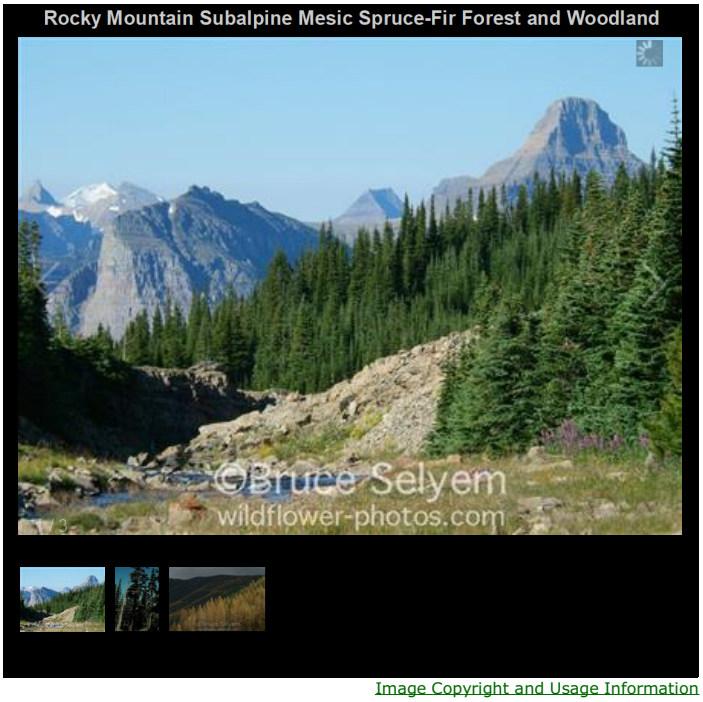


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General Description

These forests are similar to Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland (4242), but occur in locations with cold-air drainage or ponding, or where snowpacks linger late into the summer, such as north-facing slopes and high-elevation ravines. They are distinguished by their occurrence on mesic to wet microsites within the matrix of the drier (and warmer) subalpine spruce-fir or lodgepole pine forests. The microsites include north-facing slopes, swales or ravines, toeslopes, cold pockets, and other locations where available soil moisture is higher or lasts longer into the growing season. This system can extend down in elevation below the subalpine zone in places where cold-air ponding occurs, especially on north and east aspects. Elevations range from 884 to 1,981 meters (2,900-6,500 feet) west of the Continental Divide, and 1,585 to 2,682 meters (5,200-8,800 feet) east of the Continental Divide. Spruce is usually associated with subalpine fir and occurs either as a climax co-dominant or as a persistent, long-lived seral species in most upper elevation subalpine fir stands. Mountain hemlock (*Tsuga mertensiana*) occurs as small patches within the matrix of this mesic spruce-fir system, but only in the most maritime of environments of northwestern Montana, in the coldest and wettest sites. The shrub understory contains many ericaceous species such as rusty leaf menziesia (*Menziesia ferruginea*), dwarf huckleberry (*Vaccinium caespitosum*), mountain huckleberry *(Vaccinium membranaceum*), bilberry (*Vaccinium myrtillus*), grouse whortleberry (*Vaccinium scoparium*), pink mountain heath (*Phyllodoce empetriformis*), black twinberry honeysuckle (*Lonicera involucrata*), gooseberry (*Ribes*species) and thimbleberry (*Rubus parviflorus*). The herbaceous understory contains mesic forbs, graminoids, and ferns and fern allies on the wettest sites. Moss cover is often high. Stand-replacing fires are less common in mesic spruce-fir forests than in dry-mesic forests.

Diagnostic Characteristics

Forest and woodlands, acidic and udic soils, very long disturbance intervals, long persistence (>500years), *Picea engelmannii, Abies lasiocarpa*

Similar Systems

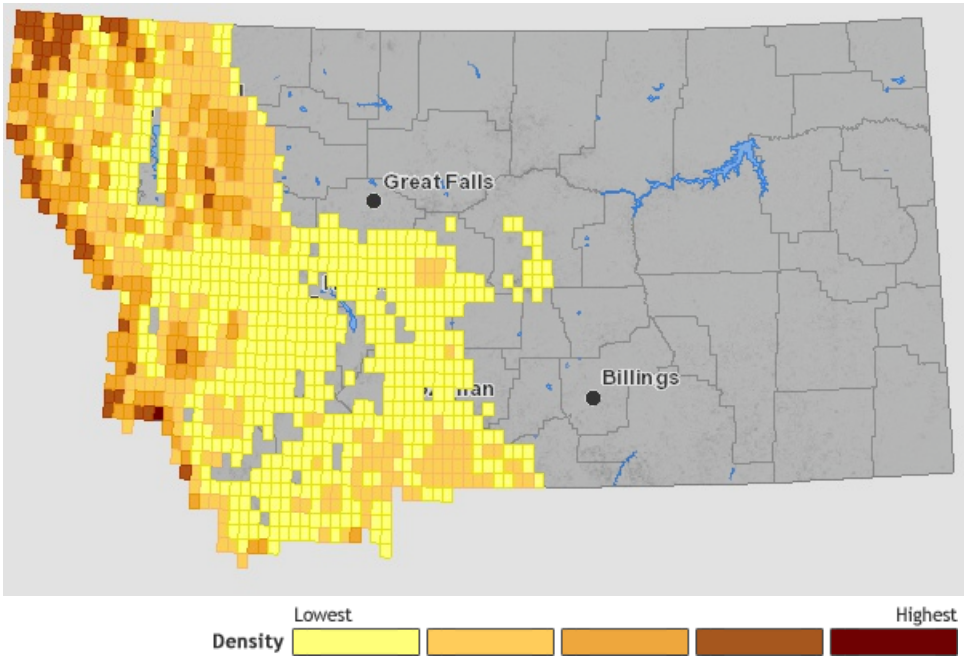
- Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest
- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland
- Rocky Mountain Subalpine Woodland and Parkland

Range

This system occurs is distinguished by its occurrence on mesic to wet microsites within the matrix of the drier (and warmer) subalpine spruce-fir or lodgepole pine forests. The microsites include north-facing slopes, swales or ravines, toeslopes, cold pockets, and other locations where available soil moisture is higher or lasts longer into the growing season. Engelmann spruce and subalpine fir mesic forests comprise a substantial part of the subalpine forests of the northwestern Montana Rocky Mountains. In Montana, these mesic to wet forests are very common west of the Continental Divide in the Flathead and Kootenai river drainages. The wetter habitat types such as subalpine fir/ devil's club (*Abies lasiocarpa/Oplopanax horridum*) and Engelmann spruce/ horsetail (*Picea engelmannii/Equisetum arvense*) associations are found locally in the Flathead Valley and along Sheep Creek north of White Sulphur Springs.

Ecological System Distribution

Approximately 6,340 square kilometers are classified as Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Large patch

Environment

This system forms a belt at relatively low to high elevations west of the Continental Divide and mid to high elevations east of the Divide throughout the Montana Rocky Mountains and rarely, in the island ranges of north-central and west-central Montana. Elevations range from 884 to 1,981 meters (2,900-6,500 feet) west of the Continental Divide, and 1,585 to 2,682 meters (5,200-8,800 feet) east of the Continental Divide. Soils are derived from a variety of parent materials. They are usually rocky or gravelly with good aeration and drainage, but are usually acidic. Occurrences are typically found in locations with cold-air drainage or

ponding, or where snowpacks linger late into the summer, such as north-facing slopes and high-elevation ravines. They can extend down in elevation below the subalpine zone in places where cold-air ponding occurs, especially on north and east aspects.

Vegetation

Tree canopy characteristics are relatively uniform, with *Picea* and *Abies* dominating either mixed or alone. Engelmann spruce is more tolerant of extreme environmental conditions than subalpine firs, and is usually more dominant in the drier and wettest occurences within this system. Mountain hemlockoccurs as small to large patches within the matrix of this mesic spruce-fir system but only in the most maritime of environments of northwestern Montana, in the coldest and wettest sites.

The understory of *Picea -Abies* forests in northwestern Montana often supports diverse stands of ericaceous plants, such as rusty leaf menziesia, dwarf huckleberry mountain huckleberry, bilberry and mountain heath. Grouse whortleberry and Labrador tea (*Ledum glandulosum*) are common on mesic sites.Cascade azalea (*Rhododendron albiflorum*) occurs in association with mountain hemlock and subalpine fir in some occurrences in northwestern Montana.Other common shrubs include Rocky Mountain maple (*Acer glabrum*), serviceberry (*Amelanchier alnifolia*), black twinberry honeysuckle, currant (*Ribes* species), thimbleberry, shortfruit willow (*Salix brachycarpa*) and greyleaf willow (*Salix glauca*). In the wettest subalpine fir forests in northwestern Montana, devil's club is a major shrub associate. These sites are usually restricted to ravine bottoms near streams and seeps where the water table remains near the surface all year. The herbaceous layer is typically diverse. Smooth woodrush (*Luzula glabrata var. hitchcockii*), bluejoint reedgrass (*Calamagrostis canadensis*), and pinegrass (*Calamagrostis rubescens*) are the most commonly associated graminoids. On moist sites with seeps or adjacent to running water, a lush herbaceous understory is present. Forb species includebaneberry (*Actaea rubra*), marsh marigold (*Caltha leptosepala*), queen's cup beadlily (*Clintonia uniflora*), bunchberry dogwood (*Cornus canadensis*),starry Solomon's seal (*Maianthemum stellatum*), sidebellswintergreeen (*Orthothilla secunda*), arrowleaf groundsel (*Senecio triangularis*), clasp-leaf twisted stalk (*Streptopus amplexifolius*), foamflower (*Tiarella trifoliata*), western meadow rue (*Thalictrum occidentale*), Sitka valerian (*Valeriana sitchensis*), green false hellebore (*Veratrum viride*), and beargrass (*Xerophyllum tenax*). Ferns and fern allies such ashorsetail (*Equisetum* species), oakfern (*Gymnocarpium dryopteris*) and ladyfern (*Athyrium species*) form dense cover, inespecially wet spruce habitats on flat sites with poor drainage. Moss cover is often high within these forests.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0311 *Populus balsamifera ssp. Trichocarpa* Northern Rocky Mountain Riparian Forest Alliance
- **CEGL005906** *Populus balsamifera ssp. trichocarpa / Populus tremuloides / Conifer - Clintonia uniflora* Riparian Forest

A3362 *Abies grandis - Pseudotsuga menziesii* Central Rocky Mountain Forest & Woodland Alliance
- **CEGL005904** *Betula papyrifera /Conifer - Clintonia uniflora* Woodland

A3614 *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Moist Forest Alliance
- **CEGL000295** *Abies lasiocarpa / Picea engelmannii - Actaea rubra* Forest
- **CEGL000317** *Abies lasiocarpa / Picea engelmannii - Luzula glabrata var. hitchcockii* Woodland
- **CEGL000330** *Abies lasiocarpa - Rhododendron albiflorum* Woodland
- **CEGL000341** *Abies lasiocarpa / Picea engelmannii - Vaccinium membranaceum* Rocky Mountain Forest
- **CEGL000415** *Picea engelmannii - Maianthemum stellatum* Forest
- **CEGL005892** *Abies lasiocarpa / Picea engelmannii - Clintonia uniflora / Xerophyllum tenax* Forest
- **CEGL005893** *Abies lasiocarpa / Picea engelmannii - Menziesia ferruginea - Clintonia uniflora* Forest
- **CEGL005894** *Abies lasiocarpa / Picea engelmannii - Menziesia ferruginea / Vaccinium scoparium* Forest
- **CEGL005895** *Abies lasiocarpa / Picea engelmannii - Menziesia ferruginea - Xerophyllum tenax* Forest
- **CEGL005896** *Abies lasiocarpa / Picea engelmannii - Menziesia ferruginea - Luzula glabrata var. hitchcockii* Woodland
- **CEGL005897** *Abies lasiocarpa / Picea engelmannii - Menziesia ferruginea - Streptopus amplexifolius* Woodland
- **CEGL005898** *Abies lasiocarpa / Picea engelmannii - Xerophyllum tenax / Luzula glabrata var. hitchcockii* Woodland
- **CEGL005912** *Abies lasiocarpa / Picea engelmannii - Clintonia uniflora* Forest
- **CEGL005914** *Abies lasiocarpa / Picea engelmannii - Vaccinium scoparium - Xerophyllum tenax* Forest
- **CEGL005917** *Abies lasiocarpa / Picea engelmannii - Vaccinium membranaceum - Xerophyllum tenax* Forest
- **CEGL005918** *Abies lasiocarpa / Picea engelmannii - Vaccinium caespitosum - Clintonia uniflora* Forest
- **CEGL005919** *Abies lasiocarpa / Picea engelmannii - Vaccinium scoparium - Thalictrum occidentale* Forest
- **CEGL005920** *Abies lasiocarpa / Picea engelmannii - Streptopus amplexifolius / Luzula glabrata var. hitchcockii* Woodland

A3615 *Abies lasiocarpa - Picea engelmannii* Southern Rocky Mountain Moist Forest Alliance
- **CEGL000294** *Abies lasiocarpa / Picea engelmannii - Acer glabrum* Forest
- **CEGL000331** *Abies lasiocarpa / Picea engelmannii - Ribes (montigenum, lacustre, inerme)* Forest

A3616 *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Talus & Scree Woodland Alliance
- **CEGL005823** *Abies lasiocarpa / Picea engelmannii - Valeriana sitchensis* Woodland

A3617 *Tsuga mertensiana* Rocky Mountain Forest Alliance
- **CEGL000504** *Tsuga mertensiana - Clintonia uniflora* Forest
- **CEGL000506** *Tsuga mertensiana - Menziesia ferruginea* Forest
- **CEGL000516** *Tsuga mertensiana - Xerophyllum tenax* Forest

A3640 *Abies lasiocarpa - Picea engelmannii - Pinus flexilis* Dry-Mesic Rocky Mountain Krummholz Alliance

A3643 *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Dry-Mesic Forest Alliance
- **CEGL000306** *Abies lasiocarpa - Clematis columbiana var. columbiana* Forest
- **CEGL002676** *Picea engelmannii - Physocarpus malvaceus* Forest

A3726 *Abies amabilis - Tsuga mertensiana - Abies lasiocarpa* Cascadian Forest & Woodland Alliance
CEGL000505 *Tsuga mertensiana - Luzula glabrata var. hitchcockii* Forest
A3729 *Abies lasiocarpa - Picea engelmannii / Rubus lasiococcus* Cascadian Forest Alliance
CEGL000920 *Abies lasiocarpa - Phyllodoce empetriformis* Woodland
A3757 *Abies lasiocarpa - Picea engelmannii* Swamp Forest Alliance
CEGL000300 *Abies lasiocarpa / Picea engelmannii - Calamagrostis canadensis* Swamp Forest
CEGL000314 *Abies lasiocarpa - Ledum glandulosum* Swamp Forest
CEGL000414 *Picea (engelmannii x glauca, engelmannii) - Packera streptanthifolia* Swamp Forest
A3948 *Valeriana sitchensis - Luzula glabrata var. hitchcockii - Xerophyllum tenax* Subalpine Mesic Meadow Alliance
CEGL005856 *Chamerion angustifolium* Rocky Mountain Meadow

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Major disturbances include occasional blowdown, insect outbreaks (30-50 years), and fire. Fire return intervals are longer in this system than in the drier Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland system and range between 170 to more than 300 years (U.S. Department of Agriculture, 2012). The majority of fires in this system are stand replacing, although mixed severity fires also occur (U.S. Department of Agriculture, 2012). The cool and moist environment of this system favors greater fuel loading and infrequent fires, however when dry conditions persist over long periods, these characteristics promote intense, stand-replacing fires (Reinhardt and Holsinger, 2010). Both subalpine fir and Engelmann spruce are highly susceptible to fire, in part due to their shallow roots, thin bark, and dense stand growth habits (Alexander and Shepperd, 1990; Uchytil, 1991). Mountain hemlock is also highly susceptible to fire due to its low-hanging branches, although its bark is relatively thick and may provide some protection to low-intensity burning (Tesky, 1992). Following fire, spruce is more successful at establishing on mineral soils while subalpine fir is comparatively better at establishing in the shade and on organic substrates. Both mountain hemlock and spruce are generally slow to establish after fire (Alexander and Shepperd, 1990; Tesky, 1992). In Montana, subalpine fir will often form pure stands with lesser dominance by Engelmann spruce, although Engelmann spruce often outlives subalpine fir in this system (Uchytil, 1991). Over time, in the absence of fire or in the presence of spruce budworm attacks, subalpine fir will largely replace spruce within most habitats of this system, with the exception of the wettest sites.

Insects and disease influence species composition and successional direction of this system. Throughout Montana, subalpine fir and spruce are affected by western spruce budworm (*Choristoneura occidentalis*) attacks. Spruce and subalpine fir in this system may be comparatively less vulnerable to spruce budworm outbreak than those in the Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland system due to higher energy reserves associated with trees on more mesic sites that increase defense potential against spruce budworm attack (Dupont et al., 1991). The spruce beetle (*Dendroctonus rufipennis*) also causes extensive damage to spruce in this system. Severe wind events that cause extensive blowdown are often followed by spruce beetle outbreaks as downed trees provide an abundant food supply and are favored by the beetles (Lindemann and Barker, 2001). Other disturbances that cause an abundance of downed material, including landslides and avalanches, also contribute to increases in local beetle populations (Jenkins et al., 2014). When outbreak conditions occur, or when downed material is unavailable, spruce beetles will also attack live trees, favoring large size classes and overmature individuals (Alexander and Shepperd, 1990). Beetle outbreaks have implications for watershed function, wildlife habitat, recreation, and stand species composition (Jenkins et al., 2014). Large stands of these subalpine forests can be killed following several years of drought or unusually mild winters.

Spruce broom rust (*Chrysomyxa arctostaphyli*) also occurs in this system causing deformation and increased vulnerability to windbreak (Alexander and Shepperd, 1990). Subalpine fir is additionally affected by western balsam bark beetle (*Dryocoetes confuses*), balsam wooly adelgid (*Adelges piceae*), and the fir engraver beetle (*Scolytus ventralis*). Root and wood rots also affect the dominant species in this system by weakening their defenses to insect attack and increasing vulnerability to windfall (Jenkins et al., 2014). Root decay is especially problematic for mature subalpine fir in the Northern Rockies (Uchytil, 1991).

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system, however, fire return intervals are generally quite long where site conditions are more mesic. Maintaining historic fire return intervals in this system may decrease stand susceptibility to spruce beetle outbreak (Bebi et al, 2003; Kulakowski and Veblen, 2006). Old stands have a greater abundance of downed material and mature individuals that are vulnerable to attack. Moderate to severe fires change the age structure of a stand thereby decreasing susceptibility to future attack (Kulakowski and Veblen, 2006).

All species in this system are vulnerable to windthrow. Mechanical thinning for silvicultural or fire risk reduction purposes should therefore consider stand blowdown as a potential result of thinning treatment. Risk of windfall increases in stands with shallow soils and poor drainage, high degree of root and wood rot, and old, dense stand structure (Alexander and Shepperd, 1990). Alternatively, thinning may be useful to promote natural regeneration and reduce abundance of overmature individuals in a stand, altering stand age structure, and thereby decreasing susceptibility to future spruce beetle outbreaks. However, logging residue may contribute to beetle population increases, and downed woody material may therefore need to be removed from the site to prevent beetle population growth. In general, increasing forest heterogeneity limits beetle spread and extent of outbreak (Jenkins et al., 2014).

Restoration Considerations

The wetter habitat types characteristic of this system are usually not subjected to frequent stand-replacing fires. However, crown fires do occur when large, stand-replacing fires in adjacent drier forests travel into these habitats. The dominant species in this system are good seed producers and are capable of regenerating well following fire. Spruce is capable of regenerating well on bare mineral soils if adequate moisture is present during the first two years of growth. Subalpine fir and mountain hemlock colonize both sites with mineral soil and those with some organic matter. At the higher elevation occurrences of this system, seedling survival may be greater where duff seedbeds are present as they protect seedlings from harsh climatic conditions, whereas at lower elevations, mineral seedbeds may be more conducive to seedling establishment (Uchytil, 1991).

Large, prescribed, stand-replacement fires are not recommended in areas where spruce is in severe decline. Small-scale prescribed burning during late fall after several hard frosts can facilitate regeneration and increase stand heterogeneity in terms of age structure and species composition, thereby decreasing susceptibility to insect outbreaks (Jenkins et al., 2014). In some cases, nursery stock may be used to expedite regeneration of severely burned areas if seed rain from adjacent stands is not likely to occur, or if bare mineral soil following severe insect outbreak is limited (Jenkins et al., 2014). When supplemental planting is required, cold, moist stratification is necessary for germination of subalpine fir and spruce (Uchytil, 1991). Success of seedling establishment may be greater than in the Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland system due this system's tendency to occur on north aspects with cool air ponding where seedling establishment is favored and droughty conditions are less likely to occur (Alexander and Shepperd, 1990).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and

conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Fisher *(Pekania pennanti)* SOC	Wolverine *(Gulo gulo)* SOC
Canada Lynx *(Lynx canadensis)* SOC	Uinta Chipmunk *(Neotamias umbrinus)* PSOC
North American Water Vole *(Microtus richardsoni)* PSOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
Western Water Shrew *(Sorex navigator)*	Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
American Pika *(Ochotona princeps)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Snowshoe Hare *(Lepus americanus)*	Least Chipmunk *(Neotamias minimus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Flying Squirrel *(Glaucomys sabrinus)*	Northern Pocket Gopher *(Thomomys talpoides)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Marten *(Martes americana)*
Least Weasel *(Mustela nivalis)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Moose *(Alces alces)*
Mountain Goat *(Oreamnos americanus)*	Bighorn Sheep *(Ovis canadensis)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC	Northern Hawk Owl *(Surnia ulula)* SOC
Black-backed Woodpecker *(Picoides arcticus)* SOC	Pileated Woodpecker *(Dryocopus pileatus)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC	Boreal Chickadee *(Poecile hudsonicus)* SOC
Brown Creeper *(Certhia americana)* SOC	Pacific Wren *(Troglodytes pacificus)* SOC
Varied Thrush *(Ixoreus naevius)* SOC	Cassin's Finch *(Haemorhous cassinii)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC	Great Gray Owl *(Strix nebulosa)* PSOC
Boreal Owl *(Aegolius funereus)* PSOC	Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC	Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*	Cooper's Hawk *(Accipiter cooperii)*
Red-tailed Hawk *(Buteo jamaicensis)*	Spruce Grouse *(Canachites canadensis)*
Dusky Grouse *(Dendragapus obscurus)*	Ruffed Grouse *(Bonasa umbellus)*
Great Horned Owl *(Bubo virginianus)*	Northern Pygmy-Owl *(Glaucidium gnoma)*
Barred Owl *(Strix varia)*	Northern Saw-whet Owl *(Aegolius acadicus)*
Vaux's Swift *(Chaetura vauxi)*	Black-chinned Hummingbird *(Archilochus alexandri)*
Calliope Hummingbird *(Selasphorus calliope)*	Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*	Downy Woodpecker *(Dryobates pubescens)*
Hairy Woodpecker *(Dryobates villosus)*	American Three-toed Woodpecker *(Picoides dorsalis)*
Northern Flicker *(Colaptes auratus)*	Olive-sided Flycatcher *(Contopus cooperi)*
Hammond's Flycatcher *(Empidonax hammondii)*	Dusky Flycatcher *(Empidonax oberholseri)*
Western Flycatcher *(Empidonax difficilis)*	Violet-green Swallow *(Tachycineta thalassina)*
Canada Jay *(Perisoreus canadensis)*	Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*	Black-capped Chickadee *(Poecile atricapillus)*
Mountain Chickadee *(Poecile gambeli)*	Chestnut-backed Chickadee *(Poecile rufescens)*
Red-breasted Nuthatch *(Sitta canadensis)*	White-breasted Nuthatch *(Sitta carolinensis)*
Pygmy Nuthatch *(Sitta pygmaea)*	Golden-crowned Kinglet *(Regulus satrapa)*
Ruby-crowned Kinglet *(Corthylio calendula)*	Townsend's Solitaire *(Myadestes townsendi)*
Swainson's Thrush *(Catharus ustulatus)*	Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*	Bohemian Waxwing *(Bombycilla garrulus)*
Cedar Waxwing *(Bombycilla cedrorum)*	Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*	Orange-crowned Warbler *(Leiothlypis celata)*
Nashville Warbler *(Leiothlypis ruficapilla)*	Cape May Warbler *(Setophaga tigrina)*
Yellow-rumped Warbler *(Setophaga coronata)*	Townsend's Warbler *(Setophaga townsendi)*
Palm Warbler *(Setophaga palmarum)*	American Redstart *(Setophaga ruticilla)*
Northern Waterthrush *(Parkesia noveboracensis)*	MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*	Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*	Black-headed Grosbeak *(Pheucticus melanocephalus)*
Fox Sparrow *(Passerella iliaca)*	Dark-eyed Junco *(Junco hyemalis)*
Pine Grosbeak *(Pinicola enucleator)*	Purple Finch *(Haemorhous purpureus)*
White-winged Crossbill *(Loxia leucoptera)*	Red Crossbill *(Loxia curvirostra)*
Pine Siskin *(Spinus pinus)*	

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Idaho Giant Salamander *(Dicamptodon aterrimus)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Western Toad *(Anaxyrus boreas)* SOC
Sierran Treefrog *(Pseudacris sierra)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Freija Fritillary *(Boloria freija)* PSOC
Gray Comma *(Polygonia progne)* SOC

Vascular Plants

Oregon Bluebells *(Mertensia bella)* SOC
Whitebark Pine *(Pinus albicaulis)* SOC
Sparrow's-egg Lady's-slipper *(Cypripedium passerinum)* SOC
Cascade reedgrass *(Calamagrostis tweedyi)* SOC
Wavy Moonwort *(Botrychium crenulatum)* SOC
Northern Twayblade *(Listera borealis)*
Sitka Columbine *(Aquilegia formosa)* SOC
California False-hellebore *(Veratrum californicum)* SOC
Northern Rattlesnake-plantain *(Goodyera repens)* SOC
Running-pine *(Lycopodium lagopus)* SOC
Michigan Moonwort *(Botrychium michiganense)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Fringed Myotis *(Myotis thysanodes)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
California Myotis *(Myotis californicus)*
North American Deermouse *(Peromyscus maniculatus)*
American Badger *(Taxidea taxus)*
Long-legged Myotis *(Myotis volans)* SOC
Hoary Marmot *(Marmota caligata)* PSOC
Yellow-pine Chipmunk *(Neotamias amoenus)*
American Mink *(Neogale vison)*
Bobcat *(Lynx rufus)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Lewis's Woodpecker *(Melanerpes lewis)* SOC
Rough-legged Hawk *(Buteo lagopus)*
Long-eared Owl *(Asio otus)*
Western Wood-Pewee *(Contopus sordidulus)*
Tree Swallow *(Tachycineta bicolor)*
Barn Swallow *(Hirundo rustica)*
Mountain Bluebird *(Sialia currucoides)*
Red-eyed Vireo *(Vireo olivaceus)*
Blackpoll Warbler *(Setophaga striata)*
Lazuli Bunting *(Passerina amoena)*
Chipping Sparrow *(Spizella passerina)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Snow Bunting *(Plectrophenax nivalis)*
House Finch *(Haemorhous mexicanus)*
Flammulated Owl *(Psiloscops flammeolus)* SOC
Veery *(Catharus fuscescens)* SOC
American Kestrel *(Falco sparverius)*
White-throated Swift *(Aeronautes saxatalis)*
Willow Flycatcher *(Empidonax traillii)*
Bank Swallow *(Riparia riparia)*
American Crow *(Corvus brachyrhynchos)*
American Pipit *(Anthus rubescens)*
Yellow Warbler *(Setophaga petechia)*
Common Yellowthroat *(Geothlypis trichas)*
American Tree Sparrow *(Spizelloides arborea)*
Song Sparrow *(Melospiza melodia)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Brown-headed Cowbird *(Molothrus ater)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Common Gartersnake *(Thamnophis sirtalis)*
Northern Rubber Boa *(Charina bottae)*

Amphibians

Coeur d'Alene Salamander *(Plethodon idahoensis)* SOC

Invertebrates

Mariposa Copper *(Tharsalea mariposa)*
Common Wood-Nymph *(Cercyonis pegala)*

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28665
System Code	CES306.830, Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4243: Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland

Literature Cited Above Legend: View Online Publication

- Alexander, R.R. and W.D. Shepperd. 1990. Picea engelmannii Parry ex Engelm. Silvics of North America 1:187-203.
- Bebi, P., D. Kulakowski, and T.T. Veblen. 2003. Interactions between fire and spruce beetles in a subalpine Rocky Mountain forest landscape. Ecology 84(2):362-371.
- Dupont, A., L. Bélanger, and J. Bousquet. 1991. Relationships between balsam fir vulnerability to spruce budworm and ecological site conditions of fir stands in central Quebec. Canadian Journal of Forest Research 21(12):1752-1759.
- Jenkins, M.J., E.G. Hebertson, and A.S. Munson. 2014. Spruce beetle biology, ecology and management in the Rocky Mountains: an addendum to spruce beetle in the rockies. Forests 5(1):21-71.
- Kulakowski, D. and T.T. Veblen. 2006. The effect of fires on susceptibility of subalpine forests to a 19th century spruce beetle outbreak in western Colorado. Canadian Journal of Forest Research 36(11):2974-2982.
- Lindemann, J.D. and W.L. Baker. 2001. Attributes of blowdown patches from a severe wind event in the Southern Rocky Mountains, USA. Landscape Ecology 16(4):313-325.
- Reinhardt, E. and L. Holsinger. 2010. Effects of fuel treatments on carbon-disturbance relationships in forests of the northern Rocky Mountains. Forest Ecology and Management 259(8):1427-1435.
- Tesky, J.L. 1992. Tsuga mertensiana. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Rocky Mounatin Subalpine Mixed-Conifer Communities. In: Fire Effects Information System, [Online]. U.S. Department of Agr
- Uchytil, R.J. 1991. Abies lasiocarpa. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

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- Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Rocky Mountain Montane Douglas-fir Forest and Woodland



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General Description

In Montana, this ecological system occurs on the east side of the Continental Divide, north to about the McDonald Pass area, and along the Rocky Mountain Front. This system is associated with a dry to submesic continental climate regime with annual precipitation ranging from 51 to 102 centimeters (20-40 inches), with a maximum in winter or late spring. Winter snowpacks typically melt off in early spring at lower elevations. Elevations range from valley bottoms to 1,980 meters (6500 feet) in northern Montana and up to 2,286 meters (7500 feet) on warm aspects in southern Montana. It occurs on north-facing aspects in most areas, and south-facing aspects at higher elevations. This is a Douglas-fir (*Pseudotsuga menziesii*) dominated system without any maritime floristic composition. Fire disturbance intervals are as infrequent as 500 years, and as a result, individual trees and forests can attain great age on some sites (500 to 1,500 years). In Montana, this system occurs from lower montane to lower subalpine environments and is prevalent on calcareous substrates. Common understory shrubs include common ninebark (*Physocarpus malvaceus*), common juniper (*Juniperus communis*), Rocky Mountain juniper (*Juniperus scopulorum*), birch-leaf spiraea (*Spiraea betulifolia*), snowberry (*Symphoricarpos* species), creeping Oregon grape (*Mahonia repens*) and Canadian buffaloberry (*Shepherdia canadensis*). The Douglas-fir/pinegrass (*Calamogrostis rubescens*) type is the most ubiquitous association found within this system in Montana.

Diagnostic Characteristics

Forest and Woodland, aridic soils, foothill to montane elevations, moderate persistence (100-500 yr) interval

Similar Systems

Similar Systems

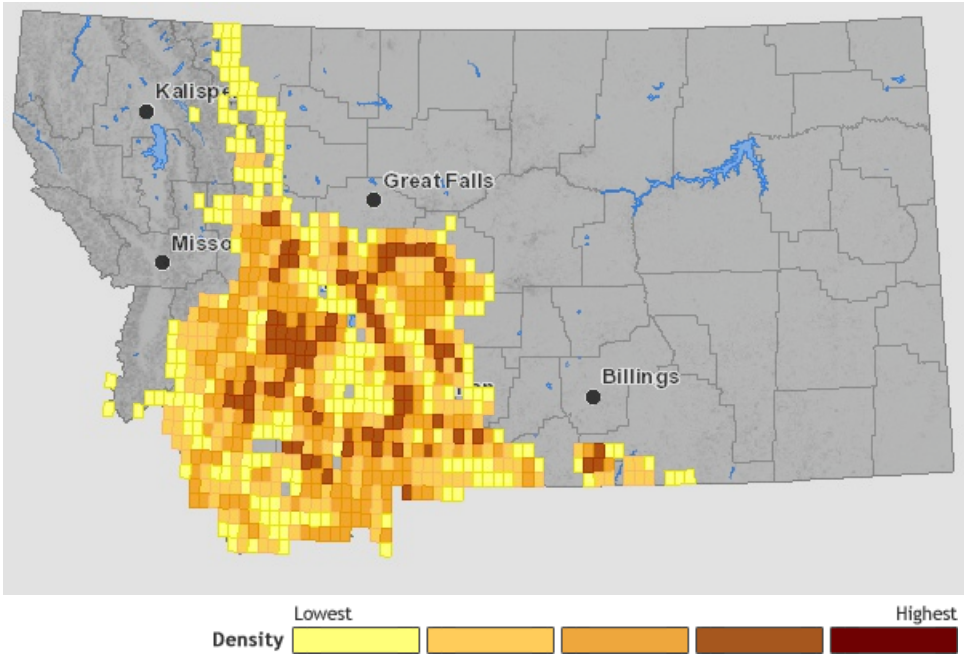
- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland

Range

This system extends north into Montana on the east side of the Continental Divide to McDonald Pass and along the Rocky Mountain Front. It occurs throughout the Beaverhead Mountains.

Ecological System Distribution

Approximately 9,629 square kilometers are classified as Rocky Mountain Montane Douglas-fir Forest and Woodland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Judith Basin, Lewis and Clark, Madison, Meagher, Missoula, Park, Pondera, Powell, Ravalli, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Matrix

Environment

East of the Continental Divide, this ecosystem forms a forest belt on cold, dry to mesic sites in the montane zone. It is found on moderately dry mountain slopes and benches. It generally occurs on gravelly soils with good aeration and drainage and a neutral to slightly acidic pH. This system is subjected to a dry to sub-mesic continental climate. Individual trees and forests can attain great age on some sites (500-1500 years), due to mixed severity fire regimes. It often occurs at the lower treeline immediately above valley grasslands, or sagebrush steppe and shrublands.

Vegetation

This system is dominated by Douglas-fir (*Pseudotsuga menziesii*) forests. Limber pine (*Pinus flexilis*) can co-occuron calcareous substrates, and lodepole pine (*Pinus contorta*) is often frequent in these stands at higher elevations. Engelmann spruce (*Picea engelmannii*) is found in some stands within the upper montane zone, occurring just below or intergrading with whitebark pine (*Pinus albicaulis*) forests. Common understory shrubs include common ninebark (*Physocarpus malvaceus*), common juniper (*Juniperus communis*), Rocky Mountain juniper (*Juniperus scopulorum*) birch-leaf spiraea (*Spiraea betulifolia*), snowberry (*Symphoricarpos* species), creeping Oregon grape (*Mahonia repens*) and Canadian buffaloberry (*Shepherdia canadensis*). Dwarf huckleberry (*Vaccinium caespitosum*) or mountain huckleberry (*Vaccinium membranaceum*) are foundon colder, mesic sites. Common graminoids include pinegrass (*Calamagrostis rubescens*), Ross' sedge (*Carex rossii*), and Geyer's sedge (*Carex geyeri*). Bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*) are often common on sites adjacent to upper elevation montane grasslands. The Douglas-fir/pinegrass (*Camogrostis rubescens*) type is the most ubiquitous association found within this system in Montana. Common forbs within these forests include yarrow (*Achillea millefolium)*, lanceleaf arnica (*Arnica latifolia*), pussytoes (*Antennaria racemosa)*, wild strawberry (*Fragaria virginiana*), twinflower (*Linnaea borealis*), and beargrass (*Xerophyllum tenax*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3395 *Pseudotsuga menziesii - Pinus ponderosa* / Herbaceous Understory Central Rocky Mountain Woodland Alliance
- **CEGL000429** *Pseudotsuga menziesii - Calamagrostis rubescens* Woodland
- **CEGL000900** *Pseudotsuga menziesii - Festuca idahoensis* Woodland
- **CEGL000908** *Pseudotsuga menziesii - Pseudoroegneria spicata* Woodland

A3462 *Pseudotsuga menziesii* Middle Rocky Mountain Dry-Mesic Forest & Woodland Alliance
- **CEGL000439** *Pseudotsuga menziesii - Juniperus communis* Forest
- **CEGL000440** *Pseudotsuga menziesii - Juniperus osteosperma* Forest
- **CEGL000442** *Pseudotsuga menziesii - Mahonia repens* Forest
- **CEGL000457** *Pseudotsuga menziesii - Spiraea betulifolia* Forest
- **CEGL000459** *Pseudotsuga menziesii - Symphoricarpos albus* Forest
- **CEGL000462** *Pseudotsuga menziesii - Symphoricarpos oreophilus* Forest
- **CEGL000903** *Pseudotsuga menziesii - Juniperus scopulorum* Woodland

A3463 *Pseudotsuga menziesii* Middle Rocky Mountain Mesic-Wet Forest Alliance
- **CEGL000441** *Pseudotsuga menziesii - Linnaea borealis* Forest
- **CEGL000447** *Pseudotsuga menziesii - Physocarpus malvaceus* Forest

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Disturbances in this system are primarily caused by fire and insects. Fire return intervals generally range from 20-45 years, although fire-free periods may be longer at more mesic or higher elevation sites (Steinberg, 2002; U.S. Department of Agriculture, 2012). The majority of fires in this system are mixed-severity, although stand replacement and low-severity fires may also occur (U.S. Department of Agriculture, 2012). Douglas-fir regenerates well following fire, with higher regeneration following low-severity burns (Harvey et al., 2013). After about 40 years, trees develop fire-resistant bark that promotes tolerance low to moderate intensity surface fires (Steinberg, 2002). In the absence of disturbance, Douglas-fir will continue to regenerate under shaded conditions, and becomes dominant in undisturbed stands.

Pre-settlement fire regimes may have been characterized by frequent, low intensity ground fires that maintained relatively open stands. Under present conditions, the fire regime is mixed severity and more variable, with stand-replacing fires more common, encouraging forest homogeneity. With vigorous fire suppression, longer fire-return intervals are now common, and multi-layered stands provide fuel "ladders," making these forests more susceptible to high-intensity, stand-replacing fires. In some areas, these forests have been priorities for timber harvesting and grazing. An additional consequence of fire suppression has been the establishment of Douglas-fir in sagebrush steppe and grassland ecosystems in southwestern Montana. Historically, frequent fires confined Douglas-fir growth to particularly rocky or moist microsites. (Arno and Gruell, 1986; Heyerdahl et al., 2006).

Fire additionally interacts with biotic disturbance dynamics in this system. The Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) causes abundant damage, and fire-affected stands tend to be more vulnerable to attack (Negron et al., 1999; Hood and Bentz, 2007; Six and Skov, 2009). A study from southwestern Montana found that large trees with high levels of crown scorch in dense stands were most vulnerable to beetle attack post-fire (Hood and Bentz, 2007). In some cases, post-fire beetle infestations may spread to nearby trees not injured by fire (DeNitto et al., 2000). Post-fire mortality may also occur as the result of Douglas-fir tussock moth (*Orgyia pseudotsugata*), western spruce budworm (*Choristoneura occidentalis*), and wood borers. Trees infected with Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) may be more susceptible to fire due to the accumulation of dense brooms that serve as ladder fuels (Steinberg, 2002).

In recent years, these forests have been subjected to prolonged periods of drought, creating conditions where stands are susceptible to outbreaks of Douglas-fir tussock moth and Douglas-fir bark beetle. The combination of prolonged drought and fire suppression have also contributed to an increase in the intensity and duration of western spruce budworm epidemics, increased Douglas-fir bark beetle populations, and increased dwarf mistletoe infestation (Steinberg, 2002). In addition to the effects of drought, disturbances such as snow breakage and windthrow may increase stand susceptibility to insect attack (Negron et al., 1999).

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system. Low-severity burning decreases fuel loading, probability of stand-replacing fires, and increases available nutrients in the soil (Arno et al., 1995). Prescribed fire may additionally be useful for limiting invasion of Douglas-fir into sagebrush steppe and grassland ecosystems in southwestern Montana (Steinberg, 2002; Heyerdahl et al., 2006). It may be important to consider the consequences of prescribed burning on stand susceptibility to Douglas-fir beetles, as beetles respond quickly to available resource pulses (i.e. fire damaged trees) following fire (Negron et al., 1999; Six and Skov, 2009).

Restoration Considerations

Post-fire Douglas-fir forest restoration strategies will depend largely on the severity of the fire. Because these forests recover well following light to moderate intensity burns, restoration practices are generally not necessary. Recovery may be slow after large-scale stand-replacing fires, as seeds are wind-dispersed and rely on nearby stands to provide a seed source. Severely burned sites on steep slopes will require sediment

retention and erosion control actions before and during restoration. When supplemental seeding or planting is necessitated, Douglas-fir establishment is best on mineral soil or thin organic seedbeds, and survival is greatest at relatively dry sites with partial shading (Steinberg, 2002). Prescribed fire may be an additional valuable restoration strategy in stands with high levels of dwarf mistletoe. High severity burning controls Douglas-fir dwarf mistletoe by eliminating infected trees and promoting regeneration of uninfected individuals (Alexander and Hawksworth, 1976). However, when utilizing prescribed burning as a restoration strategy, the effects of fire on local Douglas-fir beetle populations should be considered.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Grizzly Bear *(Ursus arctos)* SOC	Wolverine *(Gulo gulo)* SOC
Canada Lynx *(Lynx canadensis)* SOC	Uinta Ground Squirrel *(Urocitellus armatus)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC	North American Water Vole *(Microtus richardsoni)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Western Spotted Skunk *(Spilogale gracilis)* PSOC

Masked Shrew *(Sorex cinereus)*
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Least Chipmunk *(Neotamias minimus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Pocket Gopher *(Thomomys talpoides)*
White-footed Deermouse *(Peromyscus leucopus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Montane Vole *(Microtus montanus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Marten *(Martes americana)*
Long-tailed Weasel *(Neogale frenata)*
American Badger *(Taxidea taxus)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*
Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
American Pika *(Ochotona princeps)*
Snowshoe Hare *(Lepus americanus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Flying Squirrel *(Glaucomys sabrinus)*
North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Least Weasel *(Mustela nivalis)*
American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Flammulated Owl *(Psiloscops flammeolus)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Boreal Owl *(Aegolius funereus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Red-tailed Hawk *(Buteo jamaicensis)*
Dusky Grouse *(Dendragapus obscurus)*
Wild Turkey *(Meleagris gallopavo)*
Great Horned Owl *(Bubo virginianus)*
Barred Owl *(Strix varia)*
Common Nighthawk *(Chordeiles minor)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Olive-sided Flycatcher *(Contopus cooperi)*
Dusky Flycatcher *(Empidonax oberholseri)*
Violet-green Swallow *(Tachycineta thalassina)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Red-breasted Nuthatch *(Sitta canadensis)*
Golden-crowned Kinglet *(Regulus satrapa)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Cedar Waxwing *(Bombycilla cedrorum)*
Cassin's Vireo *(Vireo cassinii)*
Western Tanager *(Piranga ludoviciana)*
Indigo Bunting *(Passerina cyanea)*
Chipping Sparrow *(Spizella passerina)*
White-throated Sparrow *(Zonotrichia albicollis)*
Dark-eyed Junco *(Junco hyemalis)*
Purple Finch *(Haemorhous purpureus)*
Pine Siskin *(Spinus pinus)*
American Goshawk *(Accipiter atricapillus)* SOC
Black-backed Woodpecker *(Picoides arcticus)* SOC
Brown Creeper *(Certhia americana)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Cooper's Hawk *(Accipiter cooperii)*
Spruce Grouse *(Canachites canadensis)*
Ruffed Grouse *(Bonasa umbellus)*
Mourning Dove *(Zenaida macroura)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Calliope Hummingbird *(Selasphorus calliope)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Canada Jay *(Perisoreus canadensis)*
Blue Jay *(Cyanocitta cristata)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
White-breasted Nuthatch *(Sitta carolinensis)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Bohemian Waxwing *(Bombycilla garrulus)*
Warbling Vireo *(Vireo gilvus)*
Yellow-rumped Warbler *(Setophaga coronata)*
Lazuli Bunting *(Passerina amoena)*
American Tree Sparrow *(Spizelloides arborea)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Pine Grosbeak *(Pinicola enucleator)*
Red Crossbill *(Loxia curvirostra)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Gophersnake *(Pituophis catenifer)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Freija Fritillary *(Boloria freija)* PSOC

Vascular Plants

Many-flowered Viguiera *(Viguiera multiflora)* SOC
Lesica's Bladderpod *(Physaria lesicii)* SOC
Sandweed *(Athysanus pusillus)* SOC
Greenleaf Manzanita *(Arctostaphylos patula)* SOC

Diamond Clarkia *(Clarkia rhomboidea)* SOC

Alpine Collomia *(Collomia debilis var. camporum)* SOC

Short-styled Columbine *(Aquilegia brevistyla)* SOC

Pink Coil-beaked Lousewort *(Pedicularis contorta var. ctenophora)* SOC

Cary's Beardtongue *(Penstemon caryi)* SOC

Lemhi Beardtongue *(Penstemon lemhiensis)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC

Fisher *(Pekania pennanti)* SOC

Spotted Bat *(Euderma maculatum)* PSOC

Birds

Lewis's Woodpecker *(Melanerpes lewis)* SOC

Pileated Woodpecker *(Dryocopus pileatus)* SOC

Pacific Wren *(Troglodytes pacificus)* SOC

Veery *(Catharus fuscescens)* SOC

Common Poorwill *(Phalaenoptilus nuttallii)* PSOC

Rough-legged Hawk *(Buteo lagopus)*

American Kestrel *(Falco sparverius)*

Prairie Falcon *(Falco mexicanus)*

Rock Pigeon *(Columba livia)*

Long-eared Owl *(Asio otus)*

Vaux's Swift *(Chaetura vauxi)*

White-throated Swift *(Aeronautes saxatalis)*

Black-chinned Hummingbird *(Archilochus alexandri)*

Western Wood-Pewee *(Contopus sordidulus)*

Willow Flycatcher *(Empidonax traillii)*

Western Kingbird *(Tyrannus verticalis)*

Eastern Kingbird *(Tyrannus tyrannus)*

Tree Swallow *(Tachycineta bicolor)*

Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*

Bank Swallow *(Riparia riparia)*

Cliff Swallow *(Petrochelidon pyrrhonota)*

Barn Swallow *(Hirundo rustica)*

Black-billed Magpie *(Pica hudsonia)*

Rock Wren *(Salpinctes obsoletus)*

Northern House Wren *(Troglodytes aedon)*

Orange-crowned Warbler *(Leiothlypis celata)*

Nashville Warbler *(Leiothlypis ruficapilla)*

Yellow Warbler *(Setophaga petechia)*

Townsend's Warbler *(Setophaga townsendi)*

American Redstart *(Setophaga ruticilla)*

MacGillivray's Warbler *(Geothlypis tolmiei)*

Common Yellowthroat *(Geothlypis trichas)*

Wilson's Warbler *(Cardellina pusilla)*

Black-headed Grosbeak *(Pheucticus melanocephalus)*

Spotted Towhee *(Pipilo maculatus)*

Vesper Sparrow *(Pooecetes gramineus)*

Lark Sparrow *(Chondestes grammacus)*

Fox Sparrow *(Passerella iliaca)*

Song Sparrow *(Melospiza melodia)*

Harris's Sparrow *(Zonotrichia querula)*

Snow Bunting *(Plectrophenax nivalis)*

Western Meadowlark *(Sturnella neglecta)*

Brewer's Blackbird *(Euphagus cyanocephalus)*

Common Grackle *(Quiscalus quiscula)*

Brown-headed Cowbird *(Molothrus ater)*

Bullock's Oriole *(Icterus bullockii)*

House Finch *(Haemorhous mexicanus)*

American Goldfinch *(Spinus tristis)*

Reptiles

Common Gartersnake *(Thamnophis sirtalis)*

Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*

Boreal Chorus Frog *(Pseudacris maculata)*

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC

Original Concept Authors

M.S. Reid

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.959, Middle Rocky Mountain Montane Douglas-Fir Forest and Woodland

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4266: Middle Rocky Mountain Montane Douglas-Fir Forest and Woodland

Literature Cited Above Legend: View Online Publication

- Alexander, M.E. and F.G. Hawksworth. 1976. Fire and dwarf mistletoes in North American coniferous forests. Journal of Forestry 74(7):446-449.
- Amo, S.F., M.G. Harrington, C.E. Fiedler, and C.E. Carlson. 1995. Restoring fire-dependent ponderosa pine forests in western Montana. Restoration and Management Notes 13:32-36.
- Arno, S.F. and G.E. Guell. 1986. Douglas-fir encroachment into mountain grasslands in southwestern Montana. J. Range Management 39(3):272-276.
- DeNitto, G., B. Cramer, K. Gibson, B. Lockman, T. McConnell, L. Stipe, and J. Taylor. 2000. Survivability and deterioration of fire-injured trees in the northern rocky mountains: a review of the literature. The Bark Beetles, Fuels, and Fire Bibliography 1.
- Harvey, B.J., D.C. Donato, W.H. Romme, and M.G. Turner. 2013. Influence of recent bark beetle outbreak on fire severity and postfire tree regeneration in montane Douglas-fir forests. Ecology 94(11): 2475-2486.
- Heyerdahl, E.K., R.F. Miller, and R.A. Parsons. 2006. History of fire and Douglas-fir establishment in a savanna and sagebrush–grassland mosaic, southwestern Montana, USA. Forest Ecology and Management 230(1):107-118.
- Hood, S. and B. Bentz. 2007. Predicting postfire Douglas-fir beetle attacks and tree mortality in the northern Rocky Mountains. Canadian Journal of Forest Research 37(6):1058-1069.
- Negron, J.F., W.C. Schaupp, K.E. Gibson, J. Anhold, D. Hansen, R. Their, and P. Mocettini. 1999. Estimating extent of mortality associated with the Douglas-fir beetle in the central and northern Rockies. Western Journal of Applied Forestry 14(3):121-127.
- Six, D.L. and K. Skov. 2009. Response of bark beetles and their natural enemies to fire and fire surrogate treatments in mixed-conifer forests in western Montana. Forest Ecology and Management 258(5):761-772.
- Steinberg, P. D. 2002. Pseudotsuga menziesii var. glauca. In: Fire Effects Information System, [Online}. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Rocky Mounatin Douglas-Fir Communities. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Fo

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- Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Rocky Mountain Montane Douglas-fir Forest and Woodland — Middle Rocky Mountain Montane Douglas-Fir Forest and Woodland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=4266

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Rocky Mountain Poor Site Lodgepole Pine Forest



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General Description

This ecological system is widespread but patchy in distribution in upper montane to subalpine zones of the Montana Rocky Mountains, and east into mountain island ranges of central Montana. These are upper montane to subalpine forests where the dominance of lodgepole pine (*Pinus contorta*)is related to fire history, topo-edaphic conditions and nutrient-poor soils. Presence of this system is determined more by substrate than by other factors. The most notable occurrence of this system is in the West Yellowstone Basin and surrounding Yellowstone Highlands, such as the Madison Plateau. In this region of Montana, cold-air ponding and coarse, rhyolitic outwash obsidian sands are the major factors contributing to the extensive development of this system in southwestern Montana. Fire is infrequent in this system, averaging every 150-400 years in subalpine forests. Following stand-replacing fires, lodgepole pine will colonize rapidly on sites that are too extreme for the establishment of other coniferous species, developing into dense, persistent, even-aged stands. Mature stands are primarily open, and develop past their initial even-aged structure to become a multi-aged structure. These stands last for longer intervals between disturbances than do conventional lodgepole pine-dominated stands.

Diagnostic Characteristics

Forest and woodland, acidic, very shallow ustic soils, organic A horizon less than 10 cm, *Pinus contorta*

Similar Systems

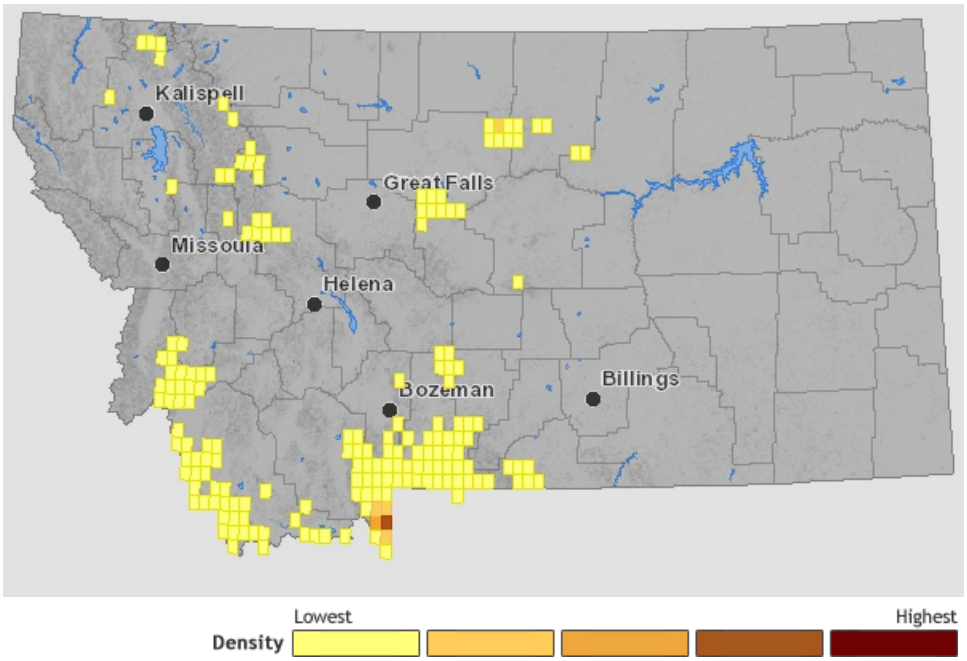
- Rocky Mountain Lodgepole Pine Forest

Range

This system occurs in parts of the upper montane and subalpine elevations throughout the Montana Rocky Mountains. Elevation ranges from 975 to 2,743 meters (3,200-9,000 feet). Presence of this system is determined more by substrate than by other factors. In north-central Montana, it can be found on appropriate habitats with intrusive volcanics and very nutrient-poor soils within the Little Rocky Mountains near Zortman and the Big Snowy and Highwood island mountain ranges. The most extensive Montana expression of this system is the West Yellowstone Basin and the surrounding Yellowstone Highlands, such as the Madison Plateau. In this region of Montana, cold-air ponding and coarse, rhyolitic outwash obsidian sands are the major factors contributing to its extensive development.

Ecological System Distribution

Approximately 93 square kilometers are classified as Rocky Mountain Poor Site Lodgepole Pine Forest in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Blaine, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Granite, Hill, Judith Basin, Lewis and Clark, Madison, Meagher, Missoula, Park, Phillips, Pondera, Powell, Ravalli, Sweet Grass, Teton

Spatial Pattern

Large patch

Environment

This system generally occurs on dry to intermediate sites with a wide seasonal temperature range and long precipitation-free periods in summer. Snowfall is heavy and supplies the major source of soil water used for growth in early summer. The nutrient-poor soils include excessively well-drained pumice deposits; glacial till and alluvium on valley floors where there is cold air accumulation; warm and droughty shallow soils over fractured quartzite bedrock; and shallow moisture-deficient soils with a significant component of volcanic ash. Soils supporting these forests are typically well-drained, gravelly, coarse-textured, acidic, and rarely formed from calcareous parent materials.

Vegetation

These forests are dominated by lodgepole pine (*Pinus contorta*) withsparse undergrowth. At the closed canopy stage of stand development, undergrowth may be totally lacking. Some open stands with very sparse understories can experience a form of mixed-severity burning along downed logs when there are insufficient fuels between logs to carry fire. Depending on the arrangement and loading of logs to living trees, either mortality or fire-scarring may occur.

The shrub layer may be conspicuous to absent. Common species include bearberry (*Arctostaphylos uva-ursi*), snowbrush ceanothus (*Ceanothus velutinus*), twinflower (*Linnaea borealis*), creeping Oregon grape (*Mahonia repens*), antelope bitterbrush(*Purshia tridentata*), birch leaf spiraea (*Spiraea betulifolia),* Canadian buffaloberry (*Shepherdia canadensis*), dwarf huckleberry (*Vaccinium caespitosum*), grouse whortleberry (*Vaccinium scoparium*), snowberry (*Symphoricarpos species*) and currant (*Ribes*species).

Herbaceous layers are generally sparse, but can be moderately dense, and are typically dominated by perennial graminoids such as Columbia needlegrass (*Achnatherum nelsonii*), pinegrass (*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), Ross' sedge (*Carex rossii*), bottlebrush squirrel tail (*Elymus elymoides*), California oatgrass (*Danthonia californica*), blue wildrye (*Elymus glaucus*), and Idaho fescue (*Festuca idahoensis*). Common forbs include yarrow (*Achillea millefolium*), arnica (*Arnica spp.*), silky lupine (*Lupinus sericeus*), phlox (*Phlox spp*.), buckwheat (*Eriogonum spp.),* and beargrass (*Xerophyllum tenax*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3207 *Artemisia tridentata ssp. spiciformis - Artemisia tridentata ssp. Vaseyana* Steppe & Shrubland Alliance
A3366 *Pinus contorta* Rocky Mountain Forest Alliance
- **CEGL000134** *Pinus contorta - Arctostaphylos uva-ursi* Forest
- **CEGL000139** *Pinus contorta - Calamagrostis rubescens* Forest
- **CEGL000141** *Pinus contorta - Carex geyeri* Forest
- **CEGL000144** *Pinus contorta - Carex rossii* Forest
- **CEGL000172** *Pinus contorta - Vaccinium scoparium* Forest

A4079 *Pinus contorta* Rocky Mountain Woodland Alliance
- **CEGL000764** *Pinus contorta - Juniperus communis* Woodland
- **CEGL000765** *Pinus contorta - Purshia tridentata* Woodland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Establishment of lodgepole pine in this system is episodic and linked to stand-replacing fire. Lodgepole pine forests with very sparse understories experience longer fire return intervals ranging from 120 to over 300 years in comparison to stands with more productive understories (U.S. Department of Agriculture, 2012). This ecosystem also experiences a greater percentage of fires of mixed severity, with fewer stand-replacing fires than more productive lodgepole forests (USDA, 2012). Longer fire return intervals and decreased fire severity is largely attributable to the absence of significant ladder fuels in this system (Anderson, 2003). Fuel loading in this system is primarily a result of downed woody debris from past disturbances (e.g. mountain pine beetle, windfall), and sparse understory is not effective at sustaining high-intensity fires (Agee, 1996; Smith and Fischer, 1997). Fire severity is therefore only great as a result of long-term fuel accumulation, or severe climate conditions (Agee, 1996; Smith and Fischer, 1997).

Biotic disturbance agents also influence stand susceptibility to fire, and in general, vulnerability to biotic vectors increases with stand age and density. Lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) increases host susceptibility to fire by altering fuel dynamics and increasing crown fire potential, and intensifies host vulnerability to insect attack (Hawksworth et al., 2002). Rocky Mountain lodgepole pine stands have historically experienced chronic infestations of mountain pine beetles (*Dendroctonus ponderosae*). Mountain pine beetles preferentially attack large individuals with greater nutritional resources, although elevated temperatures and increasing drought severity additionally combine to favor beetle population growth and weaken lodgepole pine defense mechanisms, increasing incidence of large-scale outbreaks (Raffa et al., 2008).

Dense, even-aged stands resulting from stand-replacing fires are increasingly susceptible to windthrow and snow damage as they mature (Smith and Fischer, 1997). Individual trees that have matured in dense stands obtain a degree of protection from neighboring trees, such that the development of deep roots and other physical mechanisms to withstand wind exposure are unnecessary. Additionally, the shallow soils typical of this system contribute to the development of shallow rooting systems. As a result, increased wind exposure resulting from natural or mechanical thinning amplifies susceptibility to windfall (Anderson, 2003).

Trees with closed, serotinous cones appear to be strongly favored by stand-replacing fire, and allow rapid colonization of fire-cleared substrates (Burns and Honkala, 1990). These forests often exhibit a multi-aged population structure, with non-fire regeneration, and often exhibit a higher proportion of trees bearing non-serotinous cones. Additionally, the mixed-severity fires and generally longer fire return intervals characteristic of this system favor regeneration from non-serotinous cones (Anderson, 2003; Schoenagel et al., 2003). If serotiny is expressed in these stands, cone polymorphism exists and allows regeneration after non-fire disturbance.

Management

Effects of fire, fire suppression, fuel accumulation, stand development, insects, and disease in these forests interact to control the establishment and maintenance of stands. In the absence of natural fire, periodic prescribed late season burns can be used to maintain this system and increase productivity by opening the stand and encouraging regeneration (Smith and Fischer, 1997). Periodic burning is particularly important to avoid stagnation or succession by shade-tolerant species in even-aged mature stands exhibiting serotinous cones. Low-severity prescribed burning may be limited by a lack of surface fuels and should be administered in late fall when fine fuels have dried (Anderson, 2003).

Restoration Considerations

Restoration strategies will depend largely on management goals. In stands where fire exclusion has occurred, restoration of historic fire regimes can decrease stand susceptibility to future mountain pine beetle attack,

and prescribed burning can be used to control dwarf mistletoe if infected individuals are eliminated (Anderson, 2003; Hawksworth et al., 2002). Under favorable moisture conditions, seeds released from serotinous cones during fire germinate on exposed mineral soil and disturbed duff the following spring. Fire creates a favorable seedbed by removing loose organic matter and exposing mineral soil or decomposed organic matter, which encourages germination. Thus, in light or moderately severe fires, additional restoration practices are not required. Natural regeneration may, however, be marginal when stand-replacing fires are followed by years of severe drought (Stephens et al., 2013), and may require supplemental restoration efforts. In scenarios that necessitate supplementary planting, germination rates for seeds from serotinous cones may be enhanced by short exposure to flame (Anderson, 2003).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Fisher *(Pekania pennanti)* SOC	Wolverine *(Gulo gulo)* SOC
Canada Lynx *(Lynx canadensis)* SOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*	American Pika *(Ochotona princeps)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Snowshoe Hare *(Lepus americanus)*

Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Flying Squirrel *(Glaucomys sabrinus)*
North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Western Heather Vole *(Phenacomys intermedius)*
Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*
Raccoon *(Procyon lotor)*
Marten *(Martes americana)*
Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*
Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*
Bighorn Sheep *(Ovis canadensis)*

Birds

Clark's Nutcracker *(Nucifraga columbiana)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Cooper's Hawk *(Accipiter cooperii)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*
Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Common Nighthawk *(Chordeiles minor)*
Calliope Hummingbird *(Selasphorus calliope)*
Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Hammond's Flycatcher *(Empidonax hammondii)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Flycatcher *(Empidonax difficilis)*
Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*
Black-capped Chickadee *(Poecile atricapillus)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
White-breasted Nuthatch *(Sitta carolinensis)*
Golden-crowned Kinglet *(Regulus satrapa)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*
Bohemian Waxwing *(Bombycilla garrulus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow-rumped Warbler *(Setophaga coronata)*
Western Tanager *(Piranga ludoviciana)*
American Tree Sparrow *(Spizelloides arborea)*
Chipping Sparrow *(Spizella passerina)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Pine Grosbeak *(Pinicola enucleator)*
Red Crossbill *(Loxia curvirostra)*
Pine Siskin *(Spinus pinus)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC

Invertebrates

Gray Comma *(Polygonia progne)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*
Least Chipmunk *(Neotamias minimus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Rough-legged Hawk *(Buteo lagopus)*
Long-eared Owl *(Asio otus)*
White-throated Swift *(Aeronautes saxatalis)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Tree Swallow *(Tachycineta bicolor)*
Warbling Vireo *(Vireo gilvus)*
Fox Sparrow *(Passerella iliaca)*
Song Sparrow *(Melospiza melodia)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Boreal Chorus Frog *(Pseudacris maculata)*

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Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.960, Rocky Mountain Poor Site Lodgepole Pine Forest

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4267: Rocky Mountain Poor Site Lodgepole Pine Forest

Literature Cited Above Legend: View Online Publication

- Agee, J.A. 1993. Fire ecology of Pacific Northwest forests. Washington, D.C.: Island Press. 493 p.
- Anderson, M.D. 2003. Pinus contorta var. latifolia. In: Fire Effects Information System, [Online}. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).
- Cochran, P.H. 1985. Soils and productivity of lodgepole pine. Pp. 89-93 In: Baumgartner, D.M., R.G. Krebill, J.T. Arnott, and G.F. Weetman, compilers and editors. Lodgepole pine: The species and its management: Symposium proceedings, May 8-10. Spokane, WA: Washington State University, Cooperative Extension.
- Hawksworth, F.G., D. Wiens, and B.W. Geils. 2002. Arceuthobium in North America. Mistletoes of North American conifers 29-56.
- Raffa, K.F., B.H. Aukema, B.J. Bentz, A.L. Carroll, J.A. Hicke, M.G. Turner, and W.H. Romme. 2008. Cross-scale drivers of natural disturbances prone to anthropogenic amplification: the dynamics of bark beetle eruptions. Bioscience 58(6): 501-517.
- Schoennagel, T., M. G. Turner, and W. H. Romme. 2003. The influence of fire interval and serotiny on postfire lodgepole pine density in Yellowstone National Park. Ecology 84:2967-2978.
- Smith, J. K. and W. C. Fischer. 1997. Fire ecology of the forest habitat types of northern Idaho. Gen. Tech. Rep. INT-GTR-363. USDA Forest Service, Ogden, UT.
- Stephens, S.L., J.K. Agee, P.Z. Fulé, M.P. North, W.H. Romme, T.W. Swetnam, and M.G. Turner. 2013. Managing forests and fire in changing climates. Science 342(6154):41-42.
- U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Rocky Mountain Lodgepole Pine Communities. In: Fire Effects Information System. Missoula, MT: USDA Forest Service, Rocky

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Burns, R. M., and B. H. Honkala, technical coordinators. 1990a. Silvics of North America: Volume 1. Conifers. USDA Forest Service. Agriculture Handbook 654. Washington, DC. 675 pp.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Citation for data on this website:
Rocky Mountain Poor Site Lodgepole Pine Forest. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=4267

Great Plains Ponderosa Pine Woodland and Savanna



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Provisional State Rank: S4
(see reason below)

External Links

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State Rank Reason

The system is at risk from insects and fire, but somewhat less so than its counterpart in the western part of the state.

General Description

These ponderosa pine (*Pinus ponderosa*) occurrences differ from the Rocky Mountain Ponderosa Pine Woodland and Savanna systems in that they are typically found within the matrix of the Great Plains grassland systems east of the Continental Divide on sites that are relatively dry and nutrient-poor (Howard, 2003). They are often surrounded by mixed-grass prairie, in places where available soil moisture is comparatively higher or soils are more coarse and rocky. Soils in this system are typically derived from both igneous and sedimentary parent materials including volcanic cinder, basalt, sandstone, and limestone (Howard, 2003). This system occurs at elevations that range from 1,189 meters (3,900 feet) in southeastern Montana to 1,646 m (5,400 feet) in north-central Montana. At the upper elevational portion of its range in central Montana, this system merges with Rocky Mountain Foothill Limber Pine-Juniper Woodlands, while in southeastern Montana, ponderosa pine is the only forest tree species (Howard, 2003; Arno, 1979). Occurrences are usually on east- and north-facing aspects.

Common overstory associates of this system include Douglas-fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*), and Rocky Mountain juniper (*Juniperus scopulorum*). Understories are commonly comprised of shrubs such as western snowberry (*Symphoricarpos occidentalis*) and skunkbush sumac (*Rhus trilobata*), and grassland species such as blue grama (*Bouteloua gracilis*), side-oats grama (*B. curtipendula*), and prairie Junegrass (*Koeleria macrantha*) (Howard, 2003; Arno, 1979). These woodlands can be physiognomically variable, ranging from very sparse patches of trees on drier sites, to nearly closed-canopy forest stands on north slopes or in draws where available soil moisture is higher. On sites

with greater available soil moisture understories may be dense and support species commonly associated with ponderosa pine woodlands west of the Continental Divide. Fire suppression of the past century, increasingly severe drought and insect outbreaks have altered the natural processes of this system.

Diagnostic Characteristics

Ridge-summit-upper slope, aridic-sand soil texture, organic A horizon less than 10 cm, *Pinus ponderosa* with graminoid understory, *Pinus ponderosa* with shrub understory

Similar Systems

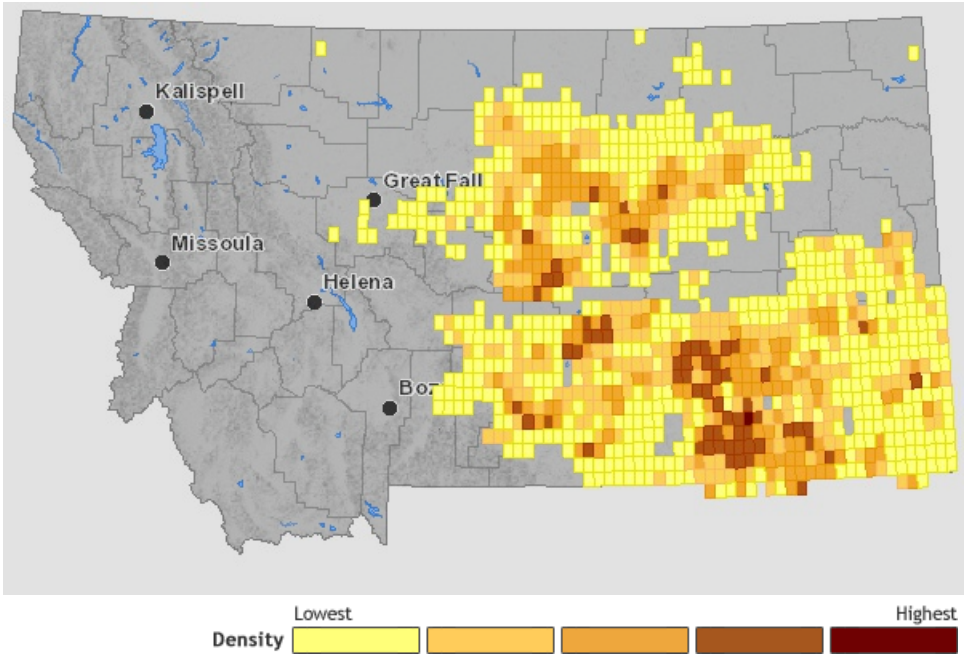
- Rocky Mountain Foothill Woodland-Steppe Transition
- Rocky Mountain Ponderosa Pine Woodland and Savanna

Range

This system is found in northern, central and eastern Montana. It occurs along the Missouri River breaks, around the Little Belts and Snowy Mountains, in south-central Montana between the Bighorns and the Black Hills (along the Tongue and Powder Rivers), and in other areas of eastern Montana. In extreme south-eastern Montana into north-eastern Wyoming, it potentially occurs in the foothills of the Bear Lodge Mountains. In north-central Montana, it occurs in the Bear Paw mountains.

Ecological System Distribution

Approximately 8,214 square kilometers are classified as Great Plains Ponderosa Pine Woodland and Savanna in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Fallon, Fergus, Garfield, Golden Valley, Hill, Judith Basin, Mccone, Meagher, Musselshell, Park, Petroleum, Phillips, Powder River, Prairie, Rosebud, Sheridan, Stillwater, Sweet Grass, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Large patch

Environment

This system occurs primarily on gentle to steep slopes along escarpments, buttes, canyons, rock outcrops, or ravines and can grade into one of the Great Plains canyon systems or the surrounding prairie system. Elevation ranges from 1,189 meters (3,900 feet) in southeastern Montana to 1,646 meters (5,400 feet) in north-central Montana. In the eastern Little Belts and Snowy Mountains, these woodlands can occur on the upper slopes. Soils typically range from well-drained loamy sands to sandy loams formed in colluvium, weathered sandstone, limestone, scoria, or eolian sand. The understory may be shrub or graminoid dominated, depending on aspect or site.

Vegetation

Along the Missouri Breaks in north-central Montana, woodlands dominated by Douglas-fir (*Pseudotsuga menziesii*) are found in the same ecological settings as ponderosa pine, and so are included in this system. In the breaks where it occurs, Douglas-firhas a very open canopy over graminoid undergrowth, predominantly composed of bluebunch wheatgrass (*Pseudoroegneria spicata*), with few to no shrubs present. In most of the Missouri Breaks, however, ponderosa pine dominates and Rocky Mountain juniper (*Juniperus scopulorum*) is a common associate. Shrubs associated with ponderosa pine dominated forests include bearberry (*Arctostaphylos uva-ursi*), creeping Oregon grape (*Mahonia repens*), soapweed yucca (*Yucca glauca*), snowberry (*Symphoricarpos* species), chokecherry (*Prunus virginiana*), common juniper (*Juniperus communis*), horizontal juniper (*Juniperus horizontalis*), serviceberry (*Amelanchier alnifolia*), skunkbush sumac (*Rhus trilobata*) and ninebark (*Physocarpus* species). The herbaceous understory can range from a sparse to a dense layer of species typical of the surrounding prairie system. Mixed-grass species are usually common, such as big bluestem (*Andropogon gerardii*), sideoats grama (*Bouteloua curtipendula*), sun sedge (*Carex inops ssp.heliophila*), threadleaf sedge (*Carex filifolia*), poverty oatgrass (*Danthonia intermedia*), prairie junegrass (*Koeleria macrantha*), green needlegrass (*Nassella viridula*), roughleaf ricegrass (*Oryzopsis asperifolia*), and western wheatgrass (*Pascopyrum smithii*). Common herbaceous forbs include yarrow (*Achillea millefolium*), pussytoes (*Antennaria* species), boreal sagewort (*Artemisia frigida*), arrowleaf balsamroot (*Balsamorhiza sagittata*), Indian blanket flower (*Gaillarida aristata*), silky lupine (*Lupinus argenteus*), crazyweed (*Oxytropis* species), alpine sweetvetch (*Hedysarum alpinum*), penstemon (*Penstemon* species), prairie cinquefoil (*Potentilla gracilis*), goldenrod (*Solidago* species) and smooth aster (*Symphyotrichum laeve*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3398 *Pinus ponderosa* Southern Rocky Mountain Forest & Woodland Alliance
- **CEGL000849** *Pinus ponderosa - Carex inops ssp. heliophila* Woodland

A3464 *Pinus ponderosa* Dry-Mesic Black Hills Forest & Woodland Alliance
- **CEGL000860** *Pinus ponderosa - Juniperus horizontalis* Woodland

A3465 *Pinus ponderosa* Mesic Black Hills Forest Alliance
- **CEGL000192** *Pinus ponderosa - Prunus virginiana* Forest
- **CEGL000204** *Pinus ponderosa - Symphoricarpos occidentalis* Forest

A3466 *Pinus ponderosa* Northwest Great Plains Open Woodland Alliance
- **CEGL000201** *Pinus ponderosa - Schizachyrium scoparium* Open Woodland
- **CEGL000873** *Pinus ponderosa - Quercus macrocarpa* Open Woodland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Frequent low-intensity surface fires are common within this system due to generally sparse understories and the accumulation of litter at the base of mature trees (Graham and Jain, 2005; Pfister et al., 1977). Fire return intervals average approximately 15 years, although infrequent mixed- to high-severity fires may also occur at longer time scales (U.S. Department of Agriculture, 2012). More mesic sites, as well as higher elevation stands are typically more dense and experience infrequent higher severity fires (every 100-200 years). The thick, insulating bark and deep rooting habit characteristic of ponderosa pines allows individuals to withstand low-severity fires, although younger trees with thinner bark may be more vulnerable (Graham and Jain, 2005). Individuals in low density stands have a better likelihood of surviving surface fires than trees in higher density stands (Howard, 2003).

Comparatively fewer insects attack ponderosa pines in this system than those occurring west of the Continental Divide (Howard, 2003), although the mountain pine beetle (*Dendroctonus ponderosae*) is the most damaging insect to ponderosa pine throughout Montana. Mountain pine beetles generally occur at endemic levels and target trees with weakened defenses due to drought, lightning strikes, pathogen infections, and old age (Graham and Jain, 2005). Outbreaks may reach epidemic levels when stands are characterized by high densities of large, stressed trees, a common attribute of stands in which low-intensity fires have been suppressed (Negron et al., 2008; Howard, 2003).

Grazing by domestic livestock may reduce associated grasses, and in cases of extreme overgrazing, cheatgrass (*Bromus tectorum*) may become established. Frequent low-intensity surface fires promote grass production (Howard, 2003), but may also encourage invasion by non-native species (Symstad et al., 2014). Wind, ice, and snow also cause infrequent disturbance resulting in the formation of canopy openings where regeneration can occur, creating multi-aged stands (Graham and Jain, 2005). In the absence of canopy-opening disturbance events, seedling establishment is discontinued approximately 70 years after a stand-replacing event (Lundquist and Negron, 2000).

Management

In the absence of natural fire, periodic prescribed burns, selective thinning, and reduction of ladder and basal fuels to prevent crown fires can be used to maintain and restore this system to similar pre-settlement conditions. Thinning understory trees and manually removing ladder fuels and heavy fuels from the base of large trees may be necessary in order to prevent old growth mortality during prescribed burning (Kolb et al., 2007). An additional benefit of thinning is to reduce the probability of insect and disease outbreaks, as these are more common in high density stands (Graham and Jain, 2005). When insect outbreaks are active, a combination of control actions including thinning, removal of infested trees, and application of targeted insecticides can be used, although control efforts are best utilized at smaller scales and

for high-value stands (Howard, 2003).

Periodic burning is used to expose mineral soils, increase nutrient availability, reduce competition, stimulate native grass and forb production, increase basal diameter growth of overstory ponderosa pine, and provide favorable seedbeds. In some cases, especially on sites heavily infested with cheatgrass, frequent prescribed burning at low intensities may stimulate greater cheatgrass cover following the fire, especially if the burn did not eliminate the seed bank. Controlling invasive species like cheatgrass prior to prescribed burning may help to reduce post-burn outbreaks (Symstad et al., 2014), and increasing the time between prescribed fires may inhibit cheatgrass by increasing surface fuels (both herbaceous and litter), which directly inhibits cheatgrass establishment (Keeley and McGinnis, 2007). Minimizing the extent of high severity burning by pre-fire thinning, or by applying prescribed burns in cooler, wetter conditions may also reduce the probability of post-burn outbreaks as higher burn intensity may correspond to greater probability of invasion by non-native species (Symstad et al., 2014).

Excessive grazing can result in the loss of the most common perennial grasses and lead to an abundance of exotic grasses in this system. Cheatgrass establishment in low-elevation ponderosa pine forests is enhanced by disturbance that opens the understory, removes litter, or both. (Mack and Pyke 1983). Fall germination and rapid elongation of roots provides cheatgrass with a competitive advantage over native perennial species (Harris 1967). Prolific seed production also contributes to the competitive advantage of this grass over native grasses and associated perennial forbs.

Restoration Considerations

Restoration strategies for this system will depend on fire severity or grazing impacts. Fire generally creates favorable conditions for ponderosa pine regeneration as surface fires remove litter and duff that inhibit seedling establishment and reduce competition with understory species (Howard, 2003). Because lightly burned areas recover quite quickly from fire, reseeding is usually not necessary, especially if an intact native herbaceous understory was present before the fire. However, to offset invasion of exotics such as cheatgrass, re-seeding with competitive native grasses may be desirable after low-intensity or prescribed surface fires. Intense fires that occur during summer months cause considerable damage to native perennial grasses. Ponderosa pine seeds are typically only viable in the seed bank for the year after dispersal (Howard, 2003). Therefore, in cases where severe, stand replacing fires occur, reseeding or replanting efforts may be necessary. Severe mountain pine beetle outbreaks may also necessitate restoration efforts as ponderosa pine does not establish well on unburned soils (Graham and Jain, 2005). In order to slow the rapid loss of the oldest age classes of ponderosa pine in this system, mechanical thinning and the restoration of historic fire return intervals to restore nutrient cycling, and reduce the probability of beetle attack and stand replacing fires is necessary.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological

system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Hispid Pocket Mouse *(Chaetodipus hispidus)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Eastern Cottontail *(Sylvilagus floridanus)*
Desert Cottontail *(Sylvilagus audubonii)*
Least Chipmunk *(Neotamias minimus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Red Squirrel *(Tamiasciurus hudsonicus)*
Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Western Harvest Mouse *(Reithrodontomys megalotis)*
White-footed Deermouse *(Peromyscus leucopus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*
Prairie Vole *(Microtus ochrogaster)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Least Weasel *(Mustela nivalis)*
American Badger *(Taxidea taxus)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*
Merriam's Shrew *(Sorex merriami)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC
Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
Masked Shrew *(Sorex cinereus)*
Northern Montane Shrew *(Sorex obscurus)*
Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*
White-tailed Jackrabbit *(Lepus townsendii)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Northern Pocket Gopher *(Thomomys talpoides)*
Ord's Kangaroo Rat *(Dipodomys ordii)*
North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Sagebrush Vole *(Lemmiscus curtatus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Pronghorn *(Antilocapra americana)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC
Black-backed Woodpecker *(Picoides arcticus)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Eastern Bluebird *(Sialia sialis)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Gyrfalcon *(Falco rusticolus)*
Dusky Grouse *(Dendragapus obscurus)*
Wild Turkey *(Meleagris gallopavo)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Downy Woodpecker *(Dryobates pubescens)*
Golden Eagle *(Aquila chrysaetos)* SOC
Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC
Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Eastern Screech-Owl *(Megascops asio)* PSOC
Chimney Swift *(Chaetura pelagica)* PSOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Turkey Vulture *(Cathartes aura)*
Cooper's Hawk *(Accipiter cooperii)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*
Ruffed Grouse *(Bonasa umbellus)*
Upland Sandpiper *(Bartramia longicauda)*
American Barn Owl *(Tyto furcata)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*

Northern Flicker *(Colaptes auratus)*
Least Flycatcher *(Empidonax minimus)*
Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Barn Swallow *(Hirundo rustica)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
White-breasted Nuthatch *(Sitta carolinensis)*
Rock Wren *(Salpinctes obsoletus)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Townsend's Solitaire *(Myadestes townsendi)*
American Robin *(Turdus migratorius)*
Brown Thrasher *(Toxostoma rufum)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Blackpoll Warbler *(Setophaga striata)*
Western Tanager *(Piranga ludoviciana)*
Blue Grosbeak *(Passerina caerulea)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Field Sparrow *(Spizella pusilla)*
White-throated Sparrow *(Zonotrichia albicollis)*
Lapland Longspur *(Calcarius lapponicus)*
Common Grackle *(Quiscalus quiscula)*
Orchard Oriole *(Icterus spurius)*
Purple Finch *(Haemorhous purpureus)*
Pine Siskin *(Spinus pinus)*
Redpoll *(Acanthis flammea)*
Western Wood-Pewee *(Contopus sordidulus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Kingbird *(Tyrannus verticalis)*
Violet-green Swallow *(Tachycineta thalassina)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Northern House Wren *(Troglodytes aedon)*
Mountain Bluebird *(Sialia currucoides)*
Hermit Thrush *(Catharus guttatus)*
Northern Mockingbird *(Mimus polyglottos)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Yellow-rumped Warbler *(Setophaga coronata)*
Yellow-breasted Chat *(Icteria virens)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Lark Sparrow *(Chondestes grammacus)*
Dark-eyed Junco *(Junco hyemalis)*
Snow Bunting *(Plectrophenax nivalis)*
Brown-headed Cowbird *(Molothrus ater)*
Bullock's Oriole *(Icterus bullockii)*
Red Crossbill *(Loxia curvirostra)*
American Goldfinch *(Spinus tristis)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Northern Rubber Boa *(Charina bottae)*
Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*
North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Pale Swallowtail *(Pterourus eurymedon)*
Common Wood-Nymph *(Cercyonis pegala)*

Vascular Plants

Nuttall Desert-parsley *(Lomatium nuttallii)* SOC
Prairie Goldenrod *(Solidago ptarmicoides)* SOC
Scribner's Panic Grass *(Dichanthelium oligosanthes var. scribnerianum)* SOC
Plains Phlox *(Phlox andicola)* PSOC
Ovalleaf Milkweed *(Asclepias ovalifolia)* SOC
Hollyleaf Clover *(Trifolium gymnocarpon)* SOC
Little Indian Breadroot *(Pediomelum hypogaeum var. hypogaeum)* PSOC

Native Species Occasionally Associated with this Ecological System

Mammals

Pallid Bat *(Antrozous pallidus)* SOC
Black-footed Ferret *(Mustela nigripes)* SOC
California Myotis *(Myotis californicus)*
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Western Water Shrew *(Sorex navigator)*
Southern Red-backed Vole *(Clethrionomys gapperi)*

Birds

Yellow-billed Cuckoo *(Coccyzus americanus)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Swainson's Hawk *(Buteo swainsoni)*
Killdeer *(Charadrius vociferus)*
Snowy Owl *(Bubo scandiacus)*
Hammond's Flycatcher *(Empidonax hammondii)*
Horned Lark *(Eremophila alpestris)*
Bank Swallow *(Riparia riparia)*
Warbling Vireo *(Vireo gilvus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Common Yellowthroat *(Geothlypis trichas)*
Vesper Sparrow *(Pooecetes gramineus)*
Song Sparrow *(Melospiza melodia)*
Western Meadowlark *(Sturnella neglecta)*
Baltimore Oriole *(Icterus galbula)*
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Northern Harrier *(Circus hudsonius)*
Peregrine Falcon *(Falco peregrinus)*
Rock Pigeon *(Columba livia)*
White-throated Swift *(Aeronautes saxatalis)*
Western Flycatcher *(Empidonax difficilis)*
Tree Swallow *(Tachycineta bicolor)*
Golden-crowned Kinglet *(Regulus satrapa)*
Red-eyed Vireo *(Vireo olivaceus)*
American Redstart *(Setophaga ruticilla)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Bunting *(Calamospiza melanocorys)*
Harris's Sparrow *(Zonotrichia querula)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Pine Grosbeak *(Pinicola enucleator)*

House Finch *(Haemorhous mexicanus)*

Reptiles

Plains Gartersnake *(Thamnophis radix)*

Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC

Invertebrates

Woodland Skipper *(Ochlodes sylvanoides)*

Greenish Blue *(Icaricia saepiolus)*

Field Crescent *(Phyciodes pulchella)*

Vascular Plants

Barr's Milkvetch *(Astragalus barrii)* SOC

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES303.650, Northwestern Great Plains - Black Hills Ponderosa Pine Woodland and Savanna

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4280: Northwestern Great Plains - Black Hills Ponderosa Pine Woodland and Savanna

Literature Cited Above Legend: View Online Publication

- Arno, S. 1979. Forest regions of Montana. Research paper Int-218, USFS Intermountain and Range Experiment Station, Ogden, Utah.
- Graham, R.T. and T.B. Jain. 2005. Ponderosa pine ecosystems. pp. 1-32. In: Proceedings of the Symposium on Ponderosa Pine: Issues, Trends, and Management, Gen. Tech. Rep. PSW-GTR-198. Albany CA: Pacific Southwest Research Station, Forest Service, US Department of Agriculture, Klamath Falls, OR.
- Howard, J. L. 2003. Pinus ponderosa var. scopulorum. In: Fire Effects Information System, [Online}. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Kolb, T.E.,J.K. Agee, P.Z. Fule, N.G. McDowell, K. Pearson, A.Sala, and R.H. Waring. 2007. Perpetuating old ponderosa pine. Forest Ecology and Management 249(3):141-157.
- Lundquist, J.E. and J.F. Negron. 2000. Endemic forest disturbances and stand structure of ponderosa pine (Pinus ponderosa) in the Upper Pine Creek Research Natural Area, South Dakota, USA. Natural Areas Journal 20(2):126-132.
- Symstad, A.J., W.E. Newton, and D.J. Swanson. 2014. Strategies for preventing invasive plant outbreaks after prescribed fire in ponderosa pine forest. Forest Ecology and Management 324:81-88.
- U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Northern Rocky Mountain Ponderosa Pine Communities. In: Fire Effects Information System. Missoula, MT: USDA Forest Servic

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- Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.
- Harris, G.A. 1967. Some competitive relationships between Agropyron spicatum and Bromus tectorum. Ecological Monographs 37:89-111.
- Keeley, J. E., and T. W. Mcginnis. 2007. "Impact of Prescribed Fire and Other Factors on Cheatgrass Persistence in a Sierra Nevada Ponderosa Pine Forest". *International Journal of Wildland Fire.* 16 (1): 96-106.
- Mack, Richard N., and David A. Pyke. 1983. "The Demography of Bromus Tectorum: Variation in Time and Space". *The*

Journal of Ecology. 71 (1): 69-93.

- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Rocky Mountain Foothill Limber Pine - Juniper Woodland

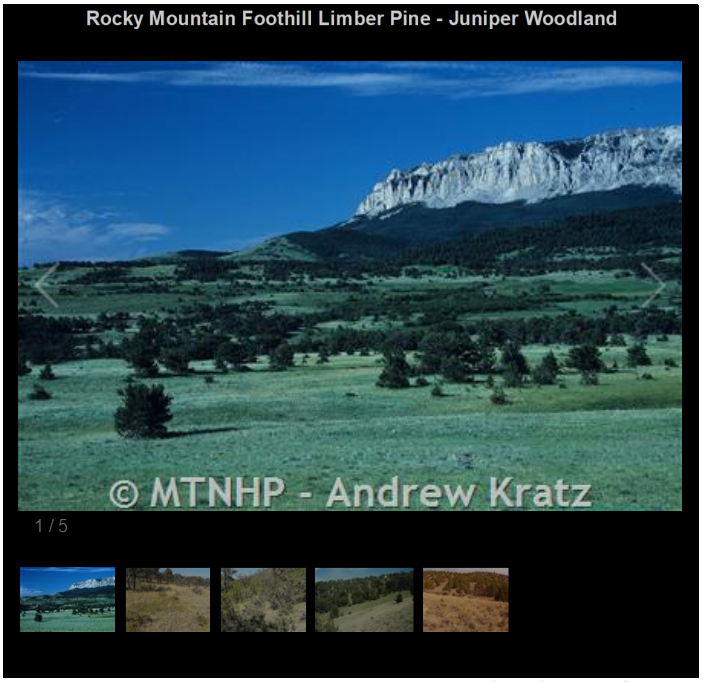


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General Description

This ecological system occurs in foothill and lower montane zones in the northern Rocky Mountains and island mountain ranges of Montana and on escarpments extending out to the western Great Plains grasslands. Elevation ranges from 1,219 to 2,286 meters (4,000-7,500 feet), occasionally higher in southwestern Montana. At higher elevations, it is limited to sites with thin soils on rock outcrops. Some of the most ecologically interesting examples occur along and within the mountains of the Rocky Mountain Front where it occurs most commonly on west and north facing aspects. At lower elevations, it can occur on all aspects and on relatively level terrain. Fire is infrequent and spotty because rocky substrates inhibit growth of the continuous canopy that would be needed to spread. This system occurs on sites that are characterized by extreme winter weather and droughty summer conditions. It is typically dominated by limber pine (*Pinus flexilis*) or Rocky Mountain juniper (*Juniperus scopulorum*). This systemis usually found below continuous forests of Douglas-fir (*Pseudotsuga menziesii*), or rarely, ponderosa pine (*Pinus ponderosa*) or lodgepole pine (*Pinus contorta*) in the foothills. Rocky Mountain juniper stands often occur in complex transitional zones or grow on exposed or severe sites within other forest systems. These juniper stands can exhibit a savanna-like character in southwestern Montana. In the system as a whole, because sites are so marginal for tree growth, limber pine mortality from abiotic and biotic stresses may be high. East of the Continental Divide, limber pine can occur at the upper tree line, with whitebark pine (*Pinus albicaulis*) in Glacier National Park and the Sweetgrass Hills. The climtate characteristic of these systems is marked by a relatively small amount of precipitation, with the wettest months during the growing season, very low humidity, and wide annual and diurnal temperature ranges. Winter conditions may be very cold but relatively dry, and often include rapid fluctuations in temperature associated with chinook winds. In Montana, limber pine and Rocky Mountain juniper stands are found mainly on calcareous substrates. Soils have a high rock component (generally over 50% cover) and are coarse- to fine-textured, often gravelly. Slopes are moderately steep to steep.

Diagnostic Characteristics

Forest and woodland, aridic, sandy, shallow soils, organic A horizon less than 10 cm, *Pinus flexilis, Juniperus scopulorum*

Similar Systems

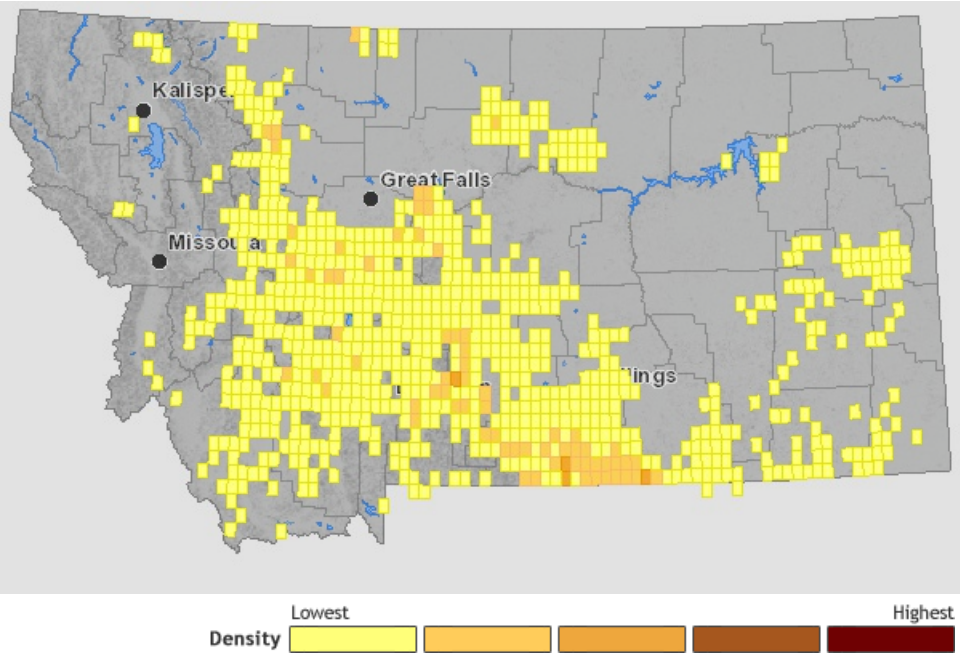
- Mountain Mahogany Woodland and Shrubland

Range

This system occurs in foothill and lower montane zones in the northern Rocky Mountain Front and foothills, within the island ranges, and on escarpments extending out into the western Great Plains. This system is well represented in the Gravelly Range and Beaverhead Range, and the greater Yellowstone ecosystem and the Pryor Range in the southern portion of the state. It ranges from southern Alberta to central Colorado and east into North and South Dakota.

Ecological System Distribution

Approximately 714 square kilometers are classified as Rocky Mountain Foothill Limber Pine - Juniper Woodland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lewis and Clark, Liberty, Madison, Mccone, Meagher, Musselshell, Park, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Large patch

Environment

The systems is usually found below continuous forests of Douglas-fir (*Pseudotsuga menziesii*) or lodgepole pine (*Pinus contorta*) in the foothills,and can occur in large stands well within the zone of continuous forests in the northern Rocky Mountains. Along the Northern Rocky Mountain Front, this system is found on west and north facing aspects in the foothills and within the mountains. At lower elevations, it can occur on all aspects and on relatively level terrain. Rocky Mountain juniper stands are often found in complex transitional zones or growing on exposed or severe sites within other forest systems. Climate is characterized by a relatively small amount of precipitation, with the wettest months during the growing season, very low humidity, and wide annual and diurnal temperature ranges. Winter conditions may be very cold but relatively dry, and often include rapid fluctuations in temperature associated with chinook winds.

In Montana, this system occurs grows mainly on limestone substrates, where roots follow the pattern of fractured and weathered rock (Burns and Honkala, 1990). Soils have a high rock component (typically over 50% cover) and are coarse-

to fine-textured, often gravelly and calcareous. Soils are generally poorly developed, shallow, have low moisture holding capacity and are easily erodable, so in some occurrences, little topsoil is present. Although the system can be seen on gently rolling terrain, limestone cliffs, and exposed bluffs, it is most often found on rocky ridges and steep rocky slopes, and can survive in extremely windswept areas at both lower and upper tree line. Slopes are typically moderately steep to steep. Elevation ranges from 1,219-2,286 meters (4,000-7,500 feet) (Pfister et al, 1977). In the Beaverhead Mountain range, it occurs at higher elevations (Cooper et al, 1999).

Vegetation

Vegetation is characterized by an open-tree canopy or patchy woodland that is dominated by either limber pine or Rocky Mountain juniper. In the Pryor Mountains Utah juniper (*Juniperus osteosperma*) is sometimes seen at its northernmost extent within this system. Douglas-fir regularly occurs, but ponderosa pine and lodgepole pine are comparatively rare within these forests. Prolonged drought and white pine blister rust (*Cronartium rubicola*) have decimated limber pine along the Rocky Mountain Front (and elsewhere), resulting in a skeleton woodland with scattered Douglas-firs as the only living trees. At the northern end of its range in Montana, limber pine is mostly associated with common juniper (*Juniperus communis*) and creeping juniper (*Juniperus horizontalis*), whereas in the southern end of its range, it is associated with Rocky Mountain juniper. A sparse to moderately dense short-shrub layer is usually present. Within north-central and northwestern Montana, the most common shrubs include bearberry (*Arctostaphylos uva-ursi),* creeping juniper*,* shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*),and Canadian buffaloberry (*Shepherdia canadensis*). Other shrubs that may be present in west-central and southern Montana includebig sagebrush (*Artemisia tridentata*), black sagebrush (*Artemisia nova*)*,* curl-leaf mountain mahogany (*Cercocarpus ledifolius*)*,* rubber rabbitbrush (*Ericameria nauseosa*), skunkbush sumac (*Rhus trilobata*)*,* Woods' rose (*Rosa woodsii*), common snowberry (*Symphoricarpos albus*), or western snowberry (*Symphoricarpos occidentalis*). Herbaceous layers are generally sparse, but range to moderately dense; they are typically dominated by perennial graminoids such as blue grama (*Bouteloua gracilis*), Idaho fescue (*Festuca idahoensis*), rough fescue (*Festuca campestris*)*,* poverty oatgrass (*Danthonia intermedia*)*,* spike fescue (*Leucopoa kingii*), needle and thread (*Hesperostipa comata),* prairie junegrass (*Koeleria macrantha*), Indian ricegrass (*Oryzopsis hymenoides*)*,* Sandberg's bluegrass (*Poa secunda*), or blue bunch wheatgrass (*Pseudoroegneria spicata*). Common forbs include yarrow (*Achillea millefolium*), fringed sage (*Artemisia frigida*), arrowleaf balsamroot (*Balsamorhiza sagittata*), prairiesmoke (*Geum triflorum*)*,* hymenopappus (*Hymenopappus* species), four-nerve daisy (*Hymenoxys* species), dotted gayfeather (*Liatris punctata)*, stone seed (*Lithospermum ruderale*), silver lupine (*Lupinus argenteus*), pricklypear (*Opuntia* species), crazyweed (*Oxytropis* species), and cushion plants such as draba (*Draba* species), phlox (*Phlox* species), Rocky Mountain douglasia (*Douglasia montana*) and Howard's alpine forget-me-not (*Eritrichium howardii*).

This system often occurs in complex ecotones on severe sites within other forest systems. It often intergrades with Rocky Mountain Dry-Mesic Montane Mixed Conifer, Rocky Mountain Lower Montane, Foothill and Valley Grassland, Mountain Mahogany Woodland and Shrubland, and Montane Sagebrush Steppe.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0540 *Pinus flexilis* Rocky Mountain Woodland Alliance
- **CEGL000805** *Pinus flexilis - Festuca idahoensis* Woodland
- **CEGL000806** *Pinus flexilis - Festuca campestris* Woodland
- **CEGL000807** *Pinus flexilis - Juniperus communis* Woodland
- **CEGL000810** *Pinus flexilis - Leucopoa kingii* Woodland
- **CEGL000815** *Pinus flexilis* Scree Woodland

A2035 *Pinus flexilis* Intermountain Basins Forest & Woodland Alliance
- **CEGL000804** *Pinus flexilis - Cercocarpus ledifolius* Woodland

A3202 *Krascheninnikovia lanata* Steppe & Dwarf-shrubland Alliance
- **CEGL001325** *Krascheninnikovia lanata - Phlox spp.* Dwarf-shrubland

A3210 *Juniperus scopulorum - Juniperus virginiana* Woodland Alliance
- **CEGL000747** *Juniperus scopulorum - Piptatherum micranthum* Woodland

A3424 *Pinus flexilis* / Shrub Understory Central Rocky Mountain Woodland Alliance
- **CEGL000808** *Pinus flexilis - Juniperus osteosperma* Woodland
- **CEGL000809** *Pinus flexilis - Juniperus scopulorum* Woodland

A3425 *Pinus flexilis* / Grass Understory Central Rocky Mountain Woodland Alliance
- **CEGL000813** *Pinus flexilis - Pseudoroegneria spicata* Woodland

A3426 *Juniperus osteosperma - Juniperus scopulorum* / Shrub Understory Central Rocky Mountain Woodland Alliance
- **CEGL000734** *Juniperus osteosperma - Cercocarpus ledifolius* Woodland
- **CEGL000742** *Juniperus scopulorum - Artemisia nova* Woodland
- **CEGL000743** *Juniperus scopulorum - Artemisia tridentata* Woodland
- **CEGL000744** *Juniperus scopulorum - Cercocarpus ledifolius* Woodland
- **CEGL000745** *Juniperus scopulorum - Cercocarpus montanus* Woodland

A3427 *Juniperus osteosperma - Juniperus scopulorum* / Grass Understory Central Rocky Mountain Woodland Alliance
- **CEGL000748** *Juniperus scopulorum - Pseudoroegneria spicata* Woodland

A3496 *Juniperus osteosperma* / Shrub Understory Woodland Alliance
- **CEGL000730** *Juniperus osteosperma - Artemisia tridentata* Woodland

A3497 *Juniperus osteosperma* / Herbaceous Understory Open Woodland Alliance
- **CEGL000738** *Juniperus osteosperma - Pseudoroegneria spicata* Open Woodland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Major disturbances in this system include fire, soil erosion from over-used range, and biotic vectors. Clark's nutcrackers have co-adapted an important mutualism with limber pine, and are the primary harvester and disperser of its seeds. These woodlands often originate with and are likely maintained by fire. Regeneration on burns is largely from germination of seedlings from Clark's nutcracker seed caches. Fire can easily kill young limber pine and Rocky Mountain juniper because of their thin bark (Fischer and Clayton, 1983), however, fuel loads in this system are generally light due to open rocky terrain, and fires do not generate severe damage or considerably alter vegetation composition. In comparison with upper treeline limber pine communities, foothill populations are thought to experience greater disturbance frequency (Schuster et al., 1995), and fire return intervals vary between 50 and 400 years (U.S. Department of Agriculture, 2012). Over time limber pine woodlands have shifted both up- and down-slope in response to changing climate and drought, and are considered to be particularly sensitive to future change (Means 2010).

This system occurs on dry, rocky sites that are typified by extreme winter weather and droughty summer conditions that offer marginal conditions for tree growth. Consequently, mortality from abiotic and biotic stressors is high in some areas. Limber pine is highly susceptible to white pine blister rust (*Cronartium ribicola*), the pine needle pathogen (*Dothistroma septospora*), and mountain pine beetles (*Dendroctonus ponderosae*). It can also be heavily infected or killed by limber pine dwarf-mistletoe (*Arceuthobium cyanocarpum*), particularly in south-central and southwestern Montana (Jackson et al., 2010), and is susceptible to infestation by cone beetles (Conophthorus contortae), the ponderosa pine cone worm (*Dioryctria auranticella*), and the western conifer seed bug (*Leptoglossus occidentalis*). Resistance to blister rust and mountain pine beetle is lower for limber pine than for other North American pines affected by these biotic agents (Hoff and McDonald 1993; Means 2010), and drought can exacerbate vulnerability to pine beetle attack (Jackson et al., 2010). The most significant damage due to biotic factors appears to occur at locations on the Lewis and Clark National Forest along the northern Rocky Mountain Front, the Gravelly range and sections of the Yellowstone ecosystem in southwestern Montana. Large numbers of trees have very thin crowns and poor terminal growth, and severe mortality is occurring in some areas.

Under natural conditions, Rocky Mountain juniper seedlings become established on moist sites in partial shade (Burns and Honkala 1990). Stands found in southwestern Montana may exhibit a savanna-like character due to the inability of Rocky Mountain juniper to establish on drier micro-sites. Rocky Mountain juniper is generally shallow rooted, and forest health can be negatively affected by heavy grazing, especially on exposed sites with erodible soils. Although Rocky Mountain juniper is relatively resistant to disease and tolerant of insects, several insect pests do attack this species including cedar flathead borers (*Chrysobothris spp.*) and bark beetles (*Phloeosinus spp.*) (Scher, 2002). Additionally, mistletoes (*Phoradendron spp.*), a blight caused by *Cercospora sequoia*, and cedar apple rust (*Gymnosporangium juniper virgiananae*) can be especially problematic (Burns and Honkala 1990).

Management

In the absence of natural fire, periodic low to moderate intensity prescribed burns can be implemented during late fall months to maintain and enhance limber pine regeneration, although results may be variable due to insufficient ground fuels and rocky terrain typical of this system. Fire may kill young trees of limber pine and Rocky Mountain juniper because of their thin bark. Thinning may also be used in particularly dense stands to reduce spread of mountain pine beetles (Bureau of Land Management, 2011). In light of blister rust prevalence, stands can be managed to maintain limber pine forest composition, and to diversify age structure to include regeneration, thereby encouraging natural selection of rust resistant individuals (Jackson et al., 2010). On sites with slopes and forage that support domestic livestock, use can be monitored to maintain soil integrity.

Restoration Considerations

Reintroduction of prescribed fire fosters limber pine restoration because it provides open sites and exposed mineral soils that are suitable for Clark's nutcracker to cache seeds, and for seedlings to establish. Augmenting natural limber pine regeneration with seed sources that exhibit some resistance to blister rust or, in some cases, with nursery stock, will be necessary in areas where seed sources are absent or greatly reduced. Blister rust-resistant or tolerant trees can be identified in previously infected stands, or by screening for an identified resistance gene (Schoettle and Sniezko 2007; Schoettle et al. 2014). Direct seeding may be the most practical restoration method on most sites, however seed-transfer guidelines should be considered when the seed source is a considerable distance from the seeding site (Schoettle and Sniezko 2007). Germination will take place during the first growing season after fall caching or direct seeding.

Because this system is characterized by shallow soils, outplanting of nursery stock may be limited to microsites with deeper soil pockets. Out-planted seedling survival has been shown to be higher when seedlings are planted on microsites with some cover, when seedlings are planted in clumps rather than singly, and when competition from surrounding vegetation is minimized (Asebrook et al. 2011). Seedling health was marginally improved in burned areas compared to unburned areas within an experimental area in Waterton Lakes National Park, Alberta (Asebrook et al., 2006).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Eastern Red Bat *(Lasiurus borealis)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Pallid Bat *(Antrozous pallidus)* SOC	Grizzly Bear *(Ursus arctos)* SOC
American Bison *(Bos bison)* SOC	Spotted Bat *(Euderma maculatum)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Western Spotted Skunk *(Spilogale gracilis)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Desert Cottontail *(Sylvilagus audubonii)*	Least Chipmunk *(Neotamias minimus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Flying Squirrel *(Glaucomys sabrinus)*	Northern Pocket Gopher *(Thomomys talpoides)*

Ord's Kangaroo Rat *(Dipodomys ordii)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*
Sagebrush Vole *(Lemmiscus curtatus)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Least Weasel *(Mustela nivalis)*
American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Bighorn Sheep *(Ovis canadensis)*
North American Deermouse *(Peromyscus maniculatus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
American Badger *(Taxidea taxus)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC
Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Blue-gray Gnatcatcher *(Polioptila caerulea)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Black-and-white Warbler *(Mniotilta varia)* PSOC
Cooper's Hawk *(Accipiter cooperii)*
Rough-legged Hawk *(Buteo lagopus)*
Peregrine Falcon *(Falco peregrinus)*
Great Horned Owl *(Bubo virginianus)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Northern Flicker *(Colaptes auratus)*
Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Red-breasted Nuthatch *(Sitta canadensis)*
Canyon Wren *(Catherpes mexicanus)*
Mountain Bluebird *(Sialia currucoides)*
Hermit Thrush *(Catharus guttatus)*
Bohemian Waxwing *(Bombycilla garrulus)*
Black-throated Gray Warbler *(Setophaga nigrescens)*
Spotted Towhee *(Pipilo maculatus)*
Clay-colored Sparrow *(Spizella pallida)*
Snow Bunting *(Plectrophenax nivalis)*
Red Crossbill *(Loxia curvirostra)*
American Goldfinch *(Spinus tristis)*
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Gray Flycatcher *(Empidonax wrightii)* PSOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Turkey Vulture *(Cathartes aura)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Mourning Dove *(Zenaida macroura)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
Calliope Hummingbird *(Selasphorus calliope)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Kingbird *(Tyrannus verticalis)*
Violet-green Swallow *(Tachycineta thalassina)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Rock Wren *(Salpinctes obsoletus)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Townsend's Solitaire *(Myadestes townsendi)*
American Robin *(Turdus migratorius)*
Yellow-rumped Warbler *(Setophaga coronata)*
Blue Grosbeak *(Passerina caerulea)*
Chipping Sparrow *(Spizella passerina)*
Lark Sparrow *(Chondestes grammacus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Pine Siskin *(Spinus pinus)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Western Milksnake *(Lampropeltis gentilis)* SOC
Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*

Vascular Plants

Nuttall Desert-parsley *(Lomatium nuttallii)* SOC
Shoshonea *(Shoshonea pulvinata)* SOC
Parry's Fleabane *(Erigeron parryi)* SOC
Beartooth Large-flowered Goldenweed *(Pyrrocoma carthamoides var. subsquarrosa)* SOC
Lesica's Bladderpod *(Physaria lesicii)* SOC
Woolly Twinpod *(Physaria didymocarpa var. lanata)* SOC
Nama *(Nama densum)* SOC
Matted Prickly-phlox *(Leptodactylon caespitosum)* SOC
Curved Bladderpod *(Physaria curvipes)*
Macoun's Cinquefoil *(Potentilla macounii)*
Taper-tip Desert-parsley *(Lomatium attenuatum)* SOC
Big Horn Fleabane *(Erigeron allocotus)* SOC
Chicken-sage *(Sphaeromeria argentea)* SOC
Sapphire Rockcress *(Boechera fecunda)* SOC
Beautiful Bladderpod *(Physaria pulchella)* SOC
Thick-leaf Bladderpod *(Physaria pachyphylla)* SOC
Railroad Canyon Wild Buckwheat *(Eriogonum soliceps)* SOC
Cary's Beardtongue *(Penstemon caryi)* SOC
Rock-tansy *(Sphaeromeria capitata)*

Native Species Occasionally Associated with this Ecological System

Mammals

Dwarf Shrew *(Sorex nanus)* PSOC
Northwestern Jumping Mouse *(Zapus saltator)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Prairie Falcon *(Falco mexicanus)*
Lewis's Woodpecker *(Melanerpes lewis)* SOC
Northern Harrier *(Circus hudsonius)*
Merlin *(Falco columbarius)*
Spruce Grouse *(Canachites canadensis)*

Dusky Grouse *(Dendragapus obscurus)*
Wild Turkey *(Meleagris gallopavo)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Hairy Woodpecker *(Dryobates villosus)*
European Starling *(Sturnus vulgaris)*
Lazuli Bunting *(Passerina amoena)*
Lark Bunting *(Calamospiza melanocorys)*
Western Meadowlark *(Sturnella neglecta)*
Ruffed Grouse *(Bonasa umbellus)*
Rock Pigeon *(Columba livia)*
White-throated Swift *(Aeronautes saxatalis)*
Cedar Waxwing *(Bombycilla cedrorum)*
Western Tanager *(Piranga ludoviciana)*
Vesper Sparrow *(Pooecetes gramineus)*
Dark-eyed Junco *(Junco hyemalis)*
Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Common Sagebrush Lizard *(Sceloporus graciosus)*
Northern Rubber Boa *(Charina bottae)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Boreal Chorus Frog *(Pseudacris maculata)*

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Montana Version Authors

T. Luna, L.K. Vance, M. Hart

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.955, Rocky Mountain Foothill Limber Pine - Juniper Woodland

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4236: Rocky Mountain Foothill Limber Pine - Juniper Woodland

Literature Cited Above Legend: View Online Publication

- Asebrook, J.M., J. Lapp, and T. Carolin. 2011. Whitebark and limber pine restoration and monitoring in Glacier National Park. Pp. 335-337 In: Proceedings of the high five symposium on the future of high-elevation, five-needle white pines in western North America, Keane, R.E., Tomback, D.F., Murray, M.P., and Smith, C.M. Missoula, MT: USDA Forest Service, Rocky Mountain Research Station. RMRS-P-63.
- Bureau of Land Management (BLM). 2011 Whitebark and Limber Pine (Five Needle Pine) Management Guidelines for Wyoming BLM. In: FY 2011 Memorandums. Wyoming: U.S. Department of the Interior, Bureau of Land Management.
- Fischer, W.C. and B.D. Clayton. 1983. Fire ecology of Montana. Forest habitat types east of the continental divide. USDA, Forest Service Gen. Tech. Rpt. INT-141.
- Hoff, R.J. and G.I. McDonald. 1993. Variation of virulence of white pine blister rust. European journal of forest pathology 23(2):103-109.
- Jackson, M., A. Gannon, H. Kearns, K. Kendall. 2010. Current Status of Limber Pine in Montana. Report 10-06. Missoula, MT: U.S. Department of Agriculture, Forest Service, Northern Region. 14 p.
- Means, R.E. 2010. Synthesis of lower treeline limber pine (Pinus flexilis) woodland knowledge, research needs, and management considerations. Pp. 29-36 In: Proceedings of the high five symposium on the future of high-elevation, five-needle white pines in western North America, Keane, R.E., Tomback, D.F., Murray, M.P., and Smith, C.M. Missoula, MT: USDA Forest Service, Rocky Mountain Research Station. RMRS-P-63.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.
- Scher, J.S. 2002. Juniperus scopulorum. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Schoettle, A.W. and R.A. Sniezko. 2007. Proactive intervention to sustain high-elevation pine ecosystems threatened by white pine blister rust. Journal of Forest Research 12(5):327-336.
- Schoettle, A.W., R.A. Sniezko, R.A., A. Kegley, and K.S. Burns. 2014. White pine blister rust resistance in limber pine: evidence for a major gene. Phytopathology 104(2):163-173.

- Schuster, W.S., J.B. Mitton, D.K. Yamaguchi, and C.A. Woodhouse. 1995. A comparison of limber pine (Pinus flexilis) ages at lower and upper treeline sites east of the Continental Divide in Colorado. American Midland Naturalist 133(1):101-111.

U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Limber Pine Communities. In: Fire Effects Information System. Missoula, MT: USDA Forest Service, Rocky Mountain Research

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- Asebrook, J.M. 2006. Revegetation Monitoring Reports: Glacier National Park. West Glacier, MT: Research Reports, Glacier National Park.

Burns, R. M., and B. H. Honkala, technical coordinators. 1990a. Silvics of North America: Volume 1. Conifers. USDA Forest Service. Agriculture Handbook 654. Washington, DC. 675 pp.

Cooper, S.V., C. Jean, and B.L. Heidel. 1999. Plant associations and related botanical inventory of the Beaverhead Mountains Section, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena. 235 pp.

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Rocky Mountain Lodgepole Pine Forest

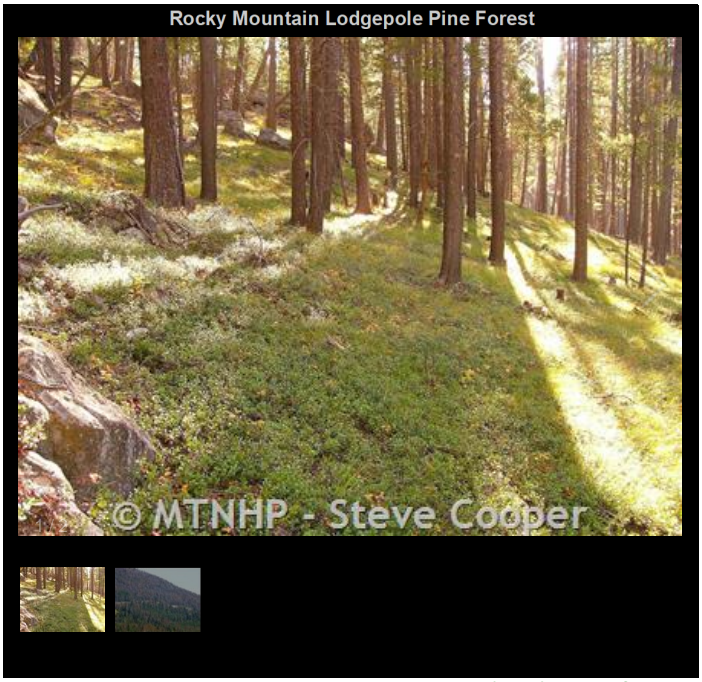


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General Description

This forested system is widespread in upper montane to subalpine zones of the Montana Rocky Mountains, and east into island ranges of north-central Montana and the Bighorn and Beartooth ranges of south-central Montana. These are montane to subalpine forests where the dominance of lodgepole pine (*Pinus contorta*) is related to fire history and topoedaphic conditions. In Montana, elevation ranges from 975 to 2,743 meters (3,200-9000 feet). These forests occur on flats to slopes of all degrees and aspect, as well as valley bottoms. Fire is frequent, and stand-replacing fires are common. Following stand-replacing fires, lodgepole pine will rapidly colonize and develop into dense, even-aged stands. Most forests in this ecological system occur as early- to mid-successional forests persisting for 50-200 years on warmer, lower elevation forests, and 150-400 years in subalpine forests. They generally occur on dry to intermediate sites with a wide seasonal range of temperatures and long precipitation-free periods in summer. Snowfall is heavy and supplies the major source of soil water used for growth in early summer. Vigorous stands occur where the precipitation exceeds 533 millimeters (21 inches). These lodgepole forests are typically associated with rock types weathering to acidic substrates, such as granite and rhyolite. In west-central Montana ranges such the Big Belts and the Rocky Mountain Front, these forests are found on limestone substrates. These systems are especially well developed on the broad ridges and high valleys near and east of the Continental Divide. Succession proceeds at different rates, moving relatively quickly on low-elevation, mesic sites and particularly slowly in high-elevation forests such as those along the Continental Divide in Montana.

Diagnostic Characteristics

Forest and woodland, acidic, shallow ustic soils, organic A horizon greater than 10 cm, *Pinus contorta*

Similar Systems

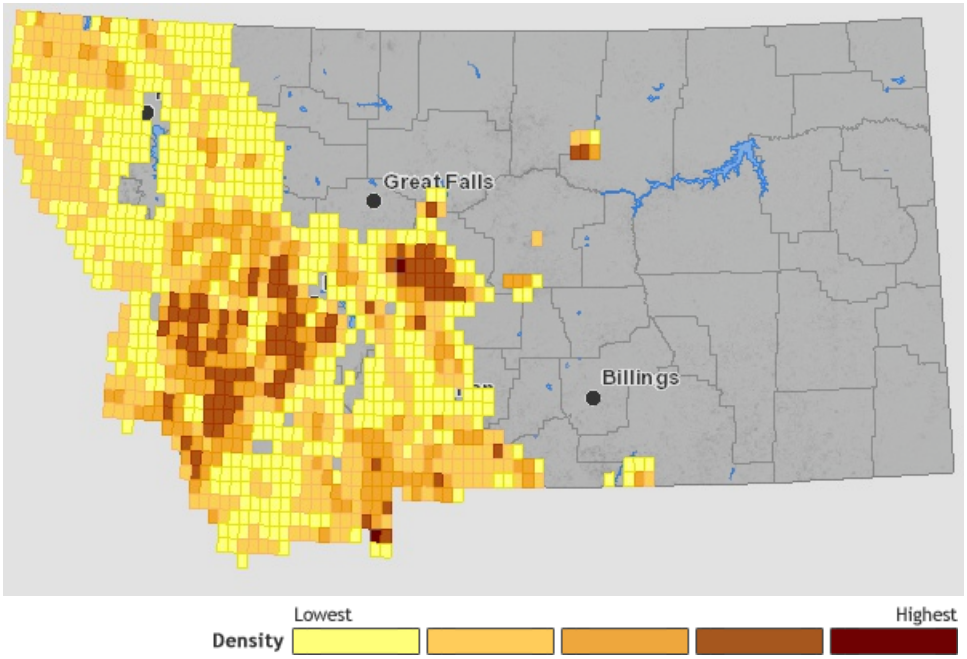
- Rocky Mountain Poor Site Lodgepole Pine Forest

Range

This system occurs throughout the Montana Rocky Mountains and the island ranges from valley bottoms west of the Continental Divide to upper subalpine forests.

Ecological System Distribution

Approximately 10,223 square kilometers are classified as Rocky Mountain Lodgepole Pine Forest in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Phillips, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Matrix

Environment

This system generally occurs on dry to intermediate sites with a wide seasonal range of temperatures and long precipitation-free periods in summer. Snowfall is heavy and supplies the major source of soil water used for growth in early summer. Vigorous stands occur where the precipitation exceeds 533 millimeters (21 inches). These lodgepole forests are typically associated with rock types weathering to acidic substrates, such as granite and rhyolite. In west-central Montana ranges such the Big Belts and the Rocky Mountain Front, these forests are found on limestone substrates. These forests are especially well developed on the broad ridges and high valleys near and east of the Continental Divide. Succession proceeds at different rates, moving relatively quickly on low-elevation, mesic sites and particularly slowly in high-elevation forests such as those along the Continental Divide in Montana.

Vegetation

These forests are dominated by lodgepole pine with shrub, grass, or barren understories. At montane elevations east of the Continental Divide, lodgepole pine stands succeed to Douglas-fir (*Pseudotsuga menziesii*) forests. In western Montana, there are a number of commonly occurring tree species in later seral stages, including Douglas-fir, western larch (*Larix occidentalis*), western white pine (*Pinus monticola*), western red cedar (*Thuja plicata*), grand fir (*Abies grandis*) and western hemlock (*Tsuga heterophylla*). In the subalpine zone, Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*) and mountain hemlock (*Tsuga mertensiana*) commonly succeed lodgepole pine following stand mortality (Pfister et al.,1977). In the productive habitats of western Montana, lodgepole pine stands often decline in a wave of

mortality, usually before they are 120 years old.

The shrub stratum may be conspicuous to absent. Common species include bearberry (*Arctostaphylos uva-ursi*), snowbrush ceanothus (*Ceanothus velutinus*), twinflower (*Linnaea borealis*), creeping Oregon grape (*Mahonia repens*), antelope bitterbrush (*Purshia tridentata*), birch leaf spiraea (*Spiraea betulifolia),*Canadian buffaloberry (*Shepherdia canadensis*), dwarf huckleberry (*Vaccinium caespitosum*), grouse whortleberry (*Vaccinium scoparium),* mountain huckleberry (*Vaccinium membranaceum*), snowberry (*Symphoricarpos species*) and currant (*Ribes* species).

Herbaceous layers are generally sparse, but can be moderately dense, and are typically dominated by perennial graminoids such as Columbia needlegrass (*Achnatherum nelsonii*), pinegrass (*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), Ross' sedge (*Carex rossii*), California oatgrass (*Danthonia californica*), blue wildrye (*Elymus glaucus*), and Idaho fescue (*Festuca idahoensis*). Common forbs include yarrow (*Achillea millefolium*), arnica (*Arnica spp.),* American pathfinder (*Adenocaulon bicolor*), queen's cup beadlily (*Clintonia uniflora*), silky lupine (*Lupinus sericeus*) and beargrass (*Xerophyllum tenax*). Saprophytic species such as coralroot orchid (*Corallorhiza spp.),* Indian pipe (*Moneses uniflora)*, pinesap (*Monotropa hypopithys)*, and pinedrops (*Pterospora andromedea*) are often associated with lodgepole pine forests.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3366 *Pinus contorta* Rocky Mountain Forest Alliance
- **CEGL000135** *Pinus contorta - Arnica cordifolia* Forest
- **CEGL000141** *Pinus contorta - Carex geyeri* Forest
- **CEGL000145** *Pinus contorta - Ceanothus velutinus* Forest
- **CEGL000153** *Pinus contorta - Linnaea borealis* Forest
- **CEGL000163** *Pinus contorta - Shepherdia canadensis* Forest
- **CEGL000164** *Pinus contorta - Spiraea betulifolia* Forest
- **CEGL000168** *Pinus contorta - Vaccinium caespitosum* Forest
- **CEGL000169** *Pinus contorta - Vaccinium membranaceum* Rocky Mountain Forest
- **CEGL000172** *Pinus contorta - Vaccinium scoparium* Forest
- **CEGL000174** *Pinus contorta - Vaccinium scoparium - Calamagrostis rubescens* Forest
- **CEGL000175** *Pinus contorta - Xerophyllum tenax* Forest
- **CEGL005913** *Pinus contorta - Vaccinium membranaceum - Xerophyllum tenax* Forest
- **CEGL005916** *Pinus contorta - Clintonia uniflora* Forest
- **CEGL005922** *Pinus contorta - Menziesia ferruginea - Clintonia uniflora* Forest
- **CEGL005923** *Pinus contorta - Vaccinium caespitosum - Clintonia uniflora* Forest
- **CEGL005924** *Pinus contorta - Vaccinium scoparium - Xerophyllum tenax* Forest
- **CEGL005928** *Pinus contorta - Menziesia ferruginea* Forest

A3948 *Valeriana sitchensis - Luzula glabrata var. hitchcockii - Xerophyllum tenax* Subalpine Mesic Meadow Alliance
- **CEGL005856** *Chamerion angustifolium* Rocky Mountain Meadow

A4079 *Pinus contorta* Rocky Mountain Woodland Alliance
- **CEGL005915** *Pinus contorta - Heracleum maximum* Woodland
- **CEGL005921** *Pinus contorta - Clintonia uniflora / Xerophyllum tenax* Woodland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Lodgepole pine is an aggressive colonizer and shade-intolerant conifer that occurs in the upper montane to lower subalpine forests throughout the major mountain ranges of Montana. Establishment is episodic and linked to stand-replacing disturbances, primarily fire. Historically, fire frequency varied between 50 and 300 years, depending on local climate and elevation, with fire frequency declining with increasing elevation (Schoenagel et al., 2003). In the Northern Rockies, severe fires have created large expanses of even-aged stands of lodgepole pine, although more frequent low- to mixed-severity burns may also occur in the intervals between stand-replacing fires, generating a matrix of mixed-age stands (Hardy et al., 2000; Arno et al., 1993). Occasionally, fire severity may be such that cones are destroyed and regeneration will rely on wind-dispersed seeds from nearby stands, resulting in slower regrowth (Anderson, 2003). Repeated fires allow lodgepole pine to persist as the climax species in this system by eliminating the potential for succession by more shade-tolerant species (Pfister et al., 1977).

Trees with closed, serotinous cones where seed release is a response to an environmental trigger, require high temperatures to release seeds and appear to be strongly favored by fire, allowing rapid colonization of fire-cleared substrates (Burns and Honkala, 1990). The incidence of serotinous cones varies within and between varieties of lodgepole pine, but within Rocky Mountain populations, serotiny varies both across regions and with stand age (Schoenagel et al., 2003). Stands that occur at lower elevations where fire return intervals are shorter exhibit greater serotiny, whereas higher elevation stands with greater fire return intervals favor non-serotinous cones which are more advantageous for successful regeneration (Schoenagel et al., 2003). Lodgepole pine stands exhibiting a multi-aged population structure also exhibit a higher proportion of trees bearing non-serotinous cones. Even-aged stands that establish after stand-replacing fires exhibit greater serotiny than those that establish after wind or insect disturbances (Anderson, 2003).

In fire-generated stands of similar age, trees become increasingly susceptible to both mountain pine beetle (*Dendroctonus ponderosae*) and lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) infestations as they mature, often resulting in large-scale mortality. In general, pine beetles preferentially attack large individuals with greater nutritional resources (Cole and Amman, 1969). In this system, large scale, stand-replacing fires have occurred frequently throughout Montana

during the past 20 years, increasing stand homogeneity favorable to beetle attack. Elevated temperatures and increasing drought severity additionally combine to favor beetle population growth and weaken lodgepole pine defense mechanisms, thereby increasing susceptibility to mountain pine beetle attack (Raffa et al., 2008). Interactions between biotic and abiotic disturbance agents in lodgepole pine systems are complex, and the widespread mortality associated with these disturbances alters ecosystem processes. Ecosystem-level effects of mountain pine beetle outbreaks include changes to carbon cycling (Kurz et al., 2008), hydrology (Bearup et al., 2014; Mikkelson et al., 2013), and fuel structure and flammability (Hicke et al., 2012; Jolly et al., 2012). However, at broad spatial scales it does not appear that pine beetle caused mortality increases stand susceptibility to fire (Hart et al., 2015; Simard et al., 2011). Alternatively, dwarf mistletoe increases host susceptibility to fire by altering fuel dynamics, and intensifies host vulnerability to insect attack (Hawksworth et al., 2002).

Management

Effects of fire, fire suppression, fuel accumulation, stand development, insects, and disease in these forests interact to control the establishment and maintenance of stands. Because they are often initiated by stand-replacing fire, Rocky Mountain lodgepole pine stands are frequently even-aged. However, stands of similar age frequently differ in density, ranging from open stands of large trees to very dense, stunted "doghair" stands. In the absence of natural fire, periodic prescribed burns and selective thinning can be used to maintain this system. Thinning may, however, increase long-term stand susceptibility to mountain pine beetle attack (Fettig et al., 2006), and dense, even-aged stands may be vulnerable to windthrow as a result of thinning (Anderson 2003). Low intensity prescribed burning may increase long-term resistance to mountain pine beetle attack (Hood and Sala, 2013), although stands may be more vulnerable to attack in the short term (Kulakowski and Jarvis, 2013). Prescribed burning may also encourage dwarf mistletoe success if infected individuals are not eliminated, as dwarf mistletoe germination rates are enhanced by smoke exposure (Kipfmueller and Baker, 1997).

Restoration Considerations

Low-frequency stand-replacing fires are characteristic of this system (Stephens et al., 2013), with higher frequency low- to mixed-severity burns occurring in the intervals between high-severity fires (Hardy et al., 2000). Restoration strategies will depend largely on management goals. Low intensity prescribed burning and selective thinning may be utilized as restoration strategies to restore historic fire regimes and increase long term resistance to mountain pine beetle attack (Hood and Sala, 2013; Fettig et al., 2006). Under favorable moisture conditions, seeds released from serotinous cones during fire germinate on exposed mineral soil and disturbed duff the following spring. Fire creates a favorable seedbed by removing loose organic matter and exposing mineral soil or decomposed organic matter, which encourages germination. Therefore, in most scenarios, additional post-fire restoration practices are not required. However, regeneration success may be marginal when stand-replacing fires are followed by years of severe drought (Stephens et al., 2013) and may require supplemental restoration efforts. When supplemental planting is necessary, germination rates for seeds from serotinous cones may be enhanced by short exposure to flame (Anderson, 2003). Early successional stages following fire in lodgepole pine forests are dominated by an understory of forbs and to a lesser extent, graminoids such as fireweed (*Chamerion angustifolium*), aster (Aster species), nettleleaf giant hyssop (*Agastache urticifolia*), and pinegrass (*Calamagrostis rubescens*).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader

landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Western Pygmy Shrew *(Sorex eximius)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Fisher *(Pekania pennanti)* SOC	Wolverine *(Gulo gulo)* SOC
Canada Lynx *(Lynx canadensis)* SOC	North American Water Vole *(Microtus richardsoni)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Western Water Shrew *(Sorex navigator)*
Northern Montane Shrew *(Sorex obscurus)*	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Snowshoe Hare *(Lepus americanus)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Red Squirrel *(Tamiasciurus hudsonicus)*	Northern Flying Squirrel *(Glaucomys sabrinus)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Raccoon *(Procyon lotor)*
Marten *(Martes americana)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Moose *(Alces alces)*	Mountain Goat *(Oreamnos americanus)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC	Flammulated Owl *(Psiloscops flammeolus)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC	Black-backed Woodpecker *(Picoides arcticus)* SOC
Pileated Woodpecker *(Dryocopus pileatus)* SOC	Clark's Nutcracker *(Nucifraga columbiana)* SOC
Boreal Chickadee *(Poecile hudsonicus)* SOC	Brown Creeper *(Certhia americana)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC	Varied Thrush *(Ixoreus naevius)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC	Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC	Boreal Owl *(Aegolius funereus)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC	Rufous Hummingbird *(Selasphorus rufus)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*	Cooper's Hawk *(Accipiter cooperii)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
Spruce Grouse *(Canachites canadensis)*	Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*	Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*	Barred Owl *(Strix varia)*
Northern Saw-whet Owl *(Aegolius acadicus)*	Common Nighthawk *(Chordeiles minor)*

Vaux's Swift *(Chaetura vauxi)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Olive-sided Flycatcher *(Contopus cooperi)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Violet-green Swallow *(Tachycineta thalassina)*
Steller's Jay *(Cyanocitta stelleri)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Bohemian Waxwing *(Bombycilla garrulus)*
Cassin's Vireo *(Vireo cassinii)*
Yellow-rumped Warbler *(Setophaga coronata)*
Wilson's Warbler *(Cardellina pusilla)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
American Tree Sparrow *(Spizelloides arborea)*
Fox Sparrow *(Passerella iliaca)*
White-throated Sparrow *(Zonotrichia albicollis)*
Dark-eyed Junco *(Junco hyemalis)*
Rusty Blackbird *(Euphagus carolinus)*
Purple Finch *(Haemorhous purpureus)*
Red Crossbill *(Loxia curvirostra)*
Redpoll *(Acanthis flammea)*
Calliope Hummingbird *(Selasphorus calliope)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Tree Swallow *(Tachycineta bicolor)*
Canada Jay *(Perisoreus canadensis)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Golden-crowned Kinglet *(Regulus satrapa)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Warbling Vireo *(Vireo gilvus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Townsend's Warbler *(Setophaga townsendi)*
Western Tanager *(Piranga ludoviciana)*
Indigo Bunting *(Passerina cyanea)*
Chipping Sparrow *(Spizella passerina)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Lapland Longspur *(Calcarius lapponicus)*
Pine Grosbeak *(Pinicola enucleator)*
White-winged Crossbill *(Loxia leucoptera)*
Pine Siskin *(Spinus pinus)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Gray Comma *(Polygonia progne)* SOC

Vascular Plants

Greenleaf Manzanita *(Arctostaphylos patula)* SOC
Pale Corydalis *(Corydalis sempervirens)* SOC
Coville Indian Paintbrush *(Castilleja covilleana)* SOC
Cascade reedgrass *(Calamagrostis tweedyi)* SOC
Velvetleaf Huckleberry *(Vaccinium myrtilloides)* SOC
Yerba Buena *(Satureja douglasii)* SOC
Lemhi Beardtongue *(Penstemon lemhiensis)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Dwarf Shrew *(Sorex nanus)* PSOC
American Mink *(Neogale vison)*
American Pika *(Ochotona princeps)*
American Badger *(Taxidea taxus)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Prairie Falcon *(Falco mexicanus)*
Mourning Dove *(Zenaida macroura)*
White-throated Swift *(Aeronautes saxatalis)*
Willow Flycatcher *(Empidonax traillii)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Rock Wren *(Salpinctes obsoletus)*
American Pipit *(Anthus rubescens)*
Northern Shrike *(Lanius borealis)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Blackpoll Warbler *(Setophaga striata)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Lazuli Bunting *(Passerina amoena)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
Harris's Sparrow *(Zonotrichia querula)*
Brown-headed Cowbird *(Molothrus ater)*
House Finch *(Haemorhous mexicanus)*
Lewis's Woodpecker *(Melanerpes lewis)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
American Kestrel *(Falco sparverius)*
Wild Turkey *(Meleagris gallopavo)*
Long-eared Owl *(Asio otus)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Eastern Kingbird *(Tyrannus tyrannus)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Northern House Wren *(Troglodytes aedon)*
Cedar Waxwing *(Bombycilla cedrorum)*
Red-eyed Vireo *(Vireo olivaceus)*
Yellow Warbler *(Setophaga petechia)*
Northern Waterthrush *(Parkesia noveboracensis)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Spotted Towhee *(Pipilo maculatus)*
Vesper Sparrow *(Pooecetes gramineus)*
Song Sparrow *(Melospiza melodia)*
Snow Bunting *(Plectrophenax nivalis)*
Bullock's Oriole *(Icterus bullockii)*
American Goldfinch *(Spinus tristis)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Prairie Rattlesnake *(Crotalus viridis)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*
Sierran Treefrog *(Pseudacris sierra)*

Invertebrates

Mariposa Copper *(Tharsalea mariposa)*

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC

Original Concept Authors

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Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28656
System Code	CES306.820, Rocky Mountain Lodgepole Pine Forest

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4237: Rocky Mountain Lodgepole Pine Forest

Literature Cited Above Legend: View Online Publication

- Anderson, M.D. 2003. Pinus contorta var. latifolia. In: Fire Effects Information System, [Online}. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).
- Arno S. F., , Forest Structure and Landscape Patterns in the Subalpine Lodgepole Pine Type: a Procedure for Unintifying Past and Present Conditions
- Bearup, L.A., R.M. Maxwell, D.W. Clow, and J.E. McCray. 2014. Hydrological effects of forest transpiration loss in bark beetle-impacted watersheds. Nature Climate Change 4(6):481-486.
- Cole, W.E. and G.D. Amman. 1969. Mountain pine beetle infestations in relation to lodgepole pine diameters. Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station. Research Note INT-95.8 p.
- Hardy, C.C., R.E. Keane, and C.A. Stewart. 1999. Ecosystem-based management in the lodgepole pine zone. Pp. 18-20 In: The Bitterroot Ecosystem Management Research Project: what we have learned: symposium proceedings. Missoula, MT: USDA Forest Service, Rocky Mountain Research Station. RMRS-P-17.
- Hart, S.J., T. Schoennagel, T.T. Veblen, and T.B. Chapman. 2015. Area burned in the western United States is unaffected by recent mountain pine beetle outbreaks. Proceedings of the National Academy of Sciences 112:4375-4380.
- Hawksworth, F.G., D. Wiens, and B.W. Geils. 2002. Arceuthobium in North America. Mistletoes of North American conifers 29-56.
- Hicke, J.A., M.C. Johnson, J.L. Hayes, and H.K. Preisler. 2012. Effects of bark beetle-caused tree mortality on wildfire. Forest Ecology and Management 271:81-90.
- Hood, S.M. and A. Sala. 2013. Frequent, Low-Intensity Fire Increases Tree Defense To Bark Beetles. Abstract. Fall Meeting of the American Geophysical Union. 7 p.
- Jolly, W.M., R.A. Parsons, A.M. Hadlow, G.M. Cohn, S.S. McAllister, J.B. Popp, and J.F. Negron. 2012. Relationships between moisture, chemistry, and ignition of Pinus contorta needles during the early stages of mountain pine beetle attack. Forest Ecology and Management 269:52-59.
- Kipfmueller, K.F. and W.L. Baker. 1998. Fires and dwarf mistletoe in a Rocky Mountain lodgepole pine ecosystem. Forest Ecology and Management 108(1):77-84.
- Kulakowski, D. and D. Jarvis. 2013. Low-severity fires increase susceptibility of lodgepole pine to mountain pine beetle outbreaks in Colorado. Forest Ecology and Management 289:544-550.
- Kurz, W.A., C.C. Dymond, G. Stinson, G.J. Rampley, E.T. Neilson, A.L. Carroll, and L. Safranyik. 2008. Mountain pine beetle and forest carbon feedback to climate change. Nature 452(7190):987-990.

- Mikkelson, K.M., L.A. Bearup, R.M. Maxwell, J D. Stednick, J.E. McCray, and J.O. Sharp. 2013. Bark beetle infestation impacts on nutrient cycling, water quality and interdependent hydrological effects. Biogeochemistry 115(1-3):1-21.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.
- Raffa, K.F., B.H. Aukema, B.J. Bentz, A.L. Carroll, J.A. Hicke, M.G. Turner, and W.H. Romme. 2008. Cross-scale drivers of natural disturbances prone to anthropogenic amplification: the dynamics of bark beetle eruptions. Bioscience 58(6): 501-517.
- Schoennagel, T., M. G. Turner, and W. H. Romme. 2003. The influence of fire interval and serotiny on postfire lodgepole pine density in Yellowstone National Park. Ecology 84:2967-2978.
- Simard, M., W.H. Romme, J.M. Griffin, and M.G. Turner. 2011. Do mountain pine beetle outbreaks change the probability of active crown fire in lodgepole pine forests? Ecological Monographs 81(1):3-24.
- Stephens, S.L., J.K. Agee, P.Z. Fulé, M.P. North, W.H. Romme, T.W. Swetnam, and M.G. Turner. 2013. Managing forests and fire in changing climates. Science 342(6154):41-42.

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Burns, R. M., and B. H. Honkala, technical coordinators. 1990a. Silvics of North America: Volume 1. Conifers. USDA Forest Service. Agriculture Handbook 654. Washington, DC. 675 pp.

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Rocky Mountain Ponderosa Pine Woodland and Savanna



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General Description

This system occurs on warm, dry, exposed sites in the foothills of the Rocky Mountains in west-central and central Montana, at the ecotone between grasslands or shrublands and more mesic coniferous forests. Elevations range from 1,066 to 1,676 meters (3,500-5,500 feet), with higher elevation examples mostly confined to central Montana. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops are most common. True savanna types are infrequent; the system is more characteristically an open forest with a grassy understory. In the western part of the state, this system is seen mostly on dry slopes in the rainshadow of the Bitterroot Mountains. East of the Continental Divide, it is most widespread around Helena and Lewistown, although it occurs throughout mountain ranges as far east as the Little Rocky and Bearpaw Mountains. Ponderosa pine (*Pinus ponderosa*) is the dominant conifer. Douglas-fir (*Pseudotsuga menziesii*) and western larch (*Larix occidentalis*) may be present in the tree canopy in the more western areas, but are usually absent. In central Montana, limber pine (*Pinus flexilis*) and horizontal juniper (*Juniperus horizontalis*) are frequently components. Although the understory of ponderosa pine forests is often shrubby in other states, in Montana, habitats are mostly dominated by graminoids, although bitterbrush (*Purshia tridentata*), white snowberry (*Symphoricarpos albus*), and skunkrush (*Rhus trilobata*) occur in forests on benchlands and rocky slopes in the central portion of the state. Understory vegetation is more typically grasses and forbs that resprout following low to moderate intensity surface fires. Prolonged drought, beetle kill and exotic invasion are rapidly changing the dynamics of this system.

Diagnostic Characteristics

Ponderosa pine with grass or shrub understory, tree cover from 10 to 50%, shallow, aridic soils with sandy texture, A soil horizon less than 10 cm, intermediate to polycyclic disturbance intervals

Similar Systems

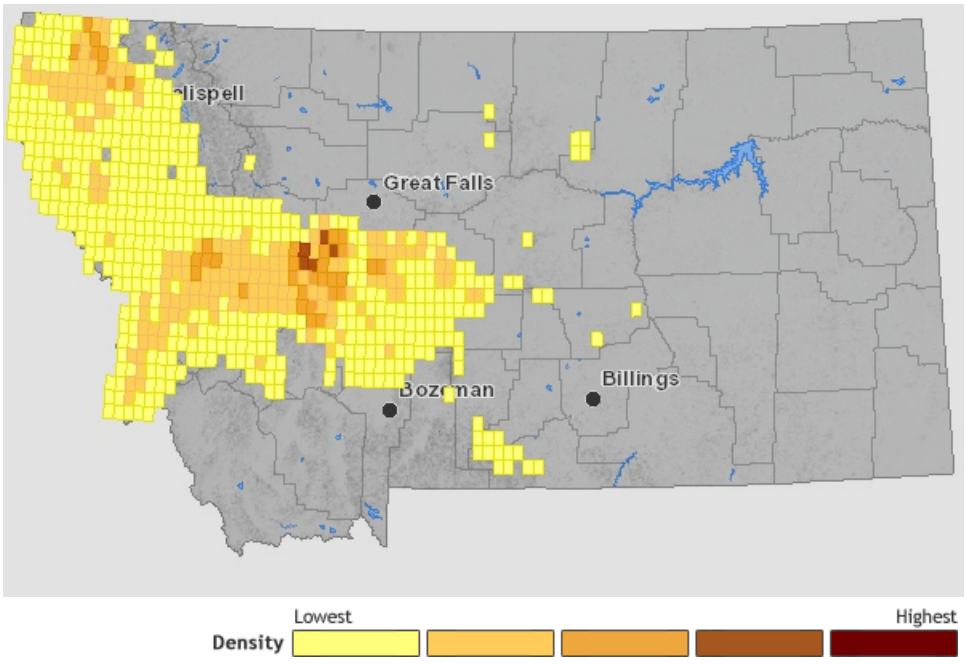
- Great Plains Ponderosa Pine Woodland and Savanna
- Rocky Mountain Foothill Woodland-Steppe Transition

Range

In the western part of the state, this system is seen mostly on dry slopes in the rainshadow of the Bitterroot Mountains. East of the Continental Divide, it is most widespread around Helena and Lewistown, although it occurs throughout mountain ranges as far east as the Little Rocky and Bearpaw Mountains.

Ecological System Distribution

Approximately 2,169 square kilometers are classified as Rocky Mountain Ponderosa Pine Woodland and Savanna in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Meagher, Mineral, Missoula, Musselshell, Park, Phillips, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Matrix

Environment

In western and central Montana, this ecosystem forms a belt on warm, dry, exposed sites between grasslands and Douglas-fir (*Pseudotsuga menziesii*) forests. Elevations range from 1,066 to 1,676 meters (3,500-5,500 feet) (Pfister et al, 1977). This system can occur at higher elevations in central Montana. It is generally found on gravelly soils with good aeration and drainage and a neutral to slightly acidic pH.

Vegetation

Ponderosa pine is the dominant conifer. Douglas-fir and western larch may be present in the tree canopy in the more western areas, but are usually absent. In central Montana, limber pineand horizontal juniperare often components. Although the understory for ponderosa pine forests is often shrubby in other states, in Montana, habitats are mostly dominated by grasses, although antelope bitterbrush, snowberry, serviceberry (*Amelanchier alnifolia*), bearberry (*Arctostaphylos uva-ursi*), common juniper (*Juniperus communis*) and skunkbush occur in forests on benchlands and rocky slopes in the central portion of the state. Understory vegetation is more typically fire-resistant grasses and forbs that resprout following surface fires. High shrub cover, understory trees, and downed logs are uncommon. These more open stands support grasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*), which is usually dominant, prairie junegrass (*Koeleria macrantha*) and needle and thread (*Hesperostipa comata*), as well as dryland sedges likethreadleaf

sedge (*Carex filifolia*) and sun sedge (*Carex inops* ssp. *heliophila*). On more mesic sites,bluebunch wheatgrass occurs as the dominant graminoid species with Idaho fescue (*Festuca idahoensis*) and rough fescue (*Festuca campestris*). In central Montana, soapweed yucca (*Yucca glauca*), Pennsylvania sedge (*Carex pennsylvanica*), grama (*Bouteloua spp.*) and bluestem (*Andropogon spp.*) occur on especially dry sites. Common herbaceous forbs include yarrow (*Achillea millefolium*), pink pussytoes (*Antennaria rosea*), arrowleaf balsamroot (*Balsamorhiza sagittata),* Indian blanket flower (*Gaillardia aristata*), and silky lupine (*Lupinus sericeus*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3207 *Artemisia tridentata ssp. spiciformis - Artemisia tridentata ssp. Vaseyana* Steppe & Shrubland Alliance
A3395 *Pseudotsuga menziesii - Pinus ponderosa* / Herbaceous Understory Central Rocky Mountain Woodland Alliance
- **CEGL000900** *Pseudotsuga menziesii - Festuca idahoensis* Woodland
- **CEGL000901** *Pseudotsuga menziesii - Festuca campestris* Woodland
- **CEGL000908** *Pseudotsuga menziesii - Pseudoroegneria spicata* Woodland

A3446 *Pinus ponderosa* / Shrub Understory Central Rocky Mountain Woodland Alliance
- **CEGL000189** *Pinus ponderosa - Physocarpus malvaceus* Forest
- **CEGL000195** *Pinus ponderosa - Purshia tridentata - Festuca idahoensis* Woodland
- **CEGL000197** *Pinus ponderosa - Purshia tridentata - Pseudoroegneria spicata* Woodland
- **CEGL000203** *Pinus ponderosa - Symphoricarpos albus* Forest
- **CEGL005841** *Pinus ponderosa - Vaccinium caespitosum* Woodland

A3447 *Pinus ponderosa* / Herbaceous Understory Central Rocky Mountain Open Woodland Alliance
- **CEGL000857** *Pinus ponderosa - Festuca idahoensis* Woodland
- **CEGL000865** *Pinus ponderosa - Pseudoroegneria spicata* Woodland

A3464 *Pinus ponderosa* Dry-Mesic Black Hills Forest & Woodland Alliance
- **CEGL000187** *Pinus ponderosa - Mahonia repens* Forest
- **CEGL000859** *Pinus ponderosa - Juniperus communis* Woodland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Under natural conditions, ponderosa pine woodlands and grasslands are maintained by frequent surface fires (Arno, 1980), and in western Montana low-severity fires occur at mean return intervals of 15 to 23 years (Smith and Fischer, 1997). Fires in this system generally occur in the early spring or late fall when conditions are wet or when trees are dormant, increasing their fire resistance (Habeck, 1992). In comparison to the Great Plains Ponderosa Pine Woodland and Savanna system in central and eastern Montana, this system experiences a larger percentage of mixed-severity fires (U.S. Department of Agriculture, 2012). The threat of stand-replacing fires is high in areas where periodic fire has been suppressed. A study at the Sawmill Resource Natural Area in the Bitterroot National Forest found an average fire return interval of 13 years prior to the initiation of systematic fire suppression policies. The thick bark and open crown structure of ponderosa pines allows them to withstand fire, a necessity in this system to control competition and allow for successful regeneration. In the absence of fire, forest density increases, and fire-intolerant species like Douglas-fir become more common (Gayton et al., 2006). Increased forest density also leads to increased incidence of high severity fires and greater susceptibility to insect attack (Jenkins et al., 2014; Habeck, 1992).

Many biotic disturbances affect this system. Seedlings and saplings can be deformed by shoot borers (*Eucosma sonomana*) and tip moths (*Rhyacionia bushnelli*), and defoliation can occur as a result of insects like the pine butterfly (*Neophasia menapia*). The insects that cause the most extensive mortality in this system are of the genus *Dendroctonus*, and include the western pine beetle (*Dendroctonus brevicomis*) and the mountain pine beetle (*Dendroctonus ponderosae*) (Graham and Jain, 2005; Habeck, 1992). Bark beetles generally occur at endemic levels in this system. However, in recent years, prolonged summer drought, milder winters, and exclusion of low severity fires resulting in increased stand density have contributed to greater susceptibility to and increasing severity of bark beetle outbreaks (Kolb et al., 2007). Fire may also decrease tree defenses to beetle attack immediately post-fire, resulting in increased vulnerability to insect attack (Davis et al., 2012). Additionally, pathogens like dwarf mistletoe (*Arceuthobium campylopodum*) influence ponderosa pine growth rates and interact with the effects of beetle attacks to increase downed woody surface fuels (Klutsch et al., 2014). Ponderosa pine mortality is high in many areas of Montana, especially in the west-central area of the state. Increased incidence of beetle outbreaks in ponderosa pine stands can have ecosystem-level effects including changes to carbon cycling (Kurz et al., 2008), hydrology (Bearup et al., 2014; Mikkelson et al., 2013), and fuel structure and flammability (Hicke et al., 2012; Jolly et al., 2012).

Grazing by domestic livestock may reduce bunchgrasses, and in cases of intensive overgrazing, cheatgrass (*Bromus tectorum*) may be dominant in the understory. Disturbances including wind, snow, and ice result in decreased stand density and provide canopy openings that allow for regeneration (Graham and Jain, 2005).

Management

In the absence of natural fire, periodic prescribed burning in late fall, selective thinning, and reduction of ladder and basal fuels to prevent crown fires can be used to maintain and restore this system to similar pre-settlement conditions. Habeck (1992) suggests prescribed burning at intervals of 20 to 25 years to maintain ponderosa pine dominance and nutrient cycling within this system. Prescribed burning may increase long-term mortality of old growth ponderosa pine, particularly

when combined with increased drought stress (Kolb et al., 2007). Thinning of understory trees and removal of ladder fuels and accumulated organic matter from the base of large trees may be necessary to protect old growth from mortality during prescribed burns (Kolb et al., 2007). Mechanical thinning has the added benefit of decreasing stand susceptibility to mountain pine beetle attack and dwarf mistletoe as outbreaks are generally associated with high stand densities (Jenkins et al., 2014; Klutsch et al., 2014).

Periodic burning is used to expose mineral soils, provide nutrient availability, reduce competition, stimulate native grass and forb production, increase basal diameter growth of overstory ponderosa pine, and provide favorable seedbeds. Management actions that increase basal diameter growth may also favor resistance to bark beetle attacks (Kolb et al., 2007). In some cases, especially on sites heavily infested with cheatgrass, frequent prescribed burning may stimulate greater cheatgrass cover following fire, especially if the burn does not eliminate the seed bank. Increasing time between prescribed fires may inhibit cheatgrass by increasing surface fuels (both herbaceous and litter) which directly inhibit establishment. Postfire cheatgrass dominance has been shown to be most strongly controlled by the pre-fire seed bank, soil moisture, fire intensity, soil nitrogen, and duration of direct sunlight (Keeley and McGinnis 2007). Excessive grazing can lead to the loss of the most common perennial grasses and increased abundance of exotic grasses. Cheatgrass establishment in low-elevation ponderosa pine and Douglas-fir forests can be enhanced by disturbance that opens the understory, removes litter, or both (Mack and Pyke 1983). Prolific seed production also contributes to the competitive advantage of this grass over native grasses and associated perennial forbs.

Restoration Considerations

Post-fire restoration strategies will depend largely on fire severity. Because fire creates favorable seedbeds for seedling establishment, lightly burned areas recover quite quickly from fire and restoration practices are generally not necessary. In cases where severe, stand-replacing fires have occurred, reseeding or replanting efforts may be necessary. When supplemental seeding or planting is necessitated, germination and seedling survival are enhanced by a period of cold stratification and relatively moist conditions (Habeck, 1992). To ensure successful establishment, repeated browsing by deer or trampling by livestock should be minimized (Habeck, 1992).

Wildfire severity and frequency are expected to increase in this system threatening old growth ponderosa pine stands that historically experienced frequent low-severity fires. In the absence of natural fire, restoration treatments such as mechanical thinning or prescribed burning reduce fuels that accumulate in the understory leading to high intensity, stand replacing fires. Additional benefits of thinning include a reduction of competition stress on old trees, which may in turn reduce mortality associated with drought and mountain pine beetles (Jenkins et al., 2014; Kolb et al., 2007).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological

system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Grizzly Bear *(Ursus arctos)* SOC	American Bison *(Bos bison)* SOC
Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Western Water Shrew *(Sorex navigator)*
Northern Montane Shrew *(Sorex obscurus)*	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Snowshoe Hare *(Lepus americanus)*
White-tailed Jackrabbit *(Lepus townsendii)*	Least Chipmunk *(Neotamias minimus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Red-tailed Chipmunk *(Neotamias ruficaudus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Flying Squirrel *(Glaucomys sabrinus)*	Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Western Heather Vole *(Phenacomys intermedius)*
Meadow Vole *(Microtus pennsylvanicus)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Northwestern Jumping Mouse *(Zapus saltator)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	American Black Bear *(Ursus americanus)*
Raccoon *(Procyon lotor)*	Marten *(Martes americana)*
Least Weasel *(Mustela nivalis)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Bald Eagle *(Haliaeetus leucocephalus)*	American Goshawk *(Accipiter atricapillus)* SOC
Golden Eagle *(Aquila chrysaetos)* SOC	Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC	Flammulated Owl *(Psiloscops flammeolus)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC	Black-backed Woodpecker *(Picoides arcticus)* SOC
Pileated Woodpecker *(Dryocopus pileatus)* SOC	Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC	Brown Creeper *(Certhia americana)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC	Varied Thrush *(Ixoreus naevius)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC	Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Eastern Screech-Owl *(Megascops asio)* PSOC	Western Screech-Owl *(Megascops kennicottii)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Rufous Hummingbird *(Selasphorus rufus)* PSOC
Turkey Vulture *(Cathartes aura)*	Sharp-shinned Hawk *(Accipiter striatus)*
Cooper's Hawk *(Accipiter cooperii)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Peregrine Falcon *(Falco peregrinus)*
Prairie Falcon *(Falco mexicanus)*	Spruce Grouse *(Canachites canadensis)*
Dusky Grouse *(Dendragapus obscurus)*	Ruffed Grouse *(Bonasa umbellus)*
Wild Turkey *(Meleagris gallopavo)*	Mourning Dove *(Zenaida macroura)*
American Barn Owl *(Tyto furcata)*	Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*	Barred Owl *(Strix varia)*
Long-eared Owl *(Asio otus)*	Northern Saw-whet Owl *(Aegolius acadicus)*
Common Nighthawk *(Chordeiles minor)*	Black-chinned Hummingbird *(Archilochus alexandri)*

Calliope Hummingbird *(Selasphorus calliope)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Western Kingbird *(Tyrannus verticalis)*
Violet-green Swallow *(Tachycineta thalassina)*
Canada Jay *(Perisoreus canadensis)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Rock Wren *(Salpinctes obsoletus)*
Golden-crowned Kinglet *(Regulus satrapa)*
Western Bluebird *(Sialia mexicana)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Northern Mockingbird *(Mimus polyglottos)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Red-eyed Vireo *(Vireo olivaceus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Townsend's Warbler *(Setophaga townsendi)*
Blackpoll Warbler *(Setophaga striata)*
Northern Waterthrush *(Parkesia noveboracensis)*
Common Yellowthroat *(Geothlypis trichas)*
Western Tanager *(Piranga ludoviciana)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Song Sparrow *(Melospiza melodia)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Pine Grosbeak *(Pinicola enucleator)*
Red Crossbill *(Loxia curvirostra)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Olive-sided Flycatcher *(Contopus cooperi)*
Willow Flycatcher *(Empidonax traillii)*
Dusky Flycatcher *(Empidonax oberholseri)*
Say's Phoebe *(Sayornis saya)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Steller's Jay *(Cyanocitta stelleri)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Northern House Wren *(Troglodytes aedon)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Yellow-rumped Warbler *(Setophaga coronata)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Fox Sparrow *(Passerella iliaca)*
White-throated Sparrow *(Zonotrichia albicollis)*
Dark-eyed Junco *(Junco hyemalis)*
Brown-headed Cowbird *(Molothrus ater)*
Purple Finch *(Haemorhous purpureus)*
Pine Siskin *(Spinus pinus)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Northern Rubber Boa *(Charina bottae)*
Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*
Western Skink *(Plestiodon skiltonianus)* SOC
North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Sierran Treefrog *(Pseudacris sierra)*
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC

Vascular Plants

Sandweed *(Athysanus pusillus)* SOC
Douglas Bladderpod *(Physaria douglasii)* SOC
Latah Tule Pea *(Lathyrus bijugatus)* SOC
Scribner's Panic Grass *(Dichanthelium oligosanthes var. scribnerianum)* SOC
Puzzling Rockcress *(Sandbergia perplexa)* SOC
Lesser Rushy Milkvetch *(Astragalus convallarius)* SOC
Coville Indian Paintbrush *(Castilleja covilleana)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Fisher *(Pekania pennanti)* SOC
Canada Lynx *(Lynx canadensis)* SOC
Moose *(Alces alces)*
Wolverine *(Gulo gulo)* SOC
Spotted Bat *(Euderma maculatum)* PSOC

Birds

Green-tailed Towhee *(Pipilo chlorurus)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Killdeer *(Charadrius vociferus)*
Snowy Owl *(Bubo scandiacus)*
White-throated Swift *(Aeronautes saxatalis)*
Bank Swallow *(Riparia riparia)*
Clay-colored Sparrow *(Spizella pallida)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Great Gray Owl *(Strix nebulosa)* PSOC
Northern Harrier *(Circus hudsonius)*
Rock Pigeon *(Columba livia)*
Vaux's Swift *(Chaetura vauxi)*
Eastern Kingbird *(Tyrannus tyrannus)*
Barn Swallow *(Hirundo rustica)*
Vesper Sparrow *(Pooecetes gramineus)*
White-crowned Sparrow *(Zonotrichia leucophrys)*

Red-winged Blackbird *(Agelaius phoeniceus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
House Finch *(Haemorhous mexicanus)*
Western Meadowlark *(Sturnella neglecta)*
Bullock's Oriole *(Icterus bullockii)*
American Goldfinch *(Spinus tristis)*

Reptiles

Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Pale Swallowtail *(Pterourus eurymedon)*
Field Crescent *(Phyciodes pulchella)*
Greenish Blue *(Icaricia saepiolus)*

Vascular Plants

Spalding's Catchfly *(Silene spaldingii)* SOC

Original Concept Authors

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Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28445
System Code	CES306.030, Northern Rocky Mountain Ponderosa Pine Woodland and Savanna

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4240: Northern Rocky Mountain Ponderosa Pine Woodland and Savanna

Literature Cited Above Legend: View Online Publication

- Bearup, L.A., R.M. Maxwell, D.W. Clow, and J.E. McCray. 2014. Hydrological effects of forest transpiration loss in bark beetle-impacted watersheds. Nature Climate Change 4(6):481-486.
- Davis, R.S., S. Hood, and B.J. Bentz. 2012. Fire-injured ponderosa pine provide a pulsed resource for bark beetles. Canadian Journal of Forest Research 42:2022-2036.
- Graham, R.T. and T.B. Jain. 2005. Ponderosa pine ecosystems. pp. 1-32. In: Proceedings of the Symposium on Ponderosa Pine: Issues, Trends, and Management, Gen. Tech. Rep. PSW-GTR-198. Albany CA: Pacific Southwest Research Station, Forest Service, US Department of Agriculture, Klamath Falls, OR.
- Habeck, R.J. 1992. Pinus ponderosa var. ponderosa. In: Fire Effects Information System. Missoula, MT: USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. 1 p.
- Hicke, J.A., M.C. Johnson, J.L. Hayes, and H.K. Preisler. 2012. Effects of bark beetle-caused tree mortality on wildfire. Forest Ecology and Management 271:81-90.
- Jenkins, M.J., J.B. Runyon, C.J. Fettig, W.G. Page, and B.J. Bentz. 2014. Interactions among the mountain pine beetle, fires, and fuels. Forest Science 60:489-501.
- Jolly, W.M., R.A. Parsons, A.M. Hadlow, G.M. Cohn, S.S. McAllister, J.B. Popp, and J.F. Negron. 2012. Relationships between moisture, chemistry, and ignition of Pinus contorta needles during the early stages of mountain pine beetle attack. Forest Ecology and Management 269:52-59.
- Klutsch, J.G., R.D. Beam, W.R. Jacobi, and J.F. Negrón. 2014. Bark beetles and dwarf mistletoe interact to alter downed woody material, canopy structure, and stand characteristics in northern Colorado ponderosa pine. Forest Ecology and Management 315:63-71.
- Kolb, T.E.,J.K. Agee, P.Z. Fule, N.G. McDowell, K. Pearson, A.Sala, and R.H. Waring. 2007. Perpetuating old ponderosa pine. Forest Ecology and Management 249(3):141-157.
- Kurz, W.A., C.C. Dymond, G. Stinson, G.J. Rampley, E.T. Neilson, A.L. Carroll, and L. Safranyik. 2008. Mountain pine beetle and forest carbon feedback to climate change. Nature 452(7190):987-990.

- Mikkelson, K.M., L.A. Bearup, R.M. Maxwell, J D. Stednick, J.E. McCray, and J.O. Sharp. 2013. Bark beetle infestation impacts on nutrient cycling, water quality and interdependent hydrological effects. Biogeochemistry 115(1-3):1-21.
- Smith, J. K. and W. C. Fischer. 1997. Fire ecology of the forest habitat types of northern Idaho. Gen. Tech. Rep. INT-GTR-363. USDA Forest Service, Ogden, UT.
- U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Northern Rocky Mountain Ponderosa Pine Communities. In: Fire Effects Information System. Missoula, MT: USDA Forest Servic

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Aguirre, Lucrecia, and Douglas A. Johnson. 1991. "Influence of Temperature and Cheatgrass Competition on Seedling Development of Two Bunchgrasses". *Journal of Range Management.* 44 (4): 347-354.
- Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.
- Gayton DV, Weber MH, Harrington M, Heyerdahl DK, Sutherland BB, Hall C, Hartman M, Peterson L, Merrel C. 2006. Fire history of a western Montana ponderosa pine grassland: A pilot study. In: Speer JH, editor. Experiential learning and exploratory research: The 13th annual North American dendroecological fieldweek (NADEF). Prof. Paper Ser. No. 23. Terre Haute, IN: Department of Geography, Geology, and Anthropology, Indiana State University; p 30-6.
- Keeley, J. E., and T. W. Mcginnis. 2007. "Impact of Prescribed Fire and Other Factors on Cheatgrass Persistence in a Sierra Nevada Ponderosa Pine Forest". *International Journal of Wildland Fire.* 16 (1): 96-106.
- Mack, Richard N., and David A. Pyke. 1983. "The Demography of Bromus Tectorum: Variation in Time and Space". *The Journal of Ecology.* 71 (1): 69-93.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Rocky Mountain Ponderosa Pine Woodland and Savanna — Northern Rocky Mountain Ponderosa Pine Woodland and Savanna. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=4240

Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland

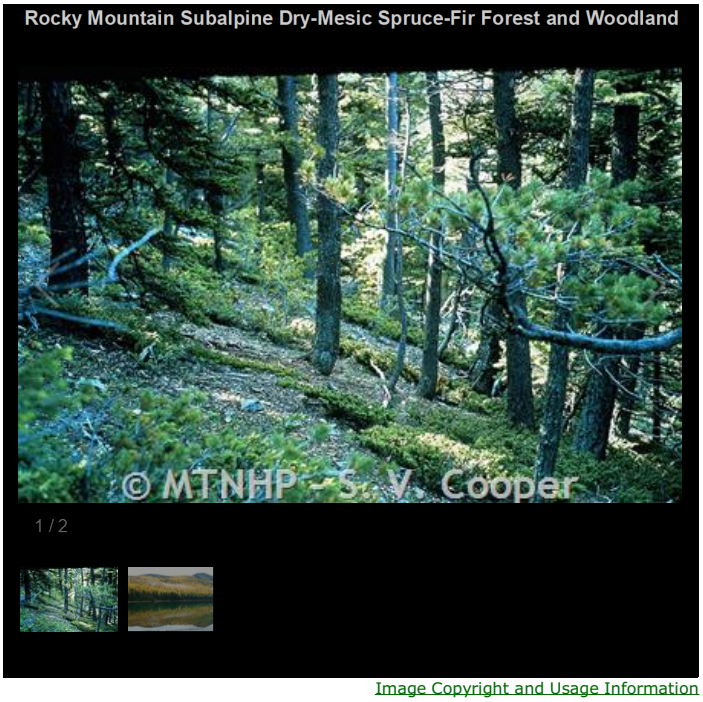


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General Description

Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) make up a substantial part of the montane and lower subalpine forests of the Montana Rocky Mountains and mountain island ranges of north-central and west-central Montana. Spruce is usually associated with fir and occurs as either a climax co-dominant or as a persistent, long-lived seral species in most upper elevation fir habitat types. Dry to mesic spruce-dominated forests range from 884-1,585 meters (2,900-5,200 feet) west of the Continental Divide, and 1585-2,073 meters (5,200-6,800 feet) east of the Continental Divide in the northern and central portions of the state. This system can be found at elevations up to 2,896 meters (9,500 feet) in southwestern Montana. Forests are found on gentle to very steep mountain slopes, high-elevation ridge tops and upper slopes, plateau-like surfaces, basins, alluvial terraces, well-drained benches, and inactive stream terraces. Tree canopy characteristics are relatively uniform. In northern Montana, Engelmann spruce hybridizes with its boreal counterpart, white spruce (*Picea glauca*). Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and western larch (*Larix occidentalis*) (west of the Continental Divide) are seral but often present in these forests. The understory is comprised of a mixture of shrubs, forbs and graminoids tolerant of warmer and drier soil conditions than those found on the more mesic to wet spruce-fir system. The drier occurrences of this system are especially common on steep slopes at upper elevations throughout the eastern Rocky Mountains, whereas the more mesic occurrences form substantial cover west of the Continental Divide in the Flathead, Lolo, Bitterroot and Kootenai river drainages.

Diagnostic Characteristics

Forest and Woodland, ustic and acidic soils, long persistence, *Picea engelmannii, Abies lasiocarpa*

Similar Systems

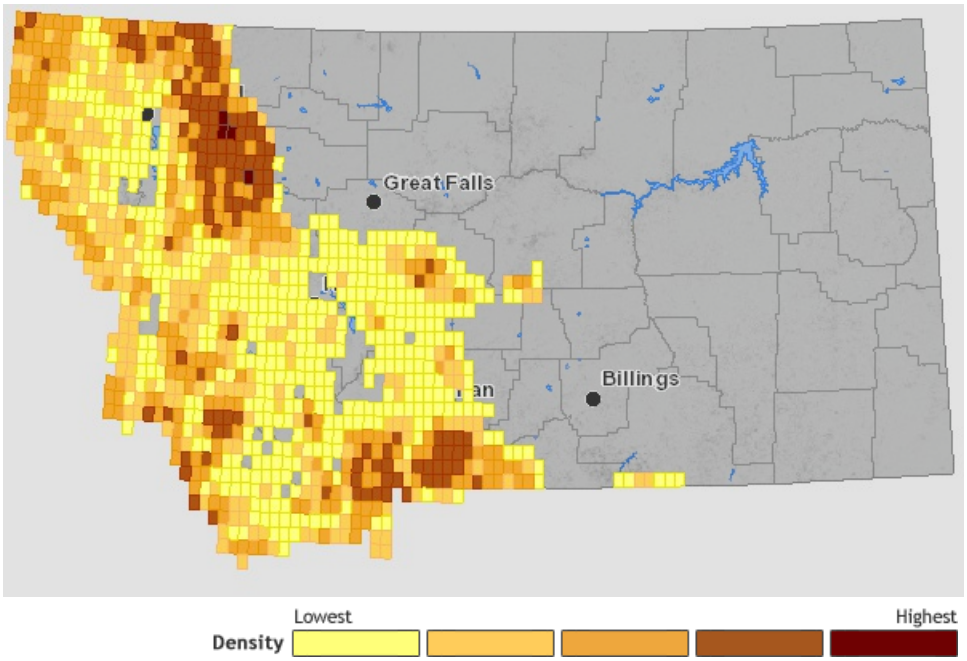
- Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest
- Rocky Mountain Montane Douglas-fir Forest and Woodland
- Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland
- Rocky Mountain Subalpine Woodland and Parkland

Range

Engelmann spruce and subalpine fir forests comprise a substantial part of the subalpine forests of the Montana Rocky Mountains, including the island ranges of north-central and west-central Montana and southern Montana. In the driest mountain ranges east of the Continental Divide (such as the Bull Mountains, Snowy Mountains, Pryor Mountains, and Dillon area), these forests are restricted to cool exposures, usually on north and east facing aspects. The drier habitats within this system are especially common on steep slopes at upper elevations throughout the Montana Rocky Mountains. The more mesic habitats within this system are very common west of the Continental Divide in the Flathead, Lolo, Bitterroot, and Kootenai river drainages.

Ecological System Distribution

Approximately 11,706 square kilometers are classified as Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Cascade, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Matrix

Environment

This system forms a belt at relatively low to high elevations west of the Continental Divide and mid to high elevations east of the Divide throughout the Montana Rocky Mountains and island ranges of north-central and west-central Montana. Soils are derived from a variety of parent materials, and are usually rocky or gravelly with good aeration and drainage, but are usually acidic. Occurrences are typically found in locations with cold-air drainage or ponding, or where snowpacks linger late into the summer, such as north-facing slopes and high-elevation ravines. They can extend down in elevation below the subalpine zone in places where cold-air ponding occurs, especially on north and east aspects. Dry to mesic spruce-dominated forests range from 884 to 1,585 meters (2,900-5,200 feet) west of the Continental Divide, and 1585 to 2,073 meters (5,200-6,800 feet) east of the Continental Divide in the northern and central portions of the state. They can be found at elevations up to 2,896 meters (9,500 feet) in southwestern Montana.

Vegetation

Tree canopy characteristics are relatively uniform, with Engelmann spruce and subalpine fir dominating, either mixed or alone. In northern Montana, Engelmann spruce hybridizes with its boreal counterpart, white spruce. Spruce is more tolerant of extreme environmental conditions than subalpine fir, and is usually more dominant in the drier and wettest habitats within this system. Douglas-fir, lodgepole pine, and western larch (west of the Continental Divide) are seral but often present in these forests. Mountain hemlock (*Tsuga mertensiana*) occurs as small to large patches within the matrix of this mesic spruce-fir system, but only in the coldest and wettest environments of northwestern Montana.

The understory of these forests often supports diverse stands of ericaceous shrubs, such as rusty leaf menziesia (*Menziesia ferruginea*), dwarf huckleberry (*Vaccinium caespitosum),* mountain huckleberry (*Vaccinium membranaceum*), dwarf bilberry (*Vaccinium myrtillus*) and mountain heath (*Phyllodoce* species). Grouse whortleberry (*Vaccinium scoparium)* is common on mesic sites. Cascade azalea (*Rhododendron albiflorum*) occurs in association with mountain hemlock and subalpine fir in some mesic occurrences in northwestern Montana.Other common shrubs include Rocky Mountain maple (*Acer glabrum*), serviceberry (*Amelanchier alnifolia*),Utah honeysuckle (*Lonicera utahensis*), ninebark (*Physocarpus malvaceus*),currant (*Ribes*species), thimbleberry (*Rubus parviflorus*)*,* birch leaf spiraea (*Spiraea betulifolia)* and common snowberry (*Symphoricarpos albus*)*.* On the driest sites in the Bighorn Mountains,big sagebrush (*Artemisia tridentata*) may be present.Smooth woodrush (*Luzula glabrata* var. *hitchcockii*)is the most common graminoid on mesic sites at higher elevations. Pinegrass (*Calamagrostis rubescens),* Geyer's sedge (*Carex geyeri*), and Ross' sedge (*Carex rossi*) are common on drier sites*.* Forb diversity varies depending on moisture conditions. Species includebaneberry *(Actaea rubra*), arnica (*Arnica* species),Columbia clematis *(Clematis occidentalis*), queen's cup beadlily (*Clintonia uniflora*), bunchberry dogwood (*Cornus canadensis*), fragrant bedstraw (*Galium triflorum*), twinflower (*Linnaea borealis*), clasp-leaf twisted stalk (*Streptopus amplexifolius*), western meadow rue (*Thalictrum occidentale*) and beargrass (*Xerophyllum tenax*)*.*

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3614 *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Moist Forest Alliance
- **CEGL000311** *Abies lasiocarpa / Picea engelmannii - Galium triflorum* Forest
- **CEGL000315** *Abies lasiocarpa / Picea engelmannii - Linnaea borealis* Forest
- **CEGL000319** *Abies lasiocarpa / Picea engelmannii - Menziesia ferruginea* Forest
- **CEGL000337** *Abies lasiocarpa / Picea engelmannii - Symphoricarpos albus* Forest
- **CEGL000338** *Abies lasiocarpa / Picea engelmannii - Thalictrum occidentale* Forest
- **CEGL000340** *Abies lasiocarpa / Picea engelmannii - Vaccinium caespitosum* Forest
- **CEGL000341** *Abies lasiocarpa / Picea engelmannii - Vaccinium membranaceum* Rocky Mountain Forest
- **CEGL000346** *Abies lasiocarpa - Xerophyllum tenax* Forest
- **CEGL000406** *Picea (engelmannii x glauca, engelmannii) - Clintonia uniflora* Forest
- **CEGL002174** *Picea engelmannii - Galium triflorum* Forest
- **CEGL002689** *Picea engelmannii - Linnaea borealis* Forest

A3615 *Abies lasiocarpa - Picea engelmannii* Southern Rocky Mountain Moist Forest Alliance

A3640 *Abies lasiocarpa - Picea engelmannii - Pinus flexilis* Dry-Mesic Rocky Mountain Krummholz Alliance
- **CEGL000985** *Abies lasiocarpa / Picea engelmannii* Krummholz

A3643 *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Dry-Mesic Forest Alliance
- **CEGL000298** *Abies lasiocarpa / Picea engelmannii - Arnica cordifolia* Forest
- **CEGL000299** *Abies lasiocarpa / Picea engelmannii - Arnica latifolia* Forest
- **CEGL000301** *Abies lasiocarpa / Picea engelmannii - Calamagrostis rubescens* Forest
- **CEGL000304** *Abies lasiocarpa / Picea engelmannii - Carex geyeri* Forest
- **CEGL000344** *Abies lasiocarpa / Picea engelmannii - Vaccinium scoparium* Forest
- **CEGL000368** *Picea engelmannii - Hypnum revolutum* Forest
- **CEGL000381** *Picea engelmannii - Vaccinium scoparium* Forest
- **CEGL000919** *Abies lasiocarpa / Picea engelmannii - Juniperus communis* Woodland
- **CEGL005925** *Picea engelmannii - Juniperus communis* Forest

A3644 *Abies lasiocarpa - Picea engelmannii* Dry-Mesic Scree & Talus Woodland Alliance
- **CEGL000925** *Abies lasiocarpa* Scree Woodland

A3948 *Valeriana sitchensis - Luzula glabrata var. hitchcockii - Xerophyllum tenax* Subalpine Mesic Meadow Alliance
- **CEGL005856** *Chamerion angustifolium* Rocky Mountain Meadow

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Major disturbances include occasional blowdown, insect outbreaks (30-50 years), and fire. Fire return intervals average approximately 130 years and are either mixed severity or stand replacing (U.S. Department of Agriculture, 2012). Fires in this system are generally more frequent and less intense than those in the Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland system. Both subalpine fir and Engelmann spruce are highly susceptible to fire, in part due to their shallow roots, thin bark, and dense stand growth habits (Alexander and Shepperd, 1990; Uchytil, 1991). Following fire, spruce is more successful at establishing on mineral soils. Subalpine fir, in contrast, is better at establishing in the shade and on organic substrates. Post-fire, subalpine fir establishment may be immediate if nearby seed sources exist and seral lodgepole pine is not present. In forests undisturbed by fire or subjected to spruce budworm attacks, subalpine fir assumes greater dominance. Over a period of 500 years, subalpine fir will largely replace spruce within most habitats of this system.

Insects and disease can play a major role in the successional direction of these forests. Throughout Montana, subalpine fir and spruce are affected by western spruce budworm (*Choristoneura occidentalis*) attacks. The spruce beetle (*Dendroctonus rufipennis*) also causes extensive damage to spruce in this system. Severe wind events that cause extensive blowdown are often followed by spruce beetle outbreaks, as downed trees provide an abundant food supply and are favored by the beetles (Lindemann and Barker, 2001). Other disturbances that cause an abundance of downed material, including landslides and avalanches, may also contribute to increases in beetle populations within a region (Jenkins et al., 2014). When outbreak conditions occur, or when downed material is unavailable, spruce beetles will also attack live trees, favoring large size classes and overmature individuals (Alexander and Shepperd, 1990). Beetle outbreaks have implications for watershed function, wildlife habitat, recreation, and stand species composition (Jenkins et al., 2014).

Historically, spruce beetle outbreaks have been related to drought conditions as drought weakens spruce resistance mechanisms to beetle attack (DeRose and Long, 2012; Jenkins et al., 2014). Drought has additionally been found to have lag effects on mortality for spruce, subalpine fir and lodgepole pine in this system, with drought having the most substantial and long-lasting effects on subalpine fir, and the smallest impact on lodgepole pine (Bigler et al., 2007). Large stands of these subalpine forests can be killed following several years of drought or unusually mild winters.

Spruce broom rust (*Chrysomyxa arctostaphyli*) also occurs in this system causing deformation, and increased vulnerability to windbreak (Alexander and Shepperd, 1990). Subalpine fir is additionally affected by western balsam bark beetle (*Dryocoetes confuses*), balsam wooly adelgid (*Adelges piceae*), and the fir engraver beetle (*Scolytus ventralis*). Root and wood rots also affect the dominant species in this system by weakening their defenses to insect attack and increasing vulnerability to windfall (Jenkins et al., 2014).

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system. Maintaining historic fire return intervals may decrease stand susceptibility to spruce beetle outbreak (Bebi et al, 2003; Kulakowski and Veblen, 2006). Old stands have a greater abundance of downed material and overmature individuals that are vulnerable to attack. Moderate to severe fires change the age structure of a stand thereby decreasing susceptibility to future beetle attack (Kulakowski and Veblen, 2006).

All species in this system are vulnerable to windthrow. Mechanical thinning for silvicultural or fire risk reduction purposes should therefore consider stand blowdown as a potential result of thinning treatment. Risk of windfall increases in stands with shallow soils and poor drainage, high degree of root and wood rot, and old, dense stand structure (Alexander and Shepperd, 1990). Alternatively, thinning may be useful to promote natural regeneration and reduce abundance of overmature individuals in a stand, altering stand age structure, and thereby decreasing susceptibility to future spruce beetle outbreaks. However, logging residue may contribute to beetle population increases, and downed woody material may therefore need to be removed from the site to reduce potential for future beetle outbreak (Jenkins et al., 2014).

Restoration Considerations

Post-fire restoration strategies will be largely dependent on the severity of the fire. Because lightly burned areas recover quite quickly from fire, reseeding is usually not necessary if an intact, native understory was present before the fire. Early successional stages may be dominated by fireweed, arnica, aster, pearly everlasting (*Anaphalis margaritacea*), mountain hollyhock (*Iliamina rivularis*) and other forbs, and small amounts of forest graminoids. Both dominant species are good seed producers and are capable of regenerating well following fire. Spruce is capable of regenerating well on bare mineral soils if adequate moisture is present during the first two years of growth. Subalpine fir colonizes sites with both mineral soil and those with some organic matter. At the higher elevation occurrences of this system, seedling survival may be greater where duff seedbeds are present as they protect seedlings from harsh climatic conditions (Uchytil, 1991).

Large, prescribed, stand-replacement fires are not recommended in areas where spruce is in severe decline. Small-scale prescribed burning during late fall after several hard frosts can facilitate regeneration and increase stand heterogeneity in terms of age structure and species composition, thereby decreasing susceptibility to insect outbreaks (Jenkins et al., 2014). In some cases, nursery stock may be used to expedite regeneration on severely burned areas if seed rain from adjacent stands is not likely to occur, or if bare mineral soil following severe insect outbreak is limited (Jenkins et al., 2014). When supplemental planting is required, cold, moist stratification is necessary for germination of subalpine fir and spruce (Uchytil, 1991). Success of seedling establishment will be greatest when spring and early summer conditions are relatively moist and late summer drought is not intense (Alexander and Shepperd, 1990).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;

4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Western Pygmy Shrew *(Sorex eximius)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Fisher *(Pekania pennanti)* SOC	Wolverine *(Gulo gulo)* SOC
Canada Lynx *(Lynx canadensis)* SOC	Uinta Chipmunk *(Neotamias umbrinus)* PSOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC	North American Water Vole *(Microtus richardsoni)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Western Spotted Skunk *(Spilogale gracilis)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
Western Water Shrew *(Sorex navigator)*	Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
American Pika *(Ochotona princeps)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Snowshoe Hare *(Lepus americanus)*	Least Chipmunk *(Neotamias minimus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Red-tailed Chipmunk *(Neotamias ruficaudus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Red Squirrel *(Tamiasciurus hudsonicus)*	Northern Flying Squirrel *(Glaucomys sabrinus)*
North American Deermouse *(Peromyscus maniculatus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Western Heather Vole *(Phenacomys intermedius)*
Meadow Vole *(Microtus pennsylvanicus)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Marten *(Martes americana)*
Long-tailed Weasel *(Neogale frenata)*	American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	Moose *(Alces alces)*
Mountain Goat *(Oreamnos americanus)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Black-backed Woodpecker *(Picoides arcticus)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Brown Creeper *(Certhia americana)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Boreal Owl *(Aegolius funereus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Cooper's Hawk *(Accipiter cooperii)*
Spruce Grouse *(Canachites canadensis)*
Ruffed Grouse *(Bonasa umbellus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Calliope Hummingbird *(Selasphorus calliope)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Canada Jay *(Perisoreus canadensis)*
Blue Jay *(Cyanocitta cristata)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Cedar Waxwing *(Bombycilla cedrorum)*
Red-eyed Vireo *(Vireo olivaceus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Cape May Warbler *(Setophaga tigrina)*
Townsend's Warbler *(Setophaga townsendi)*
Northern Waterthrush *(Parkesia noveboracensis)*
Wilson's Warbler *(Cardellina pusilla)*
Western Tanager *(Piranga ludoviciana)*
Indigo Bunting *(Passerina cyanea)*
Fox Sparrow *(Passerella iliaca)*
Dark-eyed Junco *(Junco hyemalis)*
Pine Grosbeak *(Pinicola enucleator)*
White-winged Crossbill *(Loxia leucoptera)*
Pine Siskin *(Spinus pinus)*
American Goshawk *(Accipiter atricapillus)* SOC
Pileated Woodpecker *(Dryocopus pileatus)* SOC
Boreal Chickadee *(Poecile hudsonicus)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Red-tailed Hawk *(Buteo jamaicensis)*
Dusky Grouse *(Dendragapus obscurus)*
Great Horned Owl *(Bubo virginianus)*
Barred Owl *(Strix varia)*
Vaux's Swift *(Chaetura vauxi)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Olive-sided Flycatcher *(Contopus cooperi)*
Dusky Flycatcher *(Empidonax oberholseri)*
Violet-green Swallow *(Tachycineta thalassina)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Golden-crowned Kinglet *(Regulus satrapa)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Bohemian Waxwing *(Bombycilla garrulus)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Yellow-rumped Warbler *(Setophaga coronata)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Canada Warbler *(Cardellina canadensis)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Chipping Sparrow *(Spizella passerina)*
White-throated Sparrow *(Zonotrichia albicollis)*
Rusty Blackbird *(Euphagus carolinus)*
Purple Finch *(Haemorhous purpureus)*
Red Crossbill *(Loxia curvirostra)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Sierran Treefrog *(Pseudacris sierra)*
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Freija Fritillary *(Boloria freija)* PSOC
Gray Comma *(Polygonia progne)* SOC

Vascular Plants

Whitestem Goldenbush *(Ericameria discoidea var. discoidea)* SOC
Beautiful Bladderpod *(Physaria pulchella)* SOC
Velvetleaf Huckleberry *(Vaccinium myrtilloides)* SOC
Short-styled Columbine *(Aquilegia brevistyla)* SOC
Coville Indian Paintbrush *(Castilleja covilleana)* SOC
Cascade reedgrass *(Calamagrostis tweedyi)* SOC
Bitterroot Bladderpod *(Physaria humilis)* SOC
Greenleaf Manzanita *(Arctostaphylos patula)* SOC
Woolly-head Clover *(Trifolium eriocephalum)* SOC
Sitka Columbine *(Aquilegia formosa)* SOC
Whitebark Pine *(Pinus albicaulis)* SOC
James Stitchwort *(Stellaria jamesiana)*

Native Species Occasionally Associated with this Ecological System

Mammals

Hoary Marmot *(Marmota caligata)* PSOC
Northern Pocket Gopher *(Thomomys talpoides)*
American Mink *(Neogale vison)*
White-tailed Deer *(Odocoileus virginianus)*
California Myotis *(Myotis californicus)*
Northwestern Jumping Mouse *(Zapus saltator)*
American Badger *(Taxidea taxus)*

Birds

Flammulated Owl *(Psiloscops flammeolus)* SOC
Veery *(Catharus fuscescens)* SOC
American Kestrel *(Falco sparverius)*
White-throated Swift *(Aeronautes saxatalis)*
Lewis's Woodpecker *(Melanerpes lewis)* SOC
Rough-legged Hawk *(Buteo lagopus)*
Long-eared Owl *(Asio otus)*
Black-chinned Hummingbird *(Archilochus alexandri)*

Western Wood-Pewee *(Contopus sordidulus)*
Tree Swallow *(Tachycineta bicolor)*
Bank Swallow *(Riparia riparia)*
Black-billed Magpie *(Pica hudsonia)*
Western Bluebird *(Sialia mexicana)*
American Pipit *(Anthus rubescens)*
Blackpoll Warbler *(Setophaga striata)*
Lazuli Bunting *(Passerina amoena)*
Lark Sparrow *(Chondestes grammacus)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Lapland Longspur *(Calcarius lapponicus)*
Brown-headed Cowbird *(Molothrus ater)*
Redpoll *(Acanthis flammea)*
Willow Flycatcher *(Empidonax traillii)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Barn Swallow *(Hirundo rustica)*
Northern House Wren *(Troglodytes aedon)*
Mountain Bluebird *(Sialia currucoides)*
Yellow Warbler *(Setophaga petechia)*
Common Yellowthroat *(Geothlypis trichas)*
American Tree Sparrow *(Spizelloides arborea)*
Song Sparrow *(Melospiza melodia)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Snow Bunting *(Plectrophenax nivalis)*
House Finch *(Haemorhous mexicanus)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Common Gartersnake *(Thamnophis sirtalis)*
Northern Rubber Boa *(Charina bottae)*

Amphibians

Idaho Giant Salamander *(Dicamptodon aterrimus)* SOC
Boreal Chorus Frog *(Pseudacris maculata)*
Western Tiger Salamander *(Ambystoma mavortium)*

Invertebrates

Common Wood-Nymph *(Cercyonis pegala)*

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC

Original Concept Authors

R. Crawford and M.S. Reid, mod. C. Chappell and G. Kittel (NatureServe ed. date 25Jan2007)

Montana Version Authors

L.K. Vance, T. Luna, M.Hart

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

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System Code	CES306.828, Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4242: Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland

Literature Cited Above Legend: View Online Publication

- Alexander, R.R. and W.D. Shepperd. 1990. Picea engelmannii Parry ex Engelm. Silvics of North America 1:187-203.
- Bebi, P., D. Kulakowski, and T.T. Veblen. 2003. Interactions between fire and spruce beetles in a subalpine Rocky Mountain forest landscape. Ecology 84(2):362-371.
- Bigler, C., D.G. Gavin, C. Gunning, and T.T. Veblen. 2007. Drought induces lagged tree mortality in a subalpine forest in the Rocky Mountains. Oikos 116(12):1983-1994.
- DeRose, R.J. and J.N. Long. 2012. Factors influencing the spatial and temporal dynamics of Engelmann spruce mortality during a spruce beetle outbreak on the Markagunt Plateau, Utah. Forest Science 58(1): 1-14.
- Jenkins, M.J., E.G. Hebertson, and A.S. Munson. 2014. Spruce beetle biology, ecology and management in the Rocky Mountains: an addendum to spruce beetle in the rockies. Forests 5(1):21-71.
- Kulakowski, D. and T.T. Veblen. 2006. The effect of fires on susceptibility of subalpine forests to a 19th century spruce beetle outbreak in western Colorado. Canadian Journal of Forest Research 36(11):2974-2982.
- Lindemann, J.D. and W.L. Baker. 2001. Attributes of blowdown patches from a severe wind event in the Southern Rocky Mountains, USA. Landscape Ecology 16(4):313-325.

U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Rocky Mounatin Subalpine Mixed-Conifer Communities. In: Fire Effects Information System, [Online]. U.S. Department of Agr

Uchytil, R.J. 1991. Abies lasiocarpa. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

Additional References Legend: View Online Publication

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- Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest



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General Description

This ecological system, composed of highly variable montane conifer forests, is found throughout Montana. It is associated with a submesic climate regime with annual precipitation ranging from 250 to 1,000 millimeters (10-39 inches), with most precipitation occurring during winter, and April through June. Winter snowpacks typically melt off in early spring at lower elevations. Elevations range from valley bottoms to 1,676 meters (5,500 feet) in northwestern Montana and up to 2,286 meters (7,500 feet) on warm aspects in southern Montana. In northwestern and west-central Montana, this ecosystem forms a forest belt on warm, dry to slightly moist sites. It generally occurs on gravelly soils with good aeration and drainage and a neutral to slightly acidic pH. In the western part of the state, it is seen mostly on well drained mountain slopes and valleys from lower treeline to up to 1,676 meters (5,500 feet). Immediately east of the Continental Divide, in north-central Montana, it occurs at montane elevations. Douglas-fir (*Pseudotsuga menziesii*) is the dominant conifer both as a seral and climax species. West of the Continental Divide, occurrences can be dominated by any combination of Douglas-fir and long-lived, seral western larch (*Larix occidentalis*), grand fir (*Abies grandis*), ponderosa pine (*Pinus ponderosa*) and lodgepole pine (*Pinus contorta*). Aspen (*Populus tremuloides*) and western white pine (*Pinus monticola*) have a minor status, with western white pine only in extreme western Montana. East of the Continental Divide, larch is absent and lodgepole pine is the co-dominant. Engelmann spruce (*Picea engelmannii*), white spruce, (*Picea glauca*)or their hybrid, become increasingly common towards the eastern edge of the Douglas-fir forest belt.

Diagnostic Characteristics

montane elevations, mixed coniferous forests, *Abies grandis*, ustic soils

Similar Systems

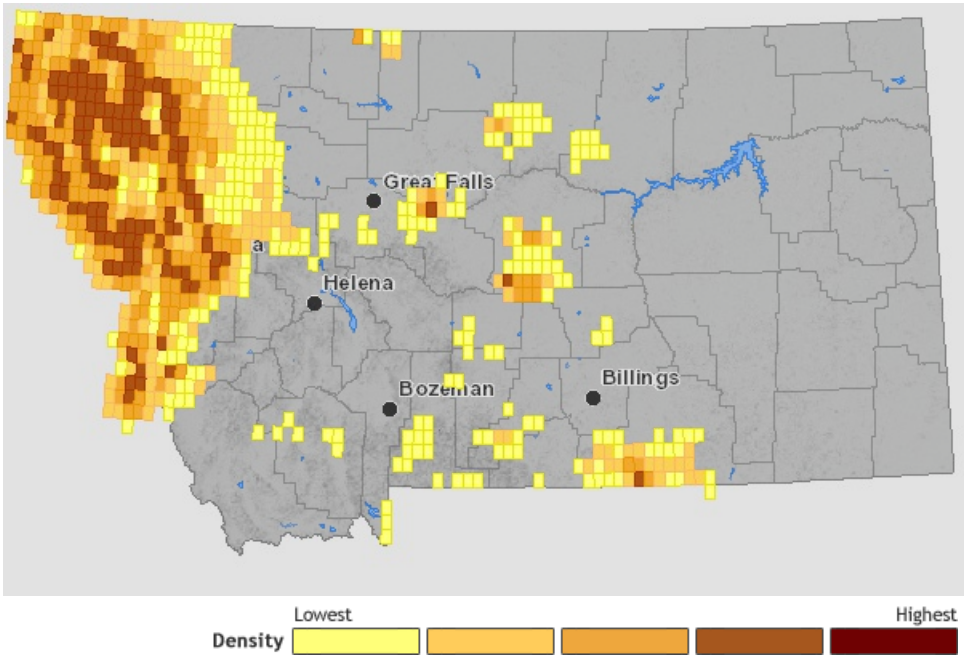
- Rocky Mountain Mesic Montane Mixed Conifer Forest
- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland
- Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland

Range

Douglas-fir and grand fir are the climax species in a broad forest belt at montane elevations throughout the western Montana Rocky Mountains. East of the Continental Divide, including the mountain island ranges of west-central and south-central Montana, Douglas-fir is the climax species. Elsewhere, this forest system is a low to montane elevational forest in the interior Pacific Northwest, ranging from southern interior British Columbia, eastern Washington, eastern Oregon and northern Idaho east to Montana, and south along the eastern slope of the Cascade Range in Washington and Oregon.

Ecological System Distribution

Approximately 10,516 square kilometers are classified as Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mineral, Missoula, Musselshell, Park, Phillips, Pondera, Powell, Ravalli, Sanders, Stillwater, Sweet Grass, Teton, Toole, Wheatland

Spatial Pattern

Matrix

Environment

In northwestern and west-central Montana, this ecosystem forms a forest belt on warm, dry to moist sites. It is associated with a submesic climate regime with annual precipitation ranging from 250 to 1,000 millimeters (10-39 inches), with most precipitation occurring during winter, and April through June. Winter snowpacks typically melt off in early spring at lower elevations. Elevations range from valley bottoms to 1,676 meters (5,500 feet) in northwestern Montana and up to 2,286 meters (7,500 feet) on warm aspects in southern Montana. In northwestern and west-central Montana, this ecosystem forms a forest belt on warm, dry to slightly moist sites. It generally occurs on gravelly soils with good aeration and drainage and a neutral to slightly acidic pH. In the western part of the state, it is seen mostly on well-drained mountain slopes and in valleys from lower treeline to up to 1,676 meters (5,500 feet). Immediately east of the Continental Divide, in north-central Montana, it occurs at montane elevations.

Vegetation

Douglas-fir is the dominant conifer; west of the Continental Divide, occurrences are dominated by a mix of Douglas-fir and long-lived, seral western and other species, including lodgepole pine and western white pine. East of the Continental

Divide, larch is absent and lodgepole pine is the co-dominant. Engelmann spruce or white spruce, or their hybrid, becomes increasingly common towards the eastern edge of the Douglas-fir forest belt. Grand fir may occur in this forest type, but is typically confined to relatively warm and moister sites in northwestern and west-central Montana.

Undergrowth is dominated by graminoids, such as bluebunch wheatgrass (*Pseudoroegneria spicata*), Columbia brome(*Bromus vulgaris*),blue wildrye (*Elymus glaucus*), pinegrass (*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), and Ross' sedge (*Carex rossii*). Common forbs that occur in the understory include American pathfinder (*Adenocaulon bicolor*), heartleaf arnica (*Arnica cordifolia*), queen's cup beadlily (*Clintonia uniflora*), twinflower (*Linnaea borealis*), and beargrass (*Xerophyllum tenax*). The shrub understory contains a variety of shrubs, such as Rocky mountain maple (*Acer glabrum*), kinnikinnick (*Arctostaphylos uva-ursi*), common juniper (*Juniperus communis*), oceanspray (*Holodiscus discolor*), mallow ninebark(*Physocarpus malvaceus*), common snowberry (*Symphoricarpos albus*), birch leaf spiraea (*Spiraea betulifolia*), dwarf bilberry (*Vaccinium caespitosum*) or mountain huckleberry (*Vaccinium membranaceum*)on colder, more mesic sites. In the western part of the state, the Douglas-fir/mountain huckleberry association is the most common type found in the Lolo, Bitterroot and Flathead Mountain ranges on relatively cold sites up to 2,073 meters (6,800 feet) (Pfister et al, 1977).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3362 *Abies grandis - Pseudotsuga menziesii* Central Rocky Mountain Forest & Woodland Alliance
- **CEGL000176** *Pinus monticola - Clintonia uniflora* Forest
- **CEGL000275** *Abies grandis - Linnaea borealis* Forest
- **CEGL000277** *Abies grandis - Physocarpus malvaceus* Forest
- **CEGL000281** *Abies grandis - Spiraea betulifolia* Forest
- **CEGL000461** *Pseudotsuga menziesii - Symphoricarpos occidentalis* Forest
- **CEGL000465** *Pseudotsuga menziesii - Vaccinium caespitosum* Forest
- **CEGL000916** *Abies grandis - Calamagrostis rubescens* Woodland
- **CEGL005850** *Pseudotsuga menziesii - Clintonia uniflora* Forest
- **CEGL005851** *Pseudotsuga menziesii - Menziesia ferruginea - Clintonia uniflora* Forest
- **CEGL005852** *Pseudotsuga menziesii - Vaccinium membranaceum - Xerophyllum tenax* Forest
- **CEGL005853** *Pseudotsuga menziesii - Heracleum maximum* Forest
- **CEGL005854** *Pseudotsuga menziesii - Clintonia uniflora/ Xerophyllum tenax* Forest

A3392 *Pseudotsuga menziesii - Pinus ponderosa* / Shrub Understory Central Rocky Mountain Forest & Woodland Alliance

A3395 *Pseudotsuga menziesii - Pinus ponderosa* / Herbaceous Understory Central Rocky Mountain Woodland Alliance
- **CEGL000429** *Pseudotsuga menziesii - Calamagrostis rubescens* Woodland
- **CEGL000430** *Pseudotsuga menziesii - Carex geyeri* Forest

A3454 *Pseudotsuga menziesii* Southern Rocky Mountain Forest & Woodland Alliance
- **CEGL000424** *Pseudotsuga menziesii - Arctostaphylos uva-ursi* Forest

A3462 *Pseudotsuga menziesii* Middle Rocky Mountain Dry-Mesic Forest & Woodland Alliance
- **CEGL000427** *Pseudotsuga menziesii - Arnica cordifolia* Forest
- **CEGL000462** *Pseudotsuga menziesii - Symphoricarpos oreophilus* Forest

A3463 *Pseudotsuga menziesii* Middle Rocky Mountain Mesic-Wet Forest Alliance
- **CEGL000441** *Pseudotsuga menziesii - Linnaea borealis* Forest

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Douglas-fir and all associated seral species in this system regenerate well following fire, and all, with the exception of lodgepole pine, tolerate repeated low intensity surface fires due to thick bark and deep roots. In the absence of disturbance, the longevity and fire resistance of western larch and Douglas-fir lead to their co-dominance in many areas of western Montana. Douglas-fir and grand fir continue to regenerate under shaded conditions, and these too may become dominant in undisturbed stands. In eastern Montana, lodgepole pine is most often co-dominant with Douglas fir. Presettlement fire regimes may have been characterized by frequent, low-intensity ground fires that maintained relatively open stands of a mix of fire-resistant species. Under present conditions, the fire regime is mixed severity and more variable with stand-replacing fires more common, resulting in increasing forest homogeneity. Fire return intervals vary between approximately 40 and 80 years, with intervals being shortest in stands in which Douglas-fir and western larch are co-dominant, and longest where Douglas-fir and lodgepole pine are co-dominant (U.S. Department of Agriculture, 2012). In Glacier National Park, this forest type historically experienced fire return intervals of 36 years at dry sites, and 46 years at relatively mesic sites, with stand replacing fires occurring at intervals of approximately 140-180 years (Barrett et al., 1991). With vigorous fire suppression, longer fire-return intervals are now common, and multi-layered stands of conifers provide fuel "ladders," making these forests more susceptible to high-intensity, stand-replacing fires. Both western larch and lodgepole pine are aggressive colonizers after major disturbances. These are very productive forests which have been priorities for timber production.

The species in this system vary in their susceptibility to biotic vectors. Western larch is generally resistant to damage from pathogens and insects (Scher, 2002). However, in western larch stands in the Bitterroot Mountains of western Montana where fire has been suppressed and regeneration is limited, dwarf mistletoe infects trees and impacts stand persistence (McCune, 1983). In contrast to western larch, grand fir, Douglas-fir, lodgepole pine, and ponderosa pine are susceptible to

a variety of insects and pathogens. Both grand fir and Douglas-fir are affected by western spruce budworm (*Choristoneura occidentalis*) and Douglas-fir tussock moth (*Orgyia pseudotsugata*), while the western balsam bark beetle (*Dryocoetes confuses*) and fir engraver beetles (*Scolytus ventralis*) further affect grand fir (Howard and Aleksoff, 2000; Steinberg, 2002). The Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) causes abundant damage to Douglas-fir in this system and fire-affected stands tend to be more vulnerable to attack (Negron et al., 1999; Hood and Bentz, 2007; Six and Skov, 2009). Both lodgepole pine and ponderosa pine are highly susceptible to mountain pine beetles. Elevated temperature and increasing drought severity combine to favor beetle population growth and weaken lodgepole and ponderosa pine defense mechanisms, increasing susceptibility to beetle attack (Raffa et al., 2008).

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system. Low-severity burning decreases fuel loading, probability of stand-replacing fires, and increases available nutrients in the soil (Arno et al., 1995). Prescribed fire is particularly important when management goals include the maintenance of western larch and/or ponderosa pine within this system (Habeck, 1992; Scher, 2002). Burning exposes a mineral seedbed which is preferred for germination by all species in this system. The timing of prescribed burning in this system is important and fall burning following dry summers is typically most effective. Removing seedlings and duff from the bases of western larch and ponderosa pine may be necessary to prevent fire damage to roots and the spread of surface fires to tree crowns (Scher, 2002; Kolb et al., 2007). The varying vulnerability of species in this system to windthrow should be considered when thinning is applied to reduce fire risk. Western larch has deep roots and moderate to high windthrow resistance, ponderosa pine and douglas fir are moderately susceptible, and lodgepole pine is highly susceptible to windthrow due to its shallow root system (Scher, 2002; Anderson, 2003).

Restoration Considerations

Restoration strategies will depend largely on the severity of the fire. Early successional stages may be dominated by fireweed (*Chamerion angustifolium*) and other forbs, graminoids and understory shrubs. Dominant species such as Douglas-fir, lodgepole pine and western larch regenerate well following fire and mineral soil seedbeds that result from burning favor germination by these species. However, prolonged drought conditions and high soil temperatures on bare mineral soils can impede natural regeneration and may require supplemental planting post-disturbance (Scher, 2002).

Intense fires that occur during summer months cause considerable damage to native perennial grasses, forbs and shrubs, and may completely destroy existing seed banks, especially on steep facing slopes and ridgetops. Steep slopes may require reseeding with native grasses to prevent soil erosion. In some cases, severely burned sites will require replanting with conifer seedlings. Generally, larger container volume of nursery stock results in higher outplanting success than bareroot nursery stock, especially where spring and early summer precipitation patterns are unpredictable, or where exposed mineral soil temperatures are high during the first year of establishment. Generally, 6-8 cubic inch container stock types are used on milder sites with good site preparation, and 10, 15 or 20 cubic inch container stock is used on the hotter, drier aspects or sites. Conifer stocking rates must be developed on a site-by-site basis and to meet management objectives.

Prescribed fire may be an additionally valuable restoration strategy in stands with high levels of dwarf mistletoe if all infected individuals are eliminated (Hawksworth et al., 2002). High severity burning controls dwarf mistletoe by eliminating infected trees and promoting regeneration of uninfected individuals (Alexander and Hawksworth, 1976). However, when utilizing prescribed burning as a restoration strategy, the effects of fire on local insect populations should be considered as vulnerability to attack may increase post fire (e.g. Hood and Bentz, 2007).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana

covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Yuma Myotis *(Myotis yumanensis)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Fisher *(Pekania pennanti)* SOC	Wolverine *(Gulo gulo)* SOC
Canada Lynx *(Lynx canadensis)* SOC	North American Water Vole *(Microtus richardsoni)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Western Spotted Skunk *(Spilogale gracilis)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
Western Water Shrew *(Sorex navigator)*	Northern Montane Shrew *(Sorex obscurus)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	American Pika *(Ochotona princeps)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Snowshoe Hare *(Lepus americanus)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Red Squirrel *(Tamiasciurus hudsonicus)*	Northern Flying Squirrel *(Glaucomys sabrinus)*
North American Deermouse *(Peromyscus maniculatus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Western Heather Vole *(Phenacomys intermedius)*
Meadow Vole *(Microtus pennsylvanicus)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Northwestern Jumping Mouse *(Zapus saltator)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	American Black Bear *(Ursus americanus)*
Raccoon *(Procyon lotor)*	Marten *(Martes americana)*
Least Weasel *(Mustela nivalis)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	Striped Skunk *(Mephitis mephitis)*
Northern River Otter *(Lontra canadensis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Moose *(Alces alces)*	

Birds

Bald Eagle *(Haliaeetus leucocephalus)*	American Goshawk *(Accipiter atricapillus)* SOC
Flammulated Owl *(Psiloscops flammeolus)* SOC	Northern Hawk Owl *(Surnia ulula)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC	Black-backed Woodpecker *(Picoides arcticus)* SOC
Pileated Woodpecker *(Dryocopus pileatus)* SOC	Clark's Nutcracker *(Nucifraga columbiana)* SOC
Boreal Chickadee *(Poecile hudsonicus)* SOC	Brown Creeper *(Certhia americana)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC	Varied Thrush *(Ixoreus naevius)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC	Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Western Screech-Owl *(Megascops kennicottii)* PSOC	Great Gray Owl *(Strix nebulosa)* PSOC

Boreal Owl *(Aegolius funereus)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Osprey *(Pandion haliaetus)*
Sharp-shinned Hawk *(Accipiter striatus)*
Cooper's Hawk *(Accipiter cooperii)*
Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*
Spruce Grouse *(Canachites canadensis)*
Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*
Wild Turkey *(Meleagris gallopavo)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Barred Owl *(Strix varia)*
Long-eared Owl *(Asio otus)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Common Nighthawk *(Chordeiles minor)*
Vaux's Swift *(Chaetura vauxi)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Calliope Hummingbird *(Selasphorus calliope)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Downy Woodpecker *(Dryobates pubescens)*
Hairy Woodpecker *(Dryobates villosus)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Northern Flicker *(Colaptes auratus)*
Olive-sided Flycatcher *(Contopus cooperi)*
Western Wood-Pewee *(Contopus sordidulus)*
Willow Flycatcher *(Empidonax traillii)*
Least Flycatcher *(Empidonax minimus)*
Hammond's Flycatcher *(Empidonax hammondii)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Flycatcher *(Empidonax difficilis)*
Tree Swallow *(Tachycineta bicolor)*
Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*
Black-capped Chickadee *(Poecile atricapillus)*
Mountain Chickadee *(Poecile gambeli)*
Chestnut-backed Chickadee *(Poecile rufescens)*
Red-breasted Nuthatch *(Sitta canadensis)*
White-breasted Nuthatch *(Sitta carolinensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Golden-crowned Kinglet *(Regulus satrapa)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Western Bluebird *(Sialia mexicana)*
Mountain Bluebird *(Sialia currucoides)*
Townsend's Solitaire *(Myadestes townsendi)*
Swainson's Thrush *(Catharus ustulatus)*
Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*
Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*
Cedar Waxwing *(Bombycilla cedrorum)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Red-eyed Vireo *(Vireo olivaceus)*
Cassin's Vireo *(Vireo cassinii)*
Orange-crowned Warbler *(Leiothlypis celata)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Yellow Warbler *(Setophaga petechia)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Magnolia Warbler *(Setophaga magnolia)*
Cape May Warbler *(Setophaga tigrina)*
Yellow-rumped Warbler *(Setophaga coronata)*
Townsend's Warbler *(Setophaga townsendi)*
Palm Warbler *(Setophaga palmarum)*
Blackpoll Warbler *(Setophaga striata)*
American Redstart *(Setophaga ruticilla)*
Northern Waterthrush *(Parkesia noveboracensis)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Common Yellowthroat *(Geothlypis trichas)*
Wilson's Warbler *(Cardellina pusilla)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
Indigo Bunting *(Passerina cyanea)*
Spotted Towhee *(Pipilo maculatus)*
American Tree Sparrow *(Spizelloides arborea)*
Chipping Sparrow *(Spizella passerina)*
Fox Sparrow *(Passerella iliaca)*
Song Sparrow *(Melospiza melodia)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Dark-eyed Junco *(Junco hyemalis)*
Lapland Longspur *(Calcarius lapponicus)*
Rusty Blackbird *(Euphagus carolinus)*
Pine Grosbeak *(Pinicola enucleator)*
Purple Finch *(Haemorhous purpureus)*
House Finch *(Haemorhous mexicanus)*
White-winged Crossbill *(Loxia leucoptera)*
Red Crossbill *(Loxia curvirostra)*
Pine Siskin *(Spinus pinus)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Western Skink *(Plestiodon skiltonianus)* SOC
Northern Rubber Boa *(Charina bottae)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Coeur d'Alene Salamander *(Plethodon idahoensis)* SOC
Idaho Giant Salamander *(Dicamptodon aterrimus)* SOC
Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Sierran Treefrog *(Pseudacris sierra)*

Vascular Plants

Greenleaf Manzanita *(Arctostaphylos patula)* SOC
Latah Tule Pea *(Lathyrus bijugatus)* SOC
Woolly-head Clover *(Trifolium eriocephalum)* SOC
Hollyleaf Clover *(Trifolium gymnocarpon)* SOC
Yerba Buena *(Satureja douglasii)* SOC
Diamond Clarkia *(Clarkia rhomboidea)* SOC
Alpine Collomia *(Collomia debilis var. camporum)* SOC
Short-styled Columbine *(Aquilegia brevistyla)* SOC
Idaho Barren Strawberry *(Waldsteinia idahoensis)* SOC
Coville Indian Paintbrush *(Castilleja covilleana)* SOC
Clustered Lady's-slipper *(Cypripedium fasciculatum)* SOC
Cascade reedgrass *(Calamagrostis tweedyi)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Northern Pocket Gopher *(Thomomys talpoides)*
American Mink *(Neogale vison)*

American Badger *(Taxidea taxus)*

Bighorn Sheep *(Ovis canadensis)*

Birds

Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC

Common Poorwill *(Phalaenoptilus nuttallii)* PSOC

Western Kingbird *(Tyrannus verticalis)*

Bank Swallow *(Riparia riparia)*

Barn Swallow *(Hirundo rustica)*

Northern House Wren *(Troglodytes aedon)*

Vesper Sparrow *(Pooecetes gramineus)*

Lincoln's Sparrow *(Melospiza lincolnii)*

Snow Bunting *(Plectrophenax nivalis)*

Brewer's Blackbird *(Euphagus cyanocephalus)*

Brown-headed Cowbird *(Molothrus ater)*

American Goldfinch *(Spinus tristis)*

Veery *(Catharus fuscescens)* SOC

White-throated Swift *(Aeronautes saxatalis)*

Eastern Kingbird *(Tyrannus tyrannus)*

Cliff Swallow *(Petrochelidon pyrrhonota)*

Black-billed Magpie *(Pica hudsonia)*

Yellow-breasted Chat *(Icteria virens)*

Lark Sparrow *(Chondestes grammacus)*

White-crowned Sparrow *(Zonotrichia leucophrys)*

Western Meadowlark *(Sturnella neglecta)*

Common Grackle *(Quiscalus quiscula)*

Bullock's Oriole *(Icterus bullockii)*

Reptiles

Gophersnake *(Pituophis catenifer)*

Amphibians

Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Mariposa Copper *(Tharsalea mariposa)*

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28641
System Code	CES306.805, Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4232: Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest

Literature Cited Above Legend: View Online Publication

- Alexander, M.E. and F.G. Hawksworth. 1976. Fire and dwarf mistletoes in North American coniferous forests. Journal of Forestry 74(7):446-449.
- Amo, S.F., M.G. Harrington, C.E. Fiedler, and C.E. Carlson. 1995. Restoring fire-dependent ponderosa pine forests in western Montana. Restoration and Management Notes 13:32-36.
- Anderson, M.D. 2003. Pinus contorta var. latifolia. In: Fire Effects Information System, [Online}. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).
- Barrett, S.W., S.F. Arno, and C.H. Key. 1991. Fire regimes of western larch-lodgepole pine forests in Glacier National Park, Montana. Canadian Journal of Forest Research 21(12):1711-1720.
- Hawksworth, F.G., D. Wiens, and B.W. Geils. 2002. Arceuthobium in North America. Mistletoes of North American conifers 29-56.
- Howard, J. L. 2003. Pinus ponderosa var. scopulorum. In: Fire Effects Information System, [Online}. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Howard, J.L. and K.C. Aleksoff. 2000. Abies grandis. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Kolb, T.E.,J.K. Agee, P.Z. Fule, N.G. McDowell, K. Pearson, A.Sala, and R.H. Waring. 2007. Perpetuating old ponderosa pine. Forest Ecology and Management 249(3):141-157.

- McCune, B. 1982. Fire frequency reduced two orders of magnitude in the Bitterroot Canyons, Montana. Canadian Journal of Forest Reaseach 13:212-218.
- Negron, J.F., W.C. Schaupp, K.E. Gibson, J. Anhold, D. Hansen, R. Their, and P. Mocettini. 1999. Estimating extent of mortality associated with the Douglas-fir beetle in the central and northern Rockies. Western Journal of Applied Forestry 14(3):121-127.
- Scher, J.S. 2002. Larix occidentalis. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Six, D.L. and K. Skov. 2009. Response of bark beetles and their natural enemies to fire and fire surrogate treatments in mixed-conifer forests in western Montana. Forest Ecology and Management 258(5):761-772.
- Steinberg, P. D. 2002. Pseudotsuga menziesii var. glauca. In: Fire Effects Information System, [Online}. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Northern Rocky Mounatin Montane Mixed-Conifer Communities. In: Fire Effects Information System, [Online]. U.S. Department

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- Arno, S. 1979. Forest regions of Montana. Research paper Int-218, USFS Intermountain and Range Experiment Station, Ogden, Utah.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Rocky Mountain Subalpine Woodland and Parkland

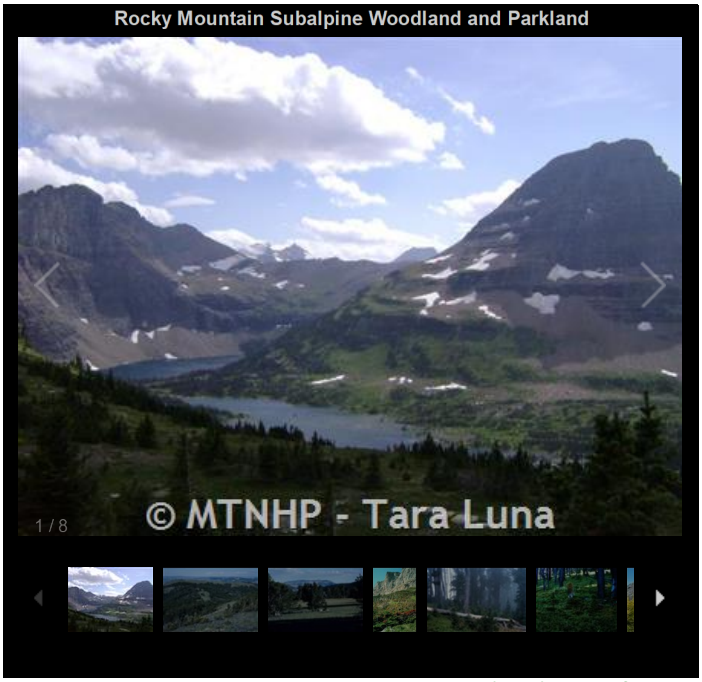


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State Rank Reason

Blister rust, insects and drought are all affecting these forests. Although decline has not been as widespread as with some other ecological systems, it is expected to continue, especially if winters are mild.

General Description

This system includes all subalpine and treeline forest associations of the Montana Rocky Mountains and island ranges. It is characteristically a high-elevation mosaic of stunted tree clumps, open woodlands, and herb- or dwarf-shrub-dominated openings, occurring above closed forest ecosystems and below alpine communities. It includes open areas with stands of whitebark pine (*Pinus albicaulis*) occurring most commonly on south-, east-, and west-facing aspects, or less commonly, alpine larch (*Larix lyallii*) on north-facing aspects and in basins with shallow rocky soils. Subalpine fir (*Abies lasiocarpa*) is the co-dominant in these systems and is often the most prevalent tree species. Engelmann spruce (*Picea engelmannii*) is usually associated with subalpine fir and occurs as either a climax co-dominant or as a persistent, long-lived seral species in most upper elevation subalpine fir habitat types. Whitebark pine may initiate tree islands at treeline sites, facilitating the establishment and growth of subalpine fir and Engelmann spruce which are less tolerant of harsh climatic conditions (Callaway, 1998; Tomback et al., 2014). Long-term absence of disturbance may enable these more shade tolerant species to succeed whitebark pine and alpine larch at these sites (Arno and Hoff, 1989). Elevations range from as low as 1,981 meters (6,500 feet) in northwestern Montana to 2,682 meters (8,800 feet) in southwestern Montana. At or above treeline, subalpine fir, spruce, and whitebark pine will often exhibit krummholz form and reproduce by layering as a result of the harsh climate and considerable snow accumulation typical of these sites.

The climate is typically very cold in winter and dry in summer. Landforms include ridgetops, mountain slopes, glacial trough walls and moraines, talus slopes, landslides and rockslides, and cirque headwalls and basins. Snow accumulation is

high in basins, but ridgetops have little snow accumulation because of high winds and sublimation. In this harsh, often wind-swept environment, trees are usually stunted and flagged from damage associated with wind, blowing snow and ice crystals, especially at the upper elevations. Tree species that occur in the otherwise sparsely vegetated communities of this system are particularly important for wildlife and watershed hydrology as they provide important food sources and slow spring snowmelt, thereby increasing the duration of summer runoff and streamflow (Arno and Hoff, 1989). Fire suppression, disease, insects and climate change are changing the structure, distribution and composition of this system.

Diagnostic Characteristics

Subalpine or upper treeline; forest and woodland; oligotrophic soils.

Similar Systems

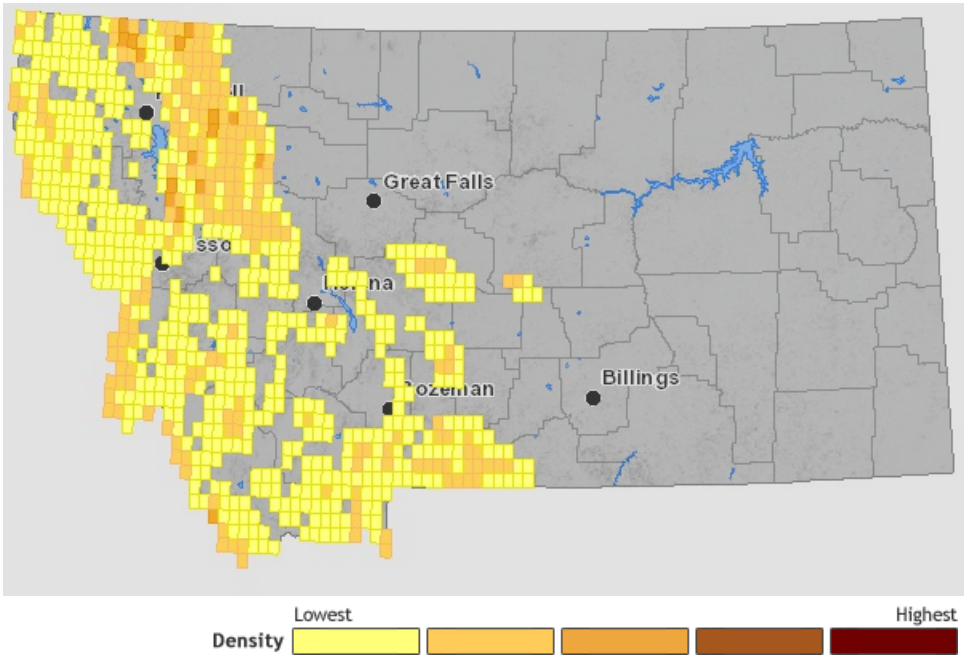
- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland
- Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland

Range

Whitebark pine-subalpine fir forests and parklands occur throughout the Montana Rocky Mountains and east into the mountain island ranges. This is the most common forest alliance in the drier mountain ranges east of the Continental Divide. It is especially well represented in the Yellowstone Basin and surrounding mountain ranges. The distribution pattern of alpine larch (*Larix lyalli*) is patchy; the best stands occur near the treeline in the Anaconda-Pintlar, Bitterroot, Cabinet, Whitefish, Swan, southern Mission, Sapphire, and Flint Creek ranges, and in scattered locations in Glacier National Park and at the top of the headwaters of the Teton and Sun River drainages (Arno and Habeck, 1972). Mountain hemlock (*Tsuga mertensiana*)/subalpine fir is a minor subalpine forest type present in some high mountain cirques along the Montana-Idaho Divide from Lolo to the Cabinet Gorge. Mountain hemlock stands are much more prevalent immediately to the west in Idaho; however, they also occur in small isolated stands in the Whitefish, Mission, and Bitterroot ranges. They are absent from Glacier National Park.

Ecological System Distribution

Approximately 1,549 square kilometers are classified as Rocky Mountain Subalpine Woodland and Parkland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Large patch

Environment

In Montana, these forests form a belt throughout the Montana Rocky Mountains and island ranges. Near the upper elevational limits, these forests and parklands are bordered by alpine meadows and tundra. On especially dry sites east of the Continental Divide, these forests are sometimes bordered by subalpine grasslands. Forests and parklands are diverse in composition and structure due to widely diverse high elevation terrain and extreme climatic conditions. At the upper limits of tree growth, stands and krummholz mats can persist for hundreds of years. This system occurs up to 1,981-2,195 meters (6,500-7,200 feet) in northwestern Montana, 2,225-2438 meters (7,300-8,000 feet) in west-central Montana and island ranges, and 2,469-2,682 meters (8,100-8,800 feet) in southwestern Montana. Soils and parent materials are variable. Alpine larch stands typically develop on granitic and quartzite substrates with little soil development or occasionally on sedimentary materials. Surface soils are usually gravelly loams with large amounts of rock present (Pfister et al., 1977). Whitebark pine-subalpine fir communities can occur on a wide range of parent materials, including calcareous bedrock substrates. Soils are typically gravelly silt loams and silts that range from slightly basic to slightly acidic. Duff layers in both forest types are typically less than 2.5 centimeters (1.0 inch) (Pfister et al., 1977). This forest and woodland system occurs on landforms such as ridgetops, mountain slopes, glacial trough walls and moraines, talus slopes, landslides and rockslides, and cirque headwalls and basins. Snow accumulation is high in basins, but ridgetops have little snow accumulation because of high winds and sublimation. In this harsh, often wind-swept environment, trees are stunted and flagged from damage associated with wind, blowing snow and ice crystals, especially at the upper elevational ecotone.

Vegetation

These forests or patches often originate when Engelmann spruce, alpine larch, or whitebark pine colonize a sheltered site. Alpine larch/subalpine fir communities are prevalent on cool, north- and east-facing exposures west of the Continental Divide. Whitebark pine/subalpine fir communities occur on adjacent, warmer exposures and aspects. Subalpine fir colonizes in the shelter of these speciesand may form a dense canopy by branch layering. This species is capable of remaining dominant within these subalpine and treeline forests due to its longevity and ability to regenerate vegetatively. In the absence of disturbance, it continues to regenerate under shaded conditions. Seed crops are erratic at the lower elevational limit of this system and are virtually absent at treeline. The most common subalpine forest association in Montana is whitebark pine-subalpine fir.

The understories of these forests are usually sparse, but moister sites support mats of ericaceous plants, such as tall huckleberry (*Vaccinium membranaceum*), dwarf bilberry (*Vaccinium myrtillus*), or most often, grouse whortleberry (*Vaccinium scoparium*). Mountain heath (*Phyllodoce* species) and white mountain heather (*Cassiope mertensiana*) are commonon sites with more organic matter accumulation. A few taller shrubs such as alpine currant (*Ribes montigenum*), short fruited willow (*Salix brachycarpa*), and planeleaf willow (*Salix planifolia*) may also be present.The herbaceous layer is sparse under dense shrub or tree canopies, but may be dense where the shrub canopy is open or absent. Purple mountain hairgrass (*Vahlodea atropurpurea*), Hitchcock's woodrush *(Luzula glabrata* var. *hitchcockii*), alpine bluegrass (*Poa alpina*), Sandberg's bluegrass (*Poa secunda*), alpine timothy (*Phleum alpinum*), pinegrass (*Calamagrostis rubescens*), Parry's rush (*Juncus parryi*) and sedges (*Carex* species) are the most common graminoids. A wide diversity of forbs are present in open meadows among or adjacent to these forests, typically including species such as arnica (*Arnica* species), subalpine wandering daisy (*Erigeron peregrinus)*, arrowleaf groundsel (*Senecio triangularis)*, aster (*Symphyotrichum species),* sibbaldia (*Sibbaldia procumbens*), glacier lily (*Erythronium grandiflorum*), rhexi-leaf paintbrush (*Castilleja rhexifolia*), western windflower (*Anemone occidentalis*), alpine St. John's wort (*Hypericum formosum)*, diverse leaf cinquefoil (*Potentilla diversifolia*), and penstemon (*Penstemon* species).

Alpine larch stands generally occur at or near upper treeline in north-facing cirques or on slopes where snowfields persist until June or July (Arno and Habeck, 1972). Typical stands are often isolated pockets of open, parklike groves. Alpine larch is considered a pioneer species in these high, north-facing aspects on rocky sites with little soil development, and due to its longevity (up to 1,000 years), is persistent on these sites. Typically, undergrowth in alpine larch stands can be limited due to high rock cover and limited soil development, but will often includes pink mountain heath (*Phyllodoce empetriformis*), Hitchcock's woodrush and subalpine fir.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0631 *Larix lyallii* Woodland Alliance
- **CEGL000951** *Larix lyallii - Vaccinium scoparium - Luzula glabrata var. hitchcockii* Woodland

A3368 *Pinus albicaulis* Forest & Woodland Alliance
- **CEGL000127** *Pinus albicaulis* Woodland [Placeholder]
- **CEGL000128** *Pinus albicaulis / Abies lasiocarpa* Woodland
- **CEGL000129** *Pinus albicaulis - Carex rossii* Forest
- **CEGL000131** *Pinus albicaulis - Vaccinium scoparium* Forest
- **CEGL000752** *Abies lasiocarpa / Pinus albicaulis - Vaccinium scoparium* Woodland
- **CEGL000754** *Pinus albicaulis / (Abies lasiocarpa) - Carex geyeri* Woodland
- **CEGL000755** *Pinus albicaulis - Festuca idahoensis* Woodland
- **CEGL000756** *Pinus albicaulis - Juniperus communis* Woodland
- **CEGL005836** *Pinus albicaulis / Abies lasiocarpa - Menziesia ferruginea - Xerophyllum tenax* Woodland
- **CEGL005837** *Pinus albicaulis / Abies lasiocarpa - Vaccinium membranaceum - Xerophyllum tenax* Woodland
- **CEGL005838** *Pinus albicaulis / Abies lasiocarpa - Vaccinium scoparium - Xerophyllum tenax* Woodland
- **CEGL005839** *Pinus albicaulis / Abies lasiocarpa - Vaccinium scoparium - Luzula glabrata var. hitchcockii* Woodland

A3640 *Abies lasiocarpa - Picea engelmannii - Pinus flexilis* Dry-Mesic Rocky Mountain Krummholz Alliance
- **CEGL000985** *Abies lasiocarpa / Picea engelmannii* Krummholz

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Major disturbances in this system include fire, avalanches, and biotic vectors. Fires in this system have average return intervals of 170 years and are either mixed severity or stand replacing (U.S. Department of Agriculture, 2012). In general, stand-replacing fires occur less frequently, at least where open woodlands limit fire severity and spread (Arno, 1980). In stands where fire return intervals are longer or where fires have been suppressed, shade-tolerant subalpine fir becomes increasingly dominant. Tree species that occur in this system vary in their susceptibility to fire. Subalpine fir has thin bark and experiences high mortality from low-intensity burns (Uchytil, 1991), whereas whitebark pine has moderately thick bark, and mature trees can withstand low severity fires (Fryer, 2002). Lightning damage to individual trees is common, but sparse canopies and rocky terrain historically limited the spread of fire. More recently, stand-replacing fires caused by lightning strikes are becoming more common in part because woodlands have become increasingly dense due to fire suppression. Post-fire regeneration is dominated by shade-intolerant whitebark pine and alpine larch. Clark's nutcrackers (*Nucifraga Columbiana*) are the primary disperser of whitebark pine seeds post-fire (Tomback, 2005). Near treeline, establishment of subalpine fir may take decades or longer to establish after fire in part due to the harsh climate characteristic of this system. Often, stand-initiating whitebark pine facilitate the establishment of later-successional species like subalpine fir and Engelmann spruce by ameliorating the harsh climatic conditions otherwise found at treeline sites (Callaway, 1998; Tomback et al., 2014).

Insects and disease are major forces of disturbance within this system. Whitebark pine is affected by white pine blister rust and mountain pine beetle (*Dendroctonus ponderosae*) and is experiencing marked decline. Infection rates of white pine blister rust, caused by the non-native pathogen *Cronartium ribicola*, have increased in recent decades. Blister rust infections are more likely to occur in microsites (Smith-McKenna et al., 2013) or years with relatively cool and humid conditions (Sturrock et al., 2011). Mortality due to blister rust is especially high in northwestern Montana, where the moister Pacific maritime climate at high elevations is more conducive to infection than the drier air in the southern mountain ranges (Smith et al., 2012). Blister rust has a tendency to kill cone producing branches in whitebark pine crowns. The resulting reduction in cone production strongly limits whitebark pine reproduction potential (McCaughey and Tomback, 2001). Mountain pine beetles, which historically occurred at endemic levels in lower subalpine forests, are causing an increased incidence of outbreak in treeline communities, causing mortality of mature whitebark pine. Additionally, beetles preferentially select trees with weakened defenses, such as those affected by blister rust or severe drought (Bockino and Tinker, 2012). Subalpine fir is becoming more prevalent in these forests due to high mortality caused by blister rust and mountain pine beetles.

Throughout Montana, both subalpine fir and spruce are affected by western spruce bud worm (*Choristoneura occidentalis*) attacks, although outbreaks are less common in high-elevation stands (Uchytil, 1991). Large stands of subalpine forests, however, can be killed following several years of drought or unusually mild winters. Subalpine fir in the northern Rocky Mountains is also susceptible to the fungus (*Heterobasidion annosum*) which causes root rot and may increase vulnerability to other biotic pathogens (Uchytil, 1991). Unlike other species in this system, alpine larch is relatively unaffected by insects or disease (Habeck, 1991).

Climate can also influence ecological processes in this system. Warming climate patterns may result in increased seedling recruitment and tree density at the upper elevation limit of this ecological system (Klasner and Fagre, 2002). Climate may have additional effects on biotic vectors. Mountain pine beetles, which were historically rare in this system due to cold temperatures, have become increasingly common as a result of changing temperature regimes (Bockino and Tinker, 2012). In addition, avalanches, which are common in precipitous mountain areas that receive heavy snowfall, cause stand-initiating disturbances that remove broad swaths of subalpine forest.

Management

In the absence of natural fire, periodic low-severity prescribed burns can be implemented during late fall months to maintain, enhance, and restore this system. Fire facilitates nutrient cycling and encourages whitebark pine dominance in stands where succession by subalpine fir and Engelmann spruce is occurring (Arno and Hoff, 1989). Fire additionally creates open sites favorable to seed caching by Clark's nutcrackers and exposes mineral soil seedbeds favored by whitebark pine and alpine larch. A long-term study in western Montana and eastern Idaho found that prescribed fire is likely most effective at restoring whitebark pine if burn sites are in close proximity to healthy whitebark stands, or if burning is followed by planting of rust-resistant nursery stock (Keane and Parsons, 2010). When selecting seed sources for supplemental planting, seed transfer guidelines should be followed to avoid maladaptation to site specific conditions (Bower and Aitken, 2008).

Restoration Considerations

Restoration strategies will in part depend on degree of blister rust infection within a stand. Small-scale prescribed burning during late fall after several hard frosts is recommended to prevent succession by subalpine fir and facilitate whitebark pine regeneration by providing open sites on exposed mineral soils suitable for nutcracker seed caching and seedling establishment (Fryer, 2002). Blister rust damage reduces cone production and nutcracker seed caching (McKinney and Tomback, 2007). When blister rust infection within a region is severe, post-burn supplemental planting with genetically rust-resistant nursery stock may be necessary (Keane and Parsons, 2010). Similarly, large scale mountain pine beetle outbreaks may necessitate supplemental planting if regeneration is limited or blister-rust infection of surviving individuals is severe. When outplanting rust-resistant nursery stock is necessary, success can be improved by reducing

seedling competition with overstory trees or understory grasses and sedges, and planting seedlings in microsites with favorable growth conditions, including on the leeward side of rocks and stumps (McCaughey et al., 2009).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Fisher *(Pekania pennanti)* SOC
North American Water Vole *(Microtus richardsoni)* PSOC
Masked Shrew *(Sorex cinereus)*
Northern Montane Shrew *(Sorex obscurus)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Least Chipmunk *(Neotamias minimus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Pocket Gopher *(Thomomys talpoides)*
Western Pygmy Shrew *(Sorex eximius)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Wolverine *(Gulo gulo)* SOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Vagrant Shrew *(Sorex vagrans)*
American Pika *(Ochotona princeps)*
Snowshoe Hare *(Lepus americanus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Flying Squirrel *(Glaucomys sabrinus)*
North American Deermouse *(Peromyscus maniculatus)*

Bushy-tailed Woodrat *(Neotoma cinerea)*
Western Heather Vole *(Phenacomys intermedius)*
Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Least Weasel *(Mustela nivalis)*
American Ermine *(Mustela richardsonii)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Mountain Goat *(Oreamnos americanus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Montane Vole *(Microtus montanus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Marten *(Martes americana)*
Long-tailed Weasel *(Neogale frenata)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*
Bighorn Sheep *(Ovis canadensis)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Western Screech-Owl *(Megascops kennicottii)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Cooper's Hawk *(Accipiter cooperii)*
Rough-legged Hawk *(Buteo lagopus)*
Peregrine Falcon *(Falco peregrinus)*
Spruce Grouse *(Canachites canadensis)*
Ruffed Grouse *(Bonasa umbellus)*
Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
Vaux's Swift *(Chaetura vauxi)*
Calliope Hummingbird *(Selasphorus calliope)*
Downy Woodpecker *(Dryobates pubescens)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Willow Flycatcher *(Empidonax traillii)*
Tree Swallow *(Tachycineta bicolor)*
Canada Jay *(Perisoreus canadensis)*
Blue Jay *(Cyanocitta cristata)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Golden-crowned Kinglet *(Regulus satrapa)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
American Pipit *(Anthus rubescens)*
Cedar Waxwing *(Bombycilla cedrorum)*
Orange-crowned Warbler *(Leiothlypis celata)*
Palm Warbler *(Setophaga palmarum)*
Wilson's Warbler *(Cardellina pusilla)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
Fox Sparrow *(Passerella iliaca)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Snow Bunting *(Plectrophenax nivalis)*
Pine Grosbeak *(Pinicola enucleator)*
Red Crossbill *(Loxia curvirostra)*
Redpoll *(Acanthis flammea)*
White-tailed Ptarmigan *(Lagopus leucura)* SOC
Black-backed Woodpecker *(Picoides arcticus)* SOC
Boreal Chickadee *(Poecile hudsonicus)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Prairie Falcon *(Falco mexicanus)*
Dusky Grouse *(Dendragapus obscurus)*
Baird's Sandpiper *(Calidris bairdii)*
Snowy Owl *(Bubo scandiacus)*
Barred Owl *(Strix varia)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Olive-sided Flycatcher *(Contopus cooperi)*
Western Flycatcher *(Empidonax difficilis)*
Violet-green Swallow *(Tachycineta thalassina)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Nashville Warbler *(Leiothlypis ruficapilla)*
American Redstart *(Setophaga ruticilla)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
Chipping Sparrow *(Spizella passerina)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Lapland Longspur *(Calcarius lapponicus)*
Rusty Blackbird *(Euphagus carolinus)*
White-winged Crossbill *(Loxia leucoptera)*
Pine Siskin *(Spinus pinus)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC
Hydaspe Fritillary *(Argynnis hydaspe)*
Woodland Skipper *(Ochlodes sylvanoides)*

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC
Beautiful Bladderpod *(Physaria pulchella)* SOC
Yellow Beardtongue *(Penstemon flavescens)* SOC
Hall's Rush *(Juncus hallii)*
Bitterroot Bladderpod *(Physaria humilis)* SOC
Selway Coil-beaked Lousewort *(Pedicularis contorta var. rubicunda)* SOC
Whitebark Pine *(Pinus albicaulis)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Canada Lynx *(Lynx canadensis)* SOC
Hoary Marmot *(Marmota caligata)* PSOC
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Western Water Shrew *(Sorex navigator)*
Western Small-footed Myotis *(Myotis ciliolabrum)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC
Brown Creeper *(Certhia americana)* SOC
Gray-crowned Rosy-Finch *(Leucosticte tephrocotis)* SOC
Boreal Owl *(Aegolius funereus)* PSOC
Northern Harrier *(Circus hudsonius)*
Northern Flicker *(Colaptes auratus)*
Dusky Flycatcher *(Empidonax oberholseri)*
American Crow *(Corvus brachyrhynchos)*
Warbling Vireo *(Vireo gilvus)*
Townsend's Warbler *(Setophaga townsendi)*
Northern Waterthrush *(Parkesia noveboracensis)*
Western Tanager *(Piranga ludoviciana)*
Song Sparrow *(Melospiza melodia)*
Brown-headed Cowbird *(Molothrus ater)*
American Goldfinch *(Spinus tristis)*
Pileated Woodpecker *(Dryocopus pileatus)* SOC
Black Rosy-Finch *(Leucosticte atrata)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
White-throated Swift *(Aeronautes saxatalis)*
Hammond's Flycatcher *(Empidonax hammondii)*
Bank Swallow *(Riparia riparia)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Yellow-rumped Warbler *(Setophaga coronata)*
Blackpoll Warbler *(Setophaga striata)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
American Tree Sparrow *(Spizelloides arborea)*
Lincoln's Sparrow *(Melospiza lincolnii)*
House Finch *(Haemorhous mexicanus)*

Reptiles

Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Sierran Treefrog *(Pseudacris sierra)*

Invertebrates

Black-tipped Darner *(Aeshna tuberculifera)* PSOC
Field Crescent *(Phyciodes pulchella)*
Common Wood-Nymph *(Cercyonis pegala)*
Greenish Blue *(Icaricia saepiolus)*
Weidemeyer's Admiral *(Limenitis weidemeyerii)*

Vascular Plants

Mountain Lousewort *(Pedicularis pulchella)* SOC

Original Concept Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.807, Northern Rocky Mountain Subalpine Woodland and Parkland

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
4233: Northern Rocky Mountain Subalpine Woodland and Parkland

Literature Cited Above Legend: View Online Publication

Arno, S.F. and R.J. Hoff. Silvics of whitebark pine (Pinus albicaulis). 1989. General Technical Report INT-253. Ogden, UT. USDA, Forest Service, Intermountain Research Station. 11pp.

- Bockino, N.K.and D.B. Tinker. 2012. Interactions of white pine blister rust and mountain pine beetle in whitebark pine ecosystems in the southern Greater Yellowstone Area. Natural Areas Journal 32(1):31-40.
- Bower, A.D. and S.N. Aitken. 2008. Ecological genetics and seed transfer guidelines for Pinus albicaulis (Pinaceae).

American Journal of Botany 95(1):66-76.

- Callaway, R.M. 1998. Competition and facilitation on elevation gradients in subalpine forests of the northern Rocky Mountains, USA. Oikos 561-573.

Fryer, J.L. 2002. Pinus albicaulis. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

Habeck, R. J. 1991. Larix lyallii. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

- Keane, R.E. and R.A. Parsons. 2010. Restoring whitebark pine forests of the northern Rocky Mountains, USA. Ecological Restoration 28(1):56-70.
- McCaughey, W., G.L. Scott,and K.L. Izlar. 2009. Technical note: whitebark pine planting guidelines. Western Journal of Applied Forestry 24(3):163-166.
- McCaughey, W.W. and D.F. Tomback. 2001. The natural regeneration process. pp105-120. In: Whitebark pine communities: ecology and restoration. Washington D.C.: Island Press.
- McKinney, S.T. and D.F. Tomback. 2007. The influence of white pine blister rust on seed dispersal in whitebark pine. Canadian Journal of Forest Research 37(6);1044-1057.
- Smith, C.M., B. Shepherd, C. Gillies,and J. Stuart-Smith. 2012. Changes in blister rust infection and mortality in whitebark pine over time. Canadian journal of forest research 43(1):90-96.
- Smith-Mckenna, E.K., L.M. Resler, D.F. Tomback, H. Zhang, and G.P. Malanson. 2013. Topographic influences on the distribution of white pine blister rust in Pinus albicaulis treeline communities. Ecoscience. 20:(3): 215-229.
- Sturrock, R.N., S.J. Frankel, A.V. Brown, P.E. Hennon, J.T. Kliejunas, K.J. Lewis, and A.J. Woods. 2011. Climate change and forest diseases. Plant Pathology 60(1):133-149.
- Tomback, D.F. 2005. The impact of seed dispersal by Clark's nutcracker on whitebark pine: multi-scale perspective on a high mountain mutualism. pp. 181-201. In: Mountain Ecosystems. Springer Berlin Heidelberg.
- Tomback, D.F., K.G. Chipman, L.M. Resler, E.K. Smith-McKenna, and C.M. Smith. 2014. Relative abundance and functional role of whitebark pine at treeline in the Northern Rocky Mountains. Arctic, Antarctic, and Alpine Research 46(2):407-418.

U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Whitebark Pine Communities. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service

Uchytil, R.J. 1991. Abies lasiocarpa. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.

Arno, S.F., and J.R. Habeck. 1972. Ecology of alpine larch (*Larix lyallii* Parlatore) in the Pacific Northwest. Ecological Monographs 42(4):417-450.

Klasner, Frederick L., and Daniel B. Fagre. 2002. "A Half Century of Change in Alpine Treeline Patterns at Glacier National Park, Montana, U.S.A.". *Arctic, Antarctic, and Alpine Research.* 34 (1): 49-56.

- McCaughey, W.W. 1990. Biotic and microsite factors affecting Pinus albicaulis establishment and survival. Ph.D. Dissertation. Bozeman, MT: Montana State University. 78 p.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Rocky Mountain Foothill Woodland-Steppe Transition

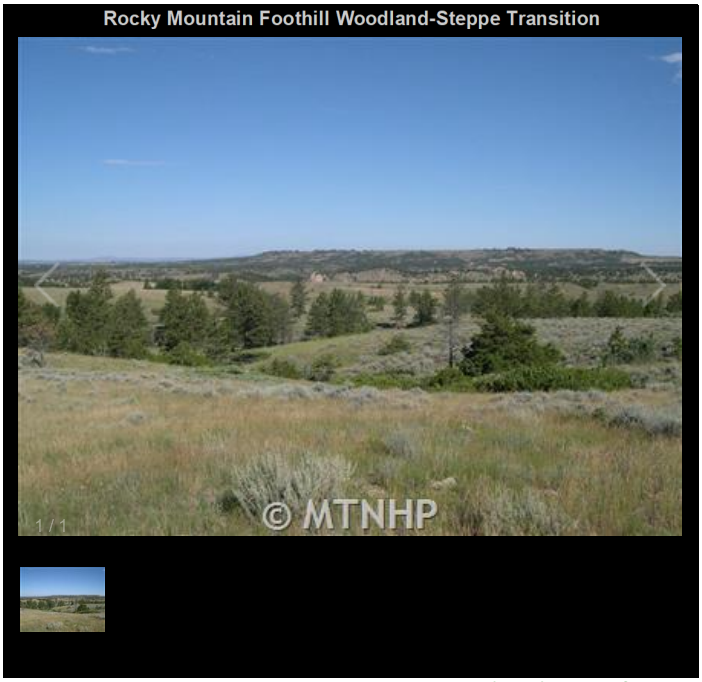


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State Rank Reason

Fire is the greatest threat, but given the proximity of this system to residential areas, fires are likely to be controlled.

General Description

This inland Pacific Northwest ecological system occurs in the foothills of the Montana Rocky Mountains, where it forms a broad ecotone between true forests ad true steppe, shrublands, or grasslands, typically on warm, dry, exposed sites too droughty to support a closed tree canopy. This is not a fire-maintained system. The "steppe" character results from a climate-edaphic interaction that results in a graminiod-dominated landscape with widely scattered trees; even in the absence of fire, a "woodland" or "forest" structure will not be obtained. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops on southerly or western aspects are most common. They can be found on glacial till, glacio-fluvial sand and gravel, dune, basaltic rubble, colluvium, deep loess or volcanic ash-derived soils, with characteristic features of good aeration and drainage, coarse texture, and an abundance of mineral material. Ponderosa pine (*Pinus ponderosa*) or Douglas-fir (*Pseudotsuga menziesii*)are the predominant conifers. Limber pine (*Pinus flexilis*)may be present in some occurrences. In fire-protected transition areas with big sagebrush steppe systems, antelope bitterbrush (*Purshia tridentata*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis),* big sagebrush (*Artemisia tridentata* ssp. *tridentata*), and three-tip sagebrush (*Artemisia tripartita*) may be common. Deciduous shrubs such as common ninebark (*Physocarpus malvaceus*), commonsnowberry (*Symphoricarpos albus*), or birch leaf spiraea (*Spiraea betulifolia)may* be abundant in occurrences west of the Continental Divide. Important grass species include bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg's bluegrass (*Poa secunda*), needle and thread (*Hesperostipa comata*), needlegrass (*Achnatherum*species), and bottlebrush squirreltail (*Elymus elymoides*). This system is very similar to Northern Rocky Mountain Ponderosa Pine Woodland and Savanna, but with more widely scattered trees.

Diagnostic Characteristics

Woody and herbaceous, aridic and shallow soils, short disturbance interval, *Pinus ponderosa*, *Pseudotsuga menziesii*

Similar Systems

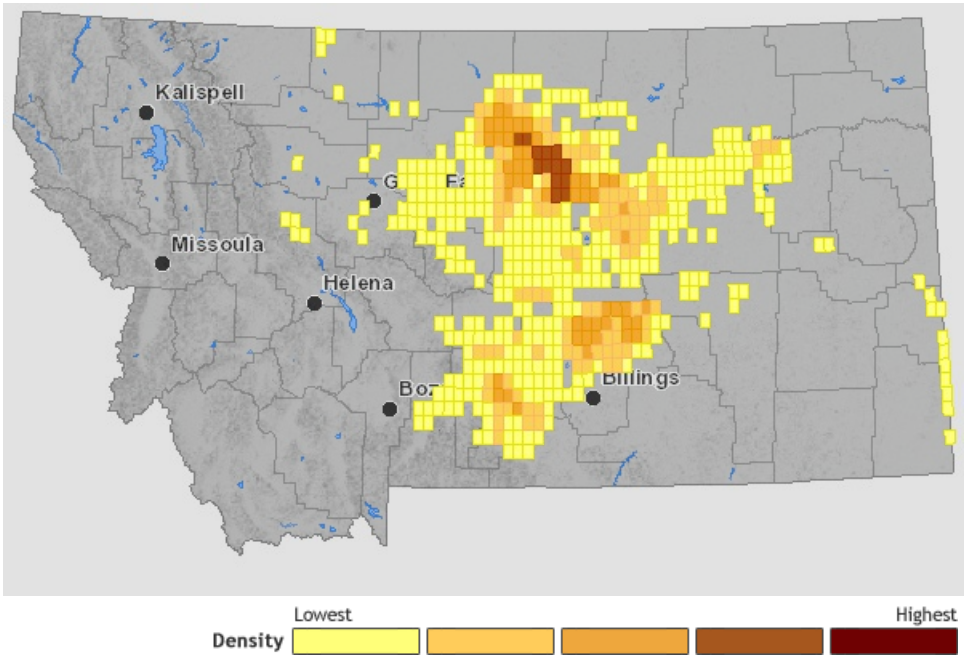
- Great Plains Ponderosa Pine Woodland and Savanna
- Rocky Mountain Ponderosa Pine Woodland and Savanna

Range

This system is found in the foothill to montane elevations east of the Continental Divide in northwestern Montana, in the Missouri river breaks and in central Montana on soils derived from shales. Elsewhere it is found from Idaho to the Columbia Plateau region of Oregon and Washington and west along the foothills of the Modoc Plateau and eastern Cascades into southern interior British Columbia.

Ecological System Distribution

Approximately 2,325 square kilometers are classified as Rocky Mountain Foothill Woodland-Steppe Transition in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Blaine, Carbon, Carter, Cascade, Chouteau, Fallon, Fergus, Garfield, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Meagher, Musselshell, Park, Petroleum, Phillips, Pondera, Prairie, Rosebud, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Large patch

Environment

In Montana, this system is found at scattered locations throughout northwestern and west central Montana, at elevations of 914-1,829 meters (3,000-6,000 feet) (Pfister et al, 1977; Mueggler and Stewart, 1980). Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops on southerly or western aspects are most common. This system can occur in association with cliff and canyon systems. It generally occurs on glacial till, glacio-fluvial sand and gravel, and loamy soils derived from a variety of parent materials. Soils are coarse with good aeration, often thin, and with slightly acidic to slightly basic pH. There is usually an abundance of mineral material consisting of fine and coarse rocks. Consequently, this system is subjected to droughty soil conditions during the growing season. Annual precipitation ranges from 36 to 56 centimeters (14 to 20 inches).

Vegetation

Ponderosa pine (*Pinus ponderosa*) or Douglas-fir (*Pseudotsuga menziesii*) are the most common conifers. Limber pine (*Pinus flexilis*) may be present in some occurrences. In transition areas with sagebrush steppe systems, antelope

bitterbrush (*Purshia tridentata*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), big sagebrush (*Artemisia tridentata* ssp. *tridentata*), and three-tip sagebrush (*Artemisia tripartita*) may be common in fire-protected sites such as rocky areas. Common ninebark (*Physocarpus malvaceus*), common snowberry (*Symphoricarpos albus*), or birch leaf spiraea (*Spiraea betulifolia)* can be abundant in occurrences on northern or eastern aspects, or sites west of the Continental Divide in northwestern Montana. Important grass species include bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg's bluegrass (*Poa secunda*), needle and thread (*Hesperostipa comata*), needlegrass (*Achnatherum* species), prairie junegrass (*Koeleria macrantha*) and bottlebrush squirreltail (*Elymus elymoides*).

Common forbs include yarrow (*Achillea millefolium*), nodding onion (*Allium cernuum*), rosy pussytoes (*Antennaria rosea*), hairy golden aster (*Heterotheca villosa*), elk thistle (*Cirsium undulatum*), fleabane (*Erigeron* species), buckwheat (*Eriogonum* species), Indian blanket flower (*Gaillardia aristata*), stoneseed (*Lithospermum ruderale*), silky lupine (*Lupinus sericeus*), silky crazyweed (*Oxtropis sericea*), and Hood's phlox (*Phlox hoodii*). Arrowleaf balsamroot (*Balsamorhiza sagittata*) can be abundant in some occurrences.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3392 *Pseudotsuga menziesii - Pinus ponderosa* / Shrub Understory Central Rocky Mountain Forest & Woodland Alliance
A3446 *Pinus ponderosa* / Shrub Understory Central Rocky Mountain Woodland Alliance
  CEGL005648 *Pinus ponderosa - Purshia tridentata* Central Rocky Mountain Woodland
A3447 *Pinus ponderosa* / Herbaceous Understory Central Rocky Mountain Open Woodland Alliance
  CEGL000865 *Pinus ponderosa - Pseudoroegneria spicata* Woodland
A3462 *Pseudotsuga menziesii* Middle Rocky Mountain Dry-Mesic Forest & Woodland Alliance
  CEGL000909 *Pseudotsuga menziesii - Purshia tridentata* Woodland
A3464 *Pinus ponderosa* Dry-Mesic Black Hills Forest & Woodland Alliance
  CEGL000878 *Pinus ponderosa* Scree Woodland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Dry conditions and droughty soils that limit tree establishment are the driving factors in this system. Tree growth is likely episodic, with regeneration episodes in years with available moisture. Tree density is limited in some areas by available growing space due to the rocky conditions of the site. Disturbances in this system include fire, soil erosion, and biotic vectors. This system burns occasionally, although it does not require fire to prevent succession to a closed canopy forest structure due to the interaction of climate and edaphic factors. Fire frequency is estimated to be 30 to 50 years (Landfire, 2007). While tree seedlings may be killed by fire, tree species in this system exhibit moderate to high fire resistance (Steinberg, 2002; Howard, 2003), and fuel loads are generally light due to open rocky terrain. Fires are consequently typically of low severity and cause minimal damage. Frequent low-intensity surface fires promote grass production (Howard, 2003), but may also encourage invasion by non-native species (Symstad et al., 2014). Consequently, invasion of non-native cheatgrass (*Bromus tectorum*) is changing fire frequency, spread, and severity, and cheatgrass invasion risk in Montana is expected to increase under future climatic conditions (Bradley, 2009).

Increasing drought frequency and severity subjects conifers in this system to increased incidence of biotic disturbance. Drought affects Douglas-fir susceptibility to Douglas-fir tussock moth (*Orgyia pseudotsugata*), Douglas-fir bark beetle (*Dendroctonus pseudotsugae*), and western spruce budworm (*Choristoneura occidentalis*) outbreaks (Steinberg, 2002). Both drought-stressed ponderosa pine and limber pine have an increased likelihood of attack by the mountain pine beetle (*Dendroctonus ponderosae*) (Graham and Jain, 2005; Jackson et al., 2010). However, outbreaks may be less likely to reach epidemic levels as stands in this system exhibit extremely low stand densities (Howard, 2003). White pine blister rust (*Cronartium ribicola*) additionally infects limber pine in this system, causing reduced regeneration and mortality (Jackson et al., 2010). Trees that occupy this edge environment and exhibit resistance to abiotic and biotic stressors are important genetic resources to maximize adaptive potential to current and continued environmental change.

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain and restore this system to similar pre-settlement conditions, although results may be variable due to insufficient ground fuels and the rocky terrain typical of this system. Periodic burning is used to expose mineral soils, provide nutrient availability, reduce competition, and stimulate native grass and forb production. When insect outbreaks are active, a combination of control actions including thinning, removal of infested trees, and application of targeted insecticides can be used, although control efforts are best utilized at small scales and for high-value individuals (Howard, 2003). In light of blister rust prevalence, stands can be managed to maintain limber pine forest composition, and to diversify age structure to include regeneration, thereby encouraging natural selection of rust resistant individuals (Jackson et al., 2010).

Excessive grazing can result in the depletion of the most common perennial grasses and lead to an abundance of exotic grasses in this system. In some cases, especially on sites heavily infested with cheatgrass, frequent prescribed burning at low intensities may stimulate greater cheatgrass cover following fire, especially if the burn fails to eliminate the seed bank. Controlling invasive species like cheatgrass prior to prescribed burning may help to reduce post-burn outbreaks (Symstad et al., 2014), and increasing the time between prescribed fires may inhibit cheatgrass by increasing surface fuels (both herbaceous and litter) which directly inhibit cheatgrass establishment (Keeley and McGinnis, 2007). On sites with slopes

and forage that support domestic livestock, use can be monitored to maintain soil integrity.

Restoration Considerations

Successful restoration of native grasses within this system may be limited to sites where pre-fire cheatgrass (*Bromus tectorum*) cover was low. Because recovery of lightly burned areas is quite quick, reseeding is usually not necessary, especially if an intact native herbaceous understory was present before the fire. However, to offset invasion of exotics such as cheatgrass, re-seeding with competitive native grasses may be desirable after low-intensity or prescribed surface fires. Cheatgrass establishment in this system is enhanced by disturbance that opens the understory, removes litter, or both. (Mack and Pyke, 1983; Gundale et al., 2008). Fall germination and rapid elongation of roots provide cheatgrass with a competitive advantage over native perennial species (Harris, 1967). Prolific seed production also contributes to the competitive advantage of this grass over native grasses and associated perennial forbs. For areas in which blister rust is prevalent, augmenting natural limber pine regeneration with seed sources that exhibit some resistance to blister rust or, in some cases, with nursery stock, may be necessary.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Least Chipmunk *(Neotamias minimus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*
Prairie Vole *(Microtus ochrogaster)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Least Weasel *(Mustela nivalis)*
American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Pronghorn *(Antilocapra americana)*
Merriam's Shrew *(Sorex merriami)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Masked Shrew *(Sorex cinereus)*
Northern Montane Shrew *(Sorex obscurus)*
Big Brown Bat *(Eptesicus fuscus)*
White-tailed Jackrabbit *(Lepus townsendii)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Red Squirrel *(Tamiasciurus hudsonicus)*
Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Long-tailed Vole *(Microtus longicaudus)*
Sagebrush Vole *(Lemmiscus curtatus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
American Badger *(Taxidea taxus)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC
Brewer's Sparrow *(Spizella breweri)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Turkey Vulture *(Cathartes aura)*
Cooper's Hawk *(Accipiter cooperii)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Dusky Grouse *(Dendragapus obscurus)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Western Wood-Pewee *(Contopus sordidulus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Kingbird *(Tyrannus verticalis)*
Tree Swallow *(Tachycineta bicolor)*
Barn Swallow *(Hirundo rustica)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
White-breasted Nuthatch *(Sitta carolinensis)*
Rock Wren *(Salpinctes obsoletus)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Gray Catbird *(Dumetella carolinensis)*
Northern Shrike *(Lanius borealis)*
Yellow-rumped Warbler *(Setophaga coronata)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
White-throated Sparrow *(Zonotrichia albicollis)*
Dark-eyed Junco *(Junco hyemalis)*
Common Grackle *(Quiscalus quiscula)*
American Goldfinch *(Spinus tristis)*
Golden Eagle *(Aquila chrysaetos)* SOC
Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Gyrfalcon *(Falco rusticolus)*
Wild Turkey *(Meleagris gallopavo)*
American Barn Owl *(Tyto furcata)*
Common Nighthawk *(Chordeiles minor)*
Least Flycatcher *(Empidonax minimus)*
Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*
Violet-green Swallow *(Tachycineta thalassina)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Northern House Wren *(Troglodytes aedon)*
Western Bluebird *(Sialia mexicana)*
American Robin *(Turdus migratorius)*
Cedar Waxwing *(Bombycilla cedrorum)*
Cape May Warbler *(Setophaga tigrina)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Lark Sparrow *(Chondestes grammacus)*
Harris's Sparrow *(Zonotrichia querula)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Redpoll *(Acanthis flammea)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
North American Racer *(Coluber constrictor)*
Plains Gartersnake *(Thamnophis radix)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Pale Swallowtail *(Pterourus eurymedon)*

Vascular Plants

Lesica's Bladderpod *(Physaria lesicii)* SOC
Macoun's Cinquefoil *(Potentilla macounii)*

Native Species Occasionally Associated with this Ecological System

Mammals

Eastern Red Bat *(Lasiurus borealis)* SOC
Pallid Bat *(Antrozous pallidus)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Black-footed Ferret *(Mustela nigripes)* SOC
Western Water Shrew *(Sorex navigator)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Moose *(Alces alces)*

Birds

Greater Sage-Grouse *(Centrocercus urophasianus)* SOC
Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Sharp-shinned Hawk *(Accipiter striatus)*
Swainson's Hawk *(Buteo swainsoni)*
Prairie Falcon *(Falco mexicanus)*
Ruffed Grouse *(Bonasa umbellus)*
Upland Sandpiper *(Bartramia longicauda)*
Northern Saw-whet Owl *(Aegolius acadicus)*
White-throated Swift *(Aeronautes saxatalis)*
Western Flycatcher *(Empidonax difficilis)*
Horned Lark *(Eremophila alpestris)*
Mountain Chickadee *(Poecile gambeli)*
Yellow Warbler *(Setophaga petechia)*
Western Tanager *(Piranga ludoviciana)*
Lazuli Bunting *(Passerina amoena)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Bunting *(Calamospiza melanocorys)*
Song Sparrow *(Melospiza melodia)*
Western Meadowlark *(Sturnella neglecta)*
Bullock's Oriole *(Icterus bullockii)*
House Finch *(Haemorhous mexicanus)*
Red Crossbill *(Loxia curvirostra)*
Pine Siskin *(Spinus pinus)*

Reptiles

Common Sagebrush Lizard *(Sceloporus graciosus)*
Northern Rubber Boa *(Charina bottae)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Invertebrates

Greenish Blue *(Icaricia saepiolus)*
Field Crescent *(Phyciodes pulchella)*
One-eyed Sphinx *(Smerinthus astarte)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.958, Northern Rocky Mountain Foothill Conifer Wooded Steppe

National Land Cover Dataset:
42: Evergreen Forest

ReGAP:
5426: Northern Rocky Mountain Foothill Conifer Wooded Steppe

Literature Cited Above Legend: View Online Publication

- Bradley, B.A. 2009. Regional analysis of the impacts of climate change on cheatgrass invasion shows potential risk and opportunity. Global Change Biology 15(1): 196-208.
- Graham, R.T. and T.B. Jain. 2005. Ponderosa pine ecosystems. pp. 1-32. In: Proceedings of the Symposium on Ponderosa Pine: Issues, Trends, and Management, Gen. Tech. Rep. PSW-GTR-198. Albany CA: Pacific Southwest Research Station, Forest Service, US Department of Agriculture, Klamath Falls, OR.
- Gundale, M.J., S. Sutherland, and T.H.DeLuca. 2008. Fire, native species, and soil resource interactions influence the spatio-temporal invasion pattern of Bromus tectorum. Ecography 31(2):201-210
- Howard, J. L. 2003. Pinus ponderosa var. scopulorum. In: Fire Effects Information System, [Online}. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Jackson, M., A. Gannon, H. Kearns, K. Kendall. 2010. Current Status of Limber Pine in Montana. Report 10-06. Missoula, MT: U.S. Department of Agriculture, Forest Service, Northern Region. 14 p.

- Keeley, J. E., and T. W. Mcginnis. 2007. "Impact of Prescribed Fire and Other Factors on Cheatgrass Persistence in a Sierra Nevada Ponderosa Pine Forest". *International Journal of Wildland Fire.* 16 (1): 96-106.
- Landfire. 2007. Northern Rocky Mountain Foothill Conifer Wooded Steppe. BPS:0111650. In: Landfire Biophysical Setting Descriptions.
- Steinberg, P. D. 2002. Pseudotsuga menziesii var. glauca. In: Fire Effects Information System, [Online}. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Symstad, A.J., W.E. Newton, and D.J. Swanson. 2014. Strategies for preventing invasive plant outbreaks after prescribed fire in ponderosa pine forest. Forest Ecology and Management 324:81-88.

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Aguirre, Lucrecia, and Douglas A. Johnson. 1991. "Influence of Temperature and Cheatgrass Competition on Seedling Development of Two Bunchgrasses". *Journal of Range Management.* 44 (4): 347-354.
- Harris, G.A. 1967. Some competitive relationships between Agropyron spicatum and Bromus tectorum. Ecological Monographs 37:89-111.
- Mack, Richard N., and David A. Pyke. 1983. "The Demography of Bromus Tectorum: Variation in Time and Space". *The Journal of Ecology.* 71 (1): 69-93.
- Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service Gen. Tech. Rep. INT-66, Intermountain Forest and Range Exp. Sta., Ogden, Utah. 154 pp.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Citation for data on this website:
Rocky Mountain Foothill Woodland-Steppe Transition — Northern Rocky Mountain Foothill Conifer Wooded Steppe. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=5426

Aspen Forest and Woodland



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General Description

This widespread ecological system is more common in the southern and central Rocky Mountains, but occurs in the montane and subalpine zones throughout much of Montana north into Canada. It is similar to the Inter-Mountain Basins Aspen Mixed Conifer Forest-Woodland found in the Big Snowy Mountains, but lacks the conifer component. Distribution of this system is primarily limited by adequate soil moisture required to meet its high evapotranspirative demand, length of growing season, and temperatures. Mean annual precipitation where these systems occur is generally greater than 38 centimeters (15 inches) and typically greater than 51 centimeters (20 inches), except in semi-arid environments where occurrences are restricted to mesic microsites such as seeps or areas below large snow drifts. Stands can occur on gentle to moderate slopes, in swales, or on level sites. At lower elevations, occurrences are found on cooler, north aspects and mesic sites. Soils are usually deep and well developed with rock often absent from the soil. Soil texture ranges from sandy loam to clay loams. This system describes mesic forests and woodlands dominated by quaking aspen (*Populus tremuloides*) without a significant conifer component (<25% relative tree cover). This aspen system can be stable and long-lived with little encroachment of coniferous species. The understory structure may be complex with multiple shrub and herbaceous layers, or simple, with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by mesic grasses or forbs. Occurrences of this system often originate, and are likely maintained, by stand-replacing disturbances such as crown fire, disease, windthrow, elk and beaver activity.

Diagnostic Characteristics

Northwestern Great Plains Aspen Forest and Parkland and Inter-Mountain Basins Aspen-Mixed Conifer Forest & Woodland

Similar Systems

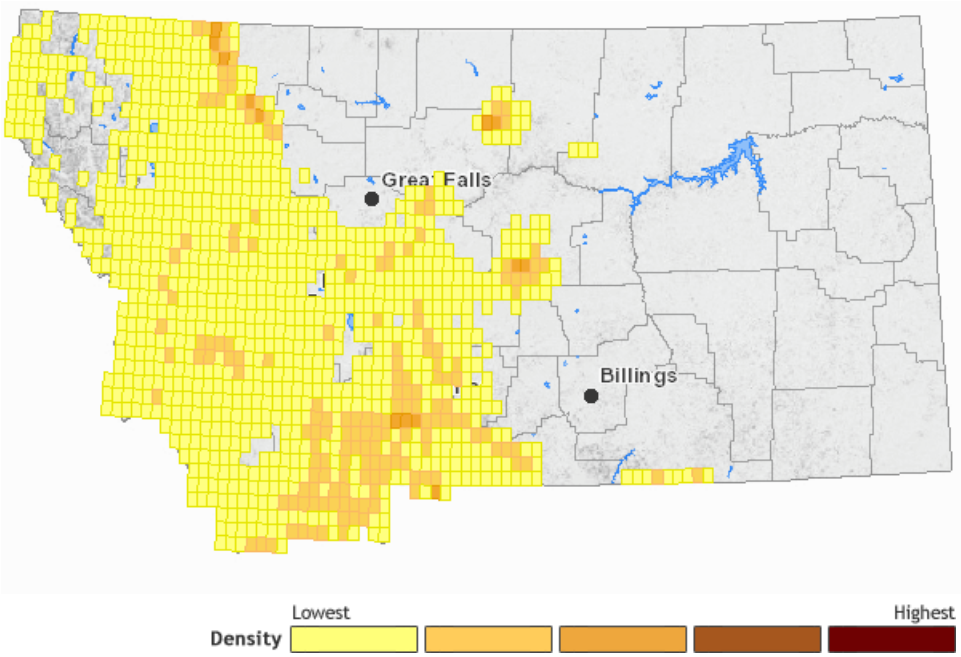
- Aspen and Mixed Conifer Forest

Range

In Montana, this system is found throughout the Rocky Mountains and island ranges of eastern and south-central Montana. Elevations generally range from 1,493 to 2,743 meters (4,900-9,000 + feet), but occurrences can be found at lower elevations in some regions.

Ecological System Distribution

Approximately 1,666 square kilometers are classified as Aspen Forest and Woodland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Phillips, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Large patch and Small patch

Environment

Climate is temperate with a relatively long growing season, typically cold winters and deep snow. Mean annual precipitation is greater than 38 centimeters (15 inches) and typically greater than 51 centimaters (20 inches), except in semi-arid environments where occurrences are restricted to mesic, microsites such as seeps or areas below large snow drifts. Stands can occur on gentle to moderate slopes, in swales, or on level sites. At lower elevations, occurrences are found on cooler, north aspects and mesic sites. Soils are usually deep and well developed, with rock often absent from the soil. Soil texture ranges from sandy loam to clay loams.

Vegetation

This system includes aspen stands with a relatively closed canopy of trees 5-20 meters (16 to 66 feet) tall. In Montana, most aspen clones are smaller than in the Central Rocky region. Clones can be stable and long-lived or seral to Douglas-fir (*Pseudotsuga menziesii*), subalpine fir (*Abies lasiocarpa*) or spruce (*Picea* species) dominated forests (Habeck, 1967). Stable climax aspen forest also occurs in southwestern Montana (Pfister et al, 1977). Conifers that may be present but are never codominant include subalpine fir, Engelmann spruce (*Picea engelmannii*), white spruce (*Picea glauca*), ponderosa pine (*Pinus ponderosa*), and Douglas-fir. Conifer species may contribute up to 25% of the tree canopy before the occurrence is reclassified as a mixed occurrence. This system can be interpreted in some instances to be the seral phase of the Inter-Mountain Basins Aspen-Mixed Conifer Forest & Woodland. In Glacier County, this system differs in height growth, which is controlled by recurring Chinook winds.

Depending on available soil moisture and other factors like disturbance, the understory structure may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by graminoids or forbs. Common shrubs include Rocky Mountain maple (*Acer glabrum*), serviceberry (*Amelanchier alnifolia*), creeping Oregon grape (*Mahonia repens*), chokecherry (*Prunus virginiana*), rose (*Rosa spp.*), thimbleberry (*Rubus parviflorus*), and snowberry (*Symphoricarpos spp.*). The herbaceous layers may be lush and diverse. Common graminoids may include mountain brome (*Bromus carinatus*), pinegrass (*Calamagrostis rubescens*), Ross' sedge (*Carex rossii*), blue wildrye (*Elymus glaucus*), slender wheatgrass (*Elymus trachycaulus*) and bearded fescue (*Festuca subulata*). Common mesic understory forbs include yarrow (*Achillea millefolium*), sharptooth angelica (*Angelica arguta*), Engelmann aster (*Eucephalus engelmannii*),larkspur *(Delphinium* species), aspen daisy (*Erigeron speciosus*), Richardson's geranium (*Geranium richardsonii*), common cow parsnip (*Heracleum maximum*), western sweet cicely (*Osmorhiza occidentalis*), western meadow rue (*Thalictrum occidentale*), stinging nettle (*Urtica dioica*) and western valerian (*Valeriana occidentalis*). Bracken fern (*Pteridium aquilinum*) is present in some stands.Exotic grasses such as the perennials Kentucky bluegrass (*Poa pratensis*), common timothy (*Phleum pratense*) and smooth brome (*Bromus inermis*) are often common in occurrences disturbed by grazing.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0422 *Abies lasiocarpa - Populus tremuloides* Rocky Mountain Moist Forest Alliance
- **CEGL005911** *Populus tremuloides / Conifer - Spiraea betulifolia / Symphoricarpos albus* Forest

A2036 *Populus tremuloides* Rocky Mountain Forest & Woodland Alliance
- **CEGL000564** *Populus tremuloides - Amelanchier alnifolia* Forest
- **CEGL000567** *Populus tremuloides - Amelanchier alnifolia / Symphoricarpos oreophilus - Calamagrostis rubescens* Forest
- **CEGL000573** *Populus tremuloides - Bromus carinatus* Forest
- **CEGL000575** *Populus tremuloides - Calamagrostis rubescens* Forest
- **CEGL000579** *Populus tremuloides - Carex geyeri* Forest
- **CEGL000586** *Populus tremuloides - Heracleum sphondylium* Forest
- **CEGL000587** *Populus tremuloides - Juniperus communis* Forest
- **CEGL000594** *Populus tremuloides - Mahonia repens* Forest
- **CEGL000595** *Populus tremuloides - Heracleum maximum* Forest
- **CEGL000602** *Populus tremuloides - Rubus parviflorus* Forest
- **CEGL000607** *Populus tremuloides - Spiraea betulifolia* Forest
- **CEGL000609** *Populus tremuloides - Symphoricarpos albus* Forest
- **CEGL000610** *Populus tremuloides - Symphoricarpos oreophilus* Forest
- **CEGL000618** *Populus tremuloides* - Tall Forbs Forest
- **CEGL000619** *Populus tremuloides - Thalictrum fendleri* Forest
- **CEGL003748** *Populus tremuloides* - Invasive Perennial Grasses Forest
- **CEGL005849** *Populus tremuloides - Urtica dioica* Forest

A3465 *Pinus ponderosa* Mesic Black Hills Forest Alliance
- **CEGL000596** *Populus tremuloides - Prunus virginiana* Forest

A3760 *Populus tremuloides* Riparian Forest Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Occurrences of this ecological system often originate with, and are likely maintained by, stand-replacing disturbances such as crown fire, disease and windthrow, or logging by humans or beaver. Fire return intervals vary from approximately 30-165 years and range from mixed severity to stand replacing (U.S. Department of Agriculture, 2012). The diversity of fire regimes is attributable to the variability of stand structure, topography, and climate found within this system (Shinneman et al., 2013). In general, aspen stands are relatively resistant to fire due to high fuel moisture content, however, favorable fire weather conditions can result in the spread of fire within stands (Shinneman et al., 2013). Boles are killed by ground fires, but can quickly and vigorously resprout by root suckers in high densities (Howard, 1996). Stems are relatively short-lived (70-120 years), and the system will generally succeed to longer-lived, shade-tolerant conifer forest if undisturbed, although seemingly stable fire-independent stands appear to also exist where edaphic and topographic conditions favor the dominance of aspen over conifers (Shinneman et al., 2013). Occurrences are often favored by fire in the conifer zone (Mueggler, 1988).

In Montana, seed production is erratic and infrequent. Natural seedling establishment is limited to years of viable seed production. Seedling recruitment is limited to sites where there is adequate soil moisture following dispersal in early summer. Following the Yellowstone fires of 1988, quaking aspen seedlings established on many suitable sites, however, re-sprouting was greater in stands that had burned (Romme et al., 1995), and seedlings were found only in burned forests (Turner et al., 2003). These seedling and sapling stands are subjected to heavy elk browsing and may not reach full maturity (Hessl and Graumlich, 2002).

Quaking aspen is dioecious; clones are either male or female. Reproduction is largely clonal. Some clones are thought to be centuries old and have the potential to be large in size. Stems are produced from a common root system; new stems are produced on the outside, advancing in front of the clone, with older trees in the center. The root system persists as stems die and are replaced. Clones can be distinguished by morphological differences in flowering and leaf emergence phenology, leaf size and shape, branching habit, bole character, and gender. Quaking aspen reproduces vegetatively by sprouting from stumps and root crowns, and by forming suckers (adventitious shoots on roots). The ability of aspen to regenerate by suckers can vary widely among clones (Schier et al, 1985) and suckering response may increase with fire

severity (Keyser et al., 2005).

In recent years, many aspen stands have exhibited mortality from biotic vectors. Some examples include Cytospora canker which is not highly destructive in healthy trees, and bronze poplar borer (*Agrilus liragus*) (Marchetti et al., 2011). These pathogens infect and proliferate in aspen stands already stressed by drought, insects, past fires, wind damage and heavy livestock and wildlife use (Shinneman et al., 2013; Marchetti et al., 2011). In addition to the tendency of drought to increase susceptibility to attack by biotic vectors, drought-related damage may also increase aspen vulnerability to future droughts (Anderegg et al., 2013). Large, older trees are generally more sensitive to water stress (Bell et al., 2014), making stands with low levels of regeneration particularly susceptible to drought-related mortality.

Management

Historic fire suppression combined with excessive browsing of young aspen by ungulates is considered to be a primary cause of aspen decline in the Northern Rockies (Shinneman et al., 2013). In the absence of natural fire, periodic prescribed burns can be implemented to maintain and enhance regeneration in declining stands with low productivity. The best conditions for burning generally occur in the early spring or late fall when surface fuels are dry and frozen when aspen stands are more vulnerable (Howard, 1996). Brown and Simmerman (1986) describe methods for determining appropriate timing of prescribed burning in aspen stands. Aspen will typically reproduce prolifically post-burning, however in areas where livestock or wildlife browsing is severe, ungulate management to reduce damage to new growth may be necessary (Shinneman et al., 2013; Durham and Marlow, 2010). A study in southwestern Montana found that aspen regeneration increased after prescribed burning, and that ungulate browsing did not limit regeneration due to the low elk density and management of cattle grazing in this region (Durham and Marlow, 2010).

Restoration Considerations

Restoration strategies will depend on fire severity, grazing or other land impacts. Because burned areas regenerate vegetatively following fire, additional restoration practices are generally not required. When supplemental planting is necessitated, seedlings preferable to vegetative cuttings, and seed germination and seedling survival are highest on well-drained, moist mineral seedbeds (Howard, 1996). Early successional stages may be dominated by fireweed (*Chamerion angustifolium*) and other forbs, small amounts of forest graminoids such as mountain brome, blue wildrye, and pinegrass, and by re-sprouting of dominant shrubs. Aspen will resprout vigorously following fires of low to moderate severity. Sprouting will also occur after higher intensity fires from root suckers that are deeper in the soil profile. In areas with high elk densities or heavy livestock use, aspen regeneration may require protection from browsing until crowns can grow high enough to avoid excessive browsing damage (6-8 years) (Durham and Marlow, 2010; Howard, 1996). Restoration of aspen stands may be additionally valuable as the species is unique in its ability to stabilize soil and protect watershed-wide water quality (Howard, 1996).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a

species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Grizzly Bear *(Ursus arctos)* SOC	Fisher *(Pekania pennanti)* SOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC	Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Western Water Shrew *(Sorex navigator)*
Northern Montane Shrew *(Sorex obscurus)*	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
American Pika *(Ochotona princeps)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Snowshoe Hare *(Lepus americanus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Flying Squirrel *(Glaucomys sabrinus)*	Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*	White-footed Deermouse *(Peromyscus leucopus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Raccoon *(Procyon lotor)*
Marten *(Martes americana)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Ermine *(Mustela richardsonii)*
American Badger *(Taxidea taxus)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Moose *(Alces alces)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC	Alder Flycatcher *(Empidonax alnorum)* SOC
Veery *(Catharus fuscescens)* SOC	Green-tailed Towhee *(Pipilo chlorurus)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC	Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC	Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC	Eastern Bluebird *(Sialia sialis)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC	Ovenbird *(Seiurus aurocapilla)* PSOC
Northern Harrier *(Circus hudsonius)*	Sharp-shinned Hawk *(Accipiter striatus)*
Cooper's Hawk *(Accipiter cooperii)*	Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*	Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*	Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*	Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*	Northern Saw-whet Owl *(Aegolius acadicus)*
Black-chinned Hummingbird *(Archilochus alexandri)*	Calliope Hummingbird *(Selasphorus calliope)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*	Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Downy Woodpecker *(Dryobates pubescens)*	Hairy Woodpecker *(Dryobates villosus)*
American Three-toed Woodpecker *(Picoides dorsalis)*	Northern Flicker *(Colaptes auratus)*
Olive-sided Flycatcher *(Contopus cooperi)*	Western Wood-Pewee *(Contopus sordidulus)*
Willow Flycatcher *(Empidonax traillii)*	Least Flycatcher *(Empidonax minimus)*

Hammond's Flycatcher *(Empidonax hammondii)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Flycatcher *(Empidonax difficilis)*
Tree Swallow *(Tachycineta bicolor)*
Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*
Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*
Blue Jay *(Cyanocitta cristata)*
Black-billed Magpie *(Pica hudsonia)*
Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*
Black-capped Chickadee *(Poecile atricapillus)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
White-breasted Nuthatch *(Sitta carolinensis)*
Northern House Wren *(Troglodytes aedon)*
Golden-crowned Kinglet *(Regulus satrapa)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Western Bluebird *(Sialia mexicana)*
Mountain Bluebird *(Sialia currucoides)*
Townsend's Solitaire *(Myadestes townsendi)*
Swainson's Thrush *(Catharus ustulatus)*
Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*
Gray Catbird *(Dumetella carolinensis)*
Cedar Waxwing *(Bombycilla cedrorum)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Red-eyed Vireo *(Vireo olivaceus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Yellow Warbler *(Setophaga petechia)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Magnolia Warbler *(Setophaga magnolia)*
Cape May Warbler *(Setophaga tigrina)*
Yellow-rumped Warbler *(Setophaga coronata)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*
Northern Waterthrush *(Parkesia noveboracensis)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Common Yellowthroat *(Geothlypis trichas)*
Wilson's Warbler *(Cardellina pusilla)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
Indigo Bunting *(Passerina cyanea)*
Chipping Sparrow *(Spizella passerina)*
Fox Sparrow *(Passerella iliaca)*
Song Sparrow *(Melospiza melodia)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-throated Sparrow *(Zonotrichia albicollis)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Harris's Sparrow *(Zonotrichia querula)*
Dark-eyed Junco *(Junco hyemalis)*
Snow Bunting *(Plectrophenax nivalis)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Pine Siskin *(Spinus pinus)*
American Goldfinch *(Spinus tristis)*
Redpoll *(Acanthis flammea)*

Reptiles

Gophersnake *(Pituophis catenifer)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC
Pale Swallowtail *(Pterourus eurymedon)*
Viceroy *(Limenitis archippus)*
Weidemeyer's Admiral *(Limenitis weidemeyerii)*
Lorquin's Admiral *(Limenitis lorquini)*

Vascular Plants

Many-flowered Viguiera *(Viguiera multiflora)* SOC
Sitka Columbine *(Aquilegia formosa)* SOC
James Stitchwort *(Stellaria jamesiana)*

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Wolverine *(Gulo gulo)* SOC
Canada Lynx *(Lynx canadensis)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC
Bighorn Sheep *(Ovis canadensis)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
American Goshawk *(Accipiter atricapillus)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Flammulated Owl *(Psiloscops flammeolus)* SOC
Pileated Woodpecker *(Dryocopus pileatus)* SOC
Brown Creeper *(Certhia americana)* SOC
Western Screech-Owl *(Megascops kennicottii)* PSOC
Boreal Owl *(Aegolius funereus)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Spruce Grouse *(Canachites canadensis)*
Wild Turkey *(Meleagris gallopavo)*
White-throated Swift *(Aeronautes saxatalis)*
Eastern Kingbird *(Tyrannus tyrannus)*
Bank Swallow *(Riparia riparia)*
Cassin's Vireo *(Vireo cassinii)*
Townsend's Warbler *(Setophaga townsendi)*
Spotted Towhee *(Pipilo maculatus)*
Clay-colored Sparrow *(Spizella pallida)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Sparrow *(Chondestes grammacus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Western Meadowlark *(Sturnella neglecta)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Common Grackle *(Quiscalus quiscula)*
Bullock's Oriole *(Icterus bullockii)*
House Finch *(Haemorhous mexicanus)*
White-winged Crossbill *(Loxia leucoptera)*
Red Crossbill *(Loxia curvirostra)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Long-toed Salamander *(Ambystoma macrodactylum)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Mariposa Copper *(Tharsalea mariposa)*
Field Crescent *(Phyciodes pulchella)*
Red-spotted Admiral *(Limenitis arthemis)* PSOC
Greenish Blue *(Icaricia saepiolus)*
One-eyed Sphinx *(Smerinthus astarte)*

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Montana Version Authors

L.K. Vance, T. Luna, M.M. Hart

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28649
System Code	CES306.813, Rocky Mountain Aspen Forest and Woodland

National Land Cover Dataset:
41: Deciduous Forest

ReGAP:
4104: Rocky Mountain Aspen Forest and Woodland

Literature Cited Above Legend: View Online Publication

- Anderegg, W.R., L. Plavcová, L.D. Anderegg, U.G. Hacke, J.A. Berry, and C.B. Field. 2013. Drought's legacy: multiyear hydraulic deterioration underlies widespread aspen forest die-off and portends increased future risk. Global Change Biology 19(4):1188-1196.
- Bell, D.M., J.B. Bradford, and W.K. Lauenroth. 2014. Forest stand structure, productivity, and age mediate climatic effects on aspen decline. Ecology 95(8):2040-2046.
- Brown, J.K. and D.G.Simmerman. 1986. Appraising fuels and flammability in western aspen: a prescribed fire guide. Gen. Tech. Rep. INT-205. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 48 p.
- Durham, D.A. and C.B. Marlow. 2010. Aspen response to prescribed fire under managed cattle grazing and low elk densities in southwest Montana. Northwest Science 84(1):141-150.
- Hessl, A.E. and L.J. Graumlich. 2002. Interactive effects of human activities, herbivory and fire on quaking aspen (Populus tremuloides) age structures in western Wyoming. Journal of Biogeography 29(7):889-902.
- Howard, J.L. 1996. Populus tremuloides. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Keyser, T.L., F.W. Smith, and W.D. Shepperd. 2005. Trembling aspen response to a mixed-severity wildfire in the Black Hills, South Dakota, USA. Canadian Journal of Forest Research 35(11):2679-2684.
- Marchetti, S.B., J.J. Worrall, and T. Eager. 2011. Secondary insects and diseases contribute to sudden aspen decline in southwestern Colorado, USA. Canadian Journal of Forest Research 41(12):2315-2325.
- Romme, W.H., M.G. Turner, L.L. Wallace, and J.S. Walker. 1995. Aspen, elk, and fire in northern Yellowstone Park. Ecology 76(7):2097-2106.
- Shinneman, D.J., W.L. Baker, P.C. Rogers, and D. Kulakowski. 2013. Fire regimes of quaking aspen in the Mountain West. Forest Ecology and Management 299: 22-34.
- Turner, M.G., W.H. Romme, R.A. Reed, and G.A. Tuskan. 2003. Post-fire aspen seedling recruitment across the Yellowstone (USA) landscape. Landscape Ecology 18(2):127-140.
- U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Northern Rocky Mounatin Quaking Aspen Communities. In: Fire Effects Information System, [Online]. U.S. Department of Agri

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Mueggler, W. F. 1988. Aspen community types of the Intermountain Region. USDA Forest Service General Technical Report INT-250. Intermountain Research Station, Ogden, UT. 135 pp.

- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.
- Schier GA, Jones JR, Winokur RP. 1985. Vegetative regeneration. In: DeByle NV, Winokur RP, editors. Aspen: ecology and management in the western United States. USDA Forest Service General Technical Report RM-119. Fort Collins, CO: Rocky Mountain Forest and Range Experiment Station; p 29-33.
- Sisson, L. 1976. The sharp-tailed grouse in Nebraska. Neb. Game and Parks Comm. Lincoln. 87 pp.

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Mountain Mahogany Woodland and Shrubland

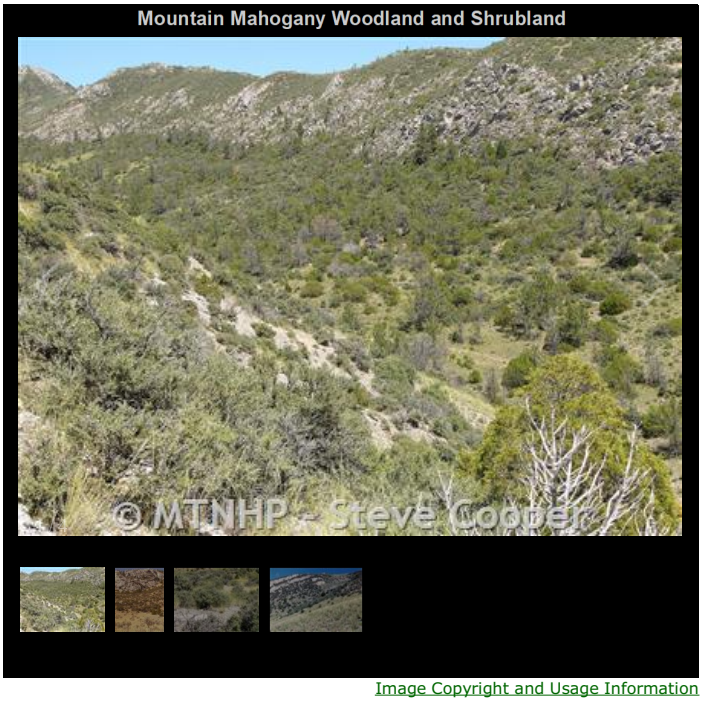


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State Rank Reason
This system is patchy and not common, but because occurrences are so dispersed, threats are also dispersed.

General Description

This ecological system occurs most frequently on moderately steep to very steep slopes in the mountain ranges of southwestern Montana, but extends as far north as the northern foothills of the Elkhorn Range and as far east as the Wolf Mountains on the Crow Indian Reservation. It occurs on rocky outcrops on south and southwestern aspects at 1,060-2,260 meters (3,500-7,400 feet) and forms small- to large-patch stands on dry and rocky soils. In Montana, this shrubland system is dominated by curl-leaf mountain mahogany (*Cercocarpus ledifolius*). Rocky Mountain juniper (*Juniperus scopulorum*) occurs throughout this system's range and Utah juniper (*J. osteosperma*) occurs in the Pryor Mountains. Conifers such as Douglas-fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*) and ponderosa pine (*P. ponderosa*) may also occur in some stands. Other co-dominant shrubs include mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*) and rubber rabbitbrush (*Ericameria nauseosa*). Other low shrubs such as snakeweed (*Gutierrezia sarothrae*) and fringed sage (*Artemisia frigida*) are common. Undergrowth is dominated by bunchgrasses, usually bluebunch wheatgrass (*Pseudoroegneria spicata*), needle and thread (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*) or Idaho fescue (*Festuca idahoensis*). Curl-leaf mountain mahoganyis a slow-growing, drought-tolerant species that generally does not re-sprout after fire. Prolonged drought, potential for increased fire severity and exotic species invasion are changing the dynamics of this system.

Diagnostic Characteristics

Forest and Woodland, vegetation cover greater than 10%, Montane to foothill elevations, *Cercocarpus ledifolius*

Similar Systems

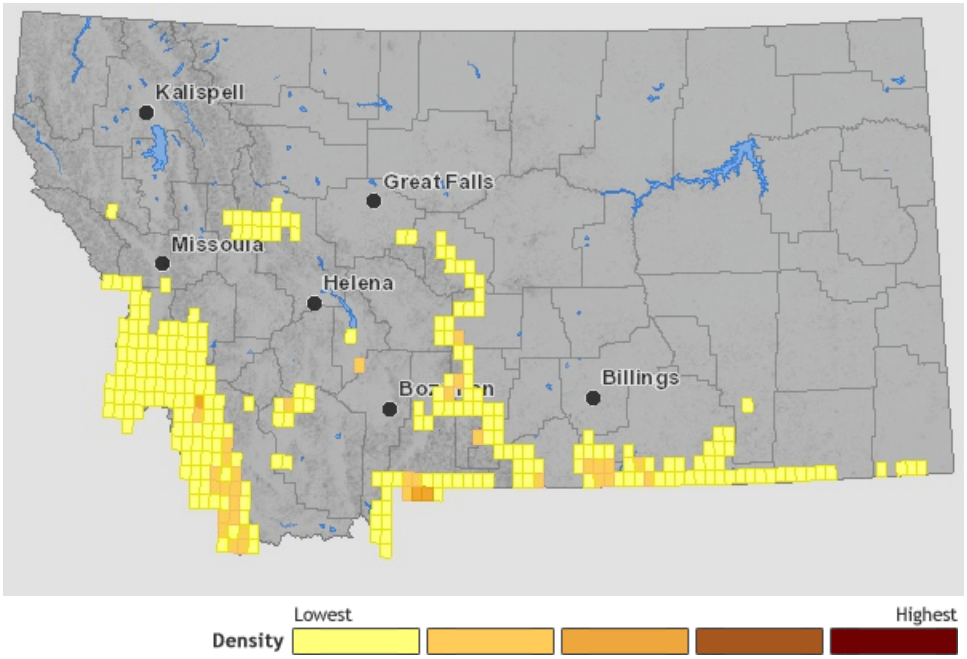
- Rocky Mountain Foothill Limber Pine - Juniper Woodland

Range

This ecological system occurs most frequently on moderately steep to very steep slopes in the mountain ranges of southwestern Montana, but it extends as far north as the northern foothills of the Elkhorn Range and as far east as the Wolf Mountains on the Crow Indian Reservation. Elsewhere in the western United States, this system occurs in hills and mountain ranges of the Intermountain West basins from the eastern foothills of the Sierra Nevada northeast to the foothills of the Bighorn Mountains.

Ecological System Distribution

Approximately 284 square kilometers are classified as Mountain Mahogany Woodland and Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Carter, Cascade, Deer Lodge, Gallatin, Granite, Judith Basin, Lewis and Clark, Madison, Meagher, Mineral, Missoula, Park, Powder River, Powell, Ravalli, Rosebud, Sanders, Stillwater, Sweet Grass, Wheatland

Spatial Pattern

Large Patch or Small Patch

Environment

This ecological system occurs as small- to large-patch stands on dry and rocky soils associated with moderately steep to very steep slopes, although occurrences on flat to gently sloping surfaces are also found in Montana. It is most prevalent on limestone outcrops where extensive stands develop, although it also occurs on other parent materials, generally as small patches. It can occur on all aspects but is most prevalent on south and southwestern aspects. This system's observed elevation range within the state is 1,060-2,260 meters (3,500-7,400 feet). Climate within its distribution range in Montana is typical of mid-continental regions with long severe winters and hot, dry summers. This system is important winter range for deer and elk.

Vegetation

This shrubland system is dominated by curl-leaf mountain mahogany (*Cercocarpus ledifolius*). Rocky Mountain juniper (*Juniperus scopulorum*) occurs throughout this system's range and Utah juniper (*J. osteosperma*) occurs in the Pryor Mountains. Conifers such as Douglas-fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*) and ponderosa pine (*P. ponderosa*) may also occur in some stands. Ponderosa pine stands within this system are mostly found in eastern Montana. Other co-dominant shrubs include mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), and rubber rabbitbrush (*Ericameria nauseosa*). Other low shrubs such as snakeweed

(*Gutierrezia sarothrae*) and fringed sage (*Artemisia frigida*) are common. Undergrowth is dominated by bunchgrasses, usually bluebunch wheatgrass (*Pseudoroegneria spicata*), needle and thread (*Hesperostipa comata*), and Indian ricegrass (*Achnatherum hymenoides*).Other low shrubs such as broom snakeweed (*Gutierrezia sarothrae*) and fringed sage (*Artemisia frigida*) are common (Mueggler and Stewart, 1980).

Bluebunch wheatgrass (*Pseudoroegneria spicata*) is the dominant grass throughout this system, although needle and thread (*Hesperostipa comata*) and Indian ricegrass (*Achnatherum hymenoides*) may be co-dominant on more xeric occurrences. Mesic occurrences are frequently dominated or co-dominated by Idaho fescue (*Festuca idahoensis*). Prairie junegrass (*Koeleria macrantha*) is a minor component. Due to the rocky and shallow substrates, undergrowth cover is relatively sparse, often with less than 20% cover. Common forbs include rosy pussytoes (*Antennaria rosea*), sulphur buckwheat (*Eriogonum umbellatum*), few-seed draba (*Draba oligosperma*), tufted fleabane (*Erigeron cespitosus*), Hood's phlox (*Phlox hoodii*), and stoneseed (*Lithospermum ruderale*). Cacti such as plains pricklypear (*Opuntia polyacantha*)and Missouri foxtail cactus (*Mammillaria missouriensis*) are present on especially xeric sites. Within this system, cheatgrass (*Bromus tectorum*) or other annual bromes and invasive weeds can be abundant.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0586 *Cercocarpus ledifolius* / Shrub Understory Woodland Alliance
A0828 *Cercocarpus ledifolius* Scrub Alliance
  CEGL000967 *Cercocarpus ledifolius - Pseudoroegneria spicata* Scrub
A3570 *Cercocarpus ledifolius* / Herbaceous Understory Woodland Alliance
  CEGL000962 *Cercocarpus ledifolius - Festuca idahoensis* Woodland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Curl-leaf mountain mahogany is easily killed by fire at all intensities. Some shrubs may re-sprout following low-intensity fires, but these are typically low in vigor and do not persist. Regeneration is by seedling recruitment. Post-fire regeneration is quick unless fire intensity is severe. High-intensity fires kill all standing shrubs and may also eliminate the seed bank (Gucker, 2006). However, a lack of continuous fuels, sparse undergrowth, open stand structure, and low downed wood accumulations contribute to a low fire frequency within this system. Fire return intervals currently range from 70 to 110 years with the majority of fires being mixed severity (U.S. Department of Agriculture, 2012). Prior to 1900, fire return intervals are estimated to have been much shorter, and have increased due to fire suppression and heavy livestock grazing, reducing fine fuel loads (Gucker, 2006). The absence of fire in curl-leaf mountain mahogany habitats in central, southwestern, and southeastern Montana has in some instances increased curl-leaf mountain mahogany abundance and regeneration success (Gruell, 1982).

Curl-leaf mountain mahogany provides food and cover for a variety of wildlife species such as deer and elk. Some livestock (domestic goats, sheep, and cattle) use this system in spring, fall, and/or winter, but rarely in the summer. In other areas of this system's geographic range, heavy grazing practices have been observed to lead to a decrease in associated grasses and an increase in the spread of cheatgrass (*Bromus tectorum*) (Young, 1989). Thus, sites invaded by cheatgrass are changing the dynamics of this system by increasing fire potential, severity, and spread.

Management

Excessive grazing can lower the cover of the most common perennial bunchgrasses in this system and lead to an increase in the cover of prairie junegrass and needle and thread grass. Unpalatable shrubs such as fringed sage or snakeweed also increase under heavy grazing pressure. Severe grazing can lead to an abundance of cheatgrass (*Bromus tectorum*), spotted knapweed (*Centaurea maculosa*), or other noxious species capable of colonizing dry, rocky soils. Prescribed fire exposes mineral soils which promote seedling establishment and is recommended for stands in which fuel levels are low, and in which cheatgrass is absent. Fire is also recommended for sites in west-central and southwestern Montana to encourage curl-lead mountain mahogany regeneration while slowing succession by shade tolerant Douglas fir (Gucker, 2006).

Restoration Considerations

Restoration strategies will depend on the type and intensity of the disturbance, and in the case of fire, on the degree of fire severity and fire recovery objectives. Light or moderately intensive burns can increase cover of native perennial bunchgrasses during the first two years following fire on sites where there was good pre-fire condition with minimal exotic cover. However, severely burned sites will require replanting with curl-leaf mountain mahogany seedlings and other co-dominant shrubs, due to the slow recovery time within this system and low rates of natural seedling recruitment. When planting from seed, cold, moist stratification is required to enhance germination success (Gucker, 2006). Generally, larger container volume of nursery stock results in higher outplanting success; 20-cubic inch container stock is recommended for use on these sites. Curl-leaf mountain mahogany is rated as good to excellent for soil erosion control due to its ability to stabilize soils. Planting rates must be developed on a site-by-site basis to meet management objectives.

Successful restoration of native grasses within this system may be limited to sites where pre-fire cheatgrass cover was low. Fall germination and rapid elongation of roots provide cheatgrass with a competitive advantage over native perennial species (Harris 1967). Cheatgrass reduces growth of bluebunch wheatgrass seedlings and is capable of producing twice

the root quantity during the first 45 days of growth (Aguirre and Johnson 1991). Prolific seed production also contributes to the competitive advantage of this species over native grasses. Thus, on sites that are heavily infested with cheatgrass prior to fire, seeding rates must be adjusted to include more competitive native grass species. Some selections of bluebunch wheatgrass that exhibit desirable growth characteristics may have promise for establishing this species on invaded sites.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Pallid Bat *(Antrozous pallidus)* SOC	Spotted Bat *(Euderma maculatum)* PSOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC	Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC	Masked Shrew *(Sorex cinereus)*

Vagrant Shrew *(Sorex vagrans)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
White-tailed Jackrabbit *(Lepus townsendii)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Northern Pocket Gopher *(Thomomys talpoides)*
White-footed Deermouse *(Peromyscus leucopus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Least Weasel *(Mustela nivalis)*
American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Pronghorn *(Antilocapra americana)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Least Chipmunk *(Neotamias minimus)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
American Badger *(Taxidea taxus)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC
Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Ruffed Grouse *(Bonasa umbellus)*
Mourning Dove *(Zenaida macroura)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Hairy Woodpecker *(Dryobates villosus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Eastern Kingbird *(Tyrannus tyrannus)*
Violet-green Swallow *(Tachycineta thalassina)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Mountain Chickadee *(Poecile gambeli)*
Northern House Wren *(Troglodytes aedon)*
Townsend's Solitaire *(Myadestes townsendi)*
Brown Thrasher *(Toxostoma rufum)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Yellow-rumped Warbler *(Setophaga coronata)*
Western Tanager *(Piranga ludoviciana)*
Lazuli Bunting *(Passerina amoena)*
American Tree Sparrow *(Spizelloides arborea)*
Vesper Sparrow *(Pooecetes gramineus)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Bullock's Oriole *(Icterus bullockii)*
American Goldfinch *(Spinus tristis)*
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Gray Flycatcher *(Empidonax wrightii)* PSOC
Cooper's Hawk *(Accipiter cooperii)*
Rough-legged Hawk *(Buteo lagopus)*
Prairie Falcon *(Falco mexicanus)*
Rock Pigeon *(Columba livia)*
Common Nighthawk *(Chordeiles minor)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Northern Flicker *(Colaptes auratus)*
Say's Phoebe *(Sayornis saya)*
Tree Swallow *(Tachycineta bicolor)*
Bank Swallow *(Riparia riparia)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Rock Wren *(Salpinctes obsoletus)*
Mountain Bluebird *(Sialia currucoides)*
American Robin *(Turdus migratorius)*
Bohemian Waxwing *(Bombycilla garrulus)*
European Starling *(Sturnus vulgaris)*
Yellow Warbler *(Setophaga petechia)*
Black-throated Gray Warbler *(Setophaga nigrescens)*
Blue Grosbeak *(Passerina caerulea)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Lark Sparrow *(Chondestes grammacus)*
Dark-eyed Junco *(Junco hyemalis)*
Brown-headed Cowbird *(Molothrus ater)*
Lesser Goldfinch *(Spinus psaltria)*
Redpoll *(Acanthis flammea)*

Reptiles

Western Milksnake *(Lampropeltis gentilis)* SOC
North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Northern Rubber Boa *(Charina bottae)*
Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*

Vascular Plants

Shoshonea *(Shoshonea pulvinata)* SOC
Chicken-sage *(Sphaeromeria argentea)* SOC
Puzzling Rockcress *(Sandbergia perplexa)* SOC
Beautiful Bladderpod *(Physaria pulchella)* SOC
Hoary Phacelia *(Phacelia incana)* SOC
Curved Bladderpod *(Physaria curvipes)*
Mojave Brickellbush *(Brickellia oblongifolia)* SOC
Sapphire Rockcress *(Boechera fecunda)* SOC
Lesica's Bladderpod *(Physaria lesicii)* SOC
Thick-leaf Bladderpod *(Physaria pachyphylla)* SOC
Cusick's Horsemint *(Agastache cusickii)* SOC
Rock-tansy *(Sphaeromeria capitata)*

Native Species Occasionally Associated with this Ecological System

Mammals

Grizzly Bear *(Ursus arctos)* SOC
Western Water Shrew *(Sorex navigator)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Black-tailed Jackrabbit *(Lepus californicus)* PSOC
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Moose *(Alces alces)*

Birds

Sage Thrasher *(Oreoscoptes montanus)* SOC
Brewer's Sparrow *(Spizella breweri)* SOC

Turkey Vulture *(Cathartes aura)*
Sharp-shinned Hawk *(Accipiter striatus)*
Wild Turkey *(Meleagris gallopavo)*
Western Wood-Pewee *(Contopus sordidulus)*
Horned Lark *(Eremophila alpestris)*
Cedar Waxwing *(Bombycilla cedrorum)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Song Sparrow *(Melospiza melodia)*
Western Meadowlark *(Sturnella neglecta)*
Common Grackle *(Quiscalus quiscula)*
Pine Siskin *(Spinus pinus)*
Northern Harrier *(Circus hudsonius)*
Dusky Grouse *(Dendragapus obscurus)*
White-throated Swift *(Aeronautes saxatalis)*
Western Kingbird *(Tyrannus verticalis)*
Black-capped Chickadee *(Poecile atricapillus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Lark Bunting *(Calamospiza melanocorys)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
House Finch *(Haemorhous mexicanus)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Pale Swallowtail *(Pterourus eurymedon)*

Vascular Plants

Bitterroot Milkvetch *(Astragalus scaphoides)* SOC

Original Concept Authors

Natureserve Western Ecology Team (NatureServe ed. date 25Jan2007)

Montana Version Authors

L.K. Vance, T. Luna, M. Hart

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28611
System Code	CES304.772, Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland

National Land Cover Dataset:
43: Mixed Forest

ReGAP:
4303: Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland

Literature Cited Above Legend: View Online Publication

Gucker, C.L. 2006. Cercocarpus ledifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Mountain-Mahogany Communities. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Serv

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Aguirre, Lucrecia, and Douglas A. Johnson. 1991. "Influence of Temperature and Cheatgrass Competition on Seedling Development of Two Bunchgrasses". *Journal of Range Management.* 44 (4): 347-354.

Gruell GE. 1982. Fires' influence on vegetative succession--wildlife habitat implications and management opportunities. In: Eustace CD, editor. Proceedings: Montana Chapter of the Wildlife Society. Billings, MT: The Wildlife Society; p 43-50.

Harris, G.A. 1967. Some competitive relationships between Agropyron spicatum and Bromus tectorum. Ecological Monographs 37:89-111.

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service Gen. Tech. Rep. INT-66, Intermountain Forest and Range Exp. Sta., Ogden, Utah. 154 pp.

Young JA. 1989. Intermountain shrubsteppe plant communities--pristine and grazed. Western raptor management symposium and workshop: Proceedings: 1987 October 26-28; Boise, ID. Scientific Technical Series No. 12.

Washington DC: National Wildlife Federation; p 3-14.

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Great Plains Wooded Draw and Ravine



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State Rank Reason
Drought and change in species composition, along with grazing, are the greatest threats

General Description

This system is typically associated with highly intermittent or ephemeral streams. It may occur on steep northern slopes or within canyon bottoms where soil moisture and topography produce higher moisture levels than are common throughout most of the area. In some areas of the western Great Plains, in higher elevation draws and ravines, Rocky Mountain juniper (*Juniperus scopulorum)* can dominate the canopy. Aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), or boxelder maple (*Acer negundo*) are commonly present in portions of the northwestern Great Plains. In central and eastern Montana, green ash (*Fraxinus pennsylvanicus*) or chokecherry (*Prunus virginiana*) are the usual dominants. Douglas hawthorne (*Crataegus douglasii*) is occasionally seen as a dominant in south-central Montana, especially around the Pryor Mountains. This system is found in ravines formed by ephemeral and intermittent streams, and on toeslopes and north-facing backslopes. Generally, these systems are less than 50 meters (165 feet) wide, although the linear extent may be considerable. Soils are usually deep and loamy. Flooding is very short in duration when it occurs, as water is rapidly channeled downslope.

Diagnostic Characteristics

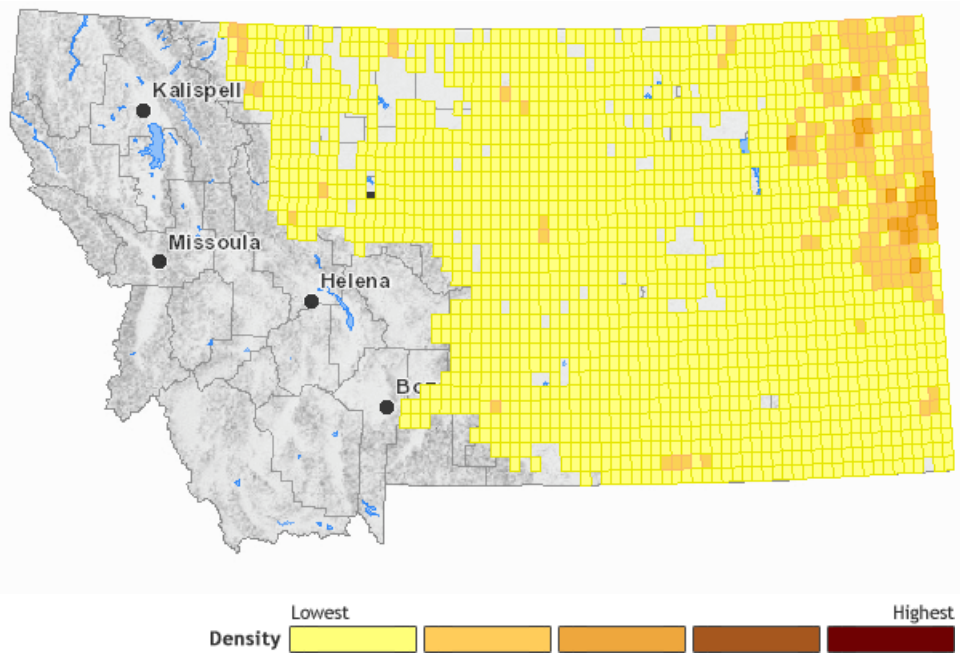
Forest and Woodland, draw, ravine

Range

This system is found throughout the Northwestern Glaciated Plains and the Northern Great Plains in Montana.

Ecological System Distribution

Approximately 1,982 square kilometers are classified as Great Plains Wooded Draw and Ravine in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fallon, Fergus, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Meagher, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Linear

Environment

Wooded draws and ravines are best developed under conditions that favor snow entrapment, development of deeper soils, and concentration of moisture. These conditions are typical of ravines formed by ephemeral and intermittent streams and on toeslopes and north-facing backslopes. Uplands are generally mixed grass prairies and shrublands. Generally, these systems are less than 50 meters (165 feet) wide, although the linear extent may be considerable. Soils are usually deep loams. Flooding is very short in duration when it occurs, as water is rapidly channeled downslope.

Vegetation

In Montana, this community is composed mostly of small trees, although larger diameter trees can occur at the foot of the ravine where there is greater available soil moisture. In some areas of the western Great Plains, in higher elevation draws and ravines, Rocky Mountain juniper can dominate the canopy. Aspen, paper birch or boxelder maple are commonly present in portions of the northwestern Great Plains. Throughout central and eastern Montana, green ash or chokecherry are the typical dominants, although Douglas hawthorne is occasionally seen as a dominant in south-central Montana, especially around the Pryor Mountains. Boxelder maple and American elm (*Ulmus rubra* or *Ulmus americana*) are often present. In many parts of Montana, particularly in disturbed occurrences, the understory is a dense shrub layer of western snowberry (*Symphoricarpos occidentalis*). In less disturbed sites, the understory is two-layered, with a shrub layer of chokecherry and other *Prunus* species, as well as hawthorne species, silverberry (*Elaeagnus commutata*), current (*Ribes* species), Woods' rose (*Rosa woodsii*), and silver buffaloberry (*Shepherdia argentea*). The lowest layer is dominated by sedges (*Carex* species) and grasses such as northern reedgrass (*Calamagrostis stricta),* western wheatgrass (*Pascopyrum smithii),* bluebunch wheatgrass (*Pseudoroegneria spicata*), and thickspike wheatgrass (*Elymus lanceolatus*). Common forbs include American licorice (*Glycyrrhiza lepidota*), yarrow (*Achillea millefolium*), meadow rue (*Thalictrum dasycarpum*), and bedstraw (*Galium* species). Exotics such as Russian olive (*Elaeagnus angustifolia*), yellow sweetclover (*Meliotus officinalis*) and Kentucky bluegrass (*Poa pratensis*) are often found throughout these systems, especially in agricultural areas.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0636 *Populus deltoides* Floodplain Woodland Alliance
CEGL000660 *Populus deltoides - Symphoricarpos occidentalis* Floodplain Woodland
A0918 *Elaeagnus commutata* Wet Shrubland Alliance
CEGL001099 *Elaeagnus commutata - Pascopyrum smithii* Wet Shrubland
A0954 *Crataegus douglasii - Crataegus succulenta* Shrubland Alliance
CEGL001093 *Crataegus douglasii / (Crataegus chrysocarpa)* Shrubland
CEGL001097 *Crataegus succulenta* Shrubland
A3209 *Betula papyrifera - Populus tremuloides - Quercus macrocarpa* Forest Alliance
A3210 *Juniperus scopulorum - Juniperus virginiana* Woodland Alliance
CEGL000747 *Juniperus scopulorum - Piptatherum micranthum* Woodland
A3211 *Fraxinus pennsylvanica - Ulmus americana* Great Plains Forest Alliance
CEGL000643 *Fraxinus pennsylvanica / Ulmus americana - Prunus virginiana* Woodland
A3423 *Populus deltoides* Floodplain Forest Alliance
CEGL000658 *Populus deltoides - Fraxinus pennsylvanica* Floodplain Forest
A3427 *Juniperus osteosperma - Juniperus scopulorum* / Grass Understory Central Rocky Mountain Woodland Alliance
CEGL000748 *Juniperus scopulorum - Pseudoroegneria spicata* Woodland
A3590 *Shepherdia argentea* Wet Shrubland Alliance
CEGL001128 *Shepherdia argentea* Wet Shrubland
A3773 *Cornus sericea - Dasiphora fruticosa ssp. floribunda - Ribes spp.* Wet Shrubland Alliance
CEGL001126 *Rosa woodsii* Wet Shrubland
CEGL001165 *Cornus sericea* Rocky Mountain Wet Shrubland
A3797 *Pinus ponderosa - Juniperus scopulorum - Abies concolor* Riparian Woodland Alliance
CEGL000746 *Juniperus scopulorum - Cornus sericea* Riparian Woodland
A3798 *Populus deltoides ssp. wislizeni - Populus deltoides ssp. monilifera - Salix amygdaloides* Riparian Woodland Alliance
CEGL002680 *Populus deltoides (ssp. wislizeni, ssp. monilifera) - Pascopyrum smithii* Riparian Woodland
A3799 *Rhus trilobata - Crataegus rivularis - Forestiera pubescens* Shrubland Alliance
CEGL001098 *Elaeagnus commutata* Wet Shrubland
CEGL001108 *Prunus virginiana / (Prunus americana)* Wet Shrubland
A3805 *Carex nebrascensis - Carex vesicaria - Carex pellita* Wet meadow Alliance
CEGL001813 *Carex nebrascensis* Wet Meadow
A4036 *Prunus virginiana - Symphoricarpos occidentalis - Amelanchier alnifolia* Great Plains Shrubland Alliance
CEGL001131 *Symphoricarpos occidentalis* Shrubland
A4131 *Fraxinus pennsylvanica - Ulmus americana - Populus deltoides* Floodplain Forest Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Fire, wildlife and livestock use, and invasion by non-native species are major disturbances in this system. Both domestic animals and wildlife use this system readily, leading to trampling of vegetation and an increase in shrub and grass domination. Boxelder is highly susceptible to mechanical damage from livestock (Rosario, 1988), and in stands where green ash is dominant, heavy livestock grazing may prevent regeneration, leading to more open stands dominated by exotic perennial grasses (Lesica, 2009). A study in green ash dominated draws in the northern Great Plains found that exclusion of livestock increased tree height and decreased mortality for both green ash and elm (Uresk et al., 2009).

Fire is a secondary influence and may promote regeneration by encouraging sprouting and thinning of stands (Lesica, 2003). Fire return intervals in this system average approximately 30 years, and range from low-severity surface fires to stand-replacing burns (U.S. Department of Agriculture, 2012). Most species in this system are highly susceptible to fire, although green ash and Rocky Mountain juniper may survive low-intensity burns in some cases (Gucker, 2005; Scher, 2002). Despite experiencing high mortality due to fire, species in this system are fire-adapted and recover quickly via root sprouting, as is the case with aspen and green ash, or by prolific seed production and wind dispersal, as is the case with paper birch and boxelder. Most species in this system, however, are capable of utilizing both strategies to varying degrees (Gucker, 2005; Howard, 1996; Uchytil, 1991; Rosario, 1988).

In parts of eastern Montana, non-native species like Russian olive (*Elaeagnus angustifolia*) have invaded this system altering vegetation composition and changing biogeochemical cycling in streams (Mineau et al., 2011). Russian olive trees are fast-growing and form a dense canopy that prevents the more shade-intolerant native species typical of this system from establishing (Combs, 2010). Additionally, Russian olive exerts a strong competitive effect on native tree species in this system, inhibiting their establishment (Katz and Shafroth, 2003). Non-native grasses also alter species composition within this system, particularly where green ash is dominant, by forming dense sods and preventing seedling recruitment (Lesica, 2009).

Management

Shade and moisture draw livestock into draws and ravines, concentrating use and creating the potential for degradation and the spread of exotic and invasive species. Alternate shade, water, and forage for livestock can reduce pressure on these systems, and maintain them as wildlife habitat. Fire may have mixed effects on this system. In southeastern Montana, burning resulted in increased abundance and size of crown sprouts in green ash-dominated wooded draws, although significantly fewer seedlings were observed in burned sites (Lesica, 2003). Prescribed burning may be beneficial to maintaining this system where regrowth will not be impeded by invasive grasses, intensive ungulate browsing, or where Russian olive has not invaded (Lesica and Marlow, 2011; Lesica, 2009; Katz and Shafroth, 2003).

Restoration Considerations

Restoration of this system may in part require alternate grazing practices to allow for successful recovery. Dominant species such as chokecherry, Douglas hawthorne and elm have extensive root systems and are rated as good to excellent for soil erosion control. Aspen and paper birch are additionally recommended for revegetation and soil stabilization (Howard, 1996; Uchytil, 1991). In some cases, shrubs can be planted in clusters or bands in areas with high soil erosion potential. All other associated understory shrubs within this system - western snowberry, silverberry, gooseberry, Woods' rose, and silver buffaloberry - are rated as good to excellent restoration species, and possess strongly rhizomatous root systems that minimize soil erosion on steep slopes.

In order to promote regeneration in areas where green ash recruitment has been prevented by exotic grasses, Lesica (2009) recommends herbicide treatment followed by seeding. Alternatively, cutting of mature individuals encourages sprouting, which may be more successful than direct seeding. However, intensive browsing by ungulates may limit the success of this approach (Lesica, 2009). In wooded draws where Russian olive has become dominant, the most effective method of restoration employs a combination of chemical and mechanical treatments. Prescribed burning is not recommended as Russian olive readily resprouts post-fire (Katz and Shafroth, 2003). Combs (2010) recommends specific methods for reducing Russian olive where invasion into this system has occurred.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT:

Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Pallid Bat *(Antrozous pallidus)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*
Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Least Chipmunk *(Neotamias minimus)*
Eastern Fox Squirrel *(Sciurus niger)*
Northern Pocket Gopher *(Thomomys talpoides)*
White-footed Deermouse *(Peromyscus leucopus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Little Brown Myotis *(Myotis lucifugus)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Northern Myotis *(Myotis septentrionalis)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
Masked Shrew *(Sorex cinereus)*
Western Water Shrew *(Sorex navigator)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Eastern Cottontail *(Sylvilagus floridanus)*
Desert Cottontail *(Sylvilagus audubonii)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Red Squirrel *(Tamiasciurus hudsonicus)*
North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Montane Vole *(Microtus montanus)*
Prairie Vole *(Microtus ochrogaster)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Least Weasel *(Mustela nivalis)*
American Mink *(Neogale vison)*
Northern River Otter *(Lontra canadensis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Yellow-billed Cuckoo *(Coccyzus americanus)* SOC
Veery *(Catharus fuscescens)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Eastern Bluebird *(Sialia sialis)* PSOC
Black-and-white Warbler *(Mniotilta varia)* PSOC
Cinnamon Teal *(Spatula cyanoptera)*
Bufflehead *(Bucephala albeola)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*
Spotted Sandpiper *(Actitis macularius)*
Mourning Dove *(Zenaida macroura)*
Long-eared Owl *(Asio otus)*
White-throated Swift *(Aeronautes saxatalis)*
Belted Kingfisher *(Megaceryle alcyon)*
Downy Woodpecker *(Dryobates pubescens)*
Western Wood-Pewee *(Contopus sordidulus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Eastern Kingbird *(Tyrannus tyrannus)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
White-breasted Nuthatch *(Sitta carolinensis)*
Mountain Bluebird *(Sialia currucoides)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Blackpoll Warbler *(Setophaga striata)*
Golden Eagle *(Aquila chrysaetos)* SOC
Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC
Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC
Eastern Screech-Owl *(Megascops asio)* PSOC
Chimney Swift *(Chaetura pelagica)* PSOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Mallard *(Anas platyrhynchos)*
Broad-winged Hawk *(Buteo platypterus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Gyrfalcon *(Falco rusticolus)*
Wild Turkey *(Meleagris gallopavo)*
Wilson's Snipe *(Gallinago delicata)*
Great Horned Owl *(Bubo virginianus)*
Common Nighthawk *(Chordeiles minor)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Northern Flicker *(Colaptes auratus)*
Least Flycatcher *(Empidonax minimus)*
Western Kingbird *(Tyrannus verticalis)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Northern House Wren *(Troglodytes aedon)*
Swainson's Thrush *(Catharus ustulatus)*
Gray Catbird *(Dumetella carolinensis)*
Brown Thrasher *(Toxostoma rufum)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Red-eyed Vireo *(Vireo olivaceus)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*

Canada Warbler *(Cardellina canadensis)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Blue Grosbeak *(Passerina caerulea)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Field Sparrow *(Spizella pusilla)*
White-throated Sparrow *(Zonotrichia albicollis)*
Lapland Longspur *(Calcarius lapponicus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Baltimore Oriole *(Icterus galbula)*
House Finch *(Haemorhous mexicanus)*
American Goldfinch *(Spinus tristis)*
Yellow-breasted Chat *(Icteria virens)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
Harris's Sparrow *(Zonotrichia querula)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Common Grackle *(Quiscalus quiscula)*
Orchard Oriole *(Icterus spurius)*
Bullock's Oriole *(Icterus bullockii)*
Lesser Goldfinch *(Spinus psaltria)*
Redpoll *(Acanthis flammea)*

Reptiles

Western Milksnake *(Lampropeltis gentilis)* SOC
North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Smooth Greensnake *(Opheodrys vernalis)* SOC
Gophersnake *(Pituophis catenifer)*
Plains Gartersnake *(Thamnophis radix)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*
Woodhouse's Toad *(Anaxyrus woodhousii)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC
Field Crescent *(Phyciodes pulchella)*
Lorquin's Admiral *(Limenitis lorquini)*
One-eyed Sphinx *(Smerinthus astarte)*
Pale Swallowtail *(Pterourus eurymedon)*
Weidemeyer's Admiral *(Limenitis weidemeyerii)*
Common Wood-Nymph *(Cercyonis pegala)*

Vascular Plants

Nannyberry *(Viburnum lentago)* SOC
Scribner's Panic Grass *(Dichanthelium oligosanthes var. scribnerianum)* SOC
Green Ash *(Fraxinus pennsylvanica)*
Heavy Sedge *(Carex gravida)* SOC
Wild Lily-of-the-valley *(Maianthemum canadense)* PSOC

Native Species Occasionally Associated with this Ecological System

Mammals

Spotted Bat *(Euderma maculatum)* PSOC
California Myotis *(Myotis californicus)*
North American Beaver *(Castor canadensis)*
Western Spotted Skunk *(Spilogale gracilis)* PSOC
White-tailed Jackrabbit *(Lepus townsendii)*
Pronghorn *(Antilocapra americana)*

Birds

Short-eared Owl *(Asio flammeus)* PSOC
Wood Duck *(Aix sponsa)*
Canvasback *(Aythya valisineria)*
Ring-necked Duck *(Aythya collaris)*
Red-breasted Merganser *(Mergus serrator)*
Northern Harrier *(Circus hudsonius)*
Cooper's Hawk *(Accipiter cooperii)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Hairy Woodpecker *(Dryobates villosus)*
Rock Wren *(Salpinctes obsoletus)*
Yellow-rumped Warbler *(Setophaga coronata)*
Common Yellowthroat *(Geothlypis trichas)*
Chipping Sparrow *(Spizella passerina)*
Savannah Sparrow *(Passerculus sandwichensis)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Tundra Swan *(Cygnus columbianus)*
American Wigeon *(Mareca americana)*
Redhead *(Aythya americana)*
Lesser Scaup *(Aythya affinis)*
Osprey *(Pandion haliaetus)*
Sharp-shinned Hawk *(Accipiter striatus)*
Sora *(Porzana carolina)*
Vaux's Swift *(Chaetura vauxi)*
Say's Phoebe *(Sayornis saya)*
Ruby-crowned Kinglet *(Corthylio calendula)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Western Tanager *(Piranga ludoviciana)*
Vesper Sparrow *(Pooecetes gramineus)*
Song Sparrow *(Melospiza melodia)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Pine Siskin *(Spinus pinus)*

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*
Common Gartersnake *(Thamnophis sirtalis)*
Painted Turtle *(Chrysemys picta)*
Northern Rubber Boa *(Charina bottae)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Northern Leopard Frog *(Lithobates pipiens)* SOC
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Purplish Copper *(Tharsalea helloides)*
Viceroy *(Limenitis archippus)*
Western Red Damsel *(Amphiagrion abbreviatum)*
Greenish Blue *(Icaricia saepiolus)*
Wandering Glider *(Pantala flavescens)*

Original Concept Authors

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Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28536
System Code	CES303.680, Western Great Plains Wooded Draw and Ravine

National Land Cover Dataset:
43: Mixed Forest

ReGAP:
4328: Western Great Plains Wooded Draw and Ravine

Literature Cited Above Legend: View Online Publication

- Combs, J. 2010. Best Management Practices for Montana Biology, Ecology, and Management of Russian Olive (Elaeagnus angustifolia L.) and Saltcedar (Tamarix ramosissima, T. chinensis, and their hybrids). Natural Resource Conservation Service. ftp://ftpfc.sc.egov.usda.gov/MT/www/technical/invasive/Invasive_Species_Tech_Note_MT30.pdf.
- Gucker, C.L. 2005. Fraxinus pennsylvanica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Howard, J.L. 1996. Populus tremuloides. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Katz, G.L. and P.B. Shafroth. 2003. Biology, ecology and management of Elaeagnus angustifolia L.(Russian olive) in western North America. Wetlands 23(4):763-777.
- Lesica, P. 2009. Can Regeneration of Green Ash (Fraxinus pennsylvanica) be Restored in Declining Woodlands in Eastern Montana?. Rangeland ecology & management 62(6):564-571.
- Lesica, P. and C.B. Marlow. 2011. Values and management of Montana's green ash draws. MontGuide No. MT201114AG. Montana State University Extension.
- Lesica, Peter. 2003. 'Effects of Wildfire on Recruitment of Fraxinus pennsylvanica in Eastern Montana Woodlands'. *American Midland Naturalist.* 149 (2): 258-267.
- Mineau, M.M., C.V. Baxter, and A.M. Marcarelli. 2011. A non-native riparian tree (Elaeagnus angustifolia) changes nutrient dynamics in streams. Ecosystems 14(3):353-365.
- Rosario, L.C. 1988. Acer negundo. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Scher, J.S. 2002. Juniperus scopulorum. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on Fire Regimes of Western Great Plains Ash-Elm Communities. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture,
- Uchytil, R.J. 1991. Betula papyrifera. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Uresk, D.W., J. Javersak, and D.E. Mergen. 2009. Tree sapling and shrub heights after 25 years of livestock grazing in green ash draws in western North Dakota. In Proceedings of the South Dakota Academy of Science 88:99-108.

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Aspen and Mixed Conifer Forest



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State Rank Reason

The system is at risk from aspen decline in general. Shifting climate may reduce range even more.

General Description

This system occurs in north-central Montana in the Big Snowy Mountain range, at elevations of 2,012-2,195 meters (6,600-7,200 feet). Occurrences are typically on gentle to steep slopes on any aspect. Soils in this mountain range are derived from alluvium, colluvium, and residuum from calcareous parent materials. Most current occurrences represent a late-seral stage of aspen (*Populus tremuloides*) forest changing to a pure conifer forest. Nearly a hundred years of fire suppression and livestock grazing have converted much of the pure aspen occurrences to the present-day aspen-conifer forest and woodland ecological system, with conifers increasing in dominance. Conifers in this system include Douglas-fir (*Pseudotsuga menziesii*), subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*) and lodgepole pine (*Pinus contorta*). Common shrubs include serviceberry (*Amelanchier alnifolia*), creeping Oregon grape (*Mahonia repens*), chokecherry (*Prunus virginiana*), Woods' rose (*Rosa woodsii*), birch-leaf spiraea (*Spiraea betulifolia*), and snowberry (*Symphoricarpos* species).

Diagnostic Characteristics

Forest and Woodland, Aspen and Conifer mixed forest, montane elevation, side and toe slope topography

Similar Systems

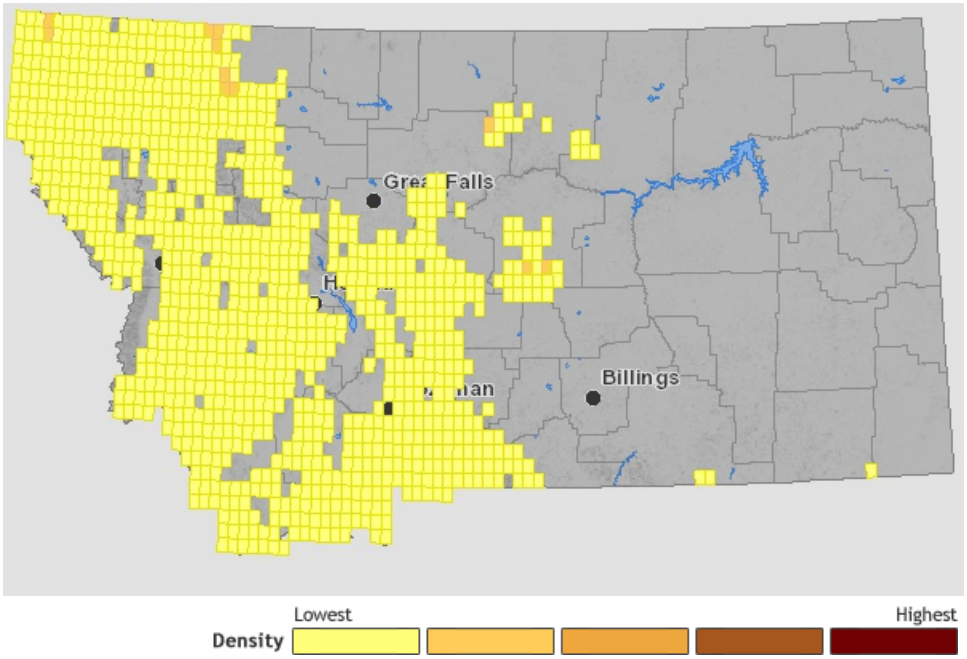
- Aspen Forest and Woodland

Range

This system occurs in north-central Montana in the Big Snowy Mountain range, at elevations of 2,012-2,195 meters (6,600-7,200 feet) on gentle to steep mountain slopes.

Ecological System Distribution

Approximately 195 square kilometers are classified as Aspen and Mixed Conifer Forest in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Phillips, Pondera, Powder River, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Matrix

Environment

In Montana, this system is found on montane slopes, where climate is dry and cold during winter months. Most precipitation occurs during late spring and early summer months. Distribution is primarily limited to areas of deeper soils with adequate soil moisture. Occurrences at high elevations are restricted by cold temperatures, and are generally only found on warmer southern aspects. By contrast, at lower elevations, aspen is restricted by lack of moisture and is found on cooler north aspects and mesic microsites. Soils are typically deep and well-developed, with rock often absent from the soil. Soil texture ranges from sandy loam to clay loam.

Vegetation

The tree canopy is composed of a mix of deciduous and coniferous species, co-dominated by aspen (*Populus tremuloides*) and conifers, including Douglas-fir (*Pseudotsuga menziesii*), subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), lodgepole pine (*Pinus contorta*) and ponderosa pine (*Pinus ponderosa*). Common understory shrubs include serviceberry (*Amelanchier alnifolia*), creeping Oregon grape (*Mahonia repens*), chokecherry (*Prunus virginiana*), Woods' rose (*Rosa woodsii*), birch-leaf spiraea (*Spiraea betulifolia*), and snowberry (*Symphoricarpos* species). Graminoid composition varies depending on available site moisture, but often includes mountain brome (*Bromus carinatus*), pinegrass (*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), blue wild rye (*Elymus glaucus*), and needlegrasses (*Achnatherum* and *Nassella* species). Common forbs include yarrow (*Achillea millefolium*), heart-leafarnica (*Arnica cordifolia)*, aspen daisy (*Erigeron speciosus*), northern bedstraw (*Galium boreale*), silver lupine (Lupinus *argenteus*), starry Solomon's seal (*Maianthemum stellatum*), and meadow rue (*Thalictrum* species). Exotic species such as Kentucky bluegrass (*Poa pratensis*), timothy (*Phleum pratense*) and common dandelion (*Taraxacum officinale*) are frequentin areas impacted by grazing.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0422 *Abies lasiocarpa - Populus tremuloides* Rocky Mountain Moist Forest Alliance
A0540 *Pinus flexilis* Rocky Mountain Woodland Alliance
A3395 *Pseudotsuga menziesii - Pinus ponderosa* / Herbaceous Understory Central Rocky Mountain Woodland Alliance
A3398 *Pinus ponderosa* Southern Rocky Mountain Forest & Woodland Alliance
A3454 *Pseudotsuga menziesii* Southern Rocky Mountain Forest & Woodland Alliance
A3462 *Pseudotsuga menziesii* Middle Rocky Mountain Dry-Mesic Forest & Woodland Alliance
A3463 *Pseudotsuga menziesii* Middle Rocky Mountain Mesic-Wet Forest Alliance
A3760 *Populus tremuloides* Riparian Forest Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Quaking aspen is seral in this system, and in the absence of fire or other disturbance the system will succeed to conifer-dominated forest (Mueggler, 1988). Succession by conifers may occur as a result of a number of processes. Soils may become more acidic and less nutrient-rich as aspen decline in the absence of disturbance, favoring conifer establishment (Cryer and Murray, 1992). Aspen may also facilitate the establishment of conifers due to the shade and higher soil moisture at the base of aspen trees, fostering interspecific competition that favor conifer dominance (St. Clair et al., 2013). Conifer establishment and growth has been found to be greater in aspen and mixed-conifer stands than in conifer dominated stands due to greater nutrient, light, and water availability. Alternatively, aspen mortality tends to increase with increasing conifer abundance due to aspen's shade-intolerance, and changes to soil chemistry (St. Clair et al., 2013). Light limitation resulting from conifer dominance additionally reduces defense compounds in aspen leaves increasing their susceptibility to herbivory (Wooley et al., 2008).

Fire return intervals in this system generally range from 30-50 years and are mostly either mixed severity or stand-replacing (U.S. Department of Agriculture, 2012). Young conifers are susceptible to fire, but older individuals can withstand low-intensity ground fires. While easily killed by fire, aspen regenerate quickly and will often dominate immediately after fires in this system (Howard, 1996). Shinneman et al., (2013) describe two types of seral mixed aspen-conifer forest types: Montane stands where fire is adequately frequent and severe to allow aspen to persist where conifer competitors are present, and mesic subalpine stands where infrequent, high severity fires promote a short period of aspen dominance before it is replaced by more shade-tolerant conifers. In part due to fire suppression practices since the early 1900s, conifers have become dominant in many seral aspen stands (Howard, 1996).

In Montana, aspen seed production is erratic and infrequent. Natural seedling establishment is rare due to limited years of viable seed dispersal, and the long, moist conditions required for initial germination and first-year establishment. Drought conditions limit natural regeneration, and also may accelerate succession as conifer species are generally more tolerant of drought. Thus, conifers are more likely to persist in this system as drought severity and frequency increase (Bell et al., 2014; St. Clair et al., 2013). Conifers may be additionally favored in stands where heavy use by livestock and wildlife limit aspen regrowth, as conifer species are generally more tolerant of browsing. Conversely, increasingly frequent fires will likely cause conifer mortality and promote aspen regeneration (St. Clair et al., 2013).

Management

Historic fire suppression combined with excessive browsing of young aspen by ungulates is considered to be a primary cause of aspen decline in the Northern Rockies (Shinneman et al., 2013). In the absence of natural fire, periodic prescribed burns can be implemented during late fall months to maintain and enhance aspen regeneration and limit succession by conifers (Hardy and Arno, 1996). A study in southwestern Montana found that aspen regeneration increased after prescribed burning, and that ungulate browsing did not limit regeneration due to the low elk density and management of cattle grazing in this region (Durham and Marlow, 2010). Maintaining fire regimes in combination with the management of ungulate use can slow mortality related to succession by conifers, and increase aspen resilience to drought by limiting competition for water with adjacent conifers (St. Clair et al., 2013).

Restoration Considerations

Restoration strategies for this system will depend largely on the severity of the fire, grazing intensity, and other land use impacts. Maintenance of historic fire regimes is the primary method recommended for restoring this system (St. Clair et al., 2013). Quaking aspen will resprout vigorously following fires of low to moderate severity. Sprouting will also occur after higher intensity fires from root suckers that are deeper in the soil profile. Because burned areas regenerate vegetatively following fire, additional restoration practices are generally not required. When supplemental planting is necessitated, seedlings are recommended over vegetative cuttings, and seed germination and seedling survival are highest on well-drained, moist mineral seedbeds (Howard, 1996). Early successional stages may be dominated by fireweed (*Chamerion angustifolium*) and other forbs, small amounts of forest graminoids, and by re-sprouting of dominant shrubs. In areas with high elk densities or heavy livestock use, aspen regeneration may require protection from browsing until crowns can grow high enough to avoid excessive browsing damage (6-8 years) (Durham and Marlow, 2010; Howard, 1996). Restoration of this system may be additionally desired as changes in species composition that occur with succession result in changes to ecosystem productivity, nutrient cycling, and may result in changes to watershed-wide water quality (St. Clair et al., 2013; Howard, 1996).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
Western Water Shrew *(Sorex navigator)*	Northern Montane Shrew *(Sorex obscurus)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Flying Squirrel *(Glaucomys sabrinus)*	Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*	White-footed Deermouse *(Peromyscus leucopus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Southern Red-backed Vole *(Clethrionomys gapperi)*

Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*
Montane Vole *(Microtus montanus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Least Weasel *(Mustela nivalis)*
American Ermine *(Mustela richardsonii)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*

Birds

Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC
Alder Flycatcher *(Empidonax alnorum)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Cooper's Hawk *(Accipiter cooperii)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Ruffed Grouse *(Bonasa umbellus)*
Mourning Dove *(Zenaida macroura)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
Vaux's Swift *(Chaetura vauxi)*
Calliope Hummingbird *(Selasphorus calliope)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Olive-sided Flycatcher *(Contopus cooperi)*
Willow Flycatcher *(Empidonax traillii)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Violet-green Swallow *(Tachycineta thalassina)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Brown Thrasher *(Toxostoma rufum)*
Northern Shrike *(Lanius borealis)*
Red-eyed Vireo *(Vireo olivaceus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Yellow-rumped Warbler *(Setophaga coronata)*
Blackpoll Warbler *(Setophaga striata)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Canada Warbler *(Cardellina canadensis)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
American Tree Sparrow *(Spizelloides arborea)*
Fox Sparrow *(Passerella iliaca)*
White-throated Sparrow *(Zonotrichia albicollis)*
Snow Bunting *(Plectrophenax nivalis)*
Brown-headed Cowbird *(Molothrus ater)*
Pine Grosbeak *(Pinicola enucleator)*
Red Crossbill *(Loxia curvirostra)*
American Goldfinch *(Spinus tristis)*
Northern Hawk Owl *(Surnia ulula)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Dusky Grouse *(Dendragapus obscurus)*
Wild Turkey *(Meleagris gallopavo)*
Great Horned Owl *(Bubo virginianus)*
Barred Owl *(Strix varia)*
Common Nighthawk *(Chordeiles minor)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Tree Swallow *(Tachycineta bicolor)*
Canada Jay *(Perisoreus canadensis)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Golden-crowned Kinglet *(Regulus satrapa)*
Western Bluebird *(Sialia mexicana)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Townsend's Warbler *(Setophaga townsendi)*
American Redstart *(Setophaga ruticilla)*
Wilson's Warbler *(Cardellina pusilla)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
Chipping Sparrow *(Spizella passerina)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Dark-eyed Junco *(Junco hyemalis)*
Common Grackle *(Quiscalus quiscula)*
Bullock's Oriole *(Icterus bullockii)*
White-winged Crossbill *(Loxia leucoptera)*
Pine Siskin *(Spinus pinus)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC
Weidemeyer's Admiral *(Limenitis weidemeyerii)*
Viceroy *(Limenitis archippus)*

Vascular Plants

Many-flowered Viguiera *(Viguiera multiflora)* SOC
James Stitchwort *(Stellaria jamesiana)*
Sitka Columbine *(Aquilegia formosa)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Canada Lynx *(Lynx canadensis)* SOC
Wolverine *(Gulo gulo)* SOC
Snowshoe Hare *(Lepus americanus)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC
Pileated Woodpecker *(Dryocopus pileatus)* SOC
Western Screech-Owl *(Megascops kennicottii)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Spruce Grouse *(Canachites canadensis)*
Spotted Towhee *(Pipilo maculatus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Flammulated Owl *(Psiloscops flammeolus)* SOC
Veery *(Catharus fuscescens)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Prairie Falcon *(Falco mexicanus)*
White-throated Swift *(Aeronautes saxatalis)*
Song Sparrow *(Melospiza melodia)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC

Amphibians

Sierran Treefrog *(Pseudacris sierra)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Lorquin's Admiral *(Limenitis lorquini)*
Red-spotted Admiral *(Limenitis arthemis)* PSOC
One-eyed Sphinx *(Smerinthus astarte)*

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC

Original Concept Authors

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Montana Version Authors

L.K. Vance, T.A. Luna, M.M Hart

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES304.776, Inter-Mountain Basins Aspen Mixed Conifer Forest-Woodland

National Land Cover Dataset:
43: Mixed Forest

ReGAP:
4302: Inter-Mountain Basins Aspen Mixed Conifer Forest-Woodland

Literature Cited Above Legend: View Online Publication

- Bell, D.M., J.B. Bradford, and W.K. Lauenroth. 2014. Forest stand structure, productivity, and age mediate climatic effects on aspen decline. Ecology 95(8):2040-2046.
- Cryer, D.H. and J.E. Murray. 1992. Aspen regeneration and soils. Rangelands Archives 14(4):223-226.
- Durham, D.A. and C.B. Marlow. 2010. Aspen response to prescribed fire under managed cattle grazing and low elk densities in southwest Montana. Northwest Science 84(1):141-150.
- Howard, J.L. 1996. Populus tremuloides. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.
- Shinneman, D.J., W.L. Baker, P.C. Rogers, and D. Kulakowski. 2013. Fire regimes of quaking aspen in the Mountain West. Forest Ecology and Management 299: 22-34.
- St. Clair, S.B., X. Cavard, and Y. Bergeron. 2013. The role of facilitation and competition in the development and resilience of aspen forests. Forest ecology and management 299:91-99.
- U.S. Department of Agriculture, Forest Service, Missoula Fire Sciences Laboratory. 2012. Information from LANDFIRE on

Fire Regimes of Northern Rocky Mounatin Quaking Aspen Communities. In: Fire Effects Information System, [Online]. U.S. Department of Agri

- Wooley, S.C., S. Walker, J. Vernon, and R.L. Lindroth. 2008. Aspen Decline, Aspen Chemistry, and Elk Herbivory: Are They Linked? Aspen chemical ecology can inform the discussion of aspen decline in the West. Rangelands 30(1):17-21.

Additional References Legend: View Online Publication

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Hardy, Colin C., and Stephen F. Arno. 1996. *The use of fire in forest restoration a general session at the annual meeting of the Society for Ecological Restoration : Seattle, WA, September 14-16, 1995*. Ogden, Utah (324 25th Street, Ogden 84401): U.S. Dept. of Agriculture, Forest Service, Intermountain Research Station.

Mueggler, W. F. 1988. Aspen community types of the Intermountain Region. USDA Forest Service General Technical Report INT-250. Intermountain Research Station, Ogden, UT. 135 pp.

- Schier GA, Jones JR, Winokur RP. 1985. Vegetative regeneration. In: DeByle NV, Winokur RP, editors. Aspen: ecology and management in the western United States. USDA Forest Service General Technical Report RM-119. Fort Collins, CO: Rocky Mountain Forest and Range Experiment Station; p 29-33.

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Alpine Dwarf-Shrubland

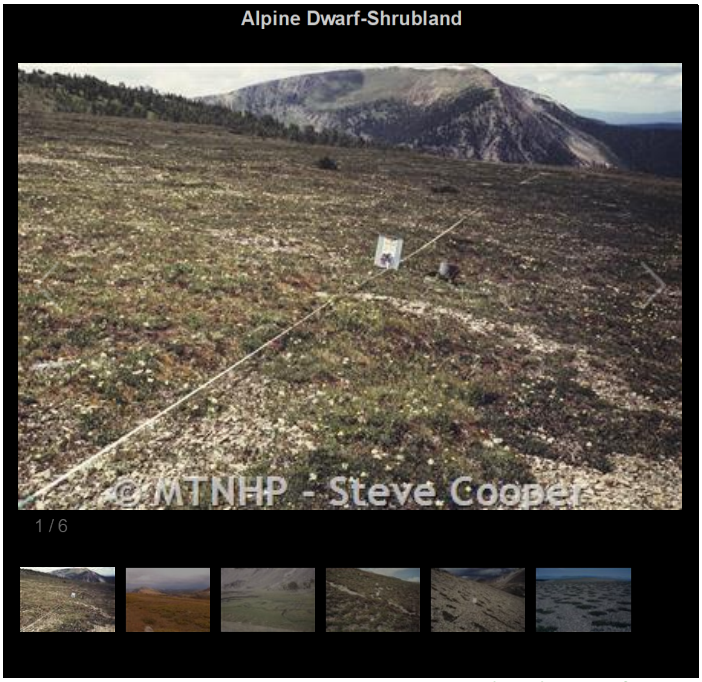


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State Rank Reason
Climate change is the major threat over the long term.

General Description

This system occurs above upper treeline throughout the Rocky Mountains and east into the mountain island ranges of central Montana. Elevation ranges from as low as 1,981 meters (6,500 feet) in northwestern Montana to 3,200 meters (10,500 feet) in southern Montana. The climate is very cold, with heavy snow accumulation and a very short growing season (60 to 90 days). This system occurs on level or concave glacial topography with late-lying snow and subirrigation from surrounding slopes. It can occur on all aspects, but is most common on north and east facing aspects. These sites are characterized as snow bed communities, where snow persists until mid or late summer, or occasionally, until fall. Soil temperatures remain colder than in the surrounding alpine meadows throughout the growing season. Soils are moist but well-drained, strongly acidic, and often with substantial peat layers. These dwarf shrublands are characterized by a semi-continuous layer of ericaceous dwarf-shrubs or dwarf willows which form a heath type ground cover less than 0.5 m (1.6 foot) in height. The ericaceous shrub community is dominated by western moss heather (*Cassiope mertensiana*), white arctic mountainheather (*Cassiope tetragona*), yellow mountain heath (*Phyllodoce glanduliflora*), pink mountain heath (*Phyllodoce empetrifomis*), and alpine bog laurel (*Kalmia microphylla)*. Grouse whortleberry (*Vaccinium scoparium*), bilberry (*Vaccinium myrtillus*) or mountain huckleberry (*Vaccinium membranaceum*) are often found within the heath shrublands in northwestern Montana. The willow community forms localized thickets on level areas or on the perimeter of depressional areas and can be dominated by either mat forming or dwarf -shrub alpine willows (*Salix spp.).* The herbaceous understory is composed of a diversity of alpine sedges (*Carex ssp.),* rushes (*Juncus spp.),* woodrushes (*Luzula spp.*), alpine grasses and forbs.

Diagnostic Characteristics

Alpine, patterned ground, glaciated, udic, acidic soils, alpine slopes, dwarf shrubland, very long disturbance interval

Similar Systems

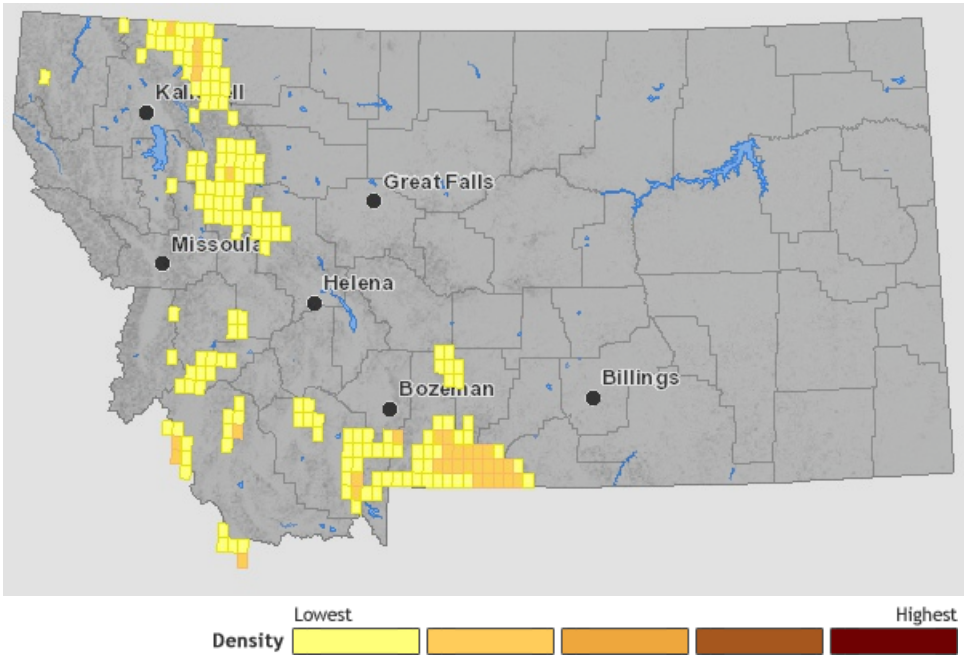
- Alpine Fell-Field
- Alpine-Montane Wet Meadow

Range

This system occurs above upper treeline throughout the Rocky Mountain ranges, and east into the mountain island ranges of central and south-central Montana. Elsewhere, this system ranges from the Canadian Rocky Mountains of British Columbia and Alberta south to northern New Mexico and the mountains of Utah and Nevada. It is found west from Montana throughout the mountains of Idaho, Oregon and the Cascade and Olympic Mountains of Washington.

Ecological System Distribution

Approximately 278 square kilometers are classified as Alpine Dwarf-Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Carbon, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Lewis and Clark, Lincoln, Madison, Missoula, Park, Pondera, Powell, Ravalli, Stillwater, Sweet Grass, Teton

Spatial Pattern

Large patch

Environment

This system is found in areas of level or concave glacial topography with late-lying snow and subirrigation from surrounding alpine slopes. Elevation ranges from as low as 1,981 meters (6,500 feet) in northwestern Montana to 3,200 meters (10,500 feet) in southwestern Montana. Sites are characterized as snow bed communities, which form in concave, depressional areas that retain snow until mid to late summer. It can occur on all aspects but is most common on north and east facing aspects. Soil temperatures remain colder than in the surrounding alpine meadow throughout the growing season. Soils have become relatively stabilized in these sites, and are moist but well-drained, strongly acidic, and often with substantial peat layers. Vegetation in these areas is controlled by snow retention, wind desiccation, and a short growing season, usually only 60 to 90 days.

Vegetation

This system is composed of dwarf shrublands of ericaceous dwarf-shrubs or dwarf, alpine willows forming a low shrubland ground cover less than 0.5 meters (1.6 feet) in height. The ericaceous shrub community is dominated by western moss

heather, white arctic mountainheather, yellow mountain heath, pink mountain, and alpine bog laurel. Grouse whortleberry, bilberry, or mountain huckleberry are often found within the heath shrublands, especially in northwestern Montana. Common graminoids and forbs include showy sedge (*Carex spectabilis*), shortstalk sedge (*Carex podocarpa*), Rocky Mountain sedge (*Carex scopulorum*), Hitchcock's woodrush (*Luzula glabrata* var. *hitchcockii*) and Piper's woodrush (*Luzula piperi*). Forbs such as alpine pussytoes (*Antennaria* species), arnica (*Arnica* species), Indian paintbrush (*Castilleja* species), glacier lily (*Erythronium grandiflorum)*, alpine Saint John's wort (*Hypericum formosum*), viviparous bistort (*Polygonum viviparum*) and Rocky Mountain groundsel (*Packera cymbalarioides*) are found within the heath-dominated shrubland.

Willow dominated communities form localized thickets on more level areas or around the perimeter of depressional areas. These depressional areas can have greater peat development. Dwarf, mat-forming species such as arctic willow (*Salix arctica*) and snow willow (*Salix reticulata*) are common associates. Other willow bed communities composed of shrubs that are less than .5 metrs (1.6 feet) tall include undergreen willow (*Salix commutata*), grayleaf willow (*Salix glauca*), plane leaf willow (*Salix planifolia*), and, in areas underlain by calcareous parent material, shortfruit willow (*Salix brachycarpa*) (Bamberg and Major, 1968). Sedges and rushes dominate in the depressional or level areas and are usually the last to emerge after snowmelt. These areas are species poor and are dominated by black sedge (*Carex nigricans*), Drummond's rush (*Juncus drummondii*) and tufted hairgrass (*Deschampsia cespitosa*) or purple mountain hairgrass (*Vahlodea atropurpurea*). Sibbaldia (*Sibbaldia procumbens*), Ross' avens (*Geum rossii*), and marsh marigold (*Caltha leptosepala*) often occur in openings in the peat (Cooper et al., 1997). Alpine dwarf shrublands occur as distinct patch types within Rocky Mountain Alpine Fell-Fields or adjacent to Rocky Mountain Alpine-Montane Wet Meadows or at the upper elevational limit of Rocky Mountain Subalpine Woodlands and Parklands.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3176 *Salix arctica - Salix nivalis - Salix reticulata* Alpine Dwarf-shrubland Alliance
- **CEGL001431** *Salix arctica / (Salix petrophila, Salix nivalis) - Polygonum bistortoides* Dwarf-shrubland
- **CEGL001435** *Salix reticulata - Caltha leptosepala* Dwarf-shrubland
- **CEGL005878** *Salix arctica - Carex nigricans* Dwarf-shrubland

A3177 *Phyllodoce empetriformis - Phyllodoce glanduliflora / Sibbaldia procumbens* Alpine Snowbed Dwarf-shrubland Alliance
- **CEGL001405** *Phyllodoce empetriformis - Antennaria lanata* Dwarf-shrubland
- **CEGL005877** *Phyllodoce glanduliflora - Sibbaldia procumbens* Dwarf-shrubland

A3178 *Dryas integrifolia - Dryas octopetala - Arctostaphylos uva-ursi* Rocky Mountain Fell-field Dwarf-shrubland Alliance
- **CEGL001890** *Dryas integrifolia / Carex spp.* Alpine Dwarf-shrub Meadow
- **CEGL001894** *Dryas octopetala / Polygonum viviparum* Alpine Dwarf-shrub Meadow

A3770 *Salix wolfii - Salix brachycarpa - Betula glandulosa* Wet Shrubland Alliance
- **CEGL001136** *Salix glauca* Wet Shrubland

A3831 *Kalmia microphylla - Cassiope mertensiana - Dryas drummondii* Wet Dwarf-shrubland Alliance
- **CEGL001396** *Cassiope mertensiana - Carex paysonis* Wet Dwarf-shrubland

A3969 *Vaccinium membranaceum - Vaccinium myrtillus - Vaccinium scoparium* Montane-Subalpine Shrubland Alliance
- **CEGL005879** *Vaccinium (myrtillus, scoparium) - Luzula glabrata var. hitchcockii* Dwarf-shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

The fire disturbance interval is typically very long (500 years or greater) within this system. Historically, stand-replacing fires occur infrequently in adjacent associated subalpine woodlands (Arno, 1979). Lightning strikes can cause fire within these systems, although severity and spread is usually variable. Other disturbances include high elevation mining, heavy recreational use, and grazing.

Management

This system is especially fragile due to the extreme limited growing season and soil development. Species that occur in these systems are generally slow growing and decrease in cover and vigor in areas of trampling or grazing.

Restoration Considerations

Removal of disturbance is necessary before any kind of restoration can be considered. Natural recovery may occur over time.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);

2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Grizzly Bear *(Ursus arctos)* SOC	Fisher *(Pekania pennanti)* SOC
Wolverine *(Gulo gulo)* SOC	Dwarf Shrew *(Sorex nanus)* PSOC
Hoary Marmot *(Marmota caligata)* PSOC	North American Water Vole *(Microtus richardsoni)* PSOC
Northern Montane Shrew *(Sorex obscurus)*	American Pika *(Ochotona princeps)*
Snowshoe Hare *(Lepus americanus)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	Mountain Goat *(Oreamnos americanus)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	White-tailed Ptarmigan *(Lagopus leucura)* SOC
Black Rosy-Finch *(Leucosticte atrata)* SOC	Gray-crowned Rosy-Finch *(Leucosticte tephrocotis)* SOC
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Prairie Falcon *(Falco mexicanus)*	Dusky Grouse *(Dendragapus obscurus)*
Common Raven *(Corvus corax)*	American Crow *(Corvus brachyrhynchos)*
American Pipit *(Anthus rubescens)*	White-crowned Sparrow *(Zonotrichia leucophrys)*

Invertebrates

Frigga Fritillary *(Boloria frigga)* SOC	White-veined Arctic *(Oeneis bore)* PSOC

Bog Fritillary *(Boloria eunomia)*

Magdalena Alpine *(Erebia magdalena)*

Vascular Plants

Low Braya *(Braya humilis)* SOC

Macoun's Draba *(Draba macounii)* SOC

Round-fruited Draba *(Draba globosa)* SOC

Five-leaf Cinquefoil *(Potentilla nivea var. pentaphylla)* SOC

Barratt's Willow *(Salix barrattiana)* SOC

Mountain Lousewort *(Pedicularis pulchella)* SOC

Running-pine *(Lycopodium lagopus)* SOC

Thick-leaf Whitlow-grass *(Draba crassa)* SOC

Porsild's Draba *(Draba porsildii)* SOC

Stalked-pod Locoweed *(Oxytropis podocarpa)* SOC

Low Arctic Cinquefoil *(Potentilla hyparctica)* SOC

Yellow Marsh Saxifrage *(Saxifraga hirculus)* SOC

Small Tofieldia *(Tofieldia pusilla)* SOC

One-flowered Cinquefoil *(Potentilla uniflora)*

Native Species Occasionally Associated with this Ecological System

Mammals

Uinta Chipmunk *(Neotamias umbrinus)* PSOC

Gray Wolf *(Canis lupus)*

Birds

White-throated Swift *(Aeronautes saxatalis)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*

Invertebrates

Freija Fritillary *(Boloria freija)* PSOC

Colorado Alpine *(Erebia callias)* PSOC

Melissa Arctic *(Oeneis melissa)* PSOC

Vascular Plants

Cliff Toothwort *(Cardamine rupicola)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28646
System Code	CES306.810, Rocky Mountain Alpine Dwarf-Shrubland

National Land Cover Dataset:
52: Scrub/Shrub

ReGAP:
5207: Rocky Mountain Alpine Dwarf-Shrubland

Additional References Legend: View Online Publication

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- Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.
- Bamberg, S. A., and J. Major. 1968. Ecology of the vegetation and soils associated with calcareous parent materials in three alpine regions of Montana. Ecological Monographs 38(2):127-167.
- Cooper, Stephen V., Peter Lesica, and Deborah S. Page-Dumroese. 1995. Plant community classification for alpine vegetation on the Beaverhead National Forest, Montana. Ogden, UT (324 25th Street, Ogden 84401): U.S. Dept. of Agriculture, Forest Service, Intermountain Research Station.

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Alpine Turf

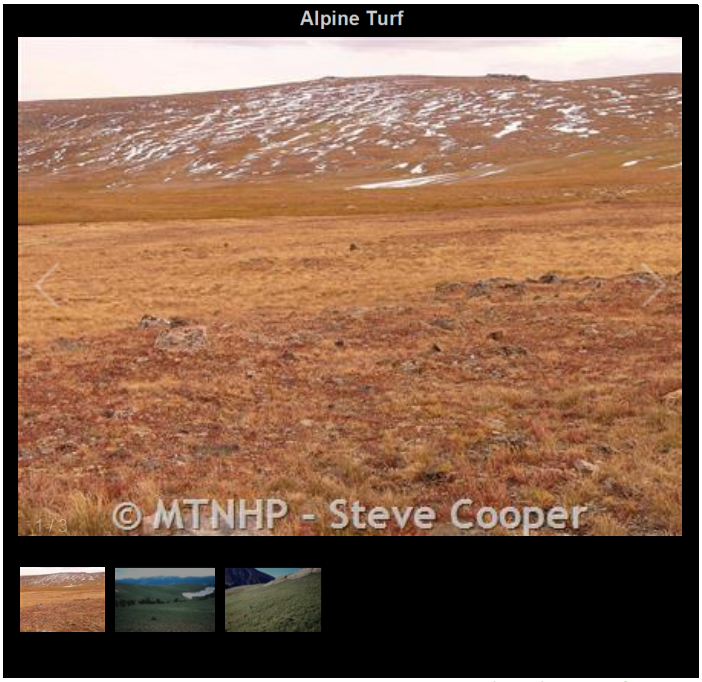


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Provisional State Rank:
(see reason below)

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State Rank Reason
This system may experience a decline as disappearance of perennial snow restricts moisture.

General Description

In Montana, this system occurs above upper treeline throughout the Montana Rocky Mountain ranges, and east into the mountain island ranges. Elevation ranges from as low as 6,600 ft in
northwestern to 10,500 feet in southwestern Montana. Turf communities form on gentle to moderate upper slopes, flat ridges, valleys, basins, and gentle summit ridges where soil has
become relatively stabilized and the water supply persists until fall. At these elevations, the growing season typically ranges from 60 to 90 days. During the growing season, these areas are subjected to windy conditions and widely variable diurnal temperatures. Freezing temperatures and snow can occur throughout the summer months. Turf communities are composed of a diversity of rhizomatous sedges, rushes, woodrushes, grasses and forbs that form a dense turf that is rarely greater than 12 cm (5 inches) tall. Depending on slope protection, soil development, snow depth, turf communities can range from dry to mesic expressions.

Throughout Montana, alpine turf supports a high diversity of sedges, grasses and forbs. Common graminoid species include alpine bluegrass (*Poa alpina*), alpine timothy (*Phleum alpinum*), alpine fescue (*Festuca brachyphylla*), and a highly diverse assemblage of sedges including northern singlespike sedge (*Carex scirpoidea*), curly sedge(*C. rupestris*), blackroot sedge (*Carex elynoides*), obtuse sedge (*Carex obtusata*), dunhead sedge (*Carexphaeocephala*), Hayden's sedge (*Carex haydeniana*), spiked woodrush (*Luzula spicata*), and Piper's woodrush (*Luzula piperi*).

Alpine forbs can often form nearly half the cover in turf communities and can include diverse leaf cinquefoil (*Potentilla diversifolia*), alpine goldenrod (*Solidago multiradiata*), moss campion (*Silene acaulis*), Parrot's beak lousewort (*Pedicularis contorta*), arnica (*Arnica* species), alpine pussytoes (*Antennaria* species), subalpine wandering daisy (*Erigeron peregrinus*), sibbaldia (*Sibbaldia procumbens*), glacier lily (*Erythronium grandiflorum*), and rhexi-leaf paintbrush (*Castilleja rhexifolia*),among many others. Woody, mat forming species such as arctic willow (*Salix arctica*) and bearberry (*Arctostaphylos uva-ursi*) can contribute significant cover in many examples of turf communities. Due to the very slow rate of community development, short growing season, and limited soil development, alpine turf cannot support heavy levels of disturbance such as repeated grazing, land disturbance and heavy foot traffic. Recovery of these communities occurs over many decades. Climatic warming and decreasing snowpack levels will alter the floristic composition and the distribution of peripheral species, northern Rocky Mountain endemics and rare species that occur within it.

Similar Systems

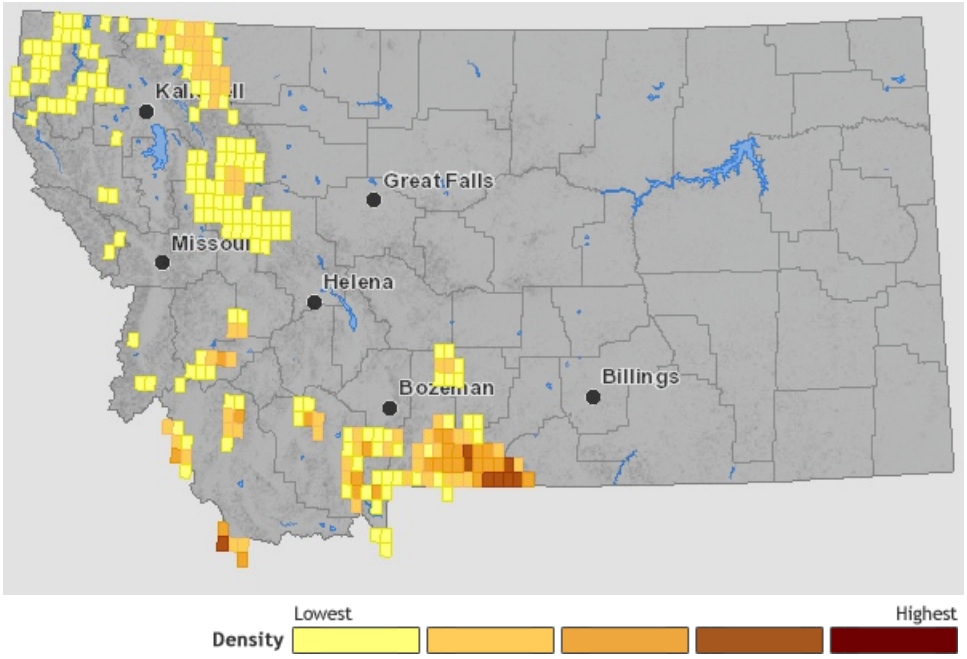
- Alpine Fell-Field

Range

This system occurs above upper treeline throughout the North American Rocky Mountain cordillera, including alpine areas of ranges in Idaho, Utah, Colorado, Wyoming and Nevada, and isolated alpine sites in the northeastern Cascades. In Montana, this system occurs above upper treeline throughout the Montana Rocky Mountain ranges, and east into the mountain island ranges. Snow pack is higher in alpine basins whereas ridges and summits can be blown free of snow due to high winds and sublimation.

Ecological System Distribution

Approximately 1,195 square kilometers are classified as Alpine Turf in the 2017 Montana Land Cover layers.
Grid on map is based on USGS 7.5 minute quadrangle map boundaries.



Montana Counties of Occurrence

Beaverhead, Carbon, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Lewis and Clark, Lincoln, Madison, Mineral, Missoula, Park, Powell, Ravalli, Sanders, Stillwater, Sweet Grass, Teton

Spatial Pattern

Large patch

Environment

In Montana, alpine turf communities are well represented throughout the Northern Rocky Mountains and island mountain ranges. Elevation ranges from as low as 6,600 ft in northwestern Montana to 10,500 feet in southwestern Montana. Turf communities form on gentle to moderate upper slopes, flat ridges, valleys, basins, and gentle summit ridges where soil has become relatively stabilized and the water supply persists until fall. At these elevations, the growing season typically ranges from 60 to 90 days. During the growing season, these areas are subjected to windy conditions and widely variable diurnal temperatures. Freezing temperatures and snow can occur throughout the summer months. During winter months, turf communities are subjected to very cold temperatures, high winds, and heavy accumulations of snow. Snow pack

accumulation is dependent on topography. Snow pack is higher in alpine basins whereas ridges and summits can be blown free of snow due to high winds and sublimation. In Montana, soils are derived a variety of parent materials, and can be acidic or calcareous. The A horizon is typically less than 10 cm deep. Soils are typically rocky or gravelly with good aeration and drainage.

Vegetation

Turf communities are composed of a diversity of rhizomatous sedges, rushes, woodrushes, grasses and forbs that form a dense turf that is rarely greater than 12 cm (5 inches) tall. Depending on slope protection, soil development, snow depth, turf communities can range from dry to mesic. In northwestern Montana, dry turf communities are dominated by graminoids. Common species include alpine bluegrass (*Poa alpina*), alpine timothy (*Phleum alpinum*), alpine fescue (*Festuca brachyphylla*), dunhead sedge (*Carex phaeocephala*), spiked woodrush (*Luzula spicata*), Piper's woodrush (*Luzula piperi*), and Hayden's sedge (*Carex haydeniana*).

Alpine forb cover is usually less than 40% in the drier expression of alpine turf communities. Common species include forbs include diverse leaf cinquefoil (*Potentilla diversifolia)*, alpine goldenrod (*Solidago multiradiata*), moss campion (*Silene acaulis*), Parrot's beak lousewort (*Pedicularis contorta*), arnica (*Arnica* species), Eschscholtz's buttercup (*Ranunculus eschscholtzii*). Woody, mat forming arctic willow (*Salix arctica*) often forms high cover in dry turf communities. In more well developed turf communities, forb diversity increase and can reach greater than 40% percent cover. Additional species include arnica (*Arnica* species), alpine pussytoes (*Antennaria* species), subalpine wandering daisy (*Erigeron peregrinus)*, one-stem fleabane (*Erigeron simplex*), sibbaldia (*Sibbaldia procumbens)*, glacier lily (*Erythronium grandiflorum)*, rhexi-leaf paintbrush (*Castilleja rhexifolia)*, western anemone (*Anemone occidentalis)*, alpine Saint John's wort (*Hypericum formosum)*, elegant death camas (*Zigadenus elegans*), alpine bistort (*Polygonum bistortoides*), and viviparous bistort (*Polygonum viviparum*). Higher levels of organic matter contribute to greater graminoid diversity including purple mountain hairgrass (*Deschampsia atropurpurea*) and beautiful sedge (*Carex spectabilis*).

In northwestern Montana, the more mesic expressions of turf communities form on gentle slopes and basins where subirrigation from permanent snow fields and higher levels of organic matter accumulation occur in the soils. Although infrequent, they support additional species including single spike sedge (*Carex scirpoidea*), curly sedge (*Carex ruprestris*), hair sedge (*Carex capillaris*) and Payson's sedge (*Carex paysonis*).

In southwestern Montana, the graminoid component of turf includes dunhead sedge, Hayden's sedge, showy sedge, single spike sedge, spiked woodrush, black and white sedge(*Carex albo-nigra*), two-tipped sedge (*Carex lachenalii*), spike sedge (*Carex nardina)*, and Drummond's rush (*Juncus drummondii*). Grasses such as alpine blue grass, alpine timothy, alpine fescue, and spike trisetum (*Trisetum spicatum*) constitute the rest of the graminoid layer. Other common species include blackroot sedge, curly sedge, Parry's rush (*Juncus parryi*), Idaho fescue (*Festuca idahoenisis*), spike fescue (*Festuca kingii*), and purple reedgrass (*Calamagrostis purpurascens*) (Cooper et al., 1999).

Southwestern Montana alpine turf communities include additional forb species more common in the middle Rocky Mountain region. Species include alpine forget-me-not (*Eritrichium nanum*), Ross avens (*Geum rossii*)*,* common alp lily (*Lloydia serotina*), and sheep cinquefoil (*Potentilla ovina*). Fern allies such as lesser spike moss (*Selaginella densa*) can be common. Moss and lichen cover is typically very low within well developed turf, but is higher in areas with the stoniest soils adjacent to fell fields and scree slopes with late persisting snowfields. Mat forming, woody species such as arctic willow, arctic dryad, snow willow (*Salix nivalis*), and within the island mountain ranges, bearberry (*Arctostaphylos uva-ursi*) are usually present within the turf.

Throughout its range in Montana, this system intergrades with scree and talus and alpine fell field communities in areas with decreasing levels of soil development. Turf development can still be evident but is discontinuous due to high rock content and very shallow soil development. In these areas, the turf community intergrades with fellfield species and early colonizers such as arctic dryad (*Dryas octopetala*), yellow sweetvetch (*Hedysarum sulphurescens*), shrubby cinquefoil (*Dasiphora fruticosa*), silver lupine (*Lupinus argenteus*), crazyweed (*Oxytropis* species) and milkvetch (*Astragalus* species). These nitrogen-fixing species accumulate litter within the mats, thus facilitating additional species colonization from the adjacent turf community. Species within the stoniest soils typically include yarrow (*Achillea millefolium*), penstemon (*Penstemon* species), phacelia (*Phacelia* species), alpine fireweed (*Chamerion latifolium)*, explorer's gentian (*Gentiana calycosa*), twinflower sandwort (*Minuartia obtusiloba*), moss campion,alpine goldenrod and aster (Symphyotrichum species). Many of the cushion species are very long lived, well adapted to limited available water during growth and possess a deep, fleshy taproot. These species will persist for decades within the turf as it develops. Early successional graminoids in these areas include Dunhead sedge, Hayden's sedge, Drummond's rush, alpine bluegrass, slender wheatgrass, Sandberg's bluegrass, and spike trisetum. These same species frequently colonize disturbed areas within the turf community such as grizzly bear diggings and ground squirrel burrows.

Imbedded within this system is a mosaic of alpine plant communities that vary in composition depending on soil development, snow retention, subterranean hydrology and localized topography. Snow bed communities dominated by ericaceous dwarf shrubs and willows often occur in as well as alpine wet meadows dominated by tufted hairgrass (*Deschampisa cespitosa*).

Alpine turf communities are often bordered by subalpine forest krummolz mats and the upper elevational limit of subalpine forests. The most common forest association in Montana is whitebark pine-subalpine fir (*Pinus albicaulis-Abies lasiocarpa*).In scattered locations on north and east facing aspects, turf communities are bordered by alpine larch(*Larix lyallii*)forests.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1262 *Achnatherum hymenoides - Pseudoroegneria spicata - Muhlenbergia pungens* Grassland Alliance
- **CEGL001666** *Pseudoroegneria spicata* - Cushion Plants Grassland

A1323 *Leucopoa kingii - Carex elynoides - Phlox pulvinata* Central Rocky Mountain Subalpine-Alpine Grassland Alliance
- **CEGL001910** *Leucopoa kingii* Grassland
- **CEGL001911** *Leucopoa kingii / Carex elynoides* Grassland
- **CEGL001912** *Leucopoa kingii / Oxytropis campestris* Grassland
- **CEGL001913** *Leucopoa kingii / Phlox pulvinata* Grassland

A3154 *Minuartia obtusiloba - Paronychia pulvinata - Silene acaulis* Alpine Fell-field Alliance
- **CEGL001862** *Carex rupestris / Potentilla ovina* Alpine Fell-field
- **CEGL001965** *Geum rossii / Minuartia obtusiloba* Alpine Fell-field

A3155 *Carex elynoides - Carex rupestris - Kobresia myosuroides* Rocky Mountain Alpine Turf Alliance
- **CEGL001852** *Carex elynoides* Alpine Turf
- **CEGL001853** *Carex elynoides / Geum rossii* Alpine Turf
- **CEGL001854** *Carex elynoides / Lupinus argenteus* Alpine Turf
- **CEGL001856** *Carex elynoides / Oxytropis sericea* Alpine Turf
- **CEGL001866** *Carex scirpoidea / Geum rossii* Alpine Turf
- **CEGL001867** *Carex scirpoidea / Potentilla diversifolia* Alpine Turf
- **CEGL001870** *Carex spp. / Geum rossii* Alpine Turf
- **CEGL005866** *Carex scirpoidea / Zigadenus elegans* Alpine Meadow

A3172 *Juncus drummondii - Juncus parryi - Sibbaldia procumbens* Rocky Mountain Alpine Snowbed Alliance

A3178 *Dryas integrifolia - Dryas octopetala - Arctostaphylos uva-ursi* Rocky Mountain Fell-field Dwarf-shrubland Alliance
- **CEGL001892** *Dryas octopetala / Carex rupestris* Alpine Dwarf-shrub Meadow
- **CEGL001893** *Dryas octopetala / Carex spp.* Alpine Dwarf-shrub Meadow
- **CEGL005832** *Arctostaphylos uva-ursi - Solidago multiradiata* Dwarf-shrubland

A3832 *Carex nigricans - Sibbaldia procumbens - Trollius laxus* Wet Meadow Alliance

A4021 Rocky Mountain Alpine Sparse Herb Bedrock & Scree Alliance

A4095 *Arctostaphylos uva-ursi / Festuca spp. - Pseudoroegneria spicata* Steppe Alliance
- **CEGL005830** *Arctostaphylos uva-ursi - Festuca campestris / Festuca idahoensis* Dwarf-shrubland
- **CEGL005831** *Arctostaphylos uva-ursi - Pseudoroegneria spicata* Dwarf-shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Historically, stand-replacing fires occurred infrequently in adjacent associated subalpine woodlands (Arno 1980). Lightning strikes can cause fire within these systems, although severity and spread is usually limited and variable. Major disturbances in this system include high elevation mining, heavy recreational use, and grazing. Changing climatic patterns will impact this system and the distribution of peripheral species, northern Rocky Mountain endemics and rare species that occur within it.

Management

Due to the very slow rate of community development, short growing season, and limited soil development, alpine turf cannot support heavy levels of disturbance such as repeated grazing, land disturbance and heavy foot traffic.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Grizzly Bear *(Ursus arctos)* SOC	Fisher *(Pekania pennanti)* SOC
Wolverine *(Gulo gulo)* SOC	Dwarf Shrew *(Sorex nanus)* PSOC
Hoary Marmot *(Marmota caligata)* PSOC	North American Water Vole *(Microtus richardsoni)* PSOC
Vagrant Shrew *(Sorex vagrans)*	Western Water Shrew *(Sorex navigator)*
American Pika *(Ochotona princeps)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*	Montane Vole *(Microtus montanus)*
Coyote *(Canis latrans)*	Red Fox *(Vulpes vulpes)*
Marten *(Martes americana)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	Mountain Goat *(Oreamnos americanus)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	White-tailed Ptarmigan *(Lagopus leucura)* SOC
Black Rosy-Finch *(Leucosticte atrata)* SOC	Gray-crowned Rosy-Finch *(Leucosticte tephrocotis)* SOC
Prairie Falcon *(Falco mexicanus)*	Dusky Grouse *(Dendragapus obscurus)*
Great Horned Owl *(Bubo virginianus)*	Horned Lark *(Eremophila alpestris)*
Common Raven *(Corvus corax)*	American Pipit *(Anthus rubescens)*
White-crowned Sparrow *(Zonotrichia leucophrys)*	

Invertebrates

Frigga Fritillary *(Boloria frigga)* SOC	White-veined Arctic *(Oeneis bore)* PSOC
Melissa Arctic *(Oeneis melissa)* PSOC	Bog Fritillary *(Boloria eunomia)*
Magdalena Alpine *(Erebia magdalena)*	

Vascular Plants

Weber's Saw-wort *(Saussurea weberi)* SOC	Low Braya *(Braya humilis)* SOC
Thick-leaf Whitlow-grass *(Draba crassa)* SOC	Macoun's Draba *(Draba macounii)* SOC
Porsild's Draba *(Draba porsildii)* SOC	Small-flowered Pennycress *(Noccaea parviflora)* SOC
Stalked-pod Locoweed *(Oxytropis podocarpa)* SOC	Glaucous Gentian *(Gentiana glauca)* SOC
Alpine Poppy *(Papaver radicatum ssp. kluanensis)* SOC	Island Koenigia *(Koenigia islandica)* SOC
Low Arctic Cinquefoil *(Potentilla hyparctica)* SOC	Cascade Willow *(Salix cascadensis)* SOC
Yellow Marsh Saxifrage *(Saxifraga hirculus)* SOC	Storm Saxifrage *(Micranthes tempestiva)* SOC
Tiny Swamp Saxifrage *(Micranthes apetala)* SOC	Snow Indian Paintbrush *(Castilleja nivea)* SOC
Arctic Eyebright *(Euphrasia subarctica)* SOC	Selway Coil-beaked Lousewort *(Pedicularis contorta var. rubicunda)* SOC
Mountain Lousewort *(Pedicularis pulchella)* SOC	Sheathed Cotton-grass *(Eriophorum callitrix)* SOC
Large-fruited Kobresia *(Kobresia sibirica)* SOC	Simple Kobresia *(Kobresia simpliciuscula)* SOC
Three-flowered Rush *(Juncus triglumis var. albescens)* SOC	Small Tofieldia *(Tofieldia pusilla)* SOC
Northern Fescue *(Festuca viviparoidea)* SOC	Ice Grass *(Phippsia algida)* SOC
Banff Bluegrass *(Poa laxa ssp. banffiana)* SOC	Running-pine *(Lycopodium lagopus)* SOC
Pygmy Goldenweed *(Tonestus pygmaeus)* PSOC	

Native Species Occasionally Associated with this Ecological System

Mammals

Uinta Chipmunk *(Neotamias umbrinus)* PSOC	Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
Northern Montane Shrew *(Sorex obscurus)*	Red-tailed Chipmunk *(Neotamias ruficaudus)*
Long-tailed Vole *(Microtus longicaudus)*	Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*	Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*

Birds

Common Nighthawk *(Chordeiles minor)*	White-throated Swift *(Aeronautes saxatalis)*
Tree Swallow *(Tachycineta bicolor)*	Violet-green Swallow *(Tachycineta thalassina)*
American Crow *(Corvus brachyrhynchos)*	Mountain Bluebird *(Sialia currucoides)*
American Robin *(Turdus migratorius)*	Lincoln's Sparrow *(Melospiza lincolnii)*

Amphibians

Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Colorado Alpine *(Erebia callias)* PSOC

Vascular Plants

Lackschewitz' Milkvetch *(Astragalus lackschewitzii)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.816, Rocky Mountain Alpine Turf

ReGAP:
7117: Rocky Mountain Alpine Turf

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Citation for data on this website:
Alpine Turf — Rocky Mountain Alpine Turf. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=7117

Alpine Fell-Field



Image Copyright and Usage Information

Provisional State Rank: S5
(see reason below)

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State Rank Reason

This system is likely to increase as perennial ice and snow disappears. Dessication and loss of alpine turf may also increase this system's occupancy.

General Description

This ecological system is found at alpine elevations throughout the Rocky Mountains, west into the mountainous areas of the Great Basin, and north into the Canadian Rockies. In Montana, alpine fell-fields are well represented throughout the Northern Rocky Mountains and island mountain ranges. Elevation ranges from as low as 1,981 meters (6,500 feet) in northwestern Montana to 3,200 meters (10,500 feet) in southwestern Montana. These are wind-scoured fell-fields that are often free of snow in the winter, such as ridgetops and exposed saddles, subjecting the vegetation to severe environmental stress. Soils on these windy, unproductive sites are shallow, stony, low in organic matter, and poorly developed; wind deflation often results in a gravelly pavement. This system is characterized by a very cold climate during winter, high winds, high ultraviolet radiation and surface temperatures during summer days, and a very short growing season. Ribbons of nitrogen-fixing arctic dryad (*Dryas octopetala*), shrubby cinquefoil (*Dasiphora fruticosa*) and alpine leguminous species occur on slopes subject to downward movement due to frost heaving. These ribbons or stair-step vegetation patterns form perpendicular to the slope. Plant cover can be low to moderate (15 to 50%) with exposed, stable scree and boulders constituting the remainder of cover. Most fell-field plants are highly adapted to this xeric environment and occur within these ribbons or as singular plants among exposed rocks. These species are typically cushioned, matted or succulent, or grow as flat rosettes, often with thick leaf cuticles or a dense cover of hairs. Crustose and foliose lichen species form significant cover on exposed rocks.

Diagnostic Characteristics

Vegetation cover greater than 15% but generally less than 50%; alpine to treeline elevations, scree and boulder fields, limited soil development, with organic matter restricted to vegetation patches.

Similar Systems

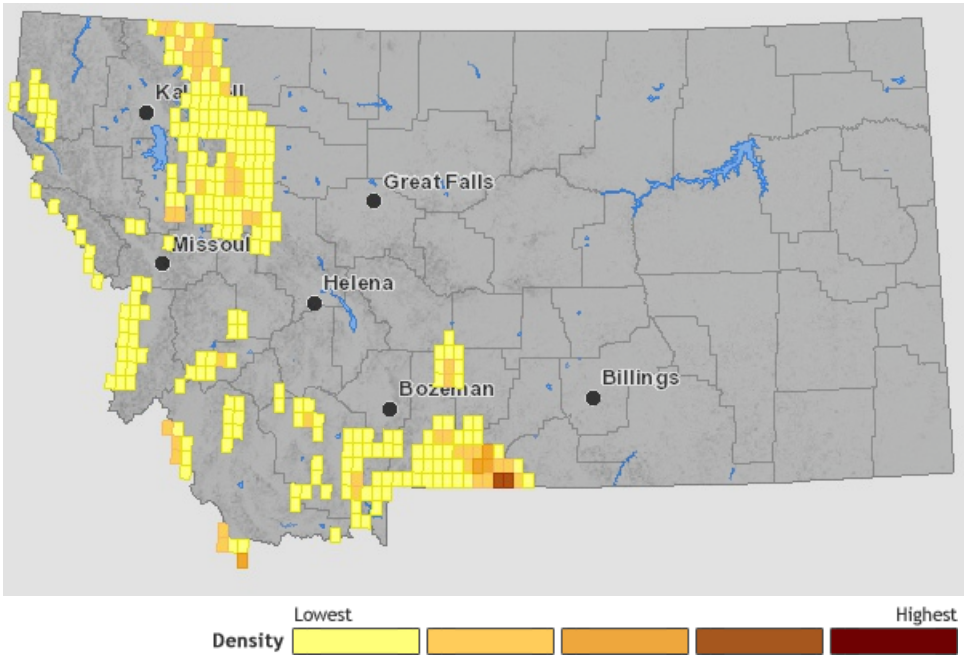
- Alpine Bedrock and Scree
- Alpine Dwarf-Shrubland
- Alpine Turf
- Glacier and Ice Field

Range

In Montana, alpine fell-fields are well represented throughout the Northern Rocky Mountains and island mountain ranges.

Ecological System Distribution

Approximately 480 square kilometers are classified as Alpine Fell-Field in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Carbon, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Large patch

Environment

Elevation ranges from as low as 1,981 meters (6,500 feet) in northwestern Montana to 3,200 meters (10,500 feet) in southwestern Montana. These wind-scoured fell-fields are often free of snow in the winter, occurring on ridgetops and exposed saddles and subjecting the vegetation to severe environmental stress. Soils on these windy, unproductive sites are shallow, stony, low in organic matter, and poorly developed; wind deflation often results in a gravelly pavement. This system is characterized by a very cold climate during winter, high winds, high ultraviolet radiation and high surface temperatures during summer days, and a very short growing season. Exposed, stable scree and isolated boulders constitute at least half of the cover. Soil development is very limited, and derived from a variety of parent materials. It is usually gravelly or rocky, and can be acidic or calcareous. Organic matter is only found in limited quantities within vegetation ribbons and patches of dwarf, woody species.

Vegetation

Ribbons of nitrogen-fixing arctic dryad (*Dryas octopetala*), shrubby cinquefoil (*Dasiphora fruticosa*) and alpine leguminous

species occur on slopes subject to downward movement due to frost heaving. Common alpine legumes include silver lupine (*Lupinus argenteus*), yellow sweetvetch (*Hedysarum sulphurescens*), alpine milkvetch (*Astragaulus alpinus*), Bourgov's milkvetch (*Astragaulus bourgovii*), boreal crazyweed (*Oxtropis borealis*), silky crazyweed (*Oxytropis sericea*), and in southwestern Montana, alpine clover (*Trifolium* species). These ribbons or stair-step vegetation patterns form perpendicular to the slope. Plants accumulate litter within the mats and improve soil fertility, thus facilitating additional species colonization within the mats. Plant cover can be low to moderate (15 to 50%) but plants are is rarely more than 9 centimeters (3.6 inches) high.

Other forbs can occur with the mats, singly or in small patches among the exposed rocks. In northwestern Montana, common forbs include yarrow (*Achillea millefolium*), penstemon (*Penstemon* species), phacelia (*Phacelia* species), alpine fireweed (*Chamerion latifolium)*, moss campion (*Silene acaulis*),twinflower sandwort (*Minuartia obtusiloba*), alpine goldenrod (*Solidago multiradiata*), sky pilot (*Polemonium viscosum*), cut-leaf daisy (*Erigeron compositus*), draba (*Draba* species), arnica (*Arnica alpina*), alpine pussytoes (*Antennaria* species), one-stem fleabane (*Erigeron simplex*), sibbaldia (*Sibbaldia procumbens*), diverse leaf cinquefoil (*Potentilla diversifolia*), moss campion (*Silene acaulis*), lousewort (*Pedicularis* species), elegant death camas (*Zigadenus elegans*), alpine bistort (*Polygonum bistortoides*), rock jasmine buckwheat (*Eriogonum androsaceum*), alpine buckwheat (*Eriogonum ovalifolium*), viviparous bistort (*Polygonum viviparum*), alpine forget-me-not (*Myosotis alpestris*) and Siberian aster (*Symphyotrichum sibiricus*). Many of the cushion species are very long lived, and are often well-adapted to limited available water because of deep, fleshy taproots. These species can persist for decades. Other low, mat forming woody species such as arctic willow (*Salix arctica*), snow willow (*Salix nivalis*), rock willow (*Salix vestita*), and in the island mountain ranges, bearberry (*Arctostaphylos uva-ursi*), are usually present among the exposed rocks. Several northern Rocky Mountain endemic species, species of concern, and potential species of concern inhabit alpine fell-field communities

Cover of sedges, rushes, woodrushes and grasses is usually lower than forb cover, but often includes species such as Dunhead sedge (*Carex phaeocephala*), spike sedge (*Carex nardina*), curly sedge (*Carex ruprestris*), northern single spike sedge (*Carex scirpoidea*), black and white sedge (*Carex albonigra*), spiked woodrush (*Luzula spicata*), Piper's woodrush (*Luzula piperi*), Drummond's rush (*Juncus drummondii*), alpine blue grass (*Poa alpina*), spike trisetum (*Trisetum spicatum*) and slender wheatgrass (*Elymus trachycaulus*). In southwestern Montana fell-field communities, other species such as blackroot sedge (*Carex elynoides*), Parry's rush (*Juncus parryi*), Idaho fescue (*Festuca idahoensis*), spike fescue (*Festuca kingii*) and sheep fescue (*Festuca ovina*) become common (Cooper et al., 1999). Diverse crustose and foliose lichen cover is often high on exposed rocks. Fern allies such as lesser spikemoss (*Selaginella densa*) can be locally abunant in some areas.

Adjacent to this system is a mosaic of alpine plant communities that vary in composition depending on soil development, snow retention, subterranean hydrology and localized topography. Alpine turf and snow bed communities occur on more level or concave sites with greater soil development adjacent to fell-fields. Alpine bedrock, talus and unstable scree fields and ice fields often occur adjacent to this system around mountain summits. Fell-fields are often bordered by subalpine forest krummolz mats and small patches of subalpine forests growing at their upper elevational limit on protected sites. The most common forest association in Montana is whitebark pine-subalpine fir (*Pinus albicaulis-Abies lasiocarpa*). In scattered locations on north and east facing aspects, fell-fields can be bordered by small patches of alpine larch (*Larix lyallii*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3154 *Minuartia obtusiloba - Paronychia pulvinata - Silene acaulis* Alpine Fell-field Alliance
- **CEGL001934** *Silene acaulis* Alpine Fell-field
- **CEGL001965** *Geum rossii / Minuartia obtusiloba* Alpine Fell-field
- **CEGL005863** *Carex albonigra / Myosotis asiatica* Alpine Fell-field

A3155 *Carex elynoides - Carex rupestris - Kobresia myosuroides* Rocky Mountain Alpine Turf Alliance
- **CEGL005872** *Kobresia myosuroides / Euphrasia disjuncta* Alpine Turf

A3172 *Juncus drummondii - Juncus parryi - Sibbaldia procumbens* Rocky Mountain Alpine Snowbed Alliance
- **CEGL005855** *Arenaria capillaris - Polytrichum piliferum* Alpine Snowbed
- **CEGL005865** *Carex paysonis / Sibbaldia procumbens* Alpine Snowbed

A3175 *Ribes cereum - Ribes montigenum - Dasiphora fruticosa ssp. Floribunda* Alpine Shrubland Alliance
- **CEGL005833** *Dasiphora fruticosa ssp. floribunda - Artemisia michauxiana* Alpine Shrub Meadow

A3832 *Carex nigricans - Sibbaldia procumbens - Trollius laxus* Wet Meadow Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Historically, stand-replacing fires occurred infrequently in adjacent associated upper elevation subalpine woodlands (Arno 1980). Lightning strikes can cause fire within fell-fields, although severity and spread is usually variable. Major disturbances can include fire, high elevation mining, heavy recreational use, and grazing. Changing climatic patterns will impact this system and the distribution of peripheral species, northern Rocky Mountain endemics and rare species that occur within it.

Management

This system is fragile due to its extremely limited growing season and soil development. Species in these systems are generally slow growing and decrease in cover and vigor in areas of trampling or grazing.

Restoration Considerations

Generally, grazing and human disturbances are very limited in this system due to inaccessibility or low forage cover.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Grizzly Bear *(Ursus arctos)* SOC	Fisher *(Pekania pennanti)* SOC
Wolverine *(Gulo gulo)* SOC	Dwarf Shrew *(Sorex nanus)* PSOC
Hoary Marmot *(Marmota caligata)* PSOC	North American Water Vole *(Microtus richardsoni)* PSOC
Western Water Shrew *(Sorex navigator)*	American Pika *(Ochotona princeps)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Western Heather Vole *(Phenacomys intermedius)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*	Red Fox *(Vulpes vulpes)*

Marten *(Martes americana)*
American Ermine *(Mustela richardsonii)*
Mountain Goat *(Oreamnos americanus)*
Bighorn Sheep *(Ovis canadensis)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC
White-tailed Ptarmigan *(Lagopus leucura)* SOC
Black Rosy-Finch *(Leucosticte atrata)* SOC
Gray-crowned Rosy-Finch *(Leucosticte tephrocotis)* SOC
Peregrine Falcon *(Falco peregrinus)*
Prairie Falcon *(Falco mexicanus)*
Ruffed Grouse *(Bonasa umbellus)*
Great Horned Owl *(Bubo virginianus)*
Horned Lark *(Eremophila alpestris)*
Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
American Pipit *(Anthus rubescens)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Snow Bunting *(Plectrophenax nivalis)*

Invertebrates

Melissa Arctic *(Oeneis melissa)* PSOC
Magdalena Alpine *(Erebia magdalena)*

Vascular Plants

Dense-leaved Pussytoes *(Antennaria densifolia)* SOC
Parry's Mountain Rabbitbrush *(Ericameria parryi var. montana)* SOC
Idaho Fleabane *(Erigeron asperugineus)* SOC
Evermann Fleabane *(Erigeron evermannii)* SOC
Smooth Fleabane *(Erigeron leiomerus)* SOC
Lackschewitz' Fleabane *(Erigeron lackschewitzii)* SOC
Weber's Saw-wort *(Saussurea weberi)* SOC
Dwarf Saw-wort *(Saussurea nuda)* SOC
Clasping Groundsel *(Senecio amplectens)* SOC
Elmer's Ragwort *(Senecio elmeri)* SOC
Cushion Townsend-daisy *(Townsendia condensata)* SOC
Low Braya *(Braya humilis)* SOC
Cliff Toothwort *(Cardamine rupicola)* SOC
White Arctic Draba *(Draba fladnizensis)* SOC
Porsild's Draba *(Draba porsildii)* SOC
Round-fruited Draba *(Draba globosa)* SOC
Bitterroot Bladderpod *(Physaria humilis)* SOC
Beautiful Bladderpod *(Physaria pulchella)* SOC
Rocky Mountain Twinpod *(Physaria saximontana var. dentata)* SOC
Lackschewitz' Milkvetch *(Astragalus lackschewitzii)* SOC
Nodding Locoweed *(Oxytropis deflexa var. foliolosa)* SOC
Parry's Locoweed *(Oxytropis parryi)* SOC
Stalked-pod Locoweed *(Oxytropis podocarpa)* SOC
Alpine Glacier Poppy *(Papaver pygmaeum)* SOC
Alpine Poppy *(Papaver radicatum ssp. kluanensis)* SOC
Entire-leaved Avens *(Dryas integrifolia)* SOC
Short-leaved Cinquefoil *(Potentilla brevifolia)* SOC
Five-leaf Cinquefoil *(Potentilla nivea var. pentaphylla)* SOC
Storm Saxifrage *(Micranthes tempestiva)* SOC
Tiny Swamp Saxifrage *(Micranthes apetala)* SOC
Snow Indian Paintbrush *(Castilleja nivea)* SOC
Arctic Eyebright *(Euphrasia subarctica)* SOC
Mountain Lousewort *(Pedicularis pulchella)* SOC
Yellow Beardtongue *(Penstemon flavescens)* SOC
Mission Mountain kittentails *(Synthyris canbyi)* SOC
Kruckeberg's Swordfern *(Polystichum kruckebergii)* SOC
Pygmy Goldenweed *(Tonestus pygmaeus)* PSOC
Large-flower Fleabane *(Erigeron grandiflorus)*
One-flowered Cinquefoil *(Potentilla uniflora)*

Native Species Occasionally Associated with this Ecological System

Mammals

Uinta Chipmunk *(Neotamias umbrinus)* PSOC
Gray Wolf *(Canis lupus)*
Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*

Birds

Spruce Grouse *(Canachites canadensis)*
White-throated Swift *(Aeronautes saxatalis)*
Violet-green Swallow *(Tachycineta thalassina)*
American Crow *(Corvus brachyrhynchos)*
American Robin *(Turdus migratorius)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Invertebrates

White-veined Arctic *(Oeneis bore)* PSOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28647

System Code	CES306.811, Rocky Mountain Alpine Fell-Field

ReGAP:
7116: Rocky Mountain Alpine Fell-Field

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.

Cooper, S.V., C. Jean, and B.L. Heidel. 1999. Plant associations and related botanical inventory of the Beaverhead Mountains Section, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena. 235 pp.

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Glacier and Ice Field



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Provisional State Rank: S2
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State Rank Reason

In Montana, climate change, especially during the past 50 years, has resulted in rapid shrinking or elimination of more than half the glaciers in Glacier National Park. At current rates of change, the remaining glaciers are expected to be gone by 2030 or sooner.

General Description

This once-widespread ecological system is composed of unvegetated landscapes of annual/perennial ice and snow at the highest elevations, where snowfall accumulation exceeds melting. The primary ecological processes include snow/ice retention, wind desiccation, and permafrost. Typically, the snowpack/ice field melts for only a few weeks during the growing season. The barren rock and rubble within the glaciers and areas of recent glacial retreat (50 years or less) is part of this system. In Montana, alpine ice-fields are well represented throughout the Northern Rocky Mountains and island mountain ranges. This system is characterized by a very cold climate, high winds and heavy snow accumulation during winter, and a growing season of 60 days or less. Plant cover is low (less than 10%) to non-existent, with exposed, unstable scree, boulders and bedrock constituting the remainder of cover. When vascular plants exist at all, they occur as singular plants among the exposed rocks or in bedrock fractures. These species are typically cushioned, matted or succulent, or grow as flat rosettes, often with thick leaf cuticles or a dense cover of hairs. Algal blooms, insects, and birds or mammals that forage on the insects are generally the only biota. In Montana, climate change, especially during the past 50 years, has resulted in rapid shrinking and elimination of many of the remaining glaciers and most of the permanent snow fields within this system.

Diagnostic Characteristics

Ice fields; glaciers; perennial ice and snow; less than 10% vascular cover.

Similar Systems

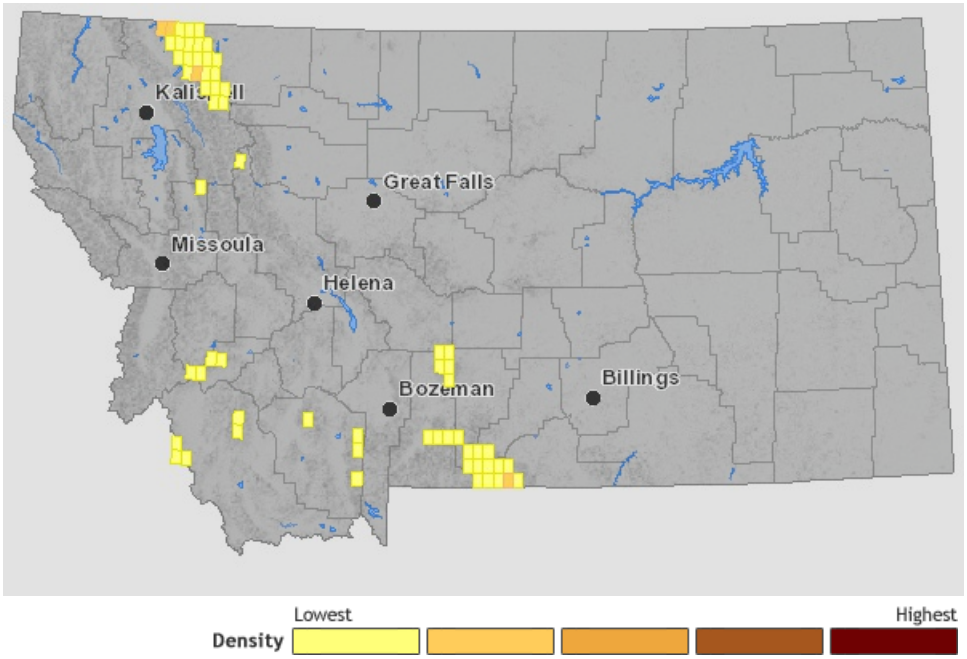
- Alpine Bedrock and Scree
- Alpine Fell-Field

Range

True alpine ice fields occur only in the Northern Rocky Mountains and portions of the Beartooth-Absaroka range. Late-persisting snowfields in the mountains of southwest Montana are more properly classified as Rocky Mountain Alpine Bedrock and Scree or Rocky Mountain Alpine Fell-Field systems, depending on the extent of their vascular plant cover.

Ecological System Distribution

Approximately 41 square kilometers are classified as Glacier and Ice Field in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Carbon, Deer Lodge, Flathead, Glacier, Granite, Lewis and Clark, Madison, Missoula, Park, Ravalli, Stillwater, Sweet Grass

Spatial Pattern

Large patch

Environment

In Montana, this system is well-represented on the higher mountain summits and associated glacial fields and basins below the summits in Glacier National Park. Permanent snowfields are usually found in protected basins and on north and east facing aspects in the Beartooth-Absarokas. Organic matter is usually only found in limited quantities in pockets among boulders, in fractures of exposed bedrock or on the windward leeside of bedrock slabs. This system is characterized by a very cold climate, heavy snow accumulation during winter, high winds, and a growing season of 60 days or less.

Vegetation

Generally, there is little to no vascular plant cover within this system and usually less than 10% cover. Plants colonize in pockets in the fractures of the bedrock or in protected pockets within steep chutes below the summits. Lichen cover is variable, but can be high in some areas. Bedrock that has recently been exposed due to recent glacial retreat is barren.

Dynamic Processes

Glacier and alpine ice fields form when rates of snow accumulation exceed rates of melting. When climate cools and/or snowfall increases dramatically, as it did during the Little Ice Age of 1500-1850, icefields expand and advance. Conversely, when snowmelt exceeds snow accumulation because of warmer and/or drier conditions, ice fields retreat from their terminus and become thinner.

Management

Although off-trail travel and climbing can affect nearby ecological systems, permanent ice fields are generally unaffected by recreation. No special management activities are necessary.

Restoration Considerations

Once lost, alpine ice fields can only be restored by dramatic climate cooling and/or increased snowfalls.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
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Native Species Commonly Associated with this Ecological System

Mammals

Wolverine *(Gulo gulo)* SOC

Mountain Goat *(Oreamnos americanus)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC

White-tailed Ptarmigan *(Lagopus leucura)* SOC

Black Rosy-Finch *(Leucosticte atrata)* SOC

Gray-crowned Rosy-Finch *(Leucosticte tephrocotis)* SOC

Common Raven *(Corvus corax)*

Invertebrates

Meltwater Lednian Stonefly *(Lednia tumana)* SOC

Western Glacier Stonefly *(Zapada glacier)* SOC

Original Concept Authors

NatureServe Western Ecology Team, mod. M.S. Reid

Montana Version Authors

L.K. Vance, T.A. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28570
System Code	CES100.728, North American Glacier and Ice Field

ReGAP:
3130: North American Glacier and Ice Field

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- Coulling, P. P., and T. J. Rawinski. 1999. Classification of vegetation and ecological land units of the Piney River and Mt. Pleasant area, Pedlar Ranger District, George Washington and Jefferson National Forests, Virginia. Natural Heritage Technical Report 99-03, Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond.
- Hall, M. H. P., and D. B. Fagre. 2003. Modeled climate-induced glacier change in Glacier National Park, 1850-2100. BioScience 53:131-140.
- Meidinger, D., and J. Pojar (eds). 1991. Ecosystems of British Columbia. British Columbia Ministry of Forests Special Report Series No. 6. 342 p.

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Alpine Bedrock and Scree

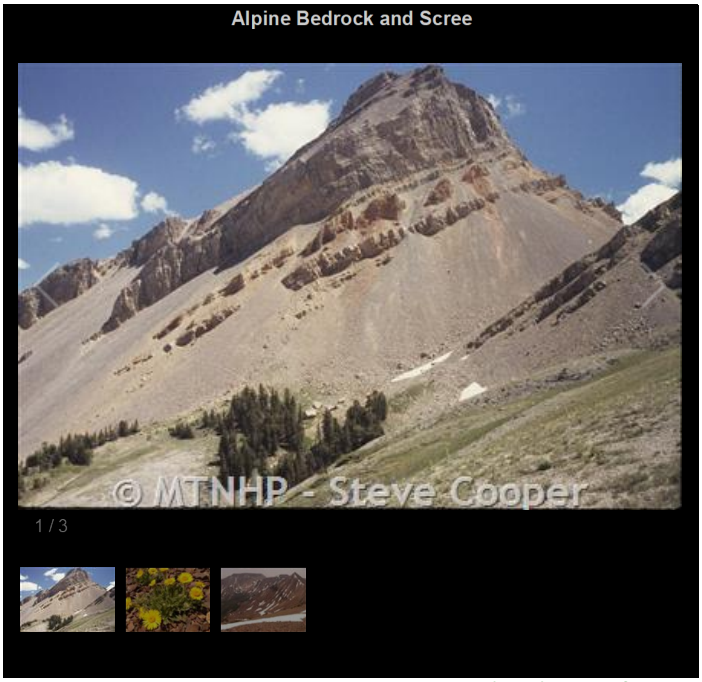


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General Description

This ecological system is restricted to the highest elevations of the Rocky Mountains, from Alberta and British Columbia south into New Mexico, and west into the highest mountain ranges of the Great Basin. It is composed of barren and sparsely vegetated alpine substrates, typically including both bedrock outcrop and scree slopes, with lichen- dominated communities. In Montana, alpine bedrock and scree are well represented throughout the northern Rocky Mountains and island mountain ranges. Elevations range from as low as 2,285 meters (7,500 feet) in northwestern Montana to 3,500 meters (11,500 feet) in southern Montana. Exposure to desiccating winds, rocky and sometimes unstable substrates, and a short growing season limit plant growth. Typically, there is sparse (less than 10%) cover of forbs, grasses, and low shrubs, with exposed, unstable scree, talus and bedrock constituting the remainder of cover. Diverse crustose and foliose lichen cover is high (often greater than 50%) on exposed talus and bedrock Soils on these windy, unproductive sites are very poorly developed, often only occurring in fractures of bedrock. This system is characterized by a very cold climate during winter, high winds, high UV radiation and high surface daytime temperatures during summer months on south and west facing aspects, and a very short growing season. Most scree- and bedrock-inhabiting plants are highly adapted to this xeric environment and occur as singular plants among the exposed rocks or in bedrock fractures. These species are typically cushioned, matted or succulent, or grow as flat rosettes, often with thick leaf cuticles or a dense cover of hairs. This system often occurs adjacent to or immediately below North American Alpine Ice Fields and intermingles with Rocky Mountain Alpine Fell Fields.

Diagnostic Characteristics

Alpine; talus and scree; rock outcrops; alpine slopes; shallow soils; less than 10% vascular cover.

Similar Systems

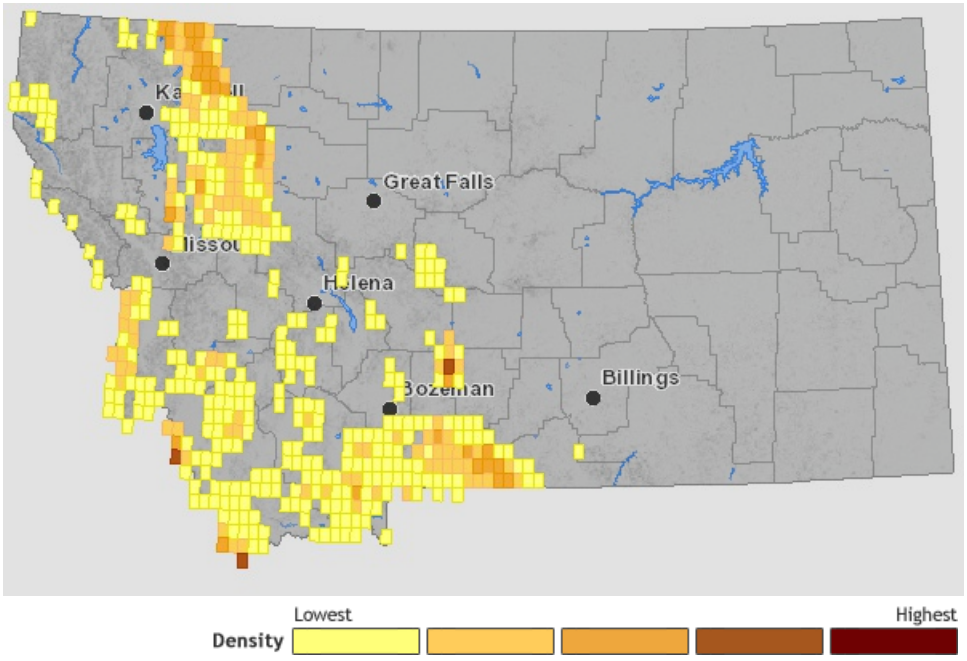
- Alpine Fell-Field
- Glacier and Ice Field

Range

This system occurs on mountain summits and the steep slopes immediately below summits throughout the Rocky Mountains and island mountain ranges of central and southern Montana. Elevation ranges from as low as 2285 meters (7,500 feet) in northwestern Montana to 3,505 meters (10,500 feet) in southern Montana.

Ecological System Distribution

Approximately 1,440 square kilometers are classified as Alpine Bedrock and Scree in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Large patch

Environment

These steep, wind-scoured, loose talus and scree fields and exposed bedrock are often blown free of snow during winter, exposing plants to severe environmental stress. Soil development is very limited, and soils are usually gravelly and rocky. Soils are derived from a variety of parent materials, and can be acidic or calcareous. Organic matter is typically only found in very limited quantities in pockets among boulders, or in fractures or the leeside of the bedrock slabs. This system is characterized by a very cold climate and high winds during winter, and by high winds, high UV radiation and high surface daytime temperatures during summer months, especially on south and west facing aspects. Unstable scree and talus, isolated boulder pockets and exposed bedrock constitute at least half of the cover.

Vegetation

Plant cover is usually less than 10% with exposed, unstable scree, talus and bedrock constituting the remainder of cover. Most scree and bedrock inhabiting plants are highly adapted to this xeric environment and occur as singular plants among the exposed rocks or in bedrock fractures. These species are typically cushioned, matted or succulent, or grow as flat rosettes, often with thick leaf cuticles or a dense cover of hairs. Diverse crustose and foliose lichen cover is high (often greater than 50%) on exposed talus and bedrock. Common lichen genera include *Rhizocarpon*, *Xanthoria*, *Lecidea*, and *Umbilicaria* species. Mosses are typically found in bedrock fractures and the leeside of bedrock slabs and chutes below the summits, especially on the north and east facing aspects.

Forbs occur singly or in small patches among the exposed talus and scree and in fractures of the bedrock or the leeside of bedrock where organic matter has accumulated. In northwestern Montana, common forbs include yarrow (*Achillea millefolium*), elliptic leaf penstemon (*Penstemon ellipticus*), phacelia (*Phacelia* species), alpine sky pilot (*Polemonium viscosum*), alpine spring beauty (*Claytonia megarhiza*), alpine sandwort (*Minuartia species*), cut-leaf daisy (*Erigeron compositus*), draba (*Draba* spp.), boreal crazyweed (*Oxtropis borealis*), silky crazyweed (*Oxytropis sericea*), wooly groundsel (*Senecio canus*), alpine arnica (*Arnica alpina*), moss campion (*Silene acaulis*), spotted saxifrage (*Saxifraga bronchialis*), alpine buckwheat (*Eriogonum ovalifolium*), alpine forget-me-not (*Myosotis alpestris*) and Siberian aster (*Symphyotrichum sibiricus*). Woody species such as arctic dryad (*Dryas octopetala*), shrubby cinquefoil (*Dasiphora fruticosa*) and rock willow (*Salix vestita*) occur in bedrock fractures or the lee side of bedrock and boulders. Saxifrages and ferns also occur in these protected microsites.

Several northern Rocky Mountain endemic species, Montana species of concern, and potential species of concern inhabit this system. In Montana, some arctic species reach their southernmost range limit within this system, while some middle and southern Rocky Mountain species reach their northernmost range limit, particularly in southwestern ranges of the state.

Graminoid cover is usually very low and often occurs within patches and mats of forbs or woody species. In northwest Montana, common species include Dunhead sedge (*Carex phaeocephala*), spike sedge (*Carex nardina)*, curly sedge (*Carex ruprestris*), single spike sedge (*Carex scirpoidea)*, black and white sedge (Carex albonigra), spiked woodrush (*Luzula spicata*), Drummond's rush (*Juncus drummondii*), alpine blue grass (*Poa alpina*), spike trisetum (*Trisetum spicatum*) and slender wheatgrass (*Elymus trachycaulus*). In southwestern Montana, other species are common, such as blackroot sedge (*Carex elynoides*), Parry's rush (*Juncus parryi*), Idaho fescue (*Festuca idahoenisis*), spike fescue (*Festuca kingii*), and sheep fescue (*Festuca ovina*) (Cooper et al. 1999).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3155 *Carex elynoides - Carex rupestris - Kobresia myosuroides* Rocky Mountain Alpine Turf Alliance
A3741 *Aquilegia flavescens - Phacelia hastata* Cliff, Scree & Rock Alliance
  CEGL005899 *Aquilegia flavescens / Senecio megacephalus* Sparse Vegetation
  CEGL005901 *Phacelia hastata / (Penstemon ellipticus)* Sparse Vegetation
A4021 Rocky Mountain Alpine Sparse Herb Bedrock & Scree Alliance
  CEGL005900 *Athyrium americanum / Cryptogramma acrostichoides* Alpine Sparse Vegetation
  CEGL005902 *Saxifraga bronchialis* Scree Slope Alpine Sparse Vegetation
  CEGL005903 *Saxifraga mertensiana* Alpine Cliff Crevice
A4022 Rocky Mountain Alpine Nonvascular Bedrock & Scree Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Historically, stand-replacing fires occurred infrequently in adjacent associated upper elevation subalpine woodlands (Arno, 1980). Lightning strikes can cause fire within these systems, although severity and spread is usually very limited. Changing climatic patterns will impact this system and the range of the peripheral species, northern Rocky Mountain endemics and rare species occurring within it.

Management

This system is fragile due to extreme limited growing season and soil development, but occurs on sites accessable only by off-trail travel and climbing.

Restoration Considerations

Generally, human disturbances are very limited in this system due to inaccessibility.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with

the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Grizzly Bear *(Ursus arctos)* SOC	Wolverine *(Gulo gulo)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC	Hoary Marmot *(Marmota caligata)* PSOC
North American Water Vole *(Microtus richardsoni)* PSOC	American Pika *(Ochotona princeps)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Marten *(Martes americana)*
Mountain Goat *(Oreamnos americanus)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	White-tailed Ptarmigan *(Lagopus leucura)* SOC
Black Swift *(Cypseloides niger)* SOC	Black Rosy-Finch *(Leucosticte atrata)* SOC
Gray-crowned Rosy-Finch *(Leucosticte tephrocotis)* SOC	Peregrine Falcon *(Falco peregrinus)*
Prairie Falcon *(Falco mexicanus)*	White-throated Swift *(Aeronautes saxatalis)*
Common Raven *(Corvus corax)*	American Pipit *(Anthus rubescens)*

Invertebrates

Melissa Arctic *(Oeneis melissa)* PSOC

Vascular Plants

Dense-leaved Pussytoes *(Antennaria densifolia)* SOC	Idaho Fleabane *(Erigeron asperugineus)* SOC
Evermann Fleabane *(Erigeron evermannii)* SOC	Fan-leaved Fleabane *(Erigeron flabellifolius)* SOC
Smooth Fleabane *(Erigeron leiomerus)* SOC	Lackschewitz' Fleabane *(Erigeron lackschewitzii)* SOC
Dwarf Saw-wort *(Saussurea nuda)* SOC	Clasping Groundsel *(Senecio amplectens)* SOC
Elmer's Ragwort *(Senecio elmeri)* SOC	Cushion Townsend-daisy *(Townsendia condensata)* SOC
Cliff Toothwort *(Cardamine rupicola)* SOC	Thick-leaf Whitlow-grass *(Draba crassa)* SOC
Dense-leaf Draba *(Draba densifolia)* SOC	White Arctic Draba *(Draba fladnizensis)* SOC
Macoun's Draba *(Draba macounii)* SOC	Porsild's Draba *(Draba porsildii)* SOC
Wind River Draba *(Draba ventosa)* SOC	Bitterroot Draba *(Draba daviesiae)* SOC
Round-fruited Draba *(Draba globosa)* SOC	Rocky Mountain Twinpod *(Physaria saximontana var. dentata)* SOC
Arctic Pearlwort *(Sagina nivalis)* SOC	Lackschewitz' Milkvetch *(Astragalus lackschewitzii)* SOC
Stalked-pod Locoweed *(Oxytropis podocarpa)* SOC	Alpine Glacier Poppy *(Papaver pygmaeum)* SOC
Alpine Poppy *(Papaver radicatum ssp. kluanensis)* SOC	Island Koenigia *(Koenigia islandica)* SOC
Short-leaved Cinquefoil *(Potentilla brevifolia)* SOC	Five-leaf Cinquefoil *(Potentilla nivea var. pentaphylla)* SOC
Cascade Willow *(Salix cascadensis)* SOC	Selway Coil-beaked Lousewort *(Pedicularis contorta var. rubicunda)* SOC

Mountain Lousewort *(Pedicularis pulchella)* SOC
Mission Mountain kittentails *(Synthyris canbyi)* SOC
Mountain Bladder Fern *(Cystopteris montana)* PSOC
One-flowered Cinquefoil *(Potentilla uniflora)*
Yellow Beardtongue *(Penstemon flavescens)* SOC
Kruckeberg's Swordfern *(Polystichum kruckebergii)* SOC
Large-flower Fleabane *(Erigeron grandiflorus)*

Native Species Occasionally Associated with this Ecological System

Mammals

Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Gray Wolf *(Canis lupus)*
Elk *(Cervus canadensis)*
Masked Shrew *(Sorex cinereus)*
Mountain Lion *(Puma concolor)*

Birds

American Crow *(Corvus brachyrhynchos)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*

Invertebrates

White-veined Arctic *(Oeneis bore)* PSOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28645
System Code	CES306.809, Rocky Mountain Alpine Bedrock and Scree

ReGAP:
3135: Rocky Mountain Alpine Bedrock and Scree

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Arno, S. F. 1980. Forest fire history in the northern Rockies. Journal of Forestry 78(8):460-465.
- Cooper, S.V., C. Jean, and B.L. Heidel. 1999. Plant associations and related botanical inventory of the Beaverhead Mountains Section, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena. 235 pp.

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Citation for data on this website:
Alpine Bedrock and Scree — Rocky Mountain Alpine Bedrock and Scree. Montana Field Guide. Montana Natural Heritage Program
Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=3135

Great Plains Shrubland



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Provisional State Rank: S4
(see reason below)

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State Rank Reason

Overgrazing and oil/gas development are the largest primary threats to this ecosystem; invasive species are secondary and largely accompany the primary threats.

General Description

This ecological system is found from southern Alberta through northern Montana's glaciated and unglaciated plains, typically at elevations ranging from 1,220 to 1,524 meters (4,000-5,000 feet). It can occur on all aspects but is more common on mesic sites with moderately shallow or deep, fine to sandy loam soils. Often it is located on slopes near breaklands and on the edge of coulees, or on upper terraces of rivers and streams. It differs from the Northwestern Great Plains Mixedgrass Prairie in that shrub cover is more than 10%, although the grass component is similar, and may occur where fire suppression in grasslands has allowed shrubs to establish. Dominant shrubs include serviceberry (*Amelanchier alnifolia*), skunkbush sumac (*Rhus trilobata*) snowberry (*Symphoricarpos* species), silver buffaloberry (*Sheperdia argentea*), shrubby cinquefoil (*Dasiphora fruticosa ssp. floribunda*), silverberry (*Elaeagnus commutata*) and horizontal rug juniper (*Juniperus horizontalis*). Silver sage (*Artemisia cana ssp. cana*) shrublands may occur on flat alluvial deposits on floodplains, terraces or benches, and alluvial fans.

Diagnostic Characteristics

Shrubland, ustic soils, temperate

Similar Systems

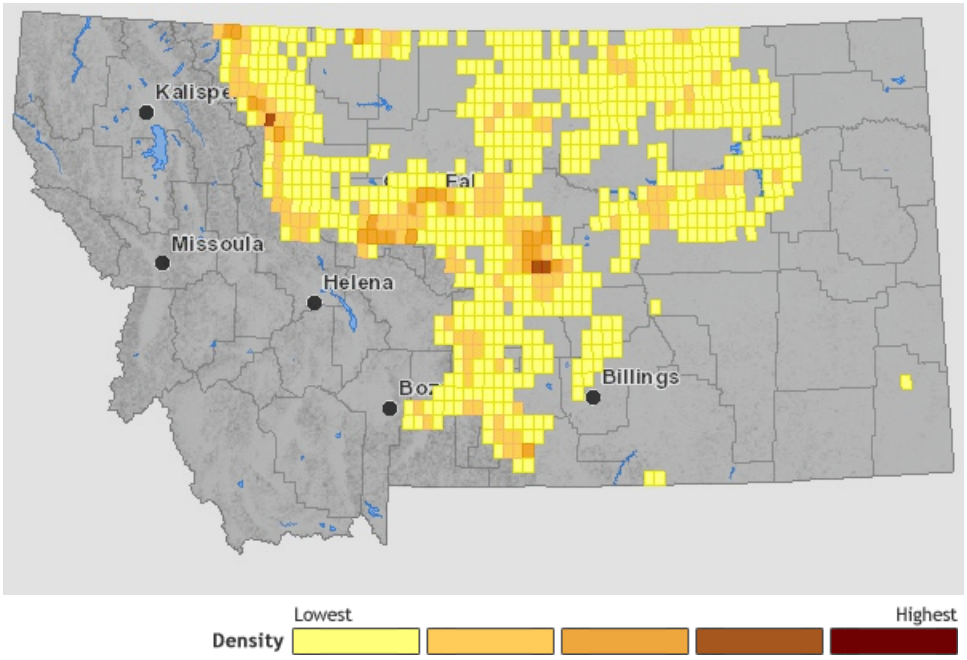
- Great Plains Mixedgrass Prairie

Range

This system extends from South Dakota into the prairie provinces of southern Canada, and west into Montana's glaciated and unglaciated plains, typically at elevations ranging from 1,220 to 1,524 meters (4,000-5,000 feet).

Ecological System Distribution

Approximately 1,663 square kilometers are classified as Great Plains Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Fergus, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Meagher, Musselshell, Park, Petroleum, Phillips, Pondera, Rosebud, Stillwater, Sweet Grass, Teton, Toole, Valley, Wheatland, Yellowstone

Spatial Pattern

Large patch

Environment

In Montana, this ecosystem forms within the northwestern Great Plains fescue (*Festuca* spp.) dominated prairie east of the Continental Divide into the western wheatgrass (*Pascopyrum smithii*) mixed grass prairie in the north-central Great Plains. Climate is semi-arid, and the growing season is short. It can occur on all aspects but is more common on mesic sites with moderately shallow or deep, fine to sandy loam soils. Often it is located on slopes near breaklands and on the edge of coulees, or on upper terraces of rivers and streams. Soils can be moderately shallow to deep, fine to sandy loam soils.

Vegetation

This system differs from Great Plains Mixed Grass Prairie in that natural shrub cover is greater than 10%, and in some cases may be greater than 50%. It is typically dominated by shrub and dwarf-shrub species such as serviceberry, skunkbush sumac, snowberry, shrubby cinquefoil, silverberry, and horizontal juniper. Silver sage shrublands may occur on flat alluvial deposits on floodplains, terraces or benches, and alluvial fans. Silver buffaloberry or western snowberry shrublands can also be found along stream terraces, rolling uplands, and badlands, or where moisture is more plentiful than on the surrounding landscape, such as in swales, ravines, near streams, and on northwest- to east-facing slopes. Common graminoids include threadleaf sedge (*Carex filifolia*), Idaho fescue (*Festuca idahoensis*), rough fescue (*Festuca campestris*), western wheatgrass, Kentucky bluegrass (*Poa pratensis*), prairie junegrass (*Koeleria macrantha*), blue grama (*Bouteloua gracilis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*). Kentucky bluegrass (*Poa pratensis*) and common timothy (*Phleum pratense*) are common introduced grasses in the northwestern part of the system's range. Common forbs include yarrow (*Achillea millefolium*), Indian blanket flower (*Gaillarida aristata*), prairiesmoke (*Geum triflorum*), sweetvetch (*Hedysarum* species), Pennsylvania pellitory (*Parietaria pensylvanica*), lupine (*Lupinus species*), scarlet guara (*Gaura coccinea*), scarlet globe-mallow (*Sphaeralcea coccinea*), cinquefoil (*Potentilla* species),and goldenrod (*Solidago* species).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0918 *Elaeagnus commutata* Wet Shrubland Alliance
- **CEGL001099** *Elaeagnus commutata - Pascopyrum smithii* Wet Shrubland

A1046 *Sarcobatus vermiculatus* Intermountain Wet Shrubland Alliance
- **CEGL001359** *Sarcobatus vermiculatus - Artemisia tridentata* Wet Shrubland

A1201 *Calamovilfa longifolia* Sand Prairie Alliance
- **CEGL001457** *Rhus trilobata / Calamovilfa longifolia* Shrub Grassland

A1537 *Rhus trilobata / Schizachyrium scoparium - Carex filifolia* Shrub Grassland Alliance
- **CEGL001504** *Rhus trilobata - Carex filifolia* Shrub Grassland
- **CEGL001506** *Rhus trilobata - Schizachyrium scoparium* Shrub Grassland

A3963 *Amelanchier alnifolia* Central Rocky Mountain Montane-Foothill Shrubland Alliance
- **CEGL001065** *Amelanchier alnifolia - Pseudoroegneria spicata* / Bunchgrass Shrubland

A3964 *Rhus glabra - Rhus trilobata* Central Rocky Mountain Montane-Foothill Shrubland Alliance
- **CEGL001120** *Rhus trilobata - Pseudoroegneria spicata* Shrub Grassland
- **CEGL001505** *Rhus trilobata - Festuca idahoensis* Shrub Grassland

A4035 *Juniperus horizontalis - Dasiphora fruticosa ssp. floribunda / Schizachyrium scoparium* Shrubland Alliance
- **CEGL001394** *Juniperus horizontalis - Schizachyrium scoparium* Dwarf-shrubland

A4036 *Prunus virginiana - Symphoricarpos occidentalis - Amelanchier alnifolia* Great Plains Shrubland Alliance

A4096 *Dasiphora fruticosa ssp. floribunda / Festuca campestris - Festuca idahoensis* Shrub-steppe Alliance
- **CEGL001502** *Dasiphora fruticosa ssp. floribunda - Festuca idahoensis* Shrub Grassland
- **CEGL001503** *Dasiphora fruticosa ssp. floribunda - Festuca campestris* Shrub Grassland

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Dynamic Processes

Fire and grazing constitute the primary dynamics affecting this system, although drought has also been an impact in the past decade. All shrub species regenerate well following low to moderate intensity fires by re-sprouting from the root systems. In areas where this system occurs in patches within a mixed grass prairie matrix, heavy grazing impacts can limit productivity of associated graminoids and forbs, leading to the increasing spread of introduced grasses and invasive forbs.

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system.

Restoration Considerations

Restoration strategies will depend largely on the severity of impacts. Many shrub species occurring within this system resprout following disturbance, including fire. Because lightly to moderately burned or grazed areas recover quickly, reseeding and replanting is usually not necessary.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
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landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

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- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Western Pygmy Shrew *(Sorex eximius)* SOC
Merriam's Shrew *(Sorex merriami)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Masked Shrew *(Sorex cinereus)*	Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Desert Cottontail *(Sylvilagus audubonii)*
White-tailed Jackrabbit *(Lepus townsendii)*	Least Chipmunk *(Neotamias minimus)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*	Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Northern Pocket Gopher *(Thomomys talpoides)*	Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Western Harvest Mouse *(Reithrodontomys megalotis)*	North American Deermouse *(Peromyscus maniculatus)*
White-footed Deermouse *(Peromyscus leucopus)*	Northern Grasshopper Mouse *(Onychomys leucogaster)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC	Loggerhead Shrike *(Lanius ludovicianus)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC	Baird's Sparrow *(Centronyx bairdii)* SOC
Short-eared Owl *(Asio flammeus)* PSOC	Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Turkey Vulture *(Cathartes aura)*	Northern Harrier *(Circus hudsonius)*
Swainson's Hawk *(Buteo swainsoni)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Gyrfalcon *(Falco rusticolus)*
Prairie Falcon *(Falco mexicanus)*	Killdeer *(Charadrius vociferus)*
Upland Sandpiper *(Bartramia longicauda)*	Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*	Snowy Owl *(Bubo scandiacus)*
Common Nighthawk *(Chordeiles minor)*	Downy Woodpecker *(Dryobates pubescens)*
Least Flycatcher *(Empidonax minimus)*	Say's Phoebe *(Sayornis saya)*
Western Kingbird *(Tyrannus verticalis)*	Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*	Tree Swallow *(Tachycineta bicolor)*
Violet-green Swallow *(Tachycineta thalassina)*	Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*	Blue Jay *(Cyanocitta cristata)*
Black-billed Magpie *(Pica hudsonia)*	Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*	Black-capped Chickadee *(Poecile atricapillus)*

Rock Wren *(Salpinctes obsoletus)*
Mountain Bluebird *(Sialia currucoides)*
Gray Catbird *(Dumetella carolinensis)*
Brown Thrasher *(Toxostoma rufum)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Magnolia Warbler *(Setophaga magnolia)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Lapland Longspur *(Calcarius lapponicus)*
Western Meadowlark *(Sturnella neglecta)*
Common Grackle *(Quiscalus quiscula)*
Baltimore Oriole *(Icterus galbula)*
House Finch *(Haemorhous mexicanus)*
Northern House Wren *(Troglodytes aedon)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Yellow Warbler *(Setophaga petechia)*
Common Yellowthroat *(Geothlypis trichas)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Bunting *(Calamospiza melanocorys)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Bullock's Oriole *(Icterus bullockii)*
American Goldfinch *(Spinus tristis)*

Reptiles

North American Racer *(Coluber constrictor)*
Plains Gartersnake *(Thamnophis radix)*
Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Common Wood-Nymph *(Cercyonis pegala)*

Vascular Plants

Nuttall Desert-parsley *(Lomatium nuttallii)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Fringed Myotis *(Myotis thysanodes)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC
Yellow-pine Chipmunk *(Neotamias amoenus)*
Long-legged Myotis *(Myotis volans)* SOC
Swift Fox *(Vulpes velox)* SOC
Western Water Shrew *(Sorex navigator)*
Northern River Otter *(Lontra canadensis)*

Birds

Long-billed Curlew *(Numenius americanus)* SOC
White-throated Swift *(Aeronautes saxatalis)*
Warbling Vireo *(Vireo gilvus)*
Yellow-rumped Warbler *(Setophaga coronata)*
Chipping Sparrow *(Spizella passerina)*
Song Sparrow *(Melospiza melodia)*
Ovenbird *(Seiurus aurocapilla)* PSOC
Bank Swallow *(Riparia riparia)*
Orange-crowned Warbler *(Leiothlypis celata)*
American Redstart *(Setophaga ruticilla)*
Field Sparrow *(Spizella pusilla)*
Red-winged Blackbird *(Agelaius phoeniceus)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Common Gartersnake *(Thamnophis sirtalis)*
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Plains Spadefoot *(Spea bombifrons)*
Woodhouse's Toad *(Anaxyrus woodhousii)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28520

System Code	CES303.662, Northwestern Great Plains Shrubland

National Land Cover Dataset:
52: Scrub/Shrub

ReGAP:
5262: Northwestern Great Plains Shrubland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Erickson, Albert W., and D. B. Siniff. 1963. *A statistical evaluation of factors influencing aerial survey results on brown bears*. Anchorage, Alaska: Alaska Department of Fish and Game.
- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

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Citation for data on this website:
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Rocky Mountain Lower Montane-Foothill Shrubland

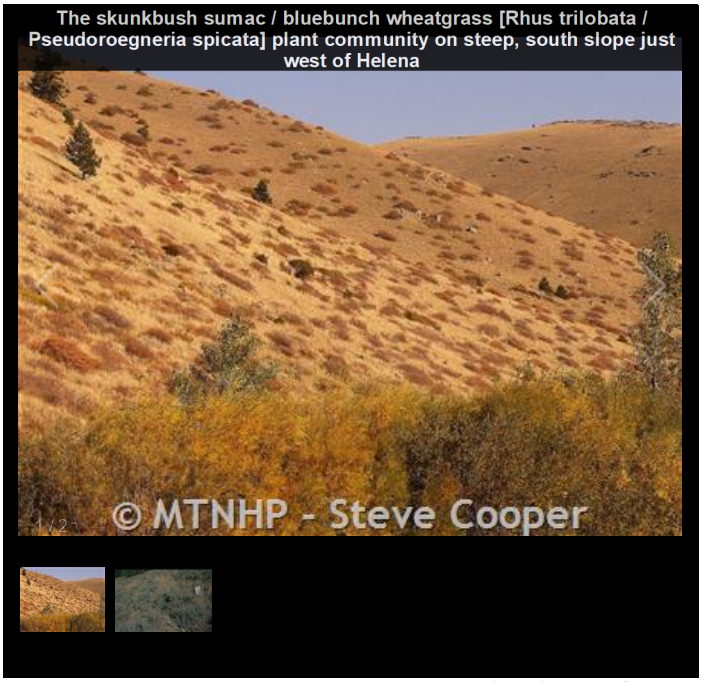


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State Rank Reason
This system may increase under drought and climate change scenarios, as intermittent streams become more ephemeral.

General Description

This shrubland system is found in the lower montane and foothill regions in the Rocky Mountains, including east into the island mountain ranges. It also occurs in southern Montana, where it forms compositionally diverse shrublands. It is common in foothills and lower slopes of mountain ranges, along higher creeks, and in draws and ravines of high plateaus on the northwestern Great Plains. The communities in this system grow at the interface between larger riparian areas and the adjacent upland shrublands and forests, usually occurring as small dense thickets, narrow bands, or irregular patches. The elevational range is 680 to 2,652 meters (2,234-8,700 feet). Shrub cover ranges from 30 to 100 percent. In Montana, chokecherry (*Prunus virginiana*) is frequently the dominant shrub species and on some sites, American plum (*Prunus americana*) may be solely present or co-dominant. Other shrubs associated with *Prunus*-dominated shrublands include currant (*Ribes* species), skunkbush sumac (*Rhus trilobata*), western snowberry (*Symphoricarpos occidentalis*), serviceberry (*Amelanchier alnifolia*), elderberry (*Sambucus spp.),* birchleaf spiraea (*Spiraea betulifolia*), andboreal sagewort (*Artemisia frigida*). Antelope bitterbrush (*Purshia tridentata*), creeping Oregon grape (*Mahonia repens*), and Woods rose (*Rosa woodsii*) may be present in some stands, along with scattered Rocky Mountain juniper (*Juniperus scopulorum)*.

Diagnostic Characteristics

Montane, lowland, shrubland, very shallow soil, aridic, intermediate disturbance interval

Similar Systems

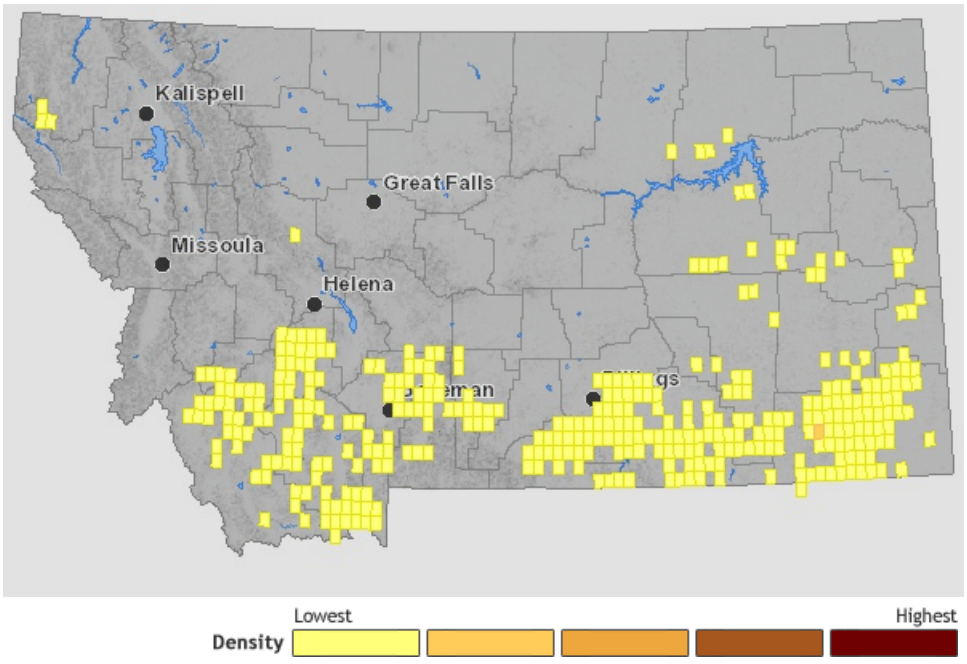
- Rocky Mountain Montane-Foothill Deciduous Shrubland

Range

This shrubland system is found in the lower montane and foothill regions in the Rocky Mountains, including east into the island mountain ranges. It also occurs in southern Montana, where it forms compositionally diverse shrublands. It is frequently found on outcrops and canyon slopes east onto the western Great Plains. Elsewhere, it ranges from New Mexico north to Montana and South Dakota

Ecological System Distribution

Approximately 36 square kilometers are classified as Rocky Mountain Lower Montane-Foothill Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Carbon, Carter, Custer, Dawson, Deer Lodge, Fallon, Gallatin, Garfield, Jefferson, Lewis and Clark, Lincoln, Madison, Park, Powder River, Prairie, Rosebud, Sanders, Silver Bow, Sweet Grass, Treasure, Valley, Yellowstone

Spatial Pattern

Large patch

Environment

This is a widespread large or small-patch shrubland that is found throughout Montana. It occurs in the foothills and lower slopes of mountain ranges, along higher creeks, and in draws and ravines of high plateaus on the Great Plains. The elevational range is 680 to 2,652 meters (2,234-8,700 feet). Shrub cover ranges from 30 to 100 percent, and is generally higher in drainage bottoms and on lowermost slopes, and lower on upper slopes. The communities in this system grow at the interface between larger riparian areas and the adjacent upland shrublands and forests, usually occurring as small dense thickets, narrow bands, or irregular patches. They often occupies draws, ephemeral creeks in steep narrow-bottomed canyons, and shallow ravines. The system can occur on slopes below seeps and springs, as small pockets on higher terraces, as narrow bands along the high-water mark of steep banks and incised channels, or at the base of cliffs adjacent to rivers. Slope varies from flat to very steep, with variable aspects, and can be associated with rock outcrops and talus. Stands are typically found on very well-drained, rocky soils but occasionally have finer soils. Soil texture ranges from sandy loam to clay loam.

Vegetation

Stands can be dominated by one species but are often a mix of three to six shrub species, which can be as abundant or even more abundant than the dominant species. In Montana, for example, chokecherry is frequently the dominant shrub species and on some sites, American plum may be solely present or co-dominant. Other shrubs associated with *Prunus*-dominated shrublands include currant, skunkbush sumac, western snowberry, serviceberry, elderberry, birchleaf spiraea andboreal sagewort. Antelope bitterbrush, creeping Oregon grape, and Woods' rose may be present in some stands, along

with scattered Rocky Mountain juniper.

In drainage bottoms, herbaceous cover is usually less than 10 percent. On slopes, shrubs typically occur within grasslands, and graminoid cover can be greater than 75 percent. Graminoid species include mountain brome (*Bromus carinatus*), needle and thread (*Hesperostipa comata*), basin wildrye (*Leymus cinereus*), and bluebunch wheatgrass (*Pseudoroegneria spicata*). Mesic sites support forb species such ascow parsnip (*Heracleum maximum*) and starry Solomon's seal (*Maianthemum stellatum*). Smooth brome (*Bromusinermis*), cheatgrass (*Bromus tectorum*), Kentucky bluegrass (*Poa pratensis*), and Canadian thistle (*Cirsium arvense*) are introduced species.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3208 *Artemisia tridentata ssp. Vaseyana* - Mixed Steppe & Shrubland Alliance
A3222 *Artemisia nova* Steppe & Shrubland Alliance
A3254 *Agropyron cristatum - Bromus inermis - Poa pratensis* Ruderal Grassland Alliance
  CEGL005264 *Bromus inermis / (Pascopyrum smithii)* Ruderal Grassland
A3799 *Rhus trilobata - Crataegus rivularis - Forestiera pubescens* Shrubland Alliance
  CEGL001108 *Prunus virginiana / (Prunus americana)* Wet Shrubland
A3964 *Rhus glabra - Rhus trilobata* Central Rocky Mountain Montane-Foothill Shrubland Alliance
  CEGL001120 *Rhus trilobata - Pseudoroegneria spicata* Shrub Grassland
  CEGL001505 *Rhus trilobata - Festuca idahoensis* Shrub Grassland
A3970 *Menziesia ferruginea - Spiraea betulifolia* Montane-Subalpine Shrubland Alliance
  CEGL005835 *Spiraea betulifolia* Shrubland
A4036 *Prunus virginiana - Symphoricarpos occidentalis - Amelanchier alnifolia* Great Plains Shrubland Alliance
  CEGL001131 *Symphoricarpos occidentalis* Shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Fire impacts these shrublands at a frequency of every 50 to 100 years, but these systems will persist for longer periods. All shrub species regenerate following low to moderate intensity fires by re-sprouting from the root systems. Fire suppression may have allowed an invasion of trees into some of these shrublands, but in many cases sites are too xeric for tree growth. Under present conditions, the fire regime is mixed severity and more variable, with stand-replacing fires being more common in adjacent forested habitats. Heavy grazing impacts can limit productivity of associated graminoids and forbs, leading to the increasing spread of introduced grasses and invasive forbs.

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system.

Restoration Considerations

Post-fire restoration strategies will depend largely on fire severity. Light to moderately burned areas usually recover quickly from fire; most dominant shrubs resprout from rhizomatous root systems and root crowns. In some cases, severely burned sites on very steep terrain may need to be reseeded to prevent soil erosion. Intense fires that occur during summer months cause considerable damage to these shrublands and seed banks.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any

questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
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Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
American Bison *(Bos bison)* SOC	Spotted Bat *(Euderma maculatum)* PSOC
Masked Shrew *(Sorex cinereus)*	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	White-tailed Jackrabbit *(Lepus townsendii)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Long-tailed Weasel *(Neogale frenata)*	American Ermine *(Mustela richardsonii)*
American Badger *(Taxidea taxus)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Moose *(Alces alces)*	Pronghorn *(Antilocapra americana)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC	Green-tailed Towhee *(Pipilo chlorurus)* SOC
Short-eared Owl *(Asio flammeus)* PSOC	Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Gyrfalcon *(Falco rusticolus)*
Prairie Falcon *(Falco mexicanus)*	Common Nighthawk *(Chordeiles minor)*
Common Raven *(Corvus corax)*	American Crow *(Corvus brachyrhynchos)*
Northern House Wren *(Troglodytes aedon)*	Mountain Bluebird *(Sialia currucoides)*
Northern Mockingbird *(Mimus polyglottos)*	Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*	European Starling *(Sturnus vulgaris)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*	Magnolia Warbler *(Setophaga magnolia)*
Cape May Warbler *(Setophaga tigrina)*	Indigo Bunting *(Passerina cyanea)*
Clay-colored Sparrow *(Spizella pallida)*	Harris's Sparrow *(Zonotrichia querula)*
Brewer's Blackbird *(Euphagus cyanocephalus)*	Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*	American Goldfinch *(Spinus tristis)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC	Western Milksnake *(Lampropeltis gentilis)* SOC
Northern Rubber Boa *(Charina bottae)*	North American Racer *(Coluber constrictor)*

Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*

Vascular Plants

Mat Buckwheat *(Eriogonum caespitosum)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC
Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Northwestern Jumping Mouse *(Zapus saltator)*
American Black Bear *(Ursus americanus)*
Mountain Lion *(Puma concolor)*

Birds

Swainson's Hawk *(Buteo swainsoni)*
White-throated Swift *(Aeronautes saxatalis)*
Western Meadowlark *(Sturnella neglecta)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Red-spotted Admiral *(Limenitis arthemis)* PSOC
Woodland Skipper *(Ochlodes sylvanoides)*
Pale Swallowtail *(Pterourus eurymedon)*
Viceroy *(Limenitis archippus)*
Common Wood-Nymph *(Cercyonis pegala)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28658
System Code	CES306.822, Rocky Mountain Lower Montane-Foothill Shrubland

ReGAP:
5263: Rocky Mountain Lower Montane-Foothill Shrubland

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Citation for data on this website:
Rocky Mountain Lower Montane-Foothill Shrubland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=5263

Rocky Mountain Montane-Foothill Deciduous Shrubland

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Provisional State Rank: S5
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State Rank Reason

This is a widespread and resilient system, occupying a broad range within the national forests and parks. Species composition may change under drought or warming scenarios, but the system should remain relatively stable.

General Description

This system is found in the lower montane and foothill regions of western Montana, and north and east into the northern Rocky Mountains. These shrublands typically occur below treeline, within the matrix of surrounding low-elevation grasslands and sagebrush shrublands. They are usually found on steep slopes of canyons, on toeslopes and occasionally on valley bottom lands. These communities can occur on all aspects. In northwestern and west-central Montana, this system forms within Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa)* forests and adjacent to fescue grasslands and big sagebrush (*Artemisia tridentata*) shrublands. In northwestern Montana, these shrublands commonly occur within the upper montane grasslands and forests along the Rocky Mountain Front. Immediately east of the Continental Divide, this system is found within montane grasslands and steep canyon slopes. Most sites have shallow soils that are either loess deposits or volcanic clays. Common ninebark (*Physocarpus malvaceus*), bittercherry (*Prunus emarginata*), common chokecherry (*Prunus virginiana*), rose (*Rosa* spp.), smooth sumac (*Rhus glabra*), Rocky Mountain maple (*Acer glabrum*), serviceberry (*Amelanchier alnifolia*), and oceanspray (*Holodiscus discolor*) are the most common dominant shrubs.

Diagnostic Characteristics

Montane, lowland, shrubland, broad leaf deciduous shrub, very shallow soil, moderate persistence

Similar Systems

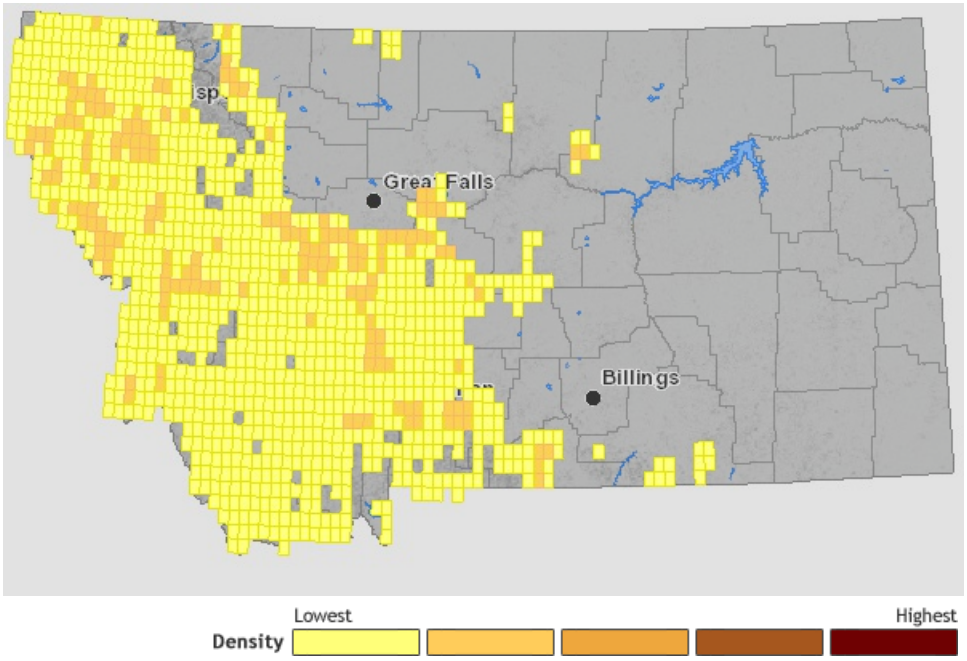
- Rocky Mountain Lower Montane-Foothill Shrubland
- Rocky Mountain Subalpine Deciduous Shrubland

Range

This system is found in the lower montane and foothill regions north and east into the northern Rocky Mountains, including east into central Montana within the island ranges. It also occurs farther south into southwestern Montana, where it forms compositionally diverse shrublands.

Ecological System Distribution

Approximately 1,340 square kilometers are classified as Rocky Mountain Montane-Foothill Deciduous Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Phillips, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Wheatland

Spatial Pattern

Large Patch

Environment

These shrublands typically occur below treeline, within the matrix of surrounding low-elevation grasslands and sagebrush shrublands. They are usually found on steep slopes of canyons, toeslopes and occasionally on valley bottom lands. These communities can occur on all aspects.

Vegetation

In northwestern and west-central Montana, this system forms within Douglas-fir (*Pseudotsuga menziesii)* and ponderosa pine (*Pinus ponderosa)* forests and adjacent to fescue grasslands and big sagebrush (*Artemisia tridentata*) shrublands. In northwestern Montana, these shrublands commonly occur within the upper montane grasslands and forests along the Rocky Mountain Front. Immediately east of the Continental Divide, this system is found within montane grasslands and steep canyon slopes. Most sites have shallow soils that are either loess deposits or volcanic clays. The system often develops at the heads of dry drainages, and on toeslopes in the moist shrub-steppe and steppe zones. Common ninebark (*Physocarpus malvaceus*), bittercherry (*Prunus emarginata*), chokecherry (*Prunus virginiana*), rose (*Rosa* spp.), smooth sumac (*Rhus glabra*), Rocky Mountain maple (*Acer glabrum*), serviceberry (*Amelanchier alnifolia),* oceanspray (*Holodiscus discolor*), birchleaf spiraea (*Spiraea betulifolia*), and common snowberry (*Symphoricarpos albus*) are the most common dominant shrubs. Canadian buffaloberry (*Shepherdia canadensis*), and snowbrush ceanothus (*Ceanothus velutinus*) are important nitrogen fixing shrubs in this system; these are more common in recently burned areas. In mesic areas, Douglas hawthorn (*Crataegus douglasii*), thimbleberry (*Rubus parviflorus*), prickly currant (*Ribes lacustre*), and alder

buckthorn (*Rhamnus alnifolia*) are common, especially on north and east facing aspects.

Common graminoids found in this shrubland community include Idaho fescue (*Festuca idahoensis*), rough fescue (*Festuca campestris*), pinegrass (*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), prairie junegrass (*Koeleria macrantha*), and bluebunch wheatgrass (*Pseudoroegneria spicata*). Some of the more common forbs include Indian blanketflower (*Gaillarida aristata*) praire cinquefoil (*Potentilla gracilis*), nineleaf biscuitroot (*Lomatium triternatum*), and arrowleaf balsamroot (*Balsamorhiza sagittata*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3773 *Cornus sericea - Dasiphora fruticosa ssp. floribunda - Ribes spp.* Wet Shrubland Alliance
  CEGL001126 *Rosa woodsii* Wet Shrubland
A3799 *Rhus trilobata - Crataegus rivularis - Forestiera pubescens* Shrubland Alliance
  CEGL001108 *Prunus virginiana / (Prunus americana)* Wet Shrubland
A3835 *Salix hookeriana - Salix sitchensis - Spiraea douglasii* Wet Shrubland Alliance
  CEGL001129 *Spiraea douglasii* Wet Shrubland
A3963 *Amelanchier alnifolia* Central Rocky Mountain Montane-Foothill Shrubland Alliance
  CEGL005885 *Amelanchier alnifolia* - (Mixed Grass, Forb) Shrubland
A3964 *Rhus glabra - Rhus trilobata* Central Rocky Mountain Montane-Foothill Shrubland Alliance
A3968 *Abies lasiocarpa - Populus tremuloides / Acer glabrum* Central Rocky Mountain Avalanche Chute Shrubland Alliance
  CEGL005889 *Ribes lacustre - Chamerion angustifolium* Shrubland
A3970 *Menziesia ferruginea - Spiraea betulifolia* Montane-Subalpine Shrubland Alliance
  CEGL005835 *Spiraea betulifolia* Shrubland
A3975 *Physocarpus malvaceus - Symphoricarpos albus* Mesic Shrubland Alliance
  CEGL005890 *Symphoricarpos albus* Shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Fire, flooding and erosion all affect these shrublands, but they generally persist on sites for long periods (up to 500 years). All shrub species regenerate well following low to moderate intensity fires by re-sprouting from the root systems. Under present conditions, the fire regime is mixed severity and more variable, with stand-replacing fires being more common in adjacent forested habitats. Heavy grazing impacts can limit productivity of associated graminoids and forbs, allowing the spread of introduced grasses and invasive forbs.

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system.

Restoration Considerations

These systems are rarely lost except in case of fire; restoration strategies will depend largely on fire severity. Light to moderately burned areas usually recover quickly from fire; most dominant shrubs resprout from rhizomatous root systems and root crowns. Intense fires that occur during summer months can cause considerable damage to these shrublands and seed banks. In some cases, severely burned sites on very steep terrain may need to be reseeded to prevent soil erosion.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's

Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Grizzly Bear *(Ursus arctos)* SOC	American Bison *(Bos bison)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC	Spotted Bat *(Euderma maculatum)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Northern Montane Shrew *(Sorex obscurus)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Snowshoe Hare *(Lepus americanus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Ermine *(Mustela richardsonii)*
American Badger *(Taxidea taxus)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Moose *(Alces alces)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC	Clark's Nutcracker *(Nucifraga columbiana)* SOC
Varied Thrush *(Ixoreus naevius)* SOC	Green-tailed Towhee *(Pipilo chlorurus)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC	Short-eared Owl *(Asio flammeus)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC	Rufous Hummingbird *(Selasphorus rufus)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC	Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*	Cooper's Hawk *(Accipiter cooperii)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*	Prairie Falcon *(Falco mexicanus)*
Spruce Grouse *(Canachites canadensis)*	Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*	Mourning Dove *(Zenaida macroura)*

Common Nighthawk *(Chordeiles minor)*
Calliope Hummingbird *(Selasphorus calliope)*
Downy Woodpecker *(Dryobates pubescens)*
Olive-sided Flycatcher *(Contopus cooperi)*
Least Flycatcher *(Empidonax minimus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Eastern Kingbird *(Tyrannus tyrannus)*
Violet-green Swallow *(Tachycineta thalassina)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Swainson's Thrush *(Catharus ustulatus)*
Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Palm Warbler *(Setophaga palmarum)*
Northern Waterthrush *(Parkesia noveboracensis)*
Common Yellowthroat *(Geothlypis trichas)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Song Sparrow *(Melospiza melodia)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Bullock's Oriole *(Icterus bullockii)*
American Goldfinch *(Spinus tristis)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Northern Flicker *(Colaptes auratus)*
Willow Flycatcher *(Empidonax traillii)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Tree Swallow *(Tachycineta bicolor)*
Canada Jay *(Perisoreus canadensis)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Northern House Wren *(Troglodytes aedon)*
Mountain Bluebird *(Sialia currucoides)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Red-eyed Vireo *(Vireo olivaceus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Yellow-rumped Warbler *(Setophaga coronata)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*
Yellow-breasted Chat *(Icteria virens)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Common Grackle *(Quiscalus quiscula)*
Baltimore Oriole *(Icterus galbula)*
Pine Siskin *(Spinus pinus)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Northern Rubber Boa *(Charina bottae)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Western Skink *(Plestiodon skiltonianus)* SOC
Gophersnake *(Pituophis catenifer)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC
Giant Sulphur *(Colias gigantea)* PSOC

Vascular Plants

Diamond Clarkia *(Clarkia rhomboidea)* SOC
Railroad Canyon Wild Buckwheat *(Eriogonum soliceps)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Canada Lynx *(Lynx canadensis)* SOC
Western Water Shrew *(Sorex navigator)*
Dwarf Shrew *(Sorex nanus)* PSOC
Least Chipmunk *(Neotamias minimus)*

Birds

Swainson's Hawk *(Buteo swainsoni)*
Northern Saw-whet Owl *(Aegolius acadicus)*
White-throated Swift *(Aeronautes saxatalis)*
Townsend's Warbler *(Setophaga townsendi)*
Savannah Sparrow *(Passerculus sandwichensis)*
Western Meadowlark *(Sturnella neglecta)*
Redpoll *(Acanthis flammea)*
Peregrine Falcon *(Falco peregrinus)*
Vaux's Swift *(Chaetura vauxi)*
Mountain Chickadee *(Poecile gambeli)*
Vesper Sparrow *(Pooecetes gramineus)*
Red-winged Blackbird *(Agelaius phoeniceus)*
House Finch *(Haemorhous mexicanus)*

Amphibians

Boreal Chorus Frog *(Pseudacris maculata)*
Sierran Treefrog *(Pseudacris sierra)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Woodland Skipper *(Ochlodes sylvanoides)*
Viceroy *(Limenitis archippus)*
Red-spotted Admiral *(Limenitis arthemis)* PSOC
Pale Swallowtail *(Pterourus eurymedon)*
Common Wood-Nymph *(Cercyonis pegala)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.994, Northern Rocky Mountain Montane-Foothill Deciduous Shrubland

ReGAP:
5312: Northern Rocky Mountain Montane-Foothill Deciduous Shrubland

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Citation for data on this website:
Rocky Mountain Montane-Foothill Deciduous Shrubland — Northern Rocky Mountain Montane-Foothill Deciduous Shrubland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=5312

Rocky Mountain Subalpine Deciduous Shrubland

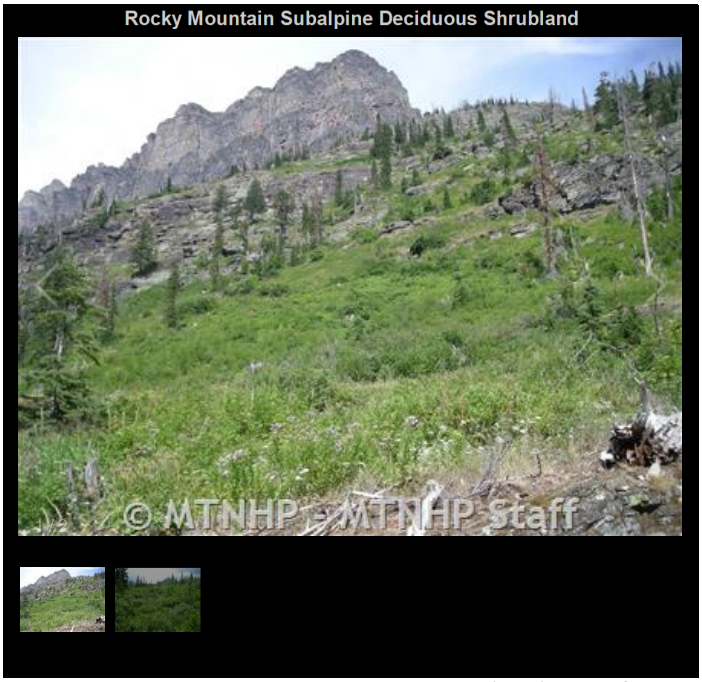


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Provisional State Rank: S5
(see reason below)

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State Rank Reason

This system is protected through most of its range. Climate effects are uncertain over the long term, but transitions from grassland to shrubland are possible, and this system should rmeina stable in size.

General Description

This shrubland ecological system is found within the zone of continuous forest in the upper montane and lower subalpine zones along both sides of the Continental Divide from southwestern to northwestern Montana, and in the island mountain ranges. Soils tend to be moist to wet. It is found on steep mountain slopes, usually on north and east facing aspects. In northwestern and west-central Montana, it forms within upper montane Douglas-fir (*Pseudotsuga menziesii*) and Engelmann spruce-subalpine fir (*Picea engelmanii/ Abies lasiocarpa*) forests on steep slopes and ravines. Soils are usually shallow, rocky or gravelly with good aeration and drainage. Occurrences are typically found in locations with cold-air drainage or ponding, or where snowpacks linger late into the summer, such as north-facing slopes and high-elevation ravines. They can extend down in elevation to the montane zone in places where cold-air ponding occurs, especially on north and east aspects. In northwestern Montana, elevation ranges from 1,525 to 1,950 meters (5,000 to 6,400 feet) west and immediately east of the Continental Divide and up to 2,682 meters (8,800 feet) in southwestern Montana. Common shrub species include rusty leaf menziesia (*Menziesia ferruginea*), black twinberry (*Lonicera involucrata*), alder buckthorn (*Rhamnus alnifolia*), prickly currant (*Ribes lacustre*), thimbleberry (*Rubus parviflorus*), sitka alder (*Alnus viridis*), cascade mountain ash (*Sorbus scopulina*), Sitka mountain ash (*Sorbus sitchensis*), and thinleaf huckleberry (*Vaccinium membranaceum*).

Diagnostic Characteristics

Montane, shrubland, broad leaf deciduous shrub, very shallow soils, moderate persistence

Similar Systems

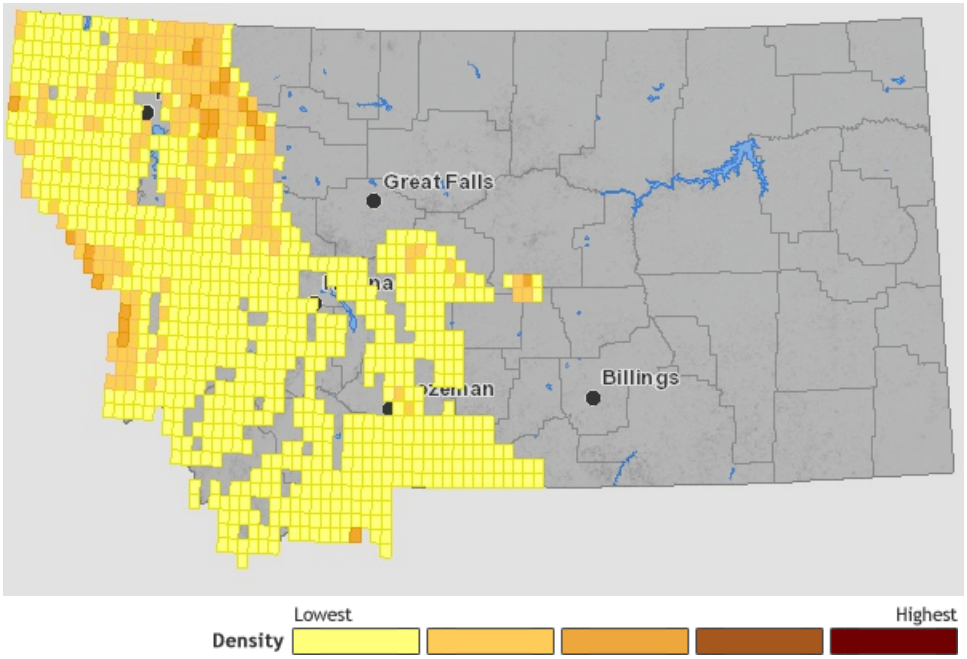
- Rocky Mountain Montane-Foothill Deciduous Shrubland

Range

This system is found in the subalpine and upper montane zones along both sides of the Continental Divide from southwestern to northwestern Montana, and in the island mountain ranges.

Ecological System Distribution

Approximately 1,605 square kilometers are classified as Rocky Mountain Subalpine Deciduous Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Large and Small Patch

Environment

In northwestern and west-central Montana, this ecosystem forms within upper montane Douglas-fir and Engelmann spruce-subalpine fir forests on steep slopes and ravines. Soils are derived from a variety of parent materials, but are usually acidic. Soils are usually shallow, rocky or gravelly with good aeration and drainage. Occurrences are typically found in locations with cold-air drainage or ponding, or where snowpacks linger late into the summer, such as north-facing slopes and high-elevation ravines. They can extend down in elevation to the montane zone in places where cold-air ponding occurs, especially on north and east aspects. In northwestern Montana, these systems are found at elevation from 1,524-1,950 meters (5,000 -6,400 feet) west and immediately east of the Continental Divide and up to 2,682 meters (8,800 feet) in southwestern Montana

Vegetation

These shrubland communities develop on steep mountain slopes, at the heads of cirque basin drainages, and on upper elevation toeslopes within the mesic montane and subalpine forest zones. Common shrub species include rusty-leaf menziesia, black twinberry, alder buckthorn, prickly currant, thimbleberry, Sitka alder, cascade mountain ash, sitka mountain ash, and thinleaf huckleberry. Extensive stands of mountain huckleberry are important summer and fall foraging areas for grizzly and black bears.

On some sites in northwestern Montana, rusty leaf menziesiaand Sitka alder can form nearly impenetrable stands. Drier aspects of this community can also support stands of thimbleberry, Canadian buffaloberrry (*Shepherdia canadensis*), birchleaf spiraea (*Spiraea betulifolia*), and deerbrush ceanothus (*Ceanothus velutinus*).

The herbaceous understory can be sparse on sites with dense shrub cover. Common graminoids include bluejoint reedgrass (*Calamagrostis canadensis*), pinegrass (*Calamagrostis rubescens*), sedges (*Carex* species), and blue wildrye (*Elymus glaucus*). Common forbs and ferns include beargrass (*Xerophyllum tenax*), fireweed (*Chamerion angustifolium*), and bracken fern (*Pteridium aquilinum*), reflecting the mesic nature of many of these shrublands. Other forb species include baneberry (*Actaea rubra*), arnica (*Arnica* species), queen's cup beadlily (*Clintonia uniflora*), boreal bedstraw (*Galium triflorum*), twinflower (*Linnaea borealis*), clasp-leaf twisted stalk(*Streptopus amplexifolius*), and western meadow rue (*Thalictrum occidentale*). Post-fire communities are often dominated by fireweed, yarrow (*Achillea millefolium*), nettle-leaf giant hyssop (*Agastache urticifolia*), aster (*Symphyotrichum spp.),* goldenrod (*Solidago spp*.), and pearly everlasting (*Anaphalis margaritacea*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3799 *Rhus trilobata - Crataegus rivularis - Forestiera pubescens* Shrubland Alliance
  CEGL001132 *Rhamnus alnifolia* Riparian Wet Shrubland
A3968 *Abies lasiocarpa - Populus tremuloides / Acer glabrum* Central Rocky Mountain Avalanche Chute Shrubland Alliance
  CEGL005889 *Ribes lacustre - Chamerion angustifolium* Shrubland
A3969 *Vaccinium membranaceum - Vaccinium myrtillus - Vaccinium scoparium* Montane-Subalpine Shrubland Alliance
  CEGL005891 *Vaccinium membranaceum - Xerophyllum tenax* Shrubland
A3970 *Menziesia ferruginea - Spiraea betulifolia* Montane-Subalpine Shrubland Alliance
  CEGL005888 *Menziesia ferruginea - Xerophyllum tenax* Shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Fire impacts these shrublands, but they typically persist on sites for long periods (up to 500 years). All shrub species regenerate well following low to moderate intensity fires by re-sprouting from the root systems. Under present conditions, the fire regime is of mixed severity and more variable than in the past, with stand-replacing fires being more common in associated forested habitats. Areas that are dry in summer also have occasional high-severity fires. Insects and diseases can play an indirect but major role in the successional direction of these shrublands by killing adjacent associated forests. Throughout Montana, subalpine fir and spruce are affected by spruce bud worm attacks and large stands of these subalpine forests can be killed following several years of drought or unusually mild winters.

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system.

Restoration Considerations

Restoration in these systems is generally restricted to post-fire efforts, and strategies will depend largely on fire severity. Light to moderately burned areas usually recover quickly from fire; most dominant shrubs resprout from rhizomatous root systems and root crowns. In some cases, severely burned sites on very steep terrain may need to be reseeded to prevent soil erosion. Intense fires occurring during summer months cause considerable damage to these shrublands and seed banks.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's

Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Grizzly Bear *(Ursus arctos)* SOC	Wolverine *(Gulo gulo)* SOC
Canada Lynx *(Lynx canadensis)* SOC	Dwarf Shrew *(Sorex nanus)* PSOC
Hoary Marmot *(Marmota caligata)* PSOC	North American Water Vole *(Microtus richardsoni)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Western Water Shrew *(Sorex navigator)*
Northern Montane Shrew *(Sorex obscurus)*	American Pika *(Ochotona princeps)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Snowshoe Hare *(Lepus americanus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Pocket Gopher *(Thomomys talpoides)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Western Heather Vole *(Phenacomys intermedius)*
Meadow Vole *(Microtus pennsylvanicus)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Northwestern Jumping Mouse *(Zapus saltator)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	American Black Bear *(Ursus americanus)*
Marten *(Martes americana)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Ermine *(Mustela richardsonii)*
Bobcat *(Lynx rufus)*	Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Moose *(Alces alces)*
Mountain Goat *(Oreamnos americanus)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
White-tailed Ptarmigan *(Lagopus leucura)* SOC	Clark's Nutcracker *(Nucifraga columbiana)* SOC
Varied Thrush *(Ixoreus naevius)* SOC	Green-tailed Towhee *(Pipilo chlorurus)* SOC
Gray-crowned Rosy-Finch *(Leucosticte tephrocotis)* SOC	Rufous Hummingbird *(Selasphorus rufus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC	Ovenbird *(Seiurus aurocapilla)* PSOC
Turkey Vulture *(Cathartes aura)*	Northern Harrier *(Circus hudsonius)*
Cooper's Hawk *(Accipiter cooperii)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Prairie Falcon *(Falco mexicanus)*	Spruce Grouse *(Canachites canadensis)*
Dusky Grouse *(Dendragapus obscurus)*	Ruffed Grouse *(Bonasa umbellus)*
Common Nighthawk *(Chordeiles minor)*	Black-chinned Hummingbird *(Archilochus alexandri)*
Calliope Hummingbird *(Selasphorus calliope)*	Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Downy Woodpecker *(Dryobates pubescens)*	Northern Flicker *(Colaptes auratus)*
Olive-sided Flycatcher *(Contopus cooperi)*	Willow Flycatcher *(Empidonax traillii)*
Least Flycatcher *(Empidonax minimus)*	Dusky Flycatcher *(Empidonax oberholseri)*
Western Flycatcher *(Empidonax difficilis)*	Eastern Kingbird *(Tyrannus tyrannus)*
Tree Swallow *(Tachycineta bicolor)*	Violet-green Swallow *(Tachycineta thalassina)*
Canada Jay *(Perisoreus canadensis)*	Steller's Jay *(Cyanocitta stelleri)*
Black-billed Magpie *(Pica hudsonia)*	Common Raven *(Corvus corax)*

American Crow *(Corvus brachyrhynchos)*
Black-capped Chickadee *(Poecile atricapillus)*
Northern House Wren *(Troglodytes aedon)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*
American Pipit *(Anthus rubescens)*
Bohemian Waxwing *(Bombycilla garrulus)*
Cedar Waxwing *(Bombycilla cedrorum)*
Northern Shrike *(Lanius borealis)*
European Starling *(Sturnus vulgaris)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Orange-crowned Warbler *(Leiothlypis celata)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Yellow Warbler *(Setophaga petechia)*
Cape May Warbler *(Setophaga tigrina)*
Yellow-rumped Warbler *(Setophaga coronata)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*
Northern Waterthrush *(Parkesia noveboracensis)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Common Yellowthroat *(Geothlypis trichas)*
Wilson's Warbler *(Cardellina pusilla)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
American Tree Sparrow *(Spizelloides arborea)*
Chipping Sparrow *(Spizella passerina)*
Fox Sparrow *(Passerella iliaca)*
Song Sparrow *(Melospiza melodia)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-throated Sparrow *(Zonotrichia albicollis)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Harris's Sparrow *(Zonotrichia querula)*
Dark-eyed Junco *(Junco hyemalis)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*
Baltimore Oriole *(Icterus galbula)*
Pine Grosbeak *(Pinicola enucleator)*
Pine Siskin *(Spinus pinus)*
American Goldfinch *(Spinus tristis)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC
Giant Sulphur *(Colias gigantea)* PSOC
Pale Swallowtail *(Pterourus eurymedon)*
Common Wood-Nymph *(Cercyonis pegala)*

Vascular Plants

Pale Corydalis *(Corydalis sempervirens)* SOC
Trailing Black Currant *(Ribes laxiflorum)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Fisher *(Pekania pennanti)* SOC
California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*
Least Chipmunk *(Neotamias minimus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
North American Deermouse *(Peromyscus maniculatus)*
American Badger *(Taxidea taxus)*
Northern River Otter *(Lontra canadensis)*
Pronghorn *(Antilocapra americana)*

Birds

Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Swainson's Hawk *(Buteo swainsoni)*
Peregrine Falcon *(Falco peregrinus)*
Mourning Dove *(Zenaida macroura)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Vaux's Swift *(Chaetura vauxi)*
White-throated Swift *(Aeronautes saxatalis)*
Mountain Chickadee *(Poecile gambeli)*
Red-eyed Vireo *(Vireo olivaceus)*
Townsend's Warbler *(Setophaga townsendi)*
Spotted Towhee *(Pipilo maculatus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Western Meadowlark *(Sturnella neglecta)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Northern Rubber Boa *(Charina bottae)*

Amphibians

Boreal Chorus Frog *(Pseudacris maculata)*
Sierran Treefrog *(Pseudacris sierra)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

T. Luna and L.K. Vance

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.961, Northern Rocky Mountain Subalpine Deciduous Shrubland

ReGAP:
5326: Northern Rocky Mountain Subalpine Deciduous Shrubland

Login Logout

Citation for data on this website:
Rocky Mountain Subalpine Deciduous Shrubland — Northern Rocky Mountain Subalpine Deciduous Shrubland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=5326

Big Sagebrush Steppe

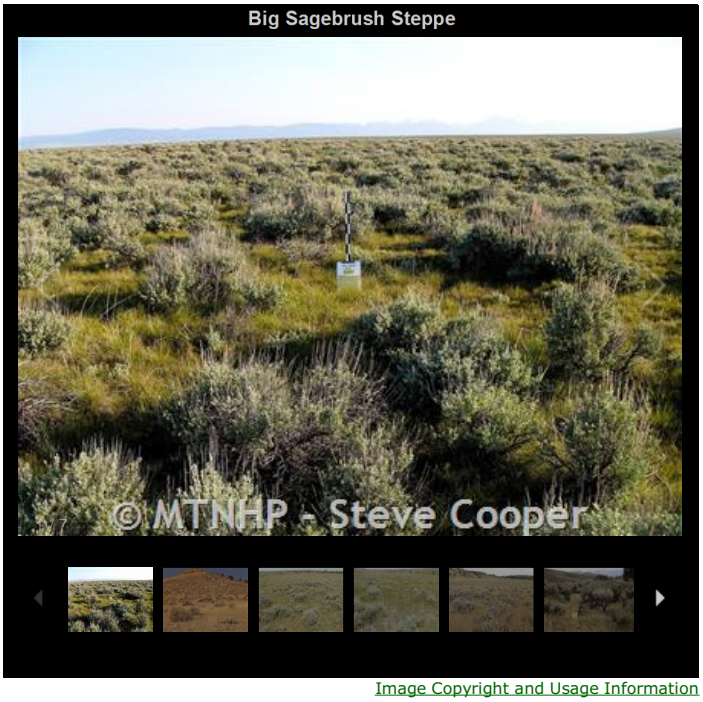


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General Description

This widespread ecological system occurs throughout much of central Montana, and north and east onto the western fringe of the Great Plains. In central Montana, where this system occurs on both glaciated and non-glaciated landscapes, it differs slightly, with more summer rain than winter precipitation and more precipitation annually. Throughout its distribution, soils are typically deep and non-saline, often with a microphytic crust. Overall shrub cover may be as low as 10 percent, or as high as 25%, but this system is always dominated by perennial grasses and forbs with greater than 25% cover. In Montana and Wyoming, stands are more mesic, with more biomass of grass, and have less shrub diversity than stands farther to the west, and 50 to 90% of the occurrences are dominated by Wyoming big sagebrush with western wheatgrass (*Pascopyrum smithii*). Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*) are indicators of disturbance, but cheatgrass is typically not as abundant as in the Intermountain West, possibly due to a colder climate. The natural fire regime of this ecological system maintains a patchy distribution of shrubs, preserving the steppe character. Shrubs may increase following heavy grazing and/or with fire suppression. In central and eastern Montana, complexes of prairie dog towns are common in this ecological system.

Diagnostic Characteristics

Lowland elevations, deep, aridic soils, xeromorphic shrubs, bunchgrasses, shrub cover less than 10%, *Artemsisia tridentata ssp. wyomingensis, Artemsisia tridentata ssp. tridentata*

Similar Systems

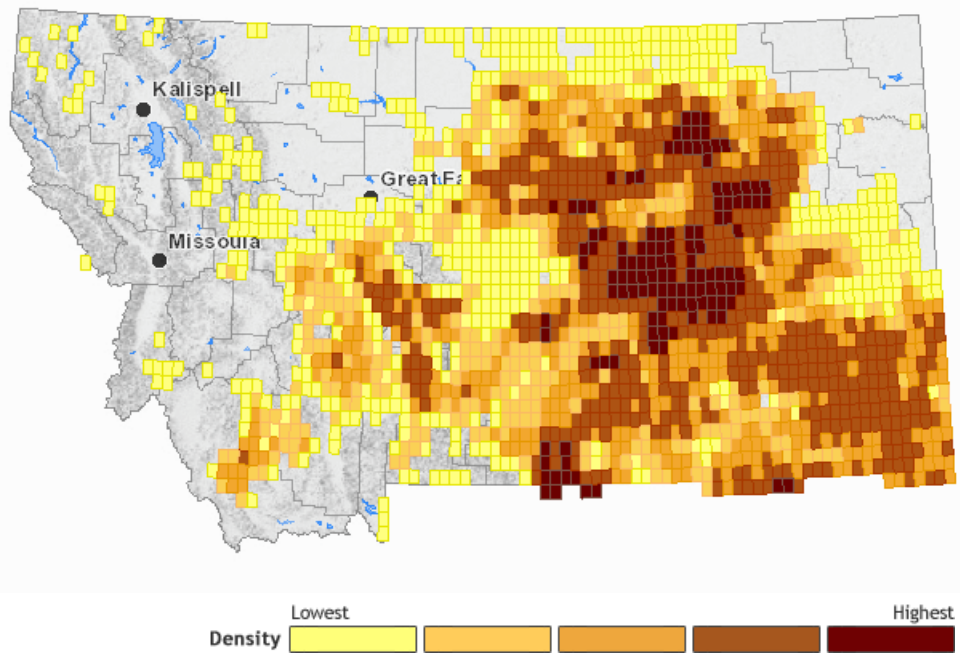
- Active and Stabilized Dune
- Big Sagebrush Shrubland
- Montane Sagebrush Steppe
- Rocky Mountain Lower Montane, Foothill, and Valley Grassland

Range

This system occurs throughout central and southeastern Montana, usually at elevations between 1,500 and 2,300 meters (4,921-7,546 feet). It also occurs throughout much of the Columbia Plateau and northern Great Basin, east into the Wyoming Basins, and north and east onto the western fringe of the Great Plains in Montana and South Dakota.

Ecological System Distribution

Approximately 43,271 square kilometers are classified as Big Sagebrush Steppe in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Hill, Jefferson, Judith Basin, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Large patch

Environment

This system occurs as extensive matrix types on level to gently rolling plains, plateaus, sideslopes and toeslopes, and as small and large patches in dissected landscapes such as breaks and badlands. Soils are alkaline and are developed from various parent materials that have weathered to predominantly heavy-textured, clay-rich Aridisols, and in more mesic conditions, Mollisols. In central Montana, this system differs slightly, with more summer rain than winter precipitation, more precipitation annually, and it occurs on glaciated and non-glaciated landscapes. Across the Montana distribution, soils are typically deep and non-saline, often with a microphytic crust. In southeastern Montana, these sites are associated with heavy soils. In north-central Montana, soils tend to be shallower often with gravelly or claypan surfaces.

Vegetation

In Montana, this system is dominated by Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*). Other shrubs present may include basin big sagebrush (*Artemisia tridentata ssp. tridentata*), silver sagebrush (*Artemisia cana*), greasewood (*Sarcobatus vermiculatus*), saltbush (*Atriplex* species), rubber rabbitbrush (*Ericameria nauseosa*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and antelope bitterbrush (*Purshia tridentata*). Overall shrub cover is less than

10 percent.

Perennial herbaceous components typically contribute greater than 25% vegetative cover and consist mostly of rhizomatous and bunch-form graminoids, with a diversity of perennial forbs. In Montana, the dominant graminoid in this system is western wheatgrass (*Pascopyrum smithii*). Other species include Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*),Sandberg's bluegrass *(Poa secunda*), or bluebunch wheatgrass (*Pseudoroegneria spicata*). Dryland rhizomatous sedges such as threadleaf sedge (*Carex filifolia)* and needleleaf sedge (*Carex duriuscula*) are very common and important in the eastern distribution of this system in Montana and Wyoming.

Common forbs include Hood's phlox (*Phlox hoodii*), sandwort (*Arenaria* species), prickly pear (*Opuntia* species), scarlet globemallow (*Sphaeralcea coccinea*), purple prairie clover (*Dalea purpurea*), gayfeather (*Liatris punctata*), and milkvetch (*Astragalus* species). Within this system, cheatgrass (*Bromus tectorum*), Japanese brome (*Bromus japonicus*) and other invasive weeds can be abundant where there is frequent disturbance.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1528 *Artemisia tripartita ssp. tripartita - Artemisia tridentata* Mesic Steppe & Shrubland Alliance
- **CEGL001536** *Artemisia tripartita ssp. tripartita - Festuca idahoensis* Shrub Grassland
- **CEGL001537** *Artemisia tripartita ssp. tripartita - Festuca campestris* Shrub Grassland
- **CEGL001538** *Artemisia tripartita ssp. tripartita - Pseudoroegneria spicata* Shrub Grassland

A3179 *Purshia tridentata - Artemisia tridentata* Mesic Steppe & Shrubland Alliance
- **CEGL001494** *Purshia tridentata - Festuca campestris* Shrub Grassland
- **CEGL001495** *Purshia tridentata - Pseudoroegneria spicata* Shrub Grassland
- **CEGL001498** *Purshia tridentata - Hesperostipa comata* Shrub Grassland
- **CEGL002674** *Purshia tridentata - Festuca idahoensis* Shrub Grassland

A3182 *Artemisia tridentata ssp. Wyomingensis* Mesic Steppe & Shrubland Alliance
- **CEGL001047** *Artemisia tridentata ssp. wyomingensis - Pascopyrum smithii* Shrub Grassland
- **CEGL001535** *Artemisia tridentata ssp. wyomingensis - Pseudoroegneria spicata* Shrub Grassland

A3183 *Artemisia tridentata ssp. tridentata - Artemisia tridentata ssp. Xericensis* Mesic Steppe & Shrubland Alliance
- **CEGL001014** *Artemisia tridentata ssp. tridentata - Festuca idahoensis* Shrubland
- **CEGL001016** *Artemisia tridentata ssp. tridentata - Leymus cinereus* Shrubland
- **CEGL001017** *Artemisia tridentata ssp. tridentata - Pascopyrum smithii / (Elymus lanceolatus)* Shrubland
- **CEGL001018** *Artemisia tridentata (ssp. tridentata, ssp. xericensis) - Pseudoroegneria spicata* Shrub Grassland
- **CEGL001530** *Artemisia tridentata - Festuca idahoensis* Shrub Grassland
- **CEGL002966** *Artemisia tridentata ssp. tridentata - Hesperostipa comata* Shrubland

A3184 *Artemisia tridentata ssp. Wyomingensis* Dry Steppe & Shrubland Alliance

A3198 *Artemisia tridentata* - Mixed Shrub Dry Steppe & Shrubland Alliance

A3586 *Artemisia cana ssp. Cana* Wet Shrubland Alliance
- **CEGL001556** *Artemisia cana ssp. cana - Pascopyrum smithii* Shrub Wet Meadow

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

The natural fire regime of this ecological system maintains a patchy distribution of shrubs, so the general aspect of the vegetation is steppe grassland. Shrubs may increase following heavy grazing and/or with fire suppression. Response to grazing can be variable, depending on the type of grazer and the season in which grazing occurs. Needle and thread (*Hesperostipa comata*) can increase in abundance in response to either grazing or fire. Microphytic crust is very important in this ecological system and is easily damaged under all grazing regimes.In central and eastern, complexes of prairie dog towns are common in this ecological system, and can be a significant disturbance.

Big sagebrush is easily killed by fire at all intensities, and when exposed to fire, plants do not resprout (Wright et al. 1979). In southwestern Montana, Wambolt and others (2001) found that fire in big sagebrush is stand replacing, killing or removing most of the aboveground vegetation, and that recovery to pre-burn cover (of sagebrush) takes at least 20 years. In Montana, Wyoming big sagebrush may require a century or longer to recover from fire (Lesica et al. 2005).

Heavy grazing practices can also lead to a decrease in associated grasses and an increase in the spread of annual bromes. Sites infested with annual bromes are changing the dynamics of this system by increasing fire potential, severity and spread.

Management

In the absence of natural fire, periodic low intensity prescribed burns can be used to maintain and restore this system to similar pre-settlement conditions. Low intensity prescribed fire is used to reduce sagebrush cover; in order to increase herbaceous forage and improve habitat quality for sage grouse and other wildlife by creating a mosaic of burned and unburned patches. Excessive grazing can result in the demise of the most common perennial grasses in this system and lead to an abundance cheatgrass or Japanese brome.

Restoration Considerations

Successful restoration of native grasses within this system may be limited to sites where pre-fire cheatgrass cover was

low. Fall germination and rapid elongation of roots provide cheatgrass with a competitive advantage over native perennial species (Harris 1967). In trials, cheatgrass reduced growth of bluebunch wheatgrassseedlings and was capable of producing twice the root quantity of bluebunch wheatgrass during the first 45 days of growth (Aguirre and Johnson, 1991). Prolific seed production also contributes to the competitive advantage of this species over native grasses. However, some selections of bluebunch wheatgrass exhibit desirable growth characteristics that hold promise for establishing this species on cheatgrass-infested sites.

Severely burned sites may require replanting with mountain big sagebrush seedlings due to slow recovery time and low rates of natural seedling recruitment. Generally, larger container volume of nursery stock results in higher outplanting success; 10 to 20 cubic inch container stock is recommended.

Wyoming big sagebrushhas been shown to have subspecies and ecotypes that are morphologically and ecologically distinct. Collecting seeds from the appropriate subspecies in the proposed out-planting site is recommended (Mahalovich and McArthur, 2004). The geographic ranges of each subspecies should serve as the geographic boundary for each seed collection zone, with the additional restriction that seeds and plants should not be moved further than 483 kilometers (300 mi) to a target planting site, or outside their native distribution. These seed transfer guidelines are an indication of the habitat requirements of the subspecies.

Polyploidy is also an important factor in adaptation. Polyploidy can influence plant fertility and vigor, and polyploidy patterns are evident at the ecotonal interfaces and within populations. Polyploids are better adapted to extreme ecological environments than diploids (Sanderson et al, 1989; McArthur and Sanderson, 1999). Thus, specific ecotypes or ploidy level of Wyoming big sagebrush may also be useful for selecting seed sources for outplanting, especially on droughty or mineral soils (Mahalovich and McArthur, 2004).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.

- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Eastern Red Bat *(Lasiurus borealis)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Pallid Bat *(Antrozous pallidus)* SOC	Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
White-tailed Prairie Dog *(Cynomys leucurus)* SOC	Hispid Pocket Mouse *(Chaetodipus hispidus)* SOC
Black-footed Ferret *(Mustela nigripes)* SOC	American Bison *(Bos bison)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC	Prairie Shrew *(Sorex haydeni)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	Black-tailed Jackrabbit *(Lepus californicus)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC	Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Western Spotted Skunk *(Spilogale gracilis)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Eastern Cottontail *(Sylvilagus floridanus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Desert Cottontail *(Sylvilagus audubonii)*
White-tailed Jackrabbit *(Lepus townsendii)*	Least Chipmunk *(Neotamias minimus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Northern Pocket Gopher *(Thomomys talpoides)*	Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Ord's Kangaroo Rat *(Dipodomys ordii)*	Western Harvest Mouse *(Reithrodontomys megalotis)*
North American Deermouse *(Peromyscus maniculatus)*	White-footed Deermouse *(Peromyscus leucopus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Ermine *(Mustela richardsonii)*
American Badger *(Taxidea taxus)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Pronghorn *(Antilocapra americana)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Greater Sage-Grouse *(Centrocercus urophasianus)* SOC	Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Mountain Plover *(Anarhynchus montanus)* SOC	Burrowing Owl *(Athene cunicularia)* SOC
Sage Thrasher *(Oreoscoptes montanus)* SOC	Loggerhead Shrike *(Lanius ludovicianus)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC	Brewer's Sparrow *(Spizella breweri)* SOC
Sagebrush Sparrow *(Artemisiospiza nevadensis)* SOC	Short-eared Owl *(Asio flammeus)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Gray Flycatcher *(Empidonax wrightii)* PSOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC	Eastern Bluebird *(Sialia sialis)* PSOC
Turkey Vulture *(Cathartes aura)*	Northern Harrier *(Circus hudsonius)*
Swainson's Hawk *(Buteo swainsoni)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Gyrfalcon *(Falco rusticolus)*
Prairie Falcon *(Falco mexicanus)*	Killdeer *(Charadrius vociferus)*
Willet *(Tringa semipalmata)*	Upland Sandpiper *(Bartramia longicauda)*
Marbled Godwit *(Limosa fedoa)*	Mourning Dove *(Zenaida macroura)*
American Barn Owl *(Tyto furcata)*	Great Horned Owl *(Bubo virginianus)*
Snowy Owl *(Bubo scandiacus)*	Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*	Black-chinned Hummingbird *(Archilochus alexandri)*
Northern Flicker *(Colaptes auratus)*	Dusky Flycatcher *(Empidonax oberholseri)*
Say's Phoebe *(Sayornis saya)*	Western Kingbird *(Tyrannus verticalis)*
Eastern Kingbird *(Tyrannus tyrannus)*	Horned Lark *(Eremophila alpestris)*
Tree Swallow *(Tachycineta bicolor)*	Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*	Bank Swallow *(Riparia riparia)*
Cliff Swallow *(Petrochelidon pyrrhonota)*	Barn Swallow *(Hirundo rustica)*
Black-billed Magpie *(Pica hudsonia)*	Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*	Rock Wren *(Salpinctes obsoletus)*
Mountain Bluebird *(Sialia currucoides)*	Brown Thrasher *(Toxostoma rufum)*
Northern Shrike *(Lanius borealis)*	European Starling *(Sturnus vulgaris)*
Indigo Bunting *(Passerina cyanea)*	Spotted Towhee *(Pipilo maculatus)*

American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Field Sparrow *(Spizella pusilla)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Sparrow *(Chondestes grammacus)*
Lark Bunting *(Calamospiza melanocorys)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Lapland Longspur *(Calcarius lapponicus)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*
Lesser Goldfinch *(Spinus psaltria)*
American Goldfinch *(Spinus tristis)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*
North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Boreal Chorus Frog *(Pseudacris maculata)*
Plains Spadefoot *(Spea bombifrons)*

Vascular Plants

Nuttall Desert-parsley *(Lomatium nuttallii)* SOC
Big Horn Fleabane *(Erigeron allocotus)* SOC
Scribner's Ragwort *(Senecio integerrimus var. scribneri)* SOC
Chicken-sage *(Sphaeromeria argentea)* SOC
Beartooth Large-flowered Goldenweed *(Pyrrocoma carthamoides var. subsquarrosa)* SOC
Round-headed Cryptantha *(Cryptantha humilis)* SOC
Miner's Candle *(Cryptantha scoparia)* SOC
Spiny Hopsage *(Grayia spinosa)* SOC
Red Sage *(Kochia americana)* SOC
Yellow Beeplant *(Cleome lutea)* SOC
Gray's Milkvetch *(Astragalus grayi)* SOC
Railhead Milkvetch *(Astragalus terminalis)* SOC
Nine-anther prairie clover *(Dalea enneandra)* SOC
Nama *(Nama densum)* SOC
Railroad Canyon Wild Buckwheat *(Eriogonum soliceps)* SOC
Smooth Buckwheat *(Eriogonum salsuginosum)* SOC
Cary's Beardtongue *(Penstemon caryi)* SOC
Rock-tansy *(Sphaeromeria capitata)*

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Pygmy Rabbit *(Sylvilagus idahoensis)* SOC
Columbia Plateau Pocket Mouse *(Perognathus parvus)* SOC
Swift Fox *(Vulpes velox)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Meadow Vole *(Microtus pennsylvanicus)*
American Black Bear *(Ursus americanus)*
Moose *(Alces alces)*

Birds

Long-billed Curlew *(Numenius americanus)* SOC
Chimney Swift *(Chaetura pelagica)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Dickcissel *(Spiza americana)* PSOC
Lesser Scaup *(Aythya affinis)*
Lesser Yellowlegs *(Tringa flavipes)*
Ring-billed Gull *(Larus delawarensis)*
California Gull *(Larus californicus)*
Rock Pigeon *(Columba livia)*
White-throated Swift *(Aeronautes saxatalis)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Blue Jay *(Cyanocitta cristata)*
Black-capped Chickadee *(Poecile atricapillus)*
Mountain Chickadee *(Poecile gambeli)*
Northern House Wren *(Troglodytes aedon)*
American Robin *(Turdus migratorius)*
Bohemian Waxwing *(Bombycilla garrulus)*
Lazuli Bunting *(Passerina amoena)*
Chipping Sparrow *(Spizella passerina)*
Savannah Sparrow *(Passerculus sandwichensis)*
Grasshopper Sparrow *(Ammodramus savannarum)*
Song Sparrow *(Melospiza melodia)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Orchard Oriole *(Icterus spurius)*
Baltimore Oriole *(Icterus galbula)*
Bullock's Oriole *(Icterus bullockii)*
House Finch *(Haemorhous mexicanus)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Common Gartersnake *(Thamnophis sirtalis)*

Vascular Plants

Mojave Brickellbush *(Brickellia oblongifolia)* SOC
Barr's Milkvetch *(Astragalus barrii)* SOC
Lesser Rushy Milkvetch *(Astragalus convallarius)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna, S.V. Cooper

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28616
System Code	CES304.778, Inter-Mountain Basins Big Sagebrush Steppe

ReGAP:
5454: Inter-Mountain Basins Big Sagebrush Steppe

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Aguirre, Lucrecia, and Douglas A. Johnson. 1991. "Influence of Temperature and Cheatgrass Competition on Seedling Development of Two Bunchgrasses". *Journal of Range Management.* 44 (4): 347-354.

Harris, G.A. 1967. Some competitive relationships between Agropyron spicatum and Bromus tectorum. Ecological Monographs 37:89-111.

Lesica, P., S.V. Cooper, and G.M. Kudray. 2005. Big sagebrush shrub-steppe postfire succession in southwest Montana. Prepared for U.S. Department of the Interior, Bureau of Land Management, Dillon Field Office. Montana Natural Heritage Program, Helena, MT. 29 pp. plus appendices.

Mahalovich, Mary F., and E. Durant McArthur. 2004. 'Sagebrush (Artemisia spp.) Seed and Plant Transfer Guidelines'. *Native Plants Journal.* 5 (2): 141-148.

McArthur, E. Durant, and Stewart C. Sanderson. 1999. "Cytogeography and Chromosome Evolution of Subgenus Tridentatae of Artemisia (Asteraceae)". *American Journal of Botany.* 86 (12): 1754-1775.

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service Gen. Tech. Rep. INT-66, Intermountain Forest and Range Exp. Sta., Ogden, Utah. 154 pp.

Sanderson SC, McArthur ED, Stutz HC. 1989. A relationship between polyploidy level and habitat in western shrub species. In: Wallace A, McArthur ED, Haferkamp MR, editors. Proceedings: symposium on shrub ecophysiology and biotechnology.1987. June 30-July 2; Logan, UT. Ogden, UT: U.S. Department of Agriculture. Forest Service. Intermountain Research Station; p 23-30.

Wambolt, C. L., K. S. Walhof and M. R. Frisina. 2001. Recovery of big sagebrush communities after burning in southwestern Montana. Journal of Environmental Management 61: 243-252.

Wright, H. A., L. F. Neuenschwander, and C. M. Britton. 1979. The role and use of fire in sagebrush-grass and pinyon-juniper plant communities: A state of the art review. USDA Forest Service General Technical Report INT-58. Intermountain Forest and Range Experiment Station. Ogden, UT.

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Montane Sagebrush Steppe



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General Description

This system dominates the montane and subalpine landscape of southwestern Montana from valley bottoms to subalpine ridges and is found as far north as Glacier National Park. It can also be seen in the island mountain ranges of the north-central and south-central portions of the state. It primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes. In general, this system occurs in areas of gentle topography, fine soils, subsurface moisture or mesic conditions, within zones of higher precipitation and areas of snow accumulation. It occurs on all slopes and aspects, variable substrates and all soil types. The shrub component of this system is generally dominated by mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*). Other co-dominant shrubs include silver sagebrush (*Artemisia cana ssp. viscidula)*, subalpine big sagebrush (*Artemisia tridentata ssp. spiciformis*), three tip sagebrush (*Artemisia tripartita* ssp. *tripartita*) and antelope bitterbrush (*Purshia tridentata*). Little sagebrush (*Artemisia arbuscula ssp. arbuscula*) shrublands are only found in southwestern Montana on sites with a perched water table. Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) sites may be included within this system if occurrences are at montane elevations, and are associated with montane graminoids such as Idaho fescue (*Festuca idahoensis),* spike fescue (*Leucopoa kingii*), or poverty oatgrass (*Danthonia intermedia)*. In ares where sage has been eliminated by human activities like burning, disking or poisoning, other shrubs may be dominant, especially rubber rabbitbrush (*Ericameria nauseosa*), and green rabbitbrush (*Chrysothamnus viscidiflorus*). Because of the mesic site conditions, most occurrences support a diverse herbaceous undergrowth of grasses and forbs. Shrub canopy cover is extremely variable, ranging from 10 percent to as high as 40 or 50 percent.

Diagnostic Characteristics

Montane to subalpine zone, deep, aridic soils, xeromorphic shrubs, bunchgrasses, shrub cover greater than 10%, *Artemsisia tridentata* ssp. *vaseyana*

Similar Systems

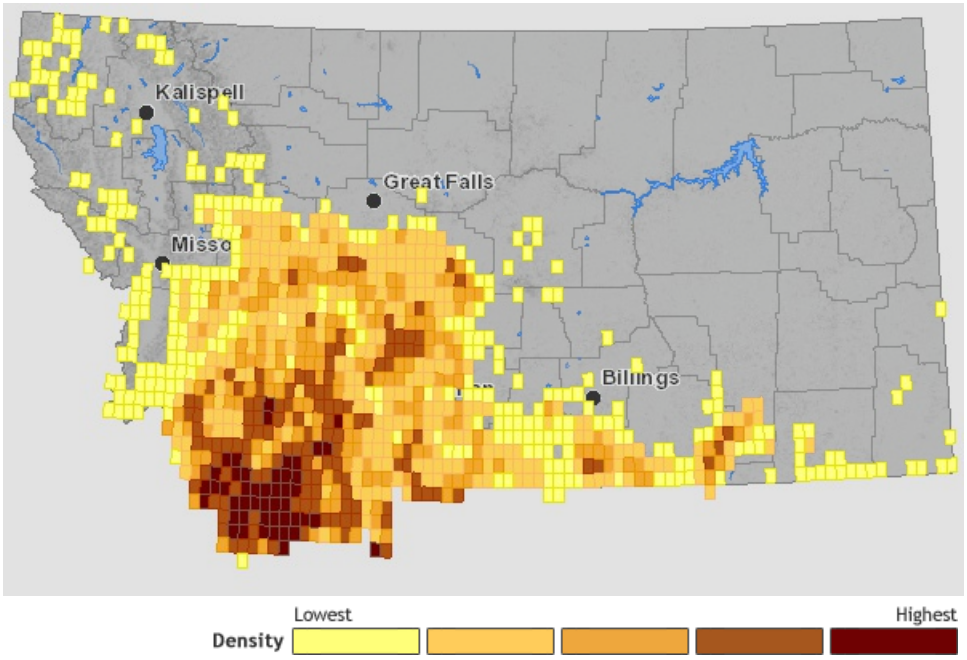
- Active and Stabilized Dune
- Big Sagebrush Shrubland
- Big Sagebrush Steppe

Range

In Montana, montane sagebrush steppe occurs within the island mountain ranges of the north-central and south-central portions of the state. It dominates the landscape of southwestern Montana from valley bottoms to subalpine ridges and is found as far north as Glacier National Park.

Ecological System Distribution

Approximately 16,260 square kilometers are classified as Montane Sagebrush Steppe in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Carter, Cascade, Chouteau, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Pondera, Powder River, Powell, Ravalli, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Treasure, Wheatland, Yellowstone

Spatial Pattern

Matrix

Environment

This ecological system occurs at montane to subalpine zones. In southwestern Montana, this system is found from 1,844 meters to 3,200 meters (6,050-10,500 feet) (Lesica et al, 2005). Much of the precipitation occurs as snow at a range of 40.3 cm (15 in.) in valley locations to upwards of 74.3 cm (35 in) along the mountain crests. Temperatures are continental with large annual and diurnal variations. In general, this system shows an affinity for mild topography, fine soils, and some source of subsurface moisture. Soils are generally moderately deep to deep, well-drained, and loam, sandy loam, clay loam, or gravelly loam textural classes. Soils often have a substantial volume of coarse fragments, and are derived from a variety of parent materials. This system primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes, but at high elevation, may be restricted to south- or west-facing slopes. In Wyoming and Montana, three tip sagebrush (*Artemisia tripartita* ssp. *tripartita*) associations are part of this system, occurring at higher elevations than the similar Inter-Mountain Basins Big Sagebrush Steppe ecological system.

Vegetation

In Montana, most of this system is dominated by mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*). Mountain big sagebrush occurs in all regions, although tends to be found only on on the highest mesas. Silver sagebrush (*Artemisia cana ssp. viscidula*) and subalpine big sagebrush (*Artemisia tridentata ssp. spiciformis*) can be co-dominant on some sites. Three tip sagebrush is found only in southwestern and west-central Montana where it functions primarily as a seral component, increasing in frequency following fire. Antelope bitterbrush (*Purshia tridentata*) may codominate, but as a codominant is of very limited occurrence, being found primarily on intrusive volcanics in western and west-central Montana. Both subspecies of little sagebrush (*Artemisia arbuscula* ssp*. arbuscula*, and *A. arbuscula ssp. longiloba*) dominated shrublands occur sporadically within this system in southwestern Montana, which is the most northerly extent of their distribution. Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) dominated sites may be included in this system if they occur in the montane zone, which is most reliably indicated by the presence of Idaho fescue (*F. idahoensis*). These relatively uncommon sites occur above 1,280 m (4,200 feet) on the mesas of eastern Montana and the dry valleys of southwestern Montana.

Other shrubs may be present, but usually at low cover values (5-10%). Species inlcude rubber rabbitbrush (*Ericameria nauseosa*), and green rabbitbrush (*Chrysothamnus viscidiflorus*), wax currant (*Ribes cereum*), Woods rose *(Rosa woodsii*), deerbrush ceanothus (*Ceanothus velutinus*), snowberry (*Symphoricarpos* species) and serviceberry (*Amelanchier alnifolia*). In ares where sage has been eliminated by human activities like burning, disking or poisoning, these other shrubs may dominate the steppe system. This can be seen around Garrison and Deer Lodge, where the sage steppe ecological system contains only minimal amounts of sage.

The herbaceous layer is usually well represented. Graminoids that can be abundant include rough fescue (*Festuca campestris*), Idaho fescue (*Festuca idahoensis*), bottlebrush squirreltail (*Elymus elymoides*), pinegrass (*Calamagrostis rubescens*), needlegrass (*Achnatherum* species), spike fescue (*Leucopoa kingii*), poverty otagrass *(Danthonia intermedia*), western wheatgrass (*Pascopyrum smithii*), mountain brome (*Bromus carinatus*), slender wheatgrass (*Elymus trachycaulus*), prairie junegrass(*Koeleria macrantha*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg's bluegrass (*Poa secunda*), and are variety of dry, upland sedges such as threadleaf sedge (*Carex filifolia*) and Geyer's sedge (*Carex geyeri*) (Mueggler and Stewart, 1988).

Forb diversity is frequently is moderate to high, commonly exceeding 30 species in a 400 m^2 macroplot. Species may include arrowleaf balsamroot (*Balsamorhiza sagittata*), Indian paintbrush (*Castilleja* species), cinquefoil (*Potentilla*species), fleabane (*Erigeron species*), phlox (*Phlox* species), milkvetch (*Astragalus* species), prairie smoke (*Geum triflorum*), lupine (*Lupinus* species), buckwheat (*Eriogonum* species), yarrow (*Achillea millefolium*), rosy pussytoes (*Antennaria rosea*), wild strawberry (*Fragaria virginiana*), and western sagewort (*Artemisia ludoviciana*). Missouri pricklypear (*Opuntia polycantha*) is common on sites in southwestern Montana (Cooper et al, 1999).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3182 *Artemisia tridentata ssp. Wyomingensis* Mesic Steppe & Shrubland Alliance
- **CEGL001047** *Artemisia tridentata ssp. wyomingensis - Pascopyrum smithii* Shrub Grassland

A3183 *Artemisia tridentata ssp. tridentata - Artemisia tridentata ssp. Xericensis* Mesic Steppe & Shrubland Alliance
- **CEGL001530** *Artemisia tridentata - Festuca idahoensis* Shrub Grassland

A3207 *Artemisia tridentata ssp. spiciformis - Artemisia tridentata ssp. Vaseyana* Steppe & Shrubland Alliance
- **CEGL001027** *Artemisia tridentata ssp. vaseyana - Leymus cinereus* Shrubland
- **CEGL001028** *Artemisia tridentata ssp. vaseyana - Pascopyrum smithii* Shrubland
- **CEGL001030** *Artemisia tridentata ssp. vaseyana - Pseudoroegneria spicata* Shrubland
- **CEGL001531** *Artemisia tridentata ssp. vaseyana - Festuca campestris* Shrub Grassland
- **CEGL001533** *Artemisia tridentata ssp. vaseyana - Festuca idahoensis* Shrub Grassland
- **CEGL002931** *Artemisia tridentata ssp. vaseyana - Hesperostipa comata* Shrubland

A3208 *Artemisia tridentata ssp. Vaseyana* - Mixed Steppe & Shrubland Alliance
- **CEGL001036** *Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus - Festuca idahoensis* Shrubland

A3219 *Artemisia arbuscula ssp. Arbuscula* Steppe & Shrubland Alliance
- **CEGL001409** *Artemisia arbuscula ssp. arbuscula - Festuca idahoensis* Shrub Grassland
- **CEGL001412** *Artemisia arbuscula ssp. arbuscula - Pseudoroegneria spicata* Shrub Grassland

A3222 *Artemisia nova* Steppe & Shrubland Alliance
- **CEGL001424** *Artemisia nova - Pseudoroegneria spicata* Shrubland

A4213 *Artemisia spp.* - Mixed Shrub Ruderal Understory Shrubland Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

The natural fire regime of this ecological system has been greatly altered, and therefore shrub cover can be highly variable. Big sagebrush is easily killed by fire at all intensities, and when exposed to fire, plants do not re-sprout (Wright et al, 1979). In southwestern Montana, Wambolt and others (2001) and Lesica and others (2005) have also shown that fire in big sagebrush is stand replacing, killing or removing most of the aboveground vegetation, and that recovery to pre-burn cover (of sagebrush) may require 15 or more years for basin big sagebrush, and on average approximately 32 years for mountain big sagebrush (Lesica et al 2005, Cooper et al. 2007).

Management

Fire and grazing can alter this system, but can also be used for management. Overgrazing reduces native bunchgrasses and often allows an increase in exotic grasses such as Kentucky bluegrass (*Poa pratensis*). However, managed grazing can be used to reduce unnaturally high fuel loads. In the absence of natural fire, periodic prescribed burns can be used to maintain and restore sagebrush steppe to pre-settlement conditions. Low intensity prescribed fire is used to reduce sagebrushcover and to increase herbaceous forage and improve habitat quality for sage grouse and other wildlife by creating a mosaic of burned and unburned patches. Results in southwestern Montana indicate that prescribed fire resulted in an average increase of 13% in grass canopy cover, so followed by light grazing, this may be a way of rejuvenating mountain big sagebrush stands. Prescribed fire or wildfire will induce only a small increase in the cover of forbs overall, and will have no effect on the abundance of plants in the Cichorieae tribe of the Asteraceae, an important food source for rearing sage grouse broods (Lesica et al, 2005).

Restoration Considerations

Severely burned sites may require replanting with mountain big sagebrush seedlings due to the slow recovery time within this system and low rates of natural seedling recruitment. Generally, larger container volume of nursery stock results in higher outplanting success; 10 to 20 cubic inch container stock is recommended for use on these sites.

Big sagebrushhas been shown to be made of subspecies and ecotypes that are morphologically and ecologically distinct. Collecting seeds from the appropriate subspecies in the proposed out-planting site is recommended (Mahalovich and McArthur, 2004). The native distribution of each subspecies serves as the geographic boundary for each seed collection zone, with the additional restriction that seeds and plants should not be moved further than 483 km (300 mi) to their target planting site.. These seed transfer guidelines are an indication of the habitat requirements of the subspecies.

Polyploidy is also an important factor in adaptation. Polyploidy can influence plant fertility and vigor and polyploidy patterns are evident at the ecotonal interfaces and within populations. Polyploids are better adapted to extreme ecological environments than diploids (Sanderson et al, 1989; McArthur and Sanderson, 1999). Thus, specific ecotypes or ploidy level of big sagebrush may also be useful for selecting seed sources for outplanting on droughty or mineral soils (Mahalovich and McArthur, 2004).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service,

Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Columbia Plateau Pocket Mouse *(Perognathus parvus)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC
Black-tailed Jackrabbit *(Lepus californicus)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Masked Shrew *(Sorex cinereus)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Mountain Cottontail *(Sylvilagus nuttallii)*
White-tailed Jackrabbit *(Lepus townsendii)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Sagebrush Vole *(Lemmiscus curtatus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
American Badger *(Taxidea taxus)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*
Merriam's Shrew *(Sorex merriami)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Pygmy Rabbit *(Sylvilagus idahoensis)* SOC
American Bison *(Bos bison)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC
Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC
Vagrant Shrew *(Sorex vagrans)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Desert Cottontail *(Sylvilagus audubonii)*
Least Chipmunk *(Neotamias minimus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*
Prairie Vole *(Microtus ochrogaster)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Least Weasel *(Mustela nivalis)*
American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Pronghorn *(Antilocapra americana)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC
Greater Sage-Grouse *(Centrocercus urophasianus)* SOC
Burrowing Owl *(Athene cunicularia)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC
Brewer's Sparrow *(Spizella breweri)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Gray Flycatcher *(Empidonax wrightii)* PSOC
Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Gyrfalcon *(Falco rusticolus)*
Dusky Grouse *(Dendragapus obscurus)*
Upland Sandpiper *(Bartramia longicauda)*
American Barn Owl *(Tyto furcata)*
Long-eared Owl *(Asio otus)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Northern Flicker *(Colaptes auratus)*
Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Bluebird *(Sialia currucoides)*
Golden Eagle *(Aquila chrysaetos)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Sage Thrasher *(Oreoscoptes montanus)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Sagebrush Sparrow *(Artemisiospiza nevadensis)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Turkey Vulture *(Cathartes aura)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*
Killdeer *(Charadrius vociferus)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Common Nighthawk *(Chordeiles minor)*
Calliope Hummingbird *(Selasphorus calliope)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Kingbird *(Tyrannus verticalis)*
Horned Lark *(Eremophila alpestris)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Common Raven *(Corvus corax)*
Rock Wren *(Salpinctes obsoletus)*
Brown Thrasher *(Toxostoma rufum)*

Northern Shrike *(Lanius borealis)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Vesper Sparrow *(Pooecetes gramineus)*
Song Sparrow *(Melospiza melodia)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Lapland Longspur *(Calcarius lapponicus)*
Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
American Goldfinch *(Spinus tristis)*
European Starling *(Sturnus vulgaris)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Bunting *(Calamospiza melanocorys)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Rusty Blackbird *(Euphagus carolinus)*
Common Grackle *(Quiscalus quiscula)*
Lesser Goldfinch *(Spinus psaltria)*

Reptiles

North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Boreal Chorus Frog *(Pseudacris maculata)*
Western Tiger Salamander *(Ambystoma mavortium)*
Plains Spadefoot *(Spea bombifrons)*

Vascular Plants

Nuttall Desert-parsley *(Lomatium nuttallii)* SOC
Hooker's Balsamroot *(Balsamorhiza hookeri)* SOC
Whitestem Goldenbush *(Ericameria discoidea var. discoidea)* SOC
Linear-leaf Fleabane *(Erigeron linearis)* SOC
Chicken-sage *(Sphaeromeria argentea)* SOC
Round-headed Cryptantha *(Cryptantha humilis)* SOC
Sapphire Rockcress *(Boechera fecunda)* SOC
Small-flowered Pennycress *(Noccaea parviflora)* SOC
Red Sage *(Kochia americana)* SOC
Lesser Rushy Milkvetch *(Astragalus convallarius)* SOC
Railhead Milkvetch *(Astragalus terminalis)* SOC
Small-flower Gymnosteris *(Gymnosteris parvula)* SOC
Cary's Beardtongue *(Penstemon caryi)* SOC
Hudson's Bay Bulrush *(Trichophorum alpinum)* SOC
White-stemmed globemallow *(Sphaeralcea munroana)* PSOC
Taper-tip Desert-parsley *(Lomatium attenuatum)* SOC
Mojave Brickellbush *(Brickellia oblongifolia)* SOC
Big Horn Fleabane *(Erigeron allocotus)* SOC
Parry's Fleabane *(Erigeron parryi)* SOC
Beartooth Large-flowered Goldenweed *(Pyrrocoma carthamoides var. subsquarrosa)* SOC
Miner's Candle *(Cryptantha scoparia)* SOC
Puzzling Rockcress *(Sandbergia perplexa)* SOC
Hutchinsia *(Hornungia procumbens)* SOC
Yellow Beeplant *(Cleome lutea)* SOC
Bitterroot Milkvetch *(Astragalus scaphoides)* SOC
Mat Buckwheat *(Eriogonum caespitosum)* SOC
Ballhead Ipomopsis *(Ipomopsis congesta ssp. crebrifolia)* SOC
Lemhi Beardtongue *(Penstemon lemhiensis)* SOC
Large-leaved Balsamroot *(Balsamorhiza macrophylla)* PSOC
Rock-tansy *(Sphaeromeria capitata)*

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Western Water Shrew *(Sorex navigator)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
American Mink *(Neogale vison)*
Moose *(Alces alces)*
Pallid Bat *(Antrozous pallidus)* SOC
Grizzly Bear *(Ursus arctos)* SOC
American Pika *(Ochotona princeps)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Northern River Otter *(Lontra canadensis)*

Birds

Long-billed Curlew *(Numenius americanus)* SOC
Peregrine Falcon *(Falco peregrinus)*
Willet *(Tringa semipalmata)*
California Gull *(Larus californicus)*
White-throated Swift *(Aeronautes saxatalis)*
Blue Jay *(Cyanocitta cristata)*
Mountain Chickadee *(Poecile gambeli)*
American Robin *(Turdus migratorius)*
Western Tanager *(Piranga ludoviciana)*
Savannah Sparrow *(Passerculus sandwichensis)*
Dark-eyed Junco *(Junco hyemalis)*
Bullock's Oriole *(Icterus bullockii)*
Redpoll *(Acanthis flammea)*
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Lesser Yellowlegs *(Tringa flavipes)*
Ring-billed Gull *(Larus delawarensis)*
Rock Pigeon *(Columba livia)*
Steller's Jay *(Cyanocitta stelleri)*
Black-capped Chickadee *(Poecile atricapillus)*
Northern House Wren *(Troglodytes aedon)*
Bohemian Waxwing *(Bombycilla garrulus)*
Lark Sparrow *(Chondestes grammacus)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
House Finch *(Haemorhous mexicanus)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*
Common Gartersnake *(Thamnophis sirtalis)*
Western Milksnake *(Lampropeltis gentilis)* SOC
Northern Rubber Boa *(Charina bottae)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Woodhouse's Toad *(Anaxyrus woodhousii)*
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Woodland Skipper *(Ochlodes sylvanoides)*

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC

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Natureserve Western Ecology Group

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28623
System Code	CES304.785, Inter-Mountain Basins Montane Sagebrush Steppe

ReGAP:
5455: Inter-Mountain Basins Montane Sagebrush Steppe

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Cooper S.V., P. Lesica and G.M. Kudray. 2007. Post-fire Recovery of Wyoming Big Sagebrush Shrub-steppe in Central and Southeast Montana. Report to the United States Department of the Interior, Bureau of Land Management, State Office. Montana Natural Heritage Program, Helena, Montana. 16 pp. plus appendices.

Cooper, S.V., C. Jean, and B.L. Heidel. 1999. Plant associations and related botanical inventory of the Beaverhead Mountains Section, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena. 235 pp.

Lesica, P., S.V. Cooper, and G.M. Kudray. 2005. Big sagebrush shrub-steppe postfire succession in southwest Montana. Prepared for U.S. Department of the Interior, Bureau of Land Management, Dillon Field Office. Montana Natural Heritage Program, Helena, MT. 29 pp. plus appendices.

Mahalovich, Mary F., and E. Durant McArthur. 2004. 'Sagebrush (Artemisia spp.) Seed and Plant Transfer Guidelines'. *Native Plants Journal.* 5 (2): 141-148.

McArthur, E. Durant, and Stewart C. Sanderson. 1999. "Cytogeography and Chromosome Evolution of Subgenus Tridentatae of Artemisia (Asteraceae)". *American Journal of Botany.* 86 (12): 1754-1775.

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service Gen. Tech. Rep. INT-66, Intermountain Forest and Range Exp. Sta., Ogden, Utah. 154 pp.

Sanderson SC, McArthur ED, Stutz HC. 1989. A relationship between polyploidy level and habitat in western shrub species. In: Wallace A, McArthur ED, Haferkamp MR, editors. Proceedings: symposium on shrub ecophysiology and biotechnology.1987. June 30-July 2; Logan, UT. Ogden, UT: U.S. Department of Agriculture. Forest Service. Intermountain Research Station; p 23-30.

Wambolt, C. L., K. S. Walhof and M. R. Frisina. 2001. Recovery of big sagebrush communities after burning in southwestern Montana. Journal of Environmental Management 61: 243-252.

Wright, H. A., L. F. Neuenschwander, and C. M. Britton. 1979. The role and use of fire in sagebrush-grass and pinyon-juniper plant communities: A state of the art review. USDA Forest Service General Technical Report INT-58. Intermountain Forest and Range Experiment Station. Ogden, UT.

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Low Sagebrush Shrubland



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Provisional State Rank: S4
(see reason below)

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State Rank Reason

The area of occupancy may be overestimated in ReGAP, as it is difficult to distinguish this specific ecological system from other sage types with a low-growth habit. However, it appears to be reasonably widespread.

General Description

This system is composed of dwarf sagebrush shrubland and shrub-steppe that forms matrix vegetation and large patches on the margins of high-elevation basins. It occurs in southwest and south-central Montana on sites that are gently to moderately sloping, particularly on dry, windswept hills and ridges that may be oriented to any aspect. Elevation ranges from 1,143 meters (3,750 feet) in the Pryor Mountains and 1,219 meters (4,000 feet in) the Canyon Ferry area and up to 2,195 meters (7,200 feet) in southwestern Montana. Typical sites are gently rolling hills and long, gently sloping pediments and fans. These sites are very windy and have shallow, often rocky soils. Rock and gravel cover much of the unvegetated ground surface, with some bare ground and litter. In Montana, soils are typically silts or clays, shallow to moderately deep, and derived from limestone parent material. The distinguishing feature of this system is a short-shrub stratum in which dwarf-shrubs (<30 centimeters tall) contribute at least two-thirds of the woody canopy. Black sage (*Artemisia nova*) is usually dominant in this system. In southwestern Montana, little sagebrush (*Artemisia arbuscula* ssp. *arbuscula* and ssp. *longiloba*) is dominant, found on restrictive clay soils that inhibit root depth and create a perched water table. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) can be present within this system.The herbaceous component includes both rhizomatous and bunchgrasses, cushion plants, and other low-growing forbs. This system is characterized as steppe vegetation, occurring in areas where precipitation is limiting for tree growth.

Diagnostic Characteristics

Steppe,shrub dominated, lowland and foothill elevations, hills, sideslopes, ridge/summit/upperslope, silt and clay soil texture, shallow aridic soils, low (less than 30 cm tall) xeromorphic shrub heights, low-growing *Artemisia* species

Similar Systems

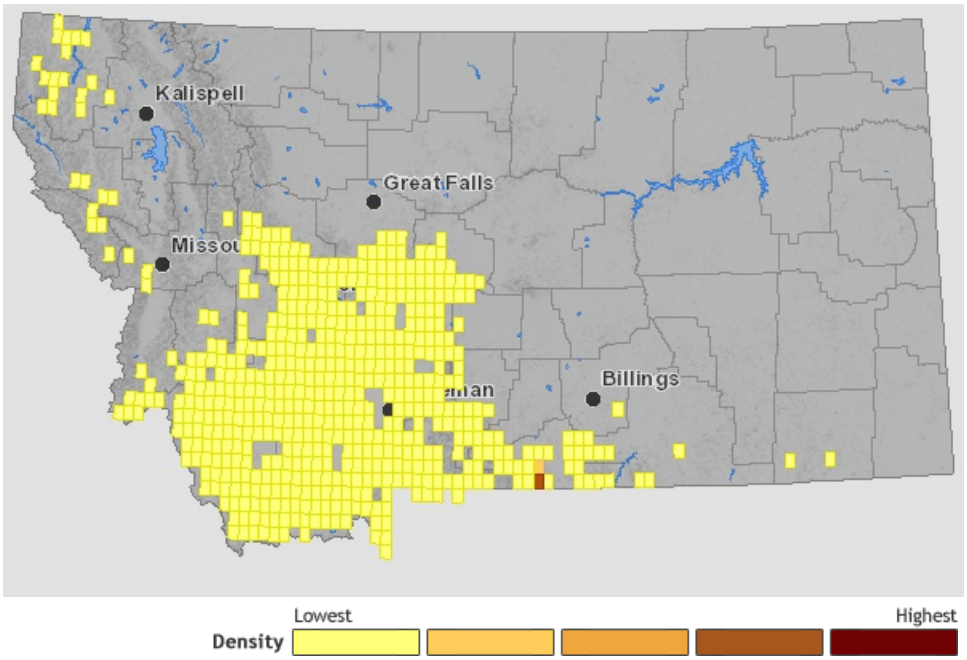
- Big Sagebrush Shrubland

Range

This system occurs in southwest and central Montana. At the northern end of its range, it occurs on the north flank on the Elkhorn Mountains near Helena. It is well represented in the Tobacco Root and Ruby Mountains, and occurs in other scattered locations in southwestern Montana. It is found on the eastern flanks of the Beartooth range on outwash fans and lower slopes, and the southerly-facing flank of the Pryor Mountains.

Ecological System Distribution

Approximately 101 square kilometers are classified as Low Sagebrush Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Judith Basin, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Powder River, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Wheatland, Yellowstone

Spatial Pattern

Large or Small Patch

Environment

This system occurs in southwest and south-central Montana on sites that are gently to moderately sloping, especially on dry, windswept hills and ridges that may be oriented to any aspect. Elevation ranges from to 1,143 meters (3,750 feet) in the Pryor Mountains and 1,219 meters (4,000 feet in) the Canyon Ferry area and up to 2,195 meters (7,200 feet) in southwestern Montana. Soils are shallow, gravelly and are often high in calcium carbonate. Rock and gravel cover much of the unvegetated ground surface, with some bare ground and litter. In Montana, soils are typically shallow to moderately deep, rapidly drained and derived from limestone. This system also occurs on granitic intrusions with overlying calcareous substrates. Soils are usually silts or clays. In southwestern Montana, soils are clays with a restrictive layer that inhibits root growth and creates a perched water table.

Vegetation

This system is characterized as steppe vegetation, occurring in areas where precipitation is limiting for tree growth. Vegetation is characterized by a low-shrub canopy dominated by black sage. In Montana, the black sage dominated steppe system grades into the Rocky Mountain Limber Pine-Juniper Woodland system in central and southern Montana.

Other shrubs are generally present, although with very low cover, including green rabbitbrush (*Chrysothamnus viscidiflorus*), little sagebrush (*Artemisia arbuscula* ssp. *longiloba*), spiny hopsage (*Grayia spinosa),* snowberry

(*Symphoricarpos longiflorus*), and broom snakeweed (*Gutierrezia sarothrae)*. In southwestern Montana, little sagebrush is the dominant low shrub. Wyoming big sagebrush can be present within this system on some occurrences. In these cases, this system can grade into or be interpreted as Big Sagebrush Shrubland.

Graminoids usually dominate the diverse herbaceous layer, with bluebunch wheatgrass (*Pseudoroegneria spicata*) being the most common. Other species present can include Indian ricegrass (*Achnatherum hymenoides*), threadleaf sedge (*Carex filifolia*), slender wheatgrass (*Elymus trachycaulus*), needle and thread (*Hesperostipa comata)*, prairie junegrass (*Koeleria macrantha)*, western wheatgrass (*Pascopyrum smithii*) and Sandberg's bluegrass (*Poa secunda*). The invasive cheatgrass (*Bromus tectorum*) frequently invades this system. Forb cover is generally low and includes cushion species and other low forbs such as Hood's phlox (*Phlox hoodii)*, tapertip hawksbeard (*Crepis acuminata*), milkvetch (*Astragalus* species), stemless mock goldenweed (*Stenotus acaulis*), spreading phlox (*Phlox diffusa*), boreal sagewort (*Artemisia frigida*), and mariposa lily (*Calochortus* species).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3182 *Artemisia tridentata ssp. Wyomingensis* Mesic Steppe & Shrubland Alliance
- **CEGL001049** *Artemisia tridentata ssp. wyomingensis - Poa secunda* Shrubland

A3221 *Artemisia arbuscula ssp. Longiloba* Steppe & Shrubland Alliance
- **CEGL001416** *Artemisia arbuscula ssp. longiloba - Pseudoroegneria spicata* Shrub Grassland
- **CEGL002585** *Artemisia arbuscula ssp. longiloba - Elymus lanceolatus* Shrubland

A3222 *Artemisia nova* Steppe & Shrubland Alliance
- **CEGL001424** *Artemisia nova - Pseudoroegneria spicata* Shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

This association usually occurs in a patchy mosaic with other types of sagebrush shrublands. Black sage and little sagebrush shrublands generally occur on the driest, most windswept sites with the shallowest soils relative to shrublands dominated by other sagebrush species. This species is easily killed by fire at all intensities, and when exposed to fire, plants do not re-sprout (Wright et al, 1979). Heavy grazing practices also lead to a decrease in associated grasses and an increase in the spread of cheatgrass. Sites invaded by cheatgrass are changing the dynamics of this system by increasing fire potential, severity and spread.

Management

Excessive grazing can result in the demise of the most common perennial grasses in this system and lead to an abundance of cheatgrass.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
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Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only

intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
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- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
White-tailed Prairie Dog *(Cynomys leucurus)* SOC	American Bison *(Bos bison)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC	Western Spotted Skunk *(Spilogale gracilis)* PSOC
Mountain Cottontail *(Sylvilagus nuttallii)*	Desert Cottontail *(Sylvilagus audubonii)*
White-tailed Jackrabbit *(Lepus townsendii)*	Least Chipmunk *(Neotamias minimus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Northern Pocket Gopher *(Thomomys talpoides)*
Olive-backed Pocket Mouse *(Perognathus fasciatus)*	Western Harvest Mouse *(Reithrodontomys megalotis)*
North American Deermouse *(Peromyscus maniculatus)*	White-footed Deermouse *(Peromyscus leucopus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Pronghorn *(Antilocapra americana)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Greater Sage-Grouse *(Centrocercus urophasianus)* SOC	Loggerhead Shrike *(Lanius ludovicianus)* SOC
Brewer's Sparrow *(Spizella breweri)* SOC	Short-eared Owl *(Asio flammeus)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Gyrfalcon *(Falco rusticolus)*
Prairie Falcon *(Falco mexicanus)*	Mourning Dove *(Zenaida macroura)*
American Barn Owl *(Tyto furcata)*	Snowy Owl *(Bubo scandiacus)*
Common Nighthawk *(Chordeiles minor)*	Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*	Horned Lark *(Eremophila alpestris)*
Black-billed Magpie *(Pica hudsonia)*	Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*	Rock Wren *(Salpinctes obsoletus)*
Mountain Bluebird *(Sialia currucoides)*	Northern Shrike *(Lanius borealis)*
European Starling *(Sturnus vulgaris)*	Spotted Towhee *(Pipilo maculatus)*
Vesper Sparrow *(Pooecetes gramineus)*	Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*	Brown-headed Cowbird *(Molothrus ater)*
American Goldfinch *(Spinus tristis)*	

Reptiles

North American Racer *(Coluber constrictor)*	Gophersnake *(Pituophis catenifer)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*

Invertebrates

Woodland Skipper *(Ochlodes sylvanoides)*

Vascular Plants

Chicken-sage *(Sphaeromeria argentea)* SOC
Mat Buckwheat *(Eriogonum caespitosum)* SOC
Beartooth Large-flowered Goldenweed *(Pyrrocoma carthamoides var. subsquarrosa)* SOC
Railroad Canyon Wild Buckwheat *(Eriogonum soliceps)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC
Western Small-footed Myotis *(Myotis ciliolabrum)*
Northwestern Jumping Mouse *(Zapus saltator)*
Mountain Lion *(Puma concolor)*
Yuma Myotis *(Myotis yumanensis)* SOC
Columbia Plateau Pocket Mouse *(Perognathus parvus)* SOC
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
American Black Bear *(Ursus americanus)*

Birds

Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Rock Pigeon *(Columba livia)*
Swainson's Hawk *(Buteo swainsoni)*
White-throated Swift *(Aeronautes saxatalis)*

Reptiles

Common Sagebrush Lizard *(Sceloporus graciosus)*
Prairie Rattlesnake *(Crotalus viridis)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Boreal Chorus Frog *(Pseudacris maculata)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28630
System Code	CES304.794, Wyoming Basins Dwarf Sagebrush Shrubland and Steppe

ReGAP:
5209: Wyoming Basins Dwarf Sagebrush Shrubland and Steppe

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Aguirre, Lucrecia, and Douglas A. Johnson. 1991. "Influence of Temperature and Cheatgrass Competition on Seedling Development of Two Bunchgrasses". *Journal of Range Management.* 44 (4): 347-354.

Harris, G.A. 1967. Some competitive relationships between Agropyron spicatum and Bromus tectorum. Ecological Monographs 37:89-111.

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service Gen. Tech. Rep. INT-66, Intermountain Forest and Range Exp. Sta., Ogden, Utah. 154 pp.

Wambolt, C. L., K. S. Walhof and M. R. Frisina. 2001. Recovery of big sagebrush communities after burning in southwestern Montana. Journal of Environmental Management 61: 243-252.

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Citation for data on this website:
Low Sagebrush Shrubland — Wyoming Basins Dwarf Sagebrush Shrubland and Steppe. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=5209

Big Sagebrush Shrubland



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Provisional State Rank: S3
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State Rank Reason

The range of this system includes areas where there may be extensive oil and gas development. Annual bromes are also increasing the risk of catastrophic fire.

General Description

This system is similar to Inter-Mountain Basins Big Sagebrush Steppe, but is characterized by lower herbaceous cover, usually less than 25 percent. In Montana, it occurs as a result of historic and current overgrazing practices and can be considered a disclimax expression of sagebrush steppe. It occurs in broad basins between mountain ranges, on plains and on foothills between 670 and 1,066 meters (2,200-3,500 feet). It can occur on all aspects. Soils are usually fine to coarse textured, well-drained and non-saline. In Montana, these shrublands are dominated by Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) and, to a lesser extent, basin big sagebrush (*Artemisia tridentata ssp. tridentata*). On pristine sites, the shrub layer ranges from 1.2-3.6 meters (4-12 feet). Other shrubs may be present on some occurrences, e.g., Rocky Mountain juniper (*Juniperus scopulorum*), saltbush (*Atriplex* species), greasewood (*Sarcobatus vermiculatus*), rubber rabbitbrush (*Ericameria nauseosa*) or green rabbitbrush (*Chrysothamnus viscidiflorus*). Perennial herbaceous cover is usually grasses, although this will vary depending on the other species present and influencing disturbance factors.

Diagnostic Characteristics

Shrubland dominated, lowland elevations, plains, alluvial plains, shallow fine to coarse textured soils, xeromorphic shrubs, shrub cover greater than 10%, *Artemsisia tridentata ssp. tridentata, Artemsisia tridentata ssp. wyomingensis*, herbaceous cover less than 25 percent

Similar Systems

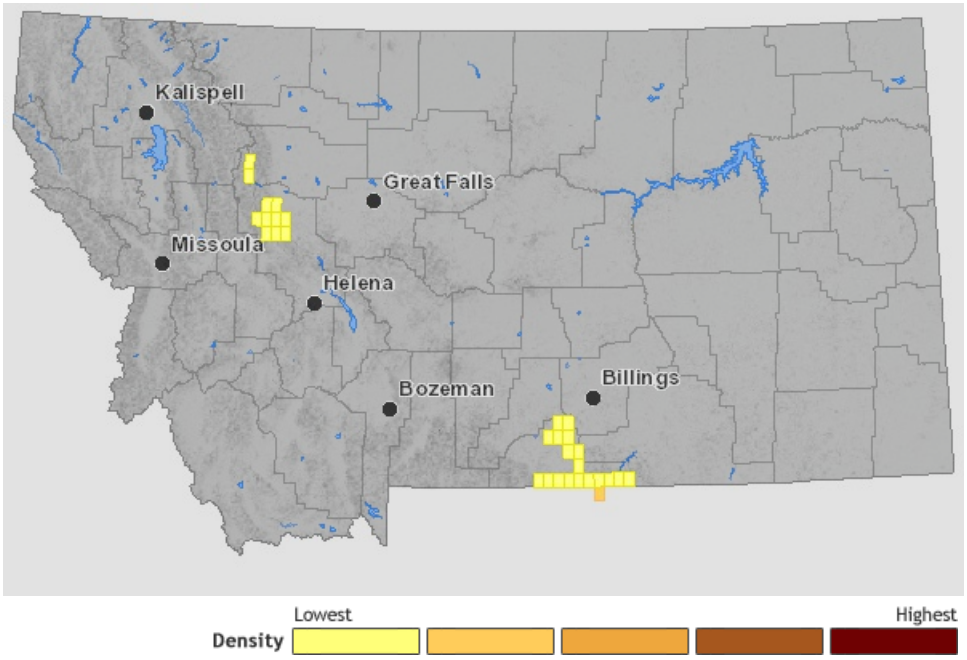
- Big Sagebrush Steppe
- Low Sagebrush Shrubland
- Montane Sagebrush Steppe

Range

This system occurs throughout much of the western U.S., typically in broad basins between mountain ranges, and on plains and and foothills. It occurs as far east as central and eastern Montana, although most of the sagebrush systems in the east are more properly characterized as steppe.

Ecological System Distribution

Approximately 5 square kilometers are classified as Big Sagebrush Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Carbon, Lewis and Clark, Teton

Spatial Pattern

Large or Small Patch

Environment

This system occurs as an extensive matrix on level to gently rolling plains, on toeslopes and in valley bottoms, as well as in small and large patches in dissected landscapes such as breaks and badlands. It is found in broad basins between mountain ranges, on plains and on foothills between 670 and 1,066 meters (2,200-3,500 feet). It can occur on all aspects. Soils are shallow, fine to coarse textured, well drained and non-saline, developed from various parent materials that have weathered to predominantly heavy-textured, clay-rich Aridisols, and in more mesic conditions, Mollisols. In southeastern Montana, these sites are associated with heavy soils developed from shales and mudstones. In north-central Montana, soils tend to be shallower, often with gravelly or claypan surfaces.

Vegetation

In Montana, this system occurs as a result of historic and current overgrazing practices and can be considered a disclimax expression of sagebrush steppe. These shrublands are dominated by big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and/or more commonly, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). In some occurrences there are scattered Rocky Mountain juniper (*Juniperus scopulorum*), greasewood (*Sarcobatus vermiculatus*), and saltbush (*Atriplex* species). Rubber rabbitbrush (*Ericameria nauseosa*) and green rabbitbrush (*Chrysothamnus viscidiflorus*) may codominate in recently burned stands.

By definition, perennial herbs contribute less than 25% of the vegetative cover (NatureServe 2009) and consist mostly of graminoids, which can vary greatly in composition, depending on the surrounding vegetation type. Dominant grasses can be either rhizomatous or bunch grasses. Perennial forb diversity is quite variable depending on site and treatment; with

livestock use the number of introduced species can easily exceed eight on a given site. Common graminoid species can include Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis),* threadleaf sedge (*Carex filifolia*), thickspike wheatgrass (*Elymus lanceolatus*), needle and thread (*Hesperostipa comata*), basin wildrye (*Leymus cinereus*), western wheatgrass (*Pascopyrum smithii*), Sandberg's bluegrass (*Poa secunda*), or bluebunch wheatgrass(*Pseudoroegneria spicata*). Bluebunch wheatgrass- bunchgrass dominated sites are most prevalent in western Montana. Sod-forming species such as thickspike wheatgrass and western wheatgrass are more common in the eastern portion of the state. Common forbs include yarrow (*Achillea millefolium)*, arrowleaf balsamroot (*Balsamorhiza sagittata*), scarlet globe mallow (*Sphaeralcea coccinea*), American vetch (*Vicia americana*), and plains prickly pear (*Opuntia polyacantha*) on especially xeric sites. Within this system, cheatgrass (*Bromus tectorum*) or other annual bromes and invasive weeds can be abundant.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3179 *Purshia tridentata - Artemisia tridentata* Mesic Steppe & Shrubland Alliance
A3182 *Artemisia tridentata ssp. Wyomingensis* Mesic Steppe & Shrubland Alliance
- **CEGL001009** *Artemisia tridentata ssp. wyomingensis - Pseudoroegneria spicata* Shrubland
- **CEGL001047** *Artemisia tridentata ssp. wyomingensis - Pascopyrum smithii* Shrub Grassland
- **CEGL001049** *Artemisia tridentata ssp. wyomingensis - Poa secunda* Shrubland
- **CEGL001535** *Artemisia tridentata ssp. wyomingensis - Pseudoroegneria spicata* Shrub Grassland

A3183 *Artemisia tridentata ssp. tridentata - Artemisia tridentata ssp. Xericensis* Mesic Steppe & Shrubland Alliance
- **CEGL001014** *Artemisia tridentata ssp. tridentata - Festuca idahoensis* Shrubland
- **CEGL001016** *Artemisia tridentata ssp. tridentata - Leymus cinereus* Shrubland
- **CEGL001017** *Artemisia tridentata ssp. tridentata - Pascopyrum smithii / (Elymus lanceolatus)* Shrubland
- **CEGL001018** *Artemisia tridentata (ssp. tridentata, ssp. xericensis) - Pseudoroegneria spicata* Shrub Grassland
- **CEGL001530** *Artemisia tridentata - Festuca idahoensis* Shrub Grassland
- **CEGL002966** *Artemisia tridentata ssp. tridentata - Hesperostipa comata* Shrubland

A3184 *Artemisia tridentata ssp. Wyomingensis* Dry Steppe & Shrubland Alliance
- **CEGL001041** *Artemisia tridentata ssp. wyomingensis - Bouteloua gracilis* Shrubland
- **CEGL001042** *Artemisia tridentata ssp. wyomingensis - Carex filifolia* Shrubland
- **CEGL001044** *Artemisia tridentata ssp. wyomingensis - Elymus albicans* Shrubland

A3196 *Ericameria nauseosa* Steppe & Shrubland Alliance
A3198 *Artemisia tridentata* - Mixed Shrub Dry Steppe & Shrubland Alliance
A3202 *Krascheninnikovia lanata* Steppe & Dwarf-shrubland Alliance
- **CEGL001327** *Krascheninnikovia lanata - Hesperostipa comata* Dwarf-shrubland

A3207 *Artemisia tridentata ssp. spiciformis - Artemisia tridentata ssp. Vaseyana* Steppe & Shrubland Alliance
- **CEGL001028** *Artemisia tridentata ssp. vaseyana - Pascopyrum smithii* Shrubland

A4213 *Artemisia spp.* - Mixed Shrub Ruderal Understory Shrubland Alliance

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Dynamic Processes

The natural fire regime of sagebrush systems maintains a patchy distribution of shrubs, so in disturbance-free areas, steppe systems would be typical.. However, shrubs increase following heavy grazing and/or with fire suppression. Heavy grazing can lead to a decrease in native bunchgrasses and an increase in exotic grasses such as Kentucky bluegrass (*Poa pratensis*) and other species.

Big sagebrush is easily killed by fire at all intensities, and when exposed to fire, plants do not re-sprout (Wright and others 1979). In southwestern Montana, researchers have found that fire in mountain big sagebrush is stand replacing, killing or removing most of the aboveground vegetation, and that recovery to pre-burn cover (of sagebrush) takes at least 20 years (Wambolt et al. 2001, Lesica et al. 2005). In Montana, Wyoming big sagebrush may require a century or longer to recover from fire (Lesica et al. 2005).

Heavy grazing practices have also led to a decrease in native grasses and an increase in the spread of annual bromes in some areas of Montana. Sites infested with annual bromes are changing the dynamics of this system by increasing fire potential, severity and spread.

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain and restore this system to similar pre-settlement conditions. Low intensity prescribed fire is used to reduce sagebrush cover, to increase herbaceous forage and to improve habitat quality for sage grouse and other wildlife by creating a mosaic of burned and unburned patches. Researchers in southwestern Montana found that prescribed fire resulted in an average increase of 13% in grass canopy cover, so followed by light grazing, fire may be a way of rejuvenating mountain big sagebrush stands. Furthermore, prescribed fire or wildfire will cause only a small increase in the cover of forbs overall, and will have no effect on the abundance of plants in the Cichorieae tribe of the Asteraceae, an important food source for rearing sage grouse broods (Lesica et al, 2005). Excessive grazing can result in the loss of the most common perennial grasses in this system and promote the spread of cheatgrass.

Restoration Considerations

Restoration Considerations

Severely burned sites may require replanting with mountain big sagebrush seedlings due to slow recovery time and low rates of natural seedling recruitment. Generally, larger container volume of nursery stock results in higher outplanting success; 10 to 20 cubic inch container stock is recommended.

Wyoming big sagebrushhas been shown to have subspecies and ecotypes that are morphologically and ecologically distinct. Collecting seeds from the appropriate subspecies in the proposed out-planting site is recommended (Mahalovich and McArthur, 2004). The geographic ranges of each subspecies should serve as the geographic boundary for each seed collection zone, with the additional restriction that seeds and plants should not be moved further than 483 kilometers (300 mi) to a target planting site, or outside their native distribution. These seed transfer guidelines are an indication of the habitat requirements of the subspecies.

Polyploidy is also an important factor in adaptation. Polyploidy can influence plant fertility and vigor, and polyploidy patterns are evident at the ecotonal interfaces and within populations. Polyploids are better adapted to extreme ecological environments than diploids (Sanderson et al, 1989; McArthur and Sanderson, 1999). Thus, specific ecotypes or ploidy level of Wyoming big sagebrush may also be useful for selecting seed sources for outplanting, especially on droughty or mineral soils (Mahalovich and McArthur, 2004).

Species Associated with this Ecological System

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Literature Cited

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- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
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Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Desert Cottontail *(Sylvilagus audubonii)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Northern Pocket Gopher *(Thomomys talpoides)*
Ord's Kangaroo Rat *(Dipodomys ordii)*	Western Harvest Mouse *(Reithrodontomys megalotis)*
North American Deermouse *(Peromyscus maniculatus)*	White-footed Deermouse *(Peromyscus leucopus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Greater Sage-Grouse *(Centrocercus urophasianus)* SOC	Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Sage Thrasher *(Oreoscoptes montanus)* SOC	Loggerhead Shrike *(Lanius ludovicianus)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC	Brewer's Sparrow *(Spizella breweri)* SOC
Sagebrush Sparrow *(Artemisiospiza nevadensis)* SOC	Short-eared Owl *(Asio flammeus)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Gray Flycatcher *(Empidonax wrightii)* PSOC
Turkey Vulture *(Cathartes aura)*	Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*	Prairie Falcon *(Falco mexicanus)*
Mourning Dove *(Zenaida macroura)*	American Barn Owl *(Tyto furcata)*
Snowy Owl *(Bubo scandiacus)*	Common Nighthawk *(Chordeiles minor)*
Say's Phoebe *(Sayornis saya)*	Eastern Kingbird *(Tyrannus tyrannus)*
Black-billed Magpie *(Pica hudsonia)*	Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*	Rock Wren *(Salpinctes obsoletus)*
Mountain Bluebird *(Sialia currucoides)*	Northern Shrike *(Lanius borealis)*
European Starling *(Sturnus vulgaris)*	Spotted Towhee *(Pipilo maculatus)*
Vesper Sparrow *(Pooecetes gramineus)*	Lark Sparrow *(Chondestes grammacus)*
Lark Bunting *(Calamospiza melanocorys)*	Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*	Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC	North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*	Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Plains Spadefoot *(Spea bombifrons)*

Vascular Plants

Big Horn Fleabane *(Erigeron allocotus)* SOC	Spiny Hopsage *(Grayia spinosa)* SOC
Red Sage *(Kochia americana)* SOC	Yellow Beeplant *(Cleome lutea)* SOC
Gray's Milkvetch *(Astragalus grayi)* SOC	Rock-tansy *(Sphaeromeria capitata)*

Native Species Occasionally Associated with this Ecological System

Mammals

Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Dwarf Shrew *(Sorex nanus)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC	California Myotis *(Myotis californicus)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*	Northwestern Jumping Mouse *(Zapus saltator)*
American Black Bear *(Ursus americanus)*	Moose *(Alces alces)*

Birds

Swainson's Hawk *(Buteo swainsoni)*	Rock Pigeon *(Columba livia)*
White-throated Swift *(Aeronautes saxatalis)*	

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC	Western Milksnake *(Lampropeltis gentilis)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*	Terrestrial Gartersnake *(Thamnophis elegans)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28615
System Code	CES304.777, Inter-Mountain Basins Big Sagebrush Shrubland

ReGAP:
5257: Inter-Mountain Basins Big Sagebrush Shrubland

Additional References Legend: View Online Publication

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- Aguirre, Lucrecia, and Douglas A. Johnson. 1991. "Influence of Temperature and Cheatgrass Competition on Seedling Development of Two Bunchgrasses". *Journal of Range Management.* 44 (4): 347-354.
- Harris, G.A. 1967. Some competitive relationships between Agropyron spicatum and Bromus tectorum. Ecological Monographs 37:89-111.
- Lesica, P., S.V. Cooper, and G.M. Kudray. 2005. Big sagebrush shrub-steppe postfire succession in southwest Montana. Prepared for U.S. Department of the Interior, Bureau of Land Management, Dillon Field Office. Montana Natural Heritage Program, Helena, MT. 29 pp. plus appendices.
- Mahalovich, Mary F., and E. Durant McArthur. 2004. 'Sagebrush (Artemisia spp.) Seed and Plant Transfer Guidelines'. *Native Plants Journal.* 5 (2): 141-148.
- McArthur, E. Durant, and Stewart C. Sanderson. 1999. "Cytogeography and Chromosome Evolution of Subgenus Tridentatae of Artemisia (Asteraceae)". *American Journal of Botany.* 86 (12): 1754-1775.
- Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service Gen. Tech. Rep. INT-66, Intermountain Forest and Range Exp. Sta., Ogden, Utah. 154 pp.
- NatureServe. NatureServe Explorer: Inter-Mountain Basins Big Sagebrush Shrubland.
- Sanderson SC, McArthur ED, Stutz HC. 1989. A relationship between polyploidy level and habitat in western shrub species. In: Wallace A, McArthur ED, Haferkamp MR, editors. Proceedings: symposium on shrub ecophysiology and biotechnology.1987. June 30-July 2; Logan, UT. Ogden, UT: U.S. Department of Agriculture. Forest Service. Intermountain Research Station; p 23-30.
- Wambolt, C. L., K. S. Walhof and M. R. Frisina. 2001. Recovery of big sagebrush communities after burning in southwestern Montana. Journal of Environmental Management 61: 243-252.

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Big Sagebrush Shrubland — Inter-Mountain Basins Big Sagebrush Shrubland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=5257

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Mixed Salt Desert Scrub



Image Copyright and Usage Information

Provisional State Rank: S1
(see reason below)

External Links

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State Rank Reason

This is a very limited system within Montana, with small patches occuring in the Wyoming Basin ecoregion. Its state rank is based on its limited distribution; nationally it is more secure.

General Description

This is a very minor ecological system found in southeastern Montana at elevations of 1,065- 1,220 meters (3,500-4,000 feet) on steep-facing erodible badlands. The environment in this region of Montana is characterized by annual precipitation of 12 inches or less, warm to hot summers and cold winters with variable amounts of snow cover. Soils on sites supporting this system are alkaline or saline Entisols. This shrub- dominated community typically contains one or more saltbush (*Atriplex*) species, such as shadscale saltbush (*Atriplex confertifolia*) or fourwing saltbush (*Atriplex canescens*). Some occurrences contain a mixture of saltbush species and Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and other shrub species. The understory is dominated by grasses, e.g, Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), Sandberg's bluegrass (*Poa secunda*), alkali sacaton (*Sporobolus airoides*), needle and thread (*Hesperostipa comata*), saline wild rye (*Leymus salinus*), bluebunch wheatgrass (*Pseudoroegneria spicata*) and inland saltgrass (*Distichlis spicata*). Forb cover is generally very low. Disturbances within this system may lead to an increase in invasive annual grasses and forbs.

Diagnostic Characteristics

Lowland, alluvial flat, alluvial plain, plains, badland, shrubland, alkaline soil, saline substrate chemistry, calcareous, silt or clay soil texture, xeromorphic shrub, dwarf-shrub, *Atriplex* species

Similar Systems

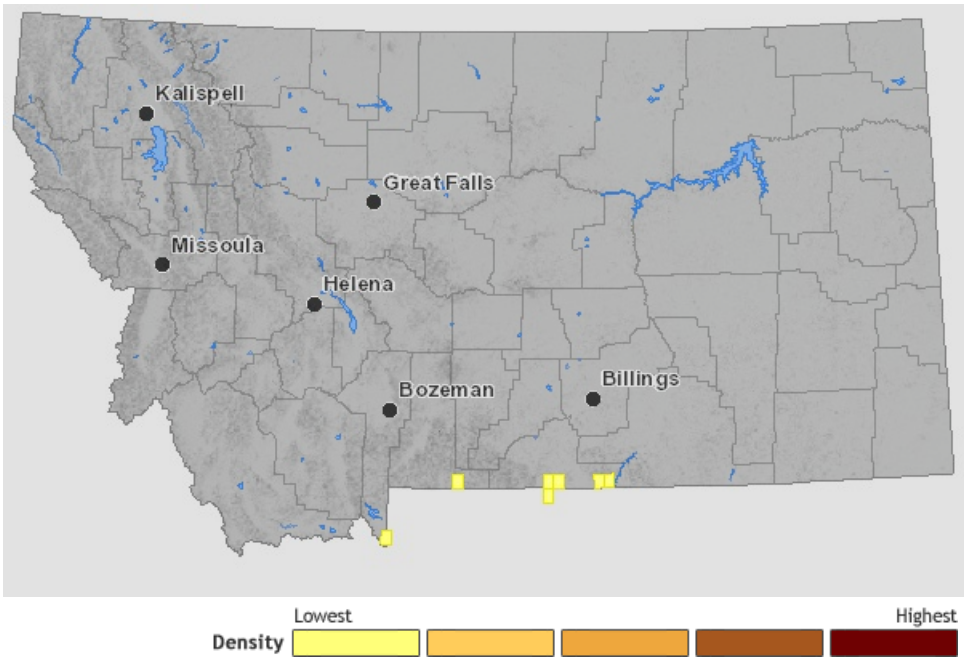
- Active and Stabilized Dune

Range

This system occurs in Montana on steep facing, erodible badlands in Carbon County at 1,065-1,220 meters (3,500-4,000 feet), but it is not well developed or represented. In Wyoming, it occurs in the Great Divide and Bighorn Basins. Elsewhere, it occurs throughout the western interior and intermountain United States, and in areas of the southern Great Plains in eastern New Mexico.

Ecological System Distribution

Approximately 1 square kilometers are classified as Mixed Salt Desert Scrub in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Carbon, Gallatin, Park

Spatial Pattern

Matrix

Environment

This is typically a system of extreme climatic conditions, with warm to hot summers and freezing winters. In Montana, annual precipitation is generally 30 centimeters (12 inches) or less. Precipitation usually occurs in spring after snowmelt as intermittent spring rains and sometimes during late summer or fall. Soils are shallow to moderately deep, poorly developed, and a product of an arid climate with little precipitation. Soils are often alkaline or saline, poorly developed Entisols.

Vegetation

Vegetation is composed of one or more saltbush (*Atriplex*) species, such as shadscale saltbush (*Atriplex confertifolia*) or fourwing saltbush (*Atriplex canescens*). Some occurrences contain a mixture of saltbush species and Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Spiny hopsage (*Grayia spinosa*) tends to occur on silty coppice dunes. Other shrubs may include winterfat (*Krascheninnikovia lanata*), green rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbit brush (*Ericameria nauseosa*), broom snakeweed (*Gutierrezia sarothrae*),budsage brush (*Picrothamnus desertorum*), shortspine horse brush (*Tetradymia spinosa*) andsoapweed yucca (*Yucca glauca*).Prickly pear (*Opuntia* species) may be present in some occurrences. Trees are not usually present, but some scattered RockyMountain juniper (*Juniperus scopulorum*) may be found.

Graminoids dominate the sparse, or sometimes moderately dense, herbaceous understory. Species present depends on habitat, the alkalinity/salinity of site and past land use, and may includeIndian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), Sandberg's bluegrass (*Poa secunda*), alkali sacaton (*Sporobolus airoides*), needle and thread (*Hesperostipa comata*), saline wild rye (*Leymus salinus*), bluebunch wheatgrass (*Pseudoroegneria spicata*) and

Inland saltgrass (*Distichlis spicata*). Forb cover is generally very low. Annual native species are common on recently disturbed sites within this system and include species such as plantain (*Plantago* species), sixweeks fescue (*Vulpia octoflora*), or Nuttall's povertyweed (*Monolepis nuttalliana*). Halophytic annuals include western glasswort (*Salicornia rubra*)and seepweed (*Suaeda* species). Perennial forbs may include boreal sagewort (*Artemisia frigida*), scarlet globe mallow (*Sphaeralcea coccinea*),and blazing star (*Mentzelia* species). Exotic annuals such as Russian thistle (*Salsola kali*) and cheatgrass (*Bromus tectorum*) are frequently found in this system.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0870 *Atriplex confertifolia* Scrub Alliance
- **CEGL001293** *Atriplex confertifolia* Wyoming Basins Shrubland
- **CEGL001300** *Atriplex confertifolia - Ericameria nauseosa* Shrubland
- **CEGL001452** *Picrothamnus desertorum* Shrubland

A3198 *Artemisia tridentata* - Mixed Shrub Dry Steppe & Shrubland Alliance
- **CEGL001040** *Artemisia tridentata ssp. wyomingensis / Atriplex confertifolia* Shrubland

A3202 *Krascheninnikovia lanata* Steppe & Dwarf-shrubland Alliance
- **CEGL001327** *Krascheninnikovia lanata - Hesperostipa comata* Dwarf-shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Species of the salt-desert shrub complex have different degrees of tolerance to salinity and aridity, and so tend to sort themselves out along a moisture/salinity gradient (West 1982). The harsh environmental conditions of these systems slow down community dynamics. The same species or species similar in stature or appearance often succeed each other after disturbances. Fire frequency was historically very low in this system. Heavy sheep grazing practices can significantly impact vigor and cover of the principal shrub species, leading to an increase of annual bromes (*Bromus* species) and other exotic annual forbs. Sites invaded with exotic annuals are changing the dynamics of this system by increasing fire potential, severity and spread.

Management

Historically, fire was rare in this system due to the characteristic low plant cover. Excessive grazing can result in the demise of the most common perennial grasses in this system and lead to an abundance cheatgrass and other invasive annuals. Off-road vehicle travel can be a significant disturbance.

Restoration Considerations

Natural regeneration of saltbush species and their associates occurs where old plants existed in the interspaces, due to accumulated organic matter and nutrients and more favorable moisture (West, 1982). Shrub seedlings should be planted in these microsites, where and when they exist on a restoration site, to improve survival rates. Dominant species have been used to stabilize soils and to reclaim disturbed sites (Carlson et al, 1984).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
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Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Pallid Bat *(Antrozous pallidus)* SOC	American Bison *(Bos bison)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Desert Cottontail *(Sylvilagus audubonii)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Greater Sage-Grouse *(Centrocercus urophasianus)* SOC	Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Sage Thrasher *(Oreoscoptes montanus)* SOC	Loggerhead Shrike *(Lanius ludovicianus)* SOC
Brewer's Sparrow *(Spizella breweri)* SOC	Sagebrush Sparrow *(Artemisiospiza nevadensis)* SOC
Short-eared Owl *(Asio flammeus)* PSOC	Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Turkey Vulture *(Cathartes aura)*	Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
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Common Nighthawk *(Chordeiles minor)*	Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*	Horned Lark *(Eremophila alpestris)*
American Crow *(Corvus brachyrhynchos)*	Rock Wren *(Salpinctes obsoletus)*
Mountain Bluebird *(Sialia currucoides)*	Northern Shrike *(Lanius borealis)*
European Starling *(Sturnus vulgaris)*	Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*	Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC	Western Milksnake *(Lampropeltis gentilis)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*	North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*	Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Plains Spadefoot *(Spea bombifrons)*

Vascular Plants

Spiny Hopsage *(Grayia spinosa)* SOC	Red Sage *(Kochia americana)* SOC

Smooth Buckwheat *(Eriogonum salsuginosum)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Western Spotted Skunk *(Spilogale gracilis)* PSOC
Ord's Kangaroo Rat *(Dipodomys ordii)*	White-footed Deermouse *(Peromyscus leucopus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Mountain Lion *(Puma concolor)*

Birds

Swainson's Hawk *(Buteo swainsoni)*	Rock Pigeon *(Columba livia)*
White-throated Swift *(Aeronautes saxatalis)*	

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC	Terrestrial Gartersnake *(Thamnophis elegans)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

T. Luna and L.K. Vance

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28622
System Code	CES304.784, Inter-Mountain Basins Mixed Salt Desert Scrub

ReGAP:
5258: Inter-Mountain Basins Mixed Salt Desert Scrub

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- Carlson, J. R., J. G. Schutz, and W. R. Oaks. 1983. Seed production technique of two chenopods: Gardner saltbush and winterfat. Pp. 191-195 in A. R. Tiedemann, E. D. McArthur, H. C. Stutz, R. Stevens, and K. C. Johnson, comps., Proc. Symposium on the Biology of Atriplex and related chenopods. USDA For. Serve Gen. Tech. Rep. INT-172. 309 pp.
- West NE. 1982. Dynamics of plant communities dominated by chenopod shrubs. Internationl Journal and Ecology and Environmental Science(8):73-84.

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(see reason below)

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State Rank Reason
Oil and gas drilling, bentonite mining and OHV use are main threats, but they are not widespread.

General Description

This system occurs in Montana on gentle slopes, rolling plains and badlands in the extreme south-central and south-eastern portions of the state. It also occurs from Glasgow north to the Canadian border. Throughout Montana, it is associated with shale foothills and badlands where soils are saline or alkaline clays and silts with low infiltration rates. It comprises relatively pure stands of Gardner's saltbush (*Atriplex gardneri*) or birdfoot sagebrush (*Artemisia pedatifida*). Other shrubs and sub-shrubs present may include longleaf wormwood (*Artemisia longifolia*), bud sagebrush (*Picrothamnus desertorum*), winterfat (*Krascheninnikovia lanata*), shortspine horsebrush (*Tetradymia spinosa*), shadscale saltbush (*Atriplex confertifolia*) or fourwing saltbush (*Atriplex canescens*). Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) can occur in patches within this system on substrates that are less saline or alkaline. The herbaceous layer is usually very sparse. Harsh environmental conditions slow down community dynamics. Following disturbance, the same species, or species similar in stature or appearance, often succeed each other. Currently, exotic grass invasions are changing the dynamics of this system.

Diagnostic Characteristics

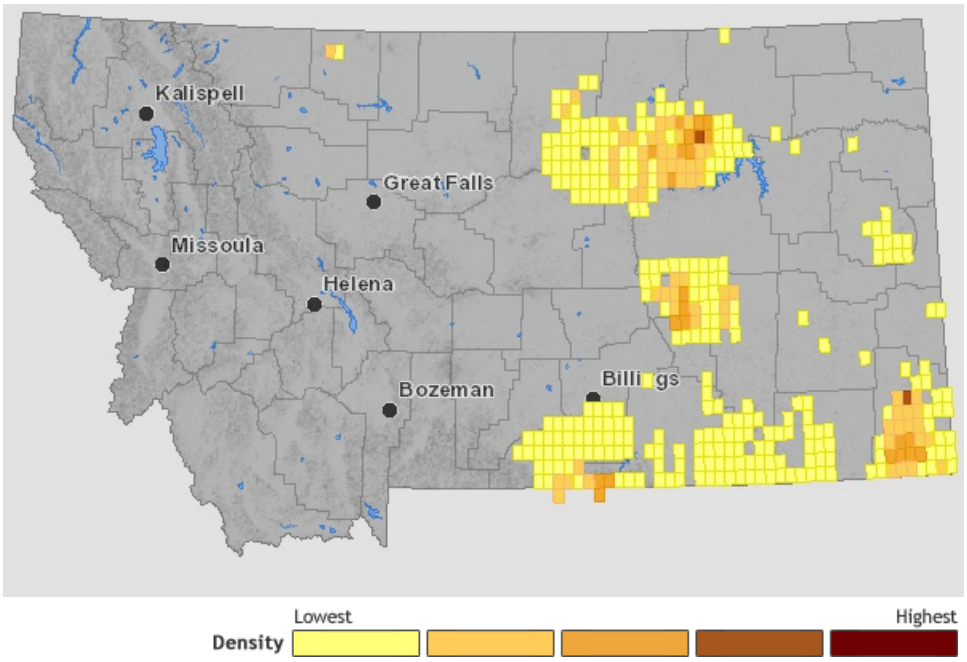
Lowland, alluvial flat, alluvial plain, plains, badland, shrubland, alkaline soil, saline substrate chemistry, calcareous, silt or clay soil texture, dwarf-shrub, *Atriplex gardneri, Atriplex* species

Range

This system occurs in Montana on gentle slopes and rolling plains and badlands in the extreme south-central portion of the eastern foothills of the Beartooth Range and in south-eastern portions of the state. Extensive areas also occur south of Glasgow. The broader range of this system ranges from the northern Colorado Plateau and Uinta Basin north to the plains of Wyoming; it potentially occurs in Alberta and is found in southern Saskatchewan.

Ecological System Distribution

Approximately 999 square kilometers are classified as Mat Saltbush Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Custer, Dawson, Fallon, Garfield, Mccone, Phillips, Powder River, Richland, Rosebud, Toole, Treasure, Valley, Yellowstone

Spatial Pattern

Matrix

Environment

Mat saltbush shrublands occur on clay or silt soils that are saline and alkaline. In Montana, substrates are generally derived from marine shales.

Vegetation

This system typically supports dwarf-shrublands composed of relatively pure stands of Gardner's saltbush (*Atriplex gardneri*), and in south-central Montana, birdfoot sagebrush (*Artemisia pedatifida*). Other dominant or codominant dwarf-shrubs may include longleaf wormwood (*Artemisia longifolia*) or bud sagebrush (*Picrothamnus desertorum*), occasionally with a mix of other low shrubs, such as winterfat (*Krascheninnikovia lanata*) or shortspine horsebrush (*Tetradymia spinosa*). Shadscale saltbush (*Atriplex confertifolia*) or fourwing saltbush (*Atriplex canescens*) may be present. Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) can occur in patches within this system on more favorable substrates that are less saline or alkaline. The herbaceous layer is typically sparse. Perennial forbs are infrequent and scattered in the undergrowth. Common species include smooth woody aster (*Xylorhiza glabriuscula*) and scarlet globe mallow (*Sphaeralcea coccinea*). Annual species of saltbush (*Atriplex*), povertyweed (*Monolepis*), goosefoot (*Chenopodium*) and seepweed (*Suadea*) are frequently present. Perennial grasses have the highest herbaceous cover. Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*), squirrel tail (*Elymus elymoides*), thickspikewheatgrass (*Elymus lanceolatus ssp. lanceolatus*), western wheatgrass (*Pascopyrum smithii*), Sandberg's bluegrass (*Poa secunda*), or alkali sacaton (*Sporobolus airoides*) are the most common species found in this system. In less saline areas, there may be inclusions of grasslands dominated by needle and thread (*Hesperostipa comata*), saline wild rye (*Leymus salinus*), western wheatgrass, or bluebunch wheatgrass (*Pseudoroegneria spicata*). There may also be inclusions of non-saline, gravelly barrens or rock outcrops dominated by cushion plants such as Hooker's sandwort (*Arenaria hookeri*) and Hood's phlox (*Phlox hoodii*) without dwarf-shrubs. Under disturbance, cheatgrass (*Bromus tectorum*) or other annual bromes can become abundant.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1110 *Atriplex gardneri* Low Scrub Alliance
- **CEGL001438** *Atriplex gardneri* Dwarf-shrubland
- **CEGL001439** *Atriplex gardneri - Picrothamnus desertorum* Dwarf-shrubland
- **CEGL001440** *Atriplex gardneri - Artemisia tridentata* Dwarf-shrubland
- **CEGL001443** *Atriplex gardneri - Monolepis nuttalliana* Dwarf-shrubland
- **CEGL001444** *Atriplex gardneri - Achnatherum hymenoides* Dwarf-shrubland
- **CEGL001445** *Atriplex gardneri - Pascopyrum smithii* Dwarf-shrubland

A1127 *Artemisia pedatifida* Low Scrub Alliance
- **CEGL001526** *Artemisia pedatifida - Festuca idahoensis* Shrubland
- **CEGL001527** *Artemisia pedatifida - Pseudoroegneria spicata* Shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

The harsh environmental conditions of these systems slow down community dynamics. Following disturbance, the same species or species similar in stature or appearance often succeed each other. Fire frequency was historically very low in this system. Heavy sheep grazing practices can significantly impact vigor and cover of the principal shrub species, leading to an increase of cheatgrass and other exotic annual forbs. Sites infested with cheatgrass are changing the dynamics of this system by increasing fire potential, severity and spread.

Management

Heavy grazing practice, particularly sheep grazing, can result in the loss of the most common perennial grasses in this system and lead to an abundance cheatgrass and other annual bromes and forbs.

Restoration Considerations

Natural regeneration of saltbush species and associated species occurs where old plants existed in the interspaces, due to accumulated organic matter and nutrients and more favorable moisture (West 1982). Shrub seedlings should be planted in these microsites improve survival rates.

Gardner's saltbush has an extensive, highly branched root system and tolerates poor site conditions. It has been used to stabilize soils and to reclaim disturbed sites (Clarke and others 1943; Carlson and others 1984). It was one of only two species to establish on coal mine spoils in Wyoming (Frischknecht and Ferguson 1984).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only

intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Pallid Bat *(Antrozous pallidus)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC	White-tailed Prairie Dog *(Cynomys leucurus)* SOC
Hispid Pocket Mouse *(Chaetodipus hispidus)* SOC	Black-footed Ferret *(Mustela nigripes)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	Desert Cottontail *(Sylvilagus audubonii)*
White-tailed Jackrabbit *(Lepus townsendii)*	Least Chipmunk *(Neotamias minimus)*
North American Deermouse *(Peromyscus maniculatus)*	Northern Grasshopper Mouse *(Onychomys leucogaster)*
Long-tailed Vole *(Microtus longicaudus)*	Sagebrush Vole *(Lemmiscus curtatus)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Greater Sage-Grouse *(Centrocercus urophasianus)* SOC	Mountain Plover *(Anarhynchus montanus)* SOC
Burrowing Owl *(Athene cunicularia)* SOC	Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Short-eared Owl *(Asio flammeus)* PSOC	Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Turkey Vulture *(Cathartes aura)*	Northern Harrier *(Circus hudsonius)*
Swainson's Hawk *(Buteo swainsoni)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Prairie Falcon *(Falco mexicanus)*
Killdeer *(Charadrius vociferus)*	Marbled Godwit *(Limosa fedoa)*
Mourning Dove *(Zenaida macroura)*	Snowy Owl *(Bubo scandiacus)*
Common Nighthawk *(Chordeiles minor)*	Say's Phoebe *(Sayornis saya)*
Horned Lark *(Eremophila alpestris)*	Barn Swallow *(Hirundo rustica)*
American Crow *(Corvus brachyrhynchos)*	Rock Wren *(Salpinctes obsoletus)*
Mountain Bluebird *(Sialia currucoides)*	European Starling *(Sturnus vulgaris)*
Vesper Sparrow *(Pooecetes gramineus)*	Lark Sparrow *(Chondestes grammacus)*
Lark Bunting *(Calamospiza melanocorys)*	Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*	Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC	Common Sagebrush Lizard *(Sceloporus graciosus)*
North American Racer *(Coluber constrictor)*	Gophersnake *(Pituophis catenifer)*
Plains Gartersnake *(Thamnophis radix)*	Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Boreal Chorus Frog *(Pseudacris maculata)*
Plains Spadefoot *(Spea bombifrons)*	

Vascular Plants

Smooth Buckwheat *(Eriogonum salsuginosum)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Swift Fox *(Vulpes velox)* SOC	Western Small-footed Myotis *(Myotis ciliolabrum)*

Big Brown Bat *(Eptesicus fuscus)*

White-footed Deermouse *(Peromyscus leucopus)*

Birds

Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC

Rock Pigeon *(Columba livia)*

Western Kingbird *(Tyrannus verticalis)*

Common Grackle *(Quiscalus quiscula)*

American Goldfinch *(Spinus tristis)*

Upland Sandpiper *(Bartramia longicauda)*

White-throated Swift *(Aeronautes saxatalis)*

Eastern Kingbird *(Tyrannus tyrannus)*

Bullock's Oriole *(Icterus bullockii)*

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC

Vascular Plants

Barr's Milkvetch *(Astragalus barrii)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28621
System Code	CES304.783, Inter-Mountain Basins Mat Saltbush Shrubland

ReGAP:
5203: Inter-Mountain Basins Mat Saltbush Shrubland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Barbour, Michael G. 2000. *North American terrestrial vegetation*. Cambridge: Cambridge University Press.
- Carlson, J. R., J. G. Schutz, and W. R. Oaks. 1983. Seed production technique of two chenopods: Gardner saltbush and winterfat. Pp. 191-195 in A. R. Tiedemann, E. D. McArthur, H. C. Stutz, R. Stevens, and K. C. Johnson, comps., Proc. Symposium on the Biology of Atriplex and related chenopods. USDA For. Serve Gen. Tech. Rep. INT-172. 309 pp.
- Clarke, S. E., E. W. Tisdale, and N. A. Skogland. 1943. The effects of climate and grazing practices on short grass prairie vegetation in southern Alberta and southwest Saskatchewan. Publ. #747, Technical Bulletin #46, Dept. of Agriculture, Ottowa, Canada.
- Frischknecht, N.C. and R.B. Ferguson. 1983. Performance of Chenopodiaceae species on processed oil shale. In A. R. Tiedemann, E. D. McArthur, H. C. Stutz, R. Stevens, and K. C. Johnson, comps., Proc. Symposium on the Biology of Atriplex and related chenopods. USDA For. Serve Gen. Tech. Rep. INT-172. 309 pp.
- West NE. 1982. Dynamics of plant communities dominated by chenopod shrubs. Internationl Journal and Ecology and Environmental Science(8):73-84.

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Citation for data on this website:
Mat Saltbush Shrubland — Inter-Mountain Basins Mat Saltbush Shrubland. Montana Field Guide. Montana Natural Heritage Program
Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=5203

Great Plains Mixedgrass Prairie



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State Rank Reason

This system has been fragmented by section roads, and isovergrazed in places, but it is widespread.

General Description

The system covers much of the eastern two-thirds of Montana, occurring continuously for hundreds of square kilometers, interrupted only by wetland/riparian areas or sand prairies. Soils are primarily fine and medium-textured. The growing season averages 115 days, ranging from 100 days on the Canadian border to 130 days on the Wyoming border. Climate is typical of mid-continental regions with long severe winters and hot summers. Grasses typically comprise the greatest canopy cover, and western wheatgrass (*Pascopyrum smithii*) is usually dominant. Other species include thickspike wheatgrass (*Elymus lanceolatus*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comata*). Near the Canadian border in north-central Montana, this system grades into rough fescue (*Festuca campestris)* and Idaho fescue (*Festuca idahoensis*) grasslands. Remnants of shortbristle needle and thread *(Hesperostipa curtiseta)* dominated vegetation are found in northernmost Montana and North Dakota, and are associated with productive sites, now mostly converted to farmland. Forb diversity is typically high. In areas of southeastern and central Montana where sagebrush steppe borders the mixed grass prairie, common plant associations include Wyoming big sagebrush-western wheatgrass (*Artemisia tridentata* ssp. *wyomingensis/ Pascopyrum smithii*). Fire and grazing are the primary drivers of this system. Drought can also impact it, in general favoring the shortgrass component at the expense of the mid-height grasses. With intensive grazing, cool season exotics such as Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), and Japanese brome (*Bromus japonicus*) increase in dominance; both of these rhizomatous species have been shown to markedly decrease species diversity. Previously cultivated acres that have been re-vegetated with non-native plants have been transformed into associations such as Kentucky bluegrass (*Poa pratensis*)/western wheatgrass *(Pascopyrum smithii)* or into pure crested wheatgrass (*Agropyron cristatum)* stands.

Diagnostic Characteristics

Glaciated, herbaceous, shallow soils, loam soil texture

Similar Systems

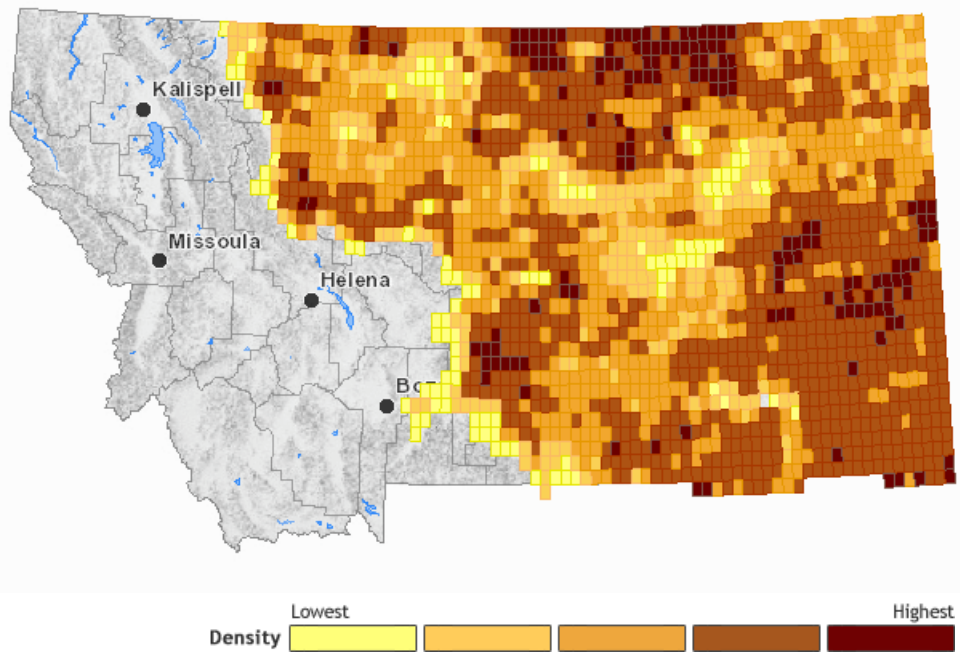
- Great Plains Sand Prairie
- Great Plains Shrubland

Range

This system is found throughout the eastern two-thirds of Montana where wetlands, sand prairie, lakes, and potholes are absent.

Ecological System Distribution

Approximately 69,178 square kilometers are classified as Great Plains Mixedgrass Prairie in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fallon, Fergus, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Meagher, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Matrix

Environment

This system is found on uplands, slopes, and creek bottoms throughout the northwestern Great Plains. Precipitation ranges from 250 to 460 millimeters (10 to 16 inches) with most of the precipitation occurring during late spring and early summer months. Soils are typically Mollisolls and Entisols. The growing season averages 115 days, and ranges from 100 days on the Canadian border to 130 days on the Wyoming border. Climate is typical of mid-continental regions with long severe winters and hot summers. Typical land uses are grazing or dry farming. Wildlife such as mule deer, sage grouse, pheasants, and antelope are common on uncultivated grasslands.

Vegetation

Dynamic vegetative communities make up this diverse prairie ecosystem. Vegetation is a mixture of mid and short grasses, generally having an average height of 30 centimeters (12 inches). Throughout the Montana portion of this system, rhizomatous western wheatgrass is the dominant component, especially on finer-textured soils and where the moisture balance is favorable. It decreases under prolonged or grazing regimes. Grasses were typically used by large herbivores such as bison, but since European settlement, herbivores such as cattle and sheep have been the primary users of the vegetation.

Near the Canadian border and at higher elevations with greater precipitation, this system grades into grasslands dominated by rough fescue and Idaho fescue. These two tussock grasses are indicative of more mesic sites and characterize the Rocky Mountain Lower Montane, Foothill and Valley Grassland system. In areas of southeastern Montana where the sagebrush steppe lands border the mixed grass prairie, common plant associations include silver sagebrush /western wheatgrass. In these border regions, shrub-loving wildlife such as antelope, mule deer, and sage grouse are common. Previously cultivated acres may have been re-vegetated by non-native plants creating associations such as Kentucky bluegrass/western wheatgrassand pure stands of crested wheatgrass. Sites with a strong component of green needlegrass indicate a more favorable moisture balance, although this is one of the most palatable of the mid-grasses. Needle and thread is also an important component; it increases with coarser soil textures, or under heavy grazing at the expense of western wheatgrass. Extreme overgrazing can result in the loss of western wheatgrass from the system, followed by drastic reductions in needle and thread and ultimately, the dominance of blue grama, Sandberg's bluegrass *(Poa secunda*), and prairie junegrass (*Koeleria macrantha*). Common forbs within this system include yarrow (*Achillea millefolium*), scarlet globemallow (*Sphaeralcea coccinea*), western sagewort, (*Artemisia ludoviciana*), boreal sagewort (*Artemisia frigida*), silver lupine (*Lupinus argenteus*), fuzzy beardtongue (*Penstemon eriantherus*), shining penstemon (*Penstemon nitidus*), prairie cinquefoil *(Potentilla gracilis*), Missouri goldenrod (*Solidago missouriensis*) anddalea (*Dalea* species). Shrub species may include western snowberry (*Symphoricarpos occidentalis),* serviceberry (*Amelanchier alnifolia*), shrubby cinquefoil (*Dasiphora fruticosa*), creeping juniper (*Juniperus horizontalis*), silver sage and Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0918 *Elaeagnus commutata* Wet Shrubland Alliance
- **CEGL001099** *Elaeagnus commutata - Pascopyrum smithii* Wet Shrubland

A3183 *Artemisia tridentata ssp. tridentata - Artemisia tridentata ssp. Xericensis* Mesic Steppe & Shrubland Alliance
- **CEGL001530** *Artemisia tridentata - Festuca idahoensis* Shrub Grassland

A3207 *Artemisia tridentata ssp. spiciformis - Artemisia tridentata ssp. Vaseyana* Steppe & Shrubland Alliance
- **CEGL001531** *Artemisia tridentata ssp. vaseyana - Festuca campestris* Shrub Grassland

A3586 *Artemisia cana ssp. Cana* Wet Shrubland Alliance
- **CEGL001556** *Artemisia cana ssp. cana - Pascopyrum smithii* Shrub Wet Meadow

A3815 *Calamagrostis canadensis - Calamagrostis stricta - Poa palustris* Wet Meadow Alliance
- **CEGL001659** *Poa palustris* Wet Meadow

A3963 *Amelanchier alnifolia* Central Rocky Mountain Montane-Foothill Shrubland Alliance
- **CEGL001065** *Amelanchier alnifolia - Pseudoroegneria spicata* / Bunchgrass Shrubland

A3986 *Festuca campestris - Festuca idahoensis* Mesic Grassland Alliance
- **CEGL001627** *Festuca campestris* Grassland
- **CEGL001629** *Festuca campestris / Pseudoroegneria spicata* Grassland
- **CEGL005875** *Festuca campestris / Festuca idahoensis* Grassland

A4029 *Hesperostipa curtiseta - Elymus lanceolatus* Grassland Alliance
- **CEGL002253** *Hesperostipa curtiseta / Elymus lanceolatus* Grassland
- **CEGL003789** *Hesperostipa curtiseta / Pascopyrum smithii* Grassland

A4031 *Pascopyrum smithii - Nassella viridula* Northwestern Great Plains Grassland Alliance
- **CEGL001579** *Pascopyrum smithii / Bouteloua gracilis / Carex filifolia* Grassland
- **CEGL001583** *Pascopyrum smithii / Nassella viridula* Grassland
- **CEGL002034** *Pascopyrum smithii / Hesperostipa comata* Central Mixedgrass Grassland

A4032 *Pseudoroegneria spicata - Pascopyrum smithii - Hesperostipa comata* Grassland Alliance
- **CEGL001663** *Pseudoroegneria spicata / Bouteloua curtipendula* Grassland
- **CEGL001664** *Pseudoroegneria spicata / Bouteloua gracilis* Grassland
- **CEGL001675** *Pseudoroegneria spicata / Pascopyrum smithii* Grassland

A4033 *Hesperostipa comata* Northwestern Great Plains Grassland Alliance
- **CEGL002037** *Hesperostipa comata / Bouteloua gracilis / Carex filifolia* Grassland

A4034 *Schizachyrium scoparium* Northwestern Great Plains Grassland Alliance
- **CEGL001682** *Schizachyrium scoparium / Carex inops ssp. Heliophila* Grassland
- **CEGL001683** *Schizachyrium scoparium / Muhlenbergia cuspidata* Grassland

A4035 *Juniperus horizontalis - Dasiphora fruticosa ssp. floribunda / Schizachyrium scoparium* Shrubland Alliance
- **CEGL001394** *Juniperus horizontalis - Schizachyrium scoparium* Dwarf-shrubland

A4036 *Prunus virginiana - Symphoricarpos occidentalis - Amelanchier alnifolia* Great Plains Shrubland Alliance
- **CEGL001131** *Symphoricarpos occidentalis* Shrubland

A4037 *Festuca idahoensis - Carex inops ssp. Heliophila* Great Plains Grassland Alliance
- **CEGL001610** *Festuca idahoensis / Carex inops ssp. Heliophila* Grassland

A4043 *Festuca altaica* Northern Great Plains Grassland Alliance

A4096 *Dasiphora fruticosa ssp. floribunda / Festuca campestris - Festuca idahoensis* Shrub-steppe Alliance
- **CEGL001502** *Dasiphora fruticosa ssp. floribunda - Festuca idahoensis* Shrub Grassland
- **CEGL001503** *Dasiphora fruticosa ssp. floribunda - Festuca campestris* Shrub Grassland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Historically, frequent indigenous anthropogenic fires and large numbers of migrating bison and other herbivores contributed to plant species and plant community diversity within this system. In the Northern Great Plains, pre-settlement

fire frequency occurred at intervals ranging from 3 to 20 years (Umbanhowar, 1996). The elimination of bison and frequent fire intervals disrupted plant community dynamics, leading to a decrease in plant community diversity.

Communities associated with this ecological system are adapted to soils that may be dry throughout the growing season. They may also occur on shallow soils, particularly Entisols, with parent material and/or bedrock formation close to the surface. Plant communities occurring on Entisols may be drought tolerant, grazing resistant, and winter hardy. Deep-rooted communities are more generally associated with Mollisols. Typically, these communities are tolerant of managed grazing practices, moderate-intensity fires, and fallowed wheat-cropping practices. Prolonged, extreme drought is a major threat to this system, reducing the density and cover of short grasses by as much as 80 percent and the bunchgrasses and native forbs to almost zero (Albertson, 1937). During prolonged drought, native forbs are rapidly replaced by non-native invasive forbs. During the severe droughts of the 1930's and 1950's, basal area cover of grasses decreased from 80 to less than 10 percent under moderate grazing regimes in 3 to 5 years (Barbour and Billings, 2000). In short, the dynamics of species changes in this system is a function of climate, but the magnitude of these changes is greatly influenced by the intensity of grazing and fire frequency.

Management

Mixed grass prairie regions that have been disturbed by previous cultivation or over-grazing may support large numbers of invasive or non-native plant species. Control of these species can occur through managed grazing practices, chemicals, or biological mechanisms such as insects or fire. In the absence of fire, regions of the mixed grass prairie may be susceptible to woody plant or cacti invasion. Controlled burning practices every four years can control plant expansion. Landowners looking to manage for wildlife may choose to burn less often than livestock managers, promoting availability of woody vegetation for wildlife species.

Restoration Considerations

Restoration strategies for this system will depend on site condition; occurrences in good condition can be restored by re-introducing prescribed fires. Periodic prescribed fires in late spring can improve productivity, contribute to species diversity and prevent encroachment of shrub communities, especially Wyoming sagebrush. Prescribed fires and appropriate grazing practices are important restoration tools to improve mixed grass prairie production and contribute to plant community diversity.

Occurrences that are severely degraded, formerly cultivated or reseeded to non-native species will require a combination of restoration techniques to create suitable conditions for native species establishment and natural recruitment. Some restoration sites may require the reintroduction of native dominant grass and forb species. In the past, large areas of this system have been planted to non-native grasses such as crested wheatgrass and smooth brome for farmland reclamation and erosion control. This has resulted in decreased mixed grass prairie species diversity and a reduced ability of native species to colonize and compete on these disturbed, reclaimed sites. Site preparation will requirenoxious species eradication and control for at least 2 seasons before and after reseeding. Pre-restoration techniques are largely accomplished by a combination of fall burning, tilling and in some cases, herbicide applications and addition of nitrogen. Native seedling density has been shown to be 20 times greater when a combination of these techniques is used (Wilson and Gerry, 1994).

Site preparation should involve soil disking techniques that discourage uniform soils and seed beds. Feathering and smoothing topsoil may not be appropriate in rough fescue grassland. Uniform soils may benefit invasive species such as Kentucky bluegrass and smooth brome, while roughened conditions may inhibit their growth, allowing rough fescue and its associated grasses to establish more readily (Desserud, 2006). Increasing the intensity of tilling has increased native species density and establishment (Wilson and Gerry, 1994).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana

covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Eastern Red Bat *(Lasiurus borealis)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Pallid Bat *(Antrozous pallidus)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC	Hispid Pocket Mouse *(Chaetodipus hispidus)* SOC
Swift Fox *(Vulpes velox)* SOC	Black-footed Ferret *(Mustela nigripes)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC	Prairie Shrew *(Sorex haydeni)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Eastern Cottontail *(Sylvilagus floridanus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Desert Cottontail *(Sylvilagus audubonii)*
White-tailed Jackrabbit *(Lepus townsendii)*	Least Chipmunk *(Neotamias minimus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*	Northern Pocket Gopher *(Thomomys talpoides)*
Olive-backed Pocket Mouse *(Perognathus fasciatus)*	Ord's Kangaroo Rat *(Dipodomys ordii)*
Western Harvest Mouse *(Reithrodontomys megalotis)*	North American Deermouse *(Peromyscus maniculatus)*
White-footed Deermouse *(Peromyscus leucopus)*	Northern Grasshopper Mouse *(Onychomys leucogaster)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Greater Sage-Grouse *(Centrocercus urophasianus)* SOC	Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Mountain Plover *(Anarhynchus montanus)* SOC	Long-billed Curlew *(Numenius americanus)* SOC
Burrowing Owl *(Athene cunicularia)* SOC	Sprague's Pipit *(Anthus spragueii)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC	Baird's Sparrow *(Centronyx bairdii)* SOC
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC	Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC	Short-eared Owl *(Asio flammeus)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Eastern Bluebird *(Sialia sialis)* PSOC	Dickcissel *(Spiza americana)* PSOC

Northern Pintail *(Anas acuta)*
Blue-winged Teal *(Spatula discors)*
Cinnamon Teal *(Spatula cyanoptera)*
Northern Shoveler *(Spatula clypeata)*
Gadwall *(Mareca strepera)*
Lesser Scaup *(Aythya affinis)*
Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*
Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*
Prairie Falcon *(Falco mexicanus)*
Black-bellied Plover *(Pluvialis squatarola)*
Killdeer *(Charadrius vociferus)*
Willet *(Tringa semipalmata)*
Upland Sandpiper *(Bartramia longicauda)*
Marbled Godwit *(Limosa fedoa)*
Sanderling *(Calidris alba)*
Baird's Sandpiper *(Calidris bairdii)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Snowy Owl *(Bubo scandiacus)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
Say's Phoebe *(Sayornis saya)*
Western Kingbird *(Tyrannus verticalis)*
Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*
Purple Martin *(Progne subis)*
Tree Swallow *(Tachycineta bicolor)*
Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Bank Swallow *(Riparia riparia)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*
Black-billed Magpie *(Pica hudsonia)*
Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*
Rock Wren *(Salpinctes obsoletus)*
Northern House Wren *(Troglodytes aedon)*
Mountain Bluebird *(Sialia currucoides)*
European Starling *(Sturnus vulgaris)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Field Sparrow *(Spizella pusilla)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Sparrow *(Chondestes grammacus)*
Lark Bunting *(Calamospiza melanocorys)*
Savannah Sparrow *(Passerculus sandwichensis)*
Grasshopper Sparrow *(Ammodramus savannarum)*
Lapland Longspur *(Calcarius lapponicus)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*
Lesser Goldfinch *(Spinus psaltria)*
American Goldfinch *(Spinus tristis)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*
North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*
Common Gartersnake *(Thamnophis sirtalis)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Western Tiger Salamander *(Ambystoma mavortium)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Boreal Chorus Frog *(Pseudacris maculata)*
Plains Spadefoot *(Spea bombifrons)*

Vascular Plants

Ovalleaf Milkweed *(Asclepias ovalifolia)* SOC
Scribner's Ragwort *(Senecio integerrimus var. scribneri)* SOC
Prairie Goldenrod *(Solidago ptarmicoides)* SOC
Woolly Twinpod *(Physaria didymocarpa var. lanata)* SOC
Pale-spiked Lobelia *(Lobelia spicata)* SOC
Bush morning-glory *(Ipomoea leptophylla)* SOC
Lead Plant *(Amorpha canescens)* SOC
Raceme Milkvetch *(Astragalus racemosus)* SOC
Nine-anther prairie clover *(Dalea enneandra)* SOC
Little Indian Breadroot *(Pediomelum hypogaeum var. hypogaeum)* PSOC

Native Species Occasionally Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
White-tailed Prairie Dog *(Cynomys leucurus)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Northern Short-tailed Shrew *(Blarina brevicauda)* PSOC
Northern Montane Shrew *(Sorex obscurus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
American Black Bear *(Ursus americanus)*
Bighorn Sheep *(Ovis canadensis)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
LeConte's Sparrow *(Ammospiza leconteii)* SOC
Nelson's Sparrow *(Ammospiza nelsoni)* SOC
Chimney Swift *(Chaetura pelagica)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
American Wigeon *(Mareca americana)*
Mallard *(Anas platyrhynchos)*
Cooper's Hawk *(Accipiter cooperii)*
Peregrine Falcon *(Falco peregrinus)*
Wild Turkey *(Meleagris gallopavo)*
Lesser Yellowlegs *(Tringa flavipes)*
Ring-billed Gull *(Larus delawarensis)*
California Gull *(Larus californicus)*
Rock Pigeon *(Columba livia)*
American Barn Owl *(Tyto furcata)*
White-throated Swift *(Aeronautes saxatalis)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Northern Flicker *(Colaptes auratus)*
American Robin *(Turdus migratorius)*
Brown Thrasher *(Toxostoma rufum)*
Northern Shrike *(Lanius borealis)*
Lazuli Bunting *(Passerina amoena)*

Indigo Bunting *(Passerina cyanea)*
Chipping Sparrow *(Spizella passerina)*
White-throated Sparrow *(Zonotrichia albicollis)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Orchard Oriole *(Icterus spurius)*
Bullock's Oriole *(Icterus bullockii)*
Redpoll *(Acanthis flammea)*
Spotted Towhee *(Pipilo maculatus)*
Song Sparrow *(Melospiza melodia)*
Harris's Sparrow *(Zonotrichia querula)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Baltimore Oriole *(Icterus galbula)*
House Finch *(Haemorhous mexicanus)*

Invertebrates

Eyed Brown *(Lethe eurydice)* PSOC
Purplish Copper *(Tharsalea helloides)*
Common Wood-Nymph *(Cercyonis pegala)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Woodland Skipper *(Ochlodes sylvanoides)*
Greenish Blue *(Icaricia saepiolus)*
Wandering Glider *(Pantala flavescens)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Autumn Meadowhawk *(Sympetrum vicinum)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28531
System Code	CES303.674, Northwestern Great Plains Mixedgrass Prairie

National Land Cover Dataset:
71: Grassland/Herbaceous

ReGAP:
7114: Northwestern Great Plains Mixedgrass Prairie

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Barbour, Michael G. 2000. *North American terrestrial vegetation*. Cambridge: Cambridge University Press.
- Desserud, Peggy Ann. 2006. *Restoration of rough fescue grassland on pipelines in southwestern Alberta*. Lethbridge, Alta: Alberta Sustainable Resource Development, Rangeland Management Branch, Public Lands and Forests Division.
- Erickson, Albert W., and D. B. Siniff. 1963. *A statistical evaluation of factors influencing aerial survey results on brown bears*. Anchorage, Alaska: Alaska Department of Fish and Game.
- Albertson, F. W. 1937. "Ecology of Mixed Prairie in West Central Kansas". *Ecological Monographs.* 7 (4): 481-547.
- Comer, P. (editor), L. Allen, S. Cooper, D. Faber-Langendoen, and G. Jones. 1999. Selected shrubland and grassland communities of the northern Great Plains. Report to the Nebraska National Forest. The Nature Conservancy.
- Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.
- Montana chapter of the wildlife society. 1976. Proceedings of the annual meeting.
- Umbanhowar, Charles Edward. 1996. "Recent Fire History of the Northern Great Plains". *American Midland Naturalist.* 135 (1): 115-121.
- Wilson, S. D., and A. K. Gerry. 1995. 'Strategies for Mixed-Grass Prairie Restoration: Herbicide, Tilling, and Nitrogen Manipulation'. *Restoration Ecology.* 3 (4): 290-298.

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Great Plains Sand Prairie

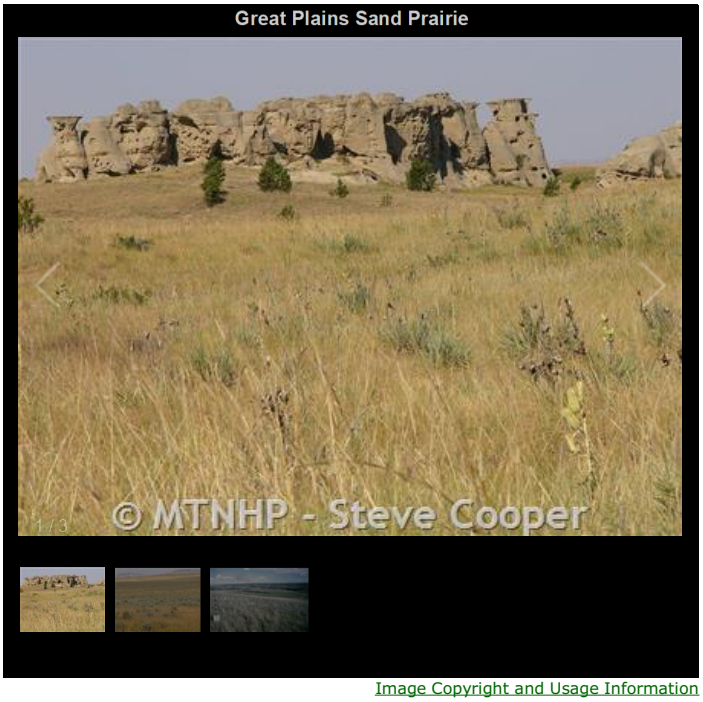


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Provisional State Rank: S4
(see reason below)

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State Rank Reason

The land cover classification may overstate the range of true sand prairie, as silver sagebrush communities, which are widespread, are currently included in this system. If they were to be classified separately, the area of occupancy would decrease dramatically

General Description

The sand prairies constitute a very unique system within the western Great Plains. The unifying and controlling feature for this system is that coarse-textured soils predominate and the dominant grasses are well-adapted to this condition. In the northwestern portion of the system's range, stand size corresponds to the area of exposed caprock sandstone, and small patches predominate, but larger patches are found embedded in the encompassing Great Plains Mixed Grass Prairie, and usually occupy higher positions in local landscapes where former caprock formations have eroded into more subdued and planar topography. In most of eastern Montana, substrates supporting this system have weathered in place from sandstone caprock. Soils can be relatively thin or deep due to varying amounts of downslope movement of weathered sands. Needle and thread (*Hesperostipa comata*) is the dominant grass species. Other frequent species include little bluestem (*Schizachyrium scoparium*), often occurring with threadleaf sedge (*Carex filifolia*) and dominating both sandy sites and actively eroding sites. Prairie sandreed (*Calamovilfa longifolia*), sand bluestem (*Andropogon hallii*) and big bluestem (*Andropogon gerardii*) are sporadically distributed and found generally on the coarsest-textured sands. Other graminoids include bluebunch wheatgrass (*Pseudoroegneria spicata*), sun sedge (*Carex inops ssp. heliophila*), and purple threeawn (*Aristida purpurea*). Characteristic forbs differ by occurrence, but species of scurf pea (*Psoralidium* species) and Indian breadroot (*Pediomelum*) species are common. Communities of silver sage (*Artemisia cana* ssp. *cana*) or skunkbush sumac (*Rhus trilobata*) can occur within this system. Wind erosion, fire and grazing constitute the other major dynamic processes that can influence this system.

Diagnostic Characteristics

herbaceous, lowland, sand soil texture, *Calamovilfa longifolia, Hesperostipa comata*

Similar Systems

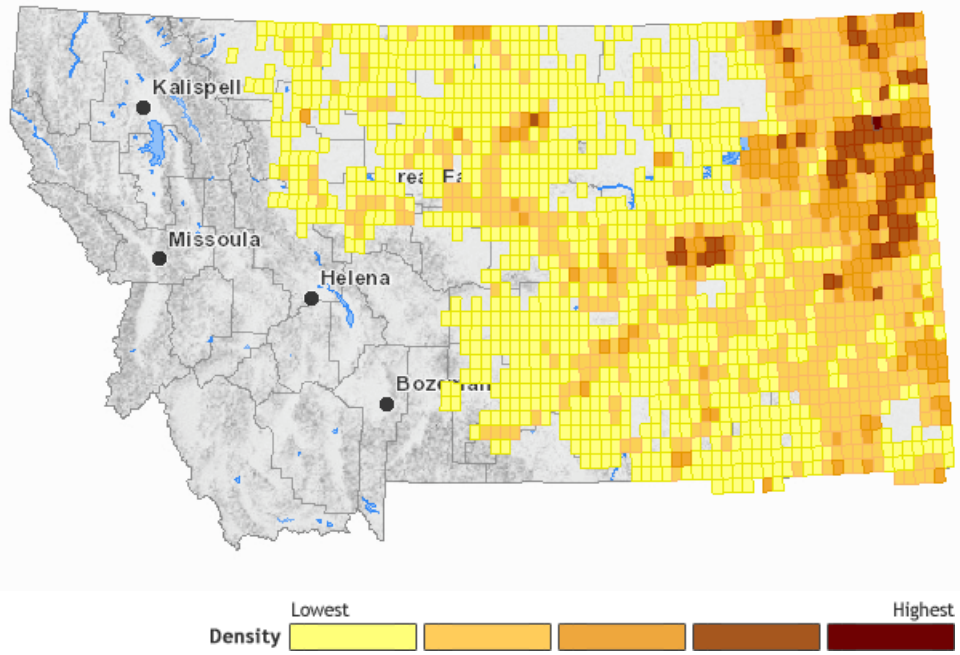
- Great Plains Mixedgrass Prairie

Range

This system is found throughout the Western Great Plains. The largest and most intact example of this system is found within the Sandhills region of Nebraska and South Dakota. However, it is also common (though occurring in predominantly small patches) farther west into central and eastern Montana. Small occurrences of this system are found even further west along the Rocky Mountain Front.

Ecological System Distribution

Approximately 10,305 square kilometers are classified as Great Plains Sand Prairie in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fallon, Fergus, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Meagher, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Large or Small Patch

Environment

The distribution, species richness and productivity of plant species within the sand prairie ecological system are controlled primarily by environmental conditions, in particular the temporal and spatial distribution of soil moisture and topography. Soils in the sand prairies can be relatively undeveloped and are highly permeable. Soil texture and drainage, along with a species' rooting morphology, photosynthetic physiology, and mechanisms to avoid transpiration loss, determine the composition and distribution of communities/associations within the sand prairies. Soils are also susceptible to wind erosion. Blowouts and sand draws are some of the unique wind-driven disturbances in the sand prairies, which can profoundly impact vegetation composition and succession within this system. In most of eastern Montana, substrates supporting this system have weathered in place from sandstone caprock; thus the solum is relatively thin, and the wind-sculpted features that are present further east, particularly in Nebraska, do not develop. Graminoid species dominate the sand prairies, although relative dominance can change due to impacts of wind disturbance.

This system is found primarily on sandy and sandy loam soils, generally in areas with a rolling topography, although it can occur on ridges, midslopes and/or lowland areas within a region. In Montana, occurrences are associated with the Great

Plains Mixed Grass Prairie, usually occupying higher positions in local landscapes, because sandy members of predominantly marine shale formations constitute the highest and most weathering-resistant points in the landscape.

Vegetation

Needle and thread is the dominant graminoid within this system, regardless of disturbance, and is found on sands and, to a lesser extent. on sandy loams. This species increases in cover with disturbance relative to other graminoids. Prairie sandreed is the only other robust graminoid occurring in abundance and is usually associated with the coarse-textured substrates, becoming nearly a monospecific dominant on sands. Other graminoids such as sun sedge, threadleaf sedge, sand bluestem, little bluestem and big bluestem may be present. Big bluestem and sand bluestem are found only as small patch occurrences in easternmost Montana. Little bluestem occurs preferentially on sites derived from sandstone or porcellanite.

Many of the warm-season graminoids such as western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), Sandberg's bluegrass *(Poa secunda*), prairie junegrass (*Koeleria macrantha*) and threadleaf sedge extend to the Rocky Mountain Front occurrences as dominant components on appropriate sites or as a response to disturbance (Kudray and Cooper 2006).

Characteristic forbs differ by region, but species of scurf pea and Indian breadroot are common. Narrowleaf purple coneflower (*Echinacea angustifolia*) can occur on sandy sites. Very diffuse patches of skunkbush sumac andhorizontal juniper (*Juniperus horizontalis*) are found on shallow sandy soils, often associated with breaklands. Other shrubs occasionally found within this system include silver sage. Soapweed yucca (*Yucca glauca*) occurs on sandy upland sites and bottomlands, but usually with less than 15 % cover. In some cases, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) occurs within or adjacent to this system.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1193 *Andropogon hallii* Sand Prairie Alliance
- **CEGL001466** *Andropogon hallii / Carex inops ssp. Heliophila* Grassland
- **CEGL001467** *Andropogon hallii / Calamovilfa longifolia* Grassland

A1201 *Calamovilfa longifolia* Sand Prairie Alliance
- **CEGL001457** *Rhus trilobata / Calamovilfa longifolia* Shrub Grassland
- **CEGL001471** *Calamovilfa longifolia / Carex inops ssp. Heliophila* Grassland
- **CEGL001473** *Calamovilfa longifolia / Hesperostipa comata* Grassland

A1262 *Achnatherum hymenoides - Pseudoroegneria spicata - Muhlenbergia pungens* Grassland Alliance
- **CEGL001674** *Pseudoroegneria spicata / Achnatherum hymenoides* Grassland

A1540 *Yucca glauca* Prairie Scrub Alliance
- **CEGL002675** *Yucca glauca - Calamovilfa longifolia* Shrub Grassland

A3586 *Artemisia cana ssp. Cana* Wet Shrubland Alliance
- **CEGL001553** *Artemisia cana ssp. cana - Hesperostipa comata* Shrub Wet Meadow

A3964 *Rhus glabra - Rhus trilobata* Central Rocky Mountain Montane-Foothill Shrubland Alliance
- **CEGL001120** *Rhus trilobata - Pseudoroegneria spicata* Shrub Grassland

A3987 *Festuca idahoensis - Pseudoroegneria spicata - Poa secunda* Dry Grassland Alliance
- **CEGL001679** *Pseudoroegneria spicata / Hesperostipa comata* Grassland

A4028 *Andropogon gerardii - Sorghastrum nutans* Mixedgrass Western Plains Grassland Alliance

A4033 *Hesperostipa comata* Northwestern Great Plains Grassland Alliance
- **CEGL001700** *Hesperostipa comata / Carex filifolia* Grassland
- **CEGL002037** *Hesperostipa comata / Bouteloua gracilis / Carex filifolia* Grassland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

The distribution, species richness and productivity of plant species within the sand prairie ecological system are controlled primarily by environmental conditions, in particular the temporal and spatial distribution of soil moisture and topography. Another important aspect of this system is its susceptibility to wind erosion. Blowouts and sand draws can impact vegetation composition and succession within this system; fire and grazing constitute the other major disturbances. Overgrazing, fire and trampling that leads to the removal of vegetation in areas susceptible to blowouts can either instigate a blowout or perpetuate blowouts occurring within the system. Overgrazing can also lead to significant erosion.

Management

Grazing should be managed to avoid instigation and perpetuation of blowouts and vegetation loss within this system. Prescribed fires can also be used to enhance, maintain and restore this system.

Restoration Considerations

In addition to reestablishing ecological processes such as prescribed fire, some restoration sites may require the reintroduction of native dominant grass species such as prairie sandreed, sand bluestem and needle and thread. Restoration efforts should utilize seed sources collected from nearby sand prairie remnants to augment and maintain genetic diversity of isolated, remnant plant populations.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Pallid Bat *(Antrozous pallidus)* SOC	Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Hispid Pocket Mouse *(Chaetodipus hispidus)* SOC	Black-footed Ferret *(Mustela nigripes)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC	Spotted Bat *(Euderma maculatum)* PSOC
Meadow Jumping Mouse *(Zapus hudsonius)* PSOC	Masked Shrew *(Sorex cinereus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Eastern Cottontail *(Sylvilagus floridanus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Desert Cottontail *(Sylvilagus audubonii)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*	Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Ord's Kangaroo Rat *(Dipodomys ordii)*	Western Harvest Mouse *(Reithrodontomys megalotis)*
North American Deermouse *(Peromyscus maniculatus)*	Northern Grasshopper Mouse *(Onychomys leucogaster)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*

Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*
Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*
American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*
Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC
Golden Eagle *(Aquila chrysaetos)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC
Baird's Sparrow *(Centronyx bairdii)* SOC
Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Eastern Bluebird *(Sialia sialis)* PSOC
Dickcissel *(Spiza americana)* PSOC
Gadwall *(Mareca strepera)*
Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*
Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*
Prairie Falcon *(Falco mexicanus)*
Black-bellied Plover *(Pluvialis squatarola)*
Killdeer *(Charadrius vociferus)*
Upland Sandpiper *(Bartramia longicauda)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Snowy Owl *(Bubo scandiacus)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
Say's Phoebe *(Sayornis saya)*
Western Kingbird *(Tyrannus verticalis)*
Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*
Purple Martin *(Progne subis)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Bank Swallow *(Riparia riparia)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*
American Crow *(Corvus brachyrhynchos)*
Rock Wren *(Salpinctes obsoletus)*
Northern House Wren *(Troglodytes aedon)*
European Starling *(Sturnus vulgaris)*
American Tree Sparrow *(Spizelloides arborea)*
Field Sparrow *(Spizella pusilla)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Sparrow *(Chondestes grammacus)*
Lark Bunting *(Calamospiza melanocorys)*
Grasshopper Sparrow *(Ammodramus savannarum)*
Lapland Longspur *(Calcarius lapponicus)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*
Lesser Goldfinch *(Spinus psaltria)*
American Goldfinch *(Spinus tristis)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*
North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*
Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Boreal Chorus Frog *(Pseudacris maculata)*
Plains Spadefoot *(Spea bombifrons)*

Vascular Plants

Narrowleaf Milkweed *(Asclepias stenophylla)* SOC
Fendler Cat's-eye *(Cryptantha fendleri)* SOC
Silver Bladderpod *(Physaria ludoviciana)* SOC
Smooth Goosefoot *(Chenopodium subglabrum)* SOC
Nine-anther prairie clover *(Dalea enneandra)* SOC
Silky prairie clover *(Dalea villosa)* SOC
Sand Cherry *(Prunus pumila)* SOC
Narrowleaf Penstemon *(Penstemon angustifolius)* SOC
Large Flowered Beardtongue *(Penstemon grandiflorus)* SOC
Schweinitz's Flatsedge *(Cyperus schweinitzii)* SOC
Little Indian Breadroot *(Pediomelum hypogaeum var. hypogaeum)* PSOC
Plains Phlox *(Phlox andicola)* PSOC

Native Species Occasionally Associated with this Ecological System

Mammals

Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC
Swift Fox *(Vulpes velox)* SOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Northern Pocket Gopher *(Thomomys talpoides)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Greater Sage-Grouse *(Centrocercus urophasianus)* SOC
Long-billed Curlew *(Numenius americanus)* SOC
Burrowing Owl *(Athene cunicularia)* SOC
Sprague's Pipit *(Anthus spragueii)* SOC
Chimney Swift *(Chaetura pelagica)* PSOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Northern Shoveler *(Spatula clypeata)*
Marbled Godwit *(Limosa fedoa)*
Rock Pigeon *(Columba livia)*
White-throated Swift *(Aeronautes saxatalis)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Northern Flicker *(Colaptes auratus)*
Violet-green Swallow *(Tachycineta thalassina)*
Black-billed Magpie *(Pica hudsonia)*
Common Raven *(Corvus corax)*
Mountain Bluebird *(Sialia currucoides)*
American Robin *(Turdus migratorius)*

Brown Thrasher *(Toxostoma rufum)*
Indigo Bunting *(Passerina cyanea)*
Chipping Sparrow *(Spizella passerina)*
Savannah Sparrow *(Passerculus sandwichensis)*
Harris's Sparrow *(Zonotrichia querula)*
Orchard Oriole *(Icterus spurius)*
Bullock's Oriole *(Icterus bullockii)*
Redpoll *(Acanthis flammea)*
Northern Shrike *(Lanius borealis)*
Spotted Towhee *(Pipilo maculatus)*
Clay-colored Sparrow *(Spizella pallida)*
White-throated Sparrow *(Zonotrichia albicollis)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Baltimore Oriole *(Icterus galbula)*
House Finch *(Haemorhous mexicanus)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Invertebrates

Greenish Blue *(Icaricia saepiolus)*
Wandering Glider *(Pantala flavescens)*
Common Wood-Nymph *(Cercyonis pegala)*
White-faced Meadowhawk *(Sympetrum obtrusum)*

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Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28527
System Code	CES303.670, Western Great Plains Sand Prairie

National Land Cover Dataset:
71: Grassland/Herbaceous

ReGAP:
7121: Western Great Plains Sand Prairie

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Erickson, Albert W., and D. B. Siniff. 1963. *A statistical evaluation of factors influencing aerial survey results on brown bears*. Anchorage, Alaska: Alaska Department of Fish and Game.
- Breckenridge, W. J. 1944. Reptiles and Amphibians of Minnesota. Univ. Minnesota Press, Minneapolis. 202 pp.
- Comer, P. (editor), L. Allen, S. Cooper, D. Faber-Langendoen, and G. Jones. 1999. Selected shrubland and grassland communities of the northern Great Plains. Report to the Nebraska National Forest. The Nature Conservancy.
- Kudray, G.M. and S.V. Cooper. 2006. Montana's Rocky Mountain Front: Vegetation Map and Type Descriptions. Report to the United States Fish and Wildlife Service. Montana Natural Heritage Program, Helena, Montana. 26 pp. plus appendices.

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Citation for data on this website:
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Rocky Mountain Lower Montane, Foothill, and Valley Grassland

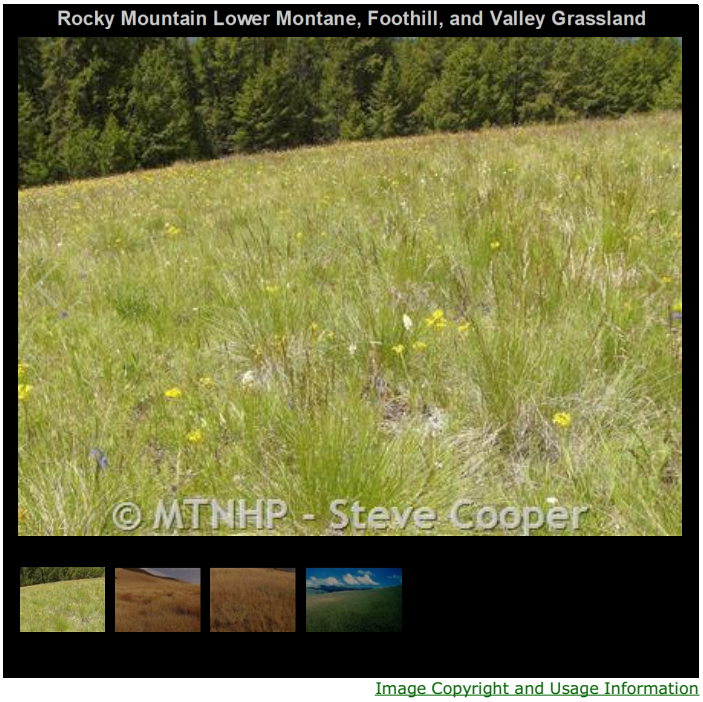


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General Description

This grassland system of the northern Rocky Mountains is found at lower montane to foothill elevations in mountains and valleys throughout Montana. These grasslands are floristically similar to Big Sagebrush Steppe but are defined by shorter summers, colder winters, and young soils derived from recent glacial and alluvial material. They are found at elevations from 548 - 1,650 meters (1,800-5,413 feet). In the lower montane zone, they range from small meadows to large open parks surrounded by conifers; below the lower treeline, they occur as extensive foothill and valley grasslands. Soils are relatively deep, fine-textured, often with coarse fragments, and non-saline. Microphytic crust may be present in high-quality occurrences. This system is typified by cool-season perennial bunch grasses and forbs (>25%) cover, with a sparse shrub cover (<10%). Rough fescue (*Festuca campestris*) is dominant in the northwestern portion of the state and Idaho fescue (*Festuca idahoensis*) is dominant or co-dominant throughout the range of the system. Bluebunch wheatgrass (*Pseudoroegneria spicata*) occurs as a co-dominant throughout the range as well, especially on xeric sites. Western wheatgrass (*Pascopyrum smithii*) is consistently present, often with appreciable coverage (>10%) in lower elevation occurrences in western Montana and virtually always present, with relatively high coverages (>25%), on the edge of the Northwestern Great Plains region. Species diversity ranges from a high of more than 50 per 400 square meter plot on mesic sites to 15 (or fewer) on xeric and disturbed sites. Most occurrences have at least 25 vascular species present. Farmland conversion, noxious species invasion, fire suppression, heavy grazing and oil and gas development are major threats to this system.

Diagnostic Characteristics

Cool season bunchgrasses, foothill and montane elevations, ustic, loam to silt soils, herbaceous cover greater than 25%, shrub cover less than 10%, graminoid cover greater than 25%

Similar Systems

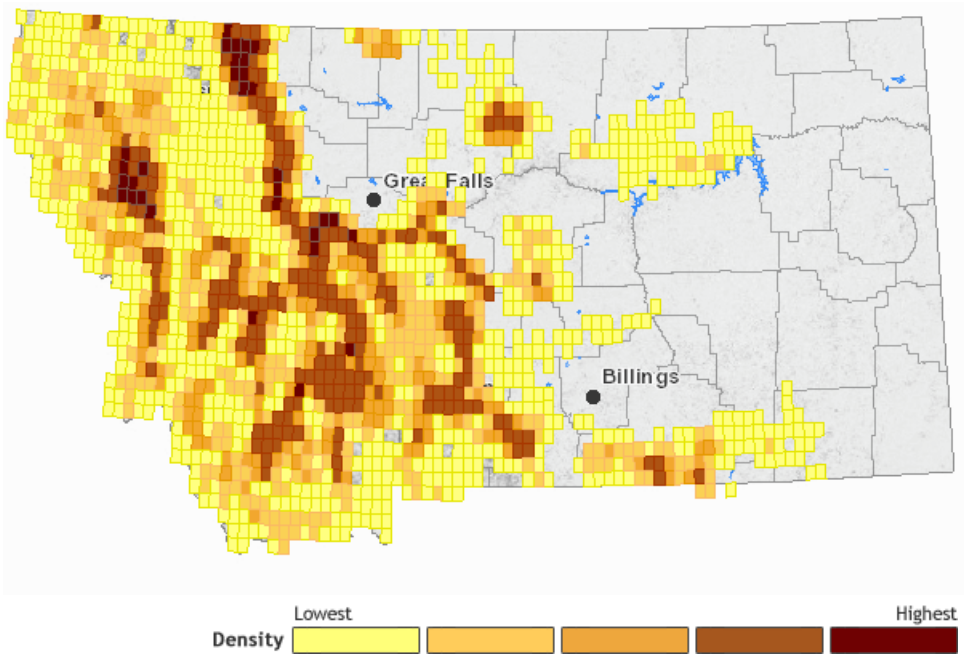
- Big Sagebrush Steppe
- Rocky Mountain Subalpine-Upper Montane Grassland

Range

In Montana, this system is found in the Bitterroot, Missoula, Mission, and Flathead valleys of western Montana, the North Fork of the Flathead River in Glacier National Park and the Tobacco Plains north of Eureka in northwestern Montana. East of the Continental Divide, this system in well represented on the Blackfeet Indian Reservation from the Alberta border and at lower elevations along the eastern edge of Glacier National Park south along the Rocky Mountain Front to west-central Montana and east to island mountain ranges. It also occurs in the Northwestern Great Plains of Montana at the highest elevations, generally above 1280 meters (4,200 feet) on mesas, buttes and high plateaus. In its broader geographic range, it occurs throughout the southern interior and southern portion of the Fraser Plateau, as well as the valleys around the Fraser River in the Pavilion Ranges, the Nicola River, and the Similkameen River in British Columbia, northwestern Wyoming, and west through Idaho into the Blue Mountains of northeastern Oregon.

Ecological System Distribution

Approximately 20,315 square kilometers are classified as Rocky Mountain Lower Montane, Foothill, and Valley Grassland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Phillips, Pondera, Powder River, Powell, Ravalli, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Valley, Wheatland, Yellowstone

Spatial Pattern

Large patch

Environment

This fescue-dominated grassland is transitional between the mixed grass prairie and montane/subalpine grasslands occurring adjacent to or within forested habitats. In northern Montana, it is often associated with aspen parkland. Rough fescue (*Festuca campestris*) and Idaho fescue (*Festuca idahoensis*) are the dominants in northwestern Montana. To the west, this system grades into Palouse prairie in northern Idaho and contains many of the same species. Average precipitation ranges from 292-406 millimeters (11.5 to 16.5 inches). Mean temperatures increase on the eastern edge of this system. Where it occurs within glaciated landscapes, numerous pothole wetlands and other wetland systems are found, often characterized by a perimeter of willow (*Salix* species).

In northwestern and west-central Montana, this ecosystem forms in openings in Douglas-fir (*Pseudotsuga menziesii*) and

ponderosa pine (*Pinus ponderosa*) forests, and in intermountain and mountain valleys and big sagebrush (*Artemisia tridentata*) shrublands. East of the Continental Divide, this system is found along valley bottoms and steep canyon slopes at montane elevations along the Rocky Mountain Front to west-central Montana. Rolling uplands and undulating plains are typical topography east of the Continental Divide, from the Alberta border south along the Rocky Mountain Front and east where this system merges with mixed prairie grassland. Much of this area is cultivated. Black Chernozems are the dominant soils, reflecting moister, cooler conditions and the incorporation of relatively high amounts of organic matter.

Vegetation

In Montana, two plant communities dominate this system: 1) Rough Fescue - Idaho Fescue, found on moister sites such as the north- and east-facing slopes in foothills and swales in the northwestern edge of the Great Plains and valley bottoms with deeper soils; and 2) Bluebunch Wheatgrass - Idaho Fescue, found on drier sites such as ridges, hilltops, and south- and west-facing slopes in the foothills and on level sites with sharply drained glacial-till soils.

On pristine, moist sites, rough fescue can form a nearly continuous cover, interspersed with Idaho fescue and the rhizomatous ecotype of bluebunch wheatgrass. Other graminoids include western needlegrass (*Achnatherum occidentale*), Richardson's needlegrass (*Achnatherum richardsonii*), oatgrass (*Danthonia* species), prairie junegrass (*Koeleria macrantha*), Sandberg's bluegrass (*Poa secunda*), western wheatgrass (*Pascopyrum smithii*), thickspike wheatgrass (*Elymus lanceolatus*), basin wildrye (*Leymus cinereus*), and Liddon sedge (*Carex petasata*). These moister sites support a forb- rich community that includes species such as arrowleaf balsamroot (*Balsamorhiza sagittata*), yarrow (*Achillea millefolium*), silky lupine (*Lupinus sericeus*), sticky geranium (*Geranium viscossisimum*), nine-leaf biscuitroot (*Lomatium triternatum*), sticky cinquefoil (*Potentilla glandulosa*), prairie cinquefoil (*Potentilla gracilis*), sulphur penstemon (*Penstemon confertus*), little larkspur (*Delphinium bicolor*), crazyweed (*Oxytropis* species), prairie gentian (*Gentiana affinis*), wild strawberry (*Fragaria virginiana*), and Indian paintbrush (*Castilleja* species).

Shrub cover is usually less than 10 percent and includes species such as shrubby cinquefoil (*Dasiphora fruticosa*), Woods' rose (*Rosa woodsii*), snowberry (*Symphoricarpos* species), and common juniper (*Juniperus communis*). Serviceberry (*Amelanchier alnifolia*), Douglas hawthorn (*Crataegus douglasii*), and common chokecherry (*Prunus virginiana*) often occur as patches on north-facing slopes of foothills where snow persists longer into the growing season.

On drier sites dominated by Idaho fescue and the bunchgrass ecotype of bluebunch wheatgrass, common forbs include yarrow, Indian blanketflower (*Gaillardia aristata)*, boreal bedstraw (*Galium boreale*), prairie smoke (*Geum triflorum*), prairie arnica (*Arnica sororia*), rosy pussytoes (*Antennaria microphylla*), prairie cinquefoil*,* silver lupine (*Lupinus argenteus*)*,* silky lupine,early biscuitroot (*Lomatium macrocarpum*)*,* alyssum leaf phlox (*Phlox alyssifolia*), Hood's phlox (*Phlox hoodii*), gayfeather (*Liatris punctata*), stoneseed (*Lithospermum ruderale*), buckwheat (*Eriogonum species*), fuzzytongue penstemon (*Penstemon eriantherus*), Missouri goldenrod (*Solidago missouriensis*)*,* crazyweed (*Oxytropis species*), alumroot (*Huechera species*), prairie crocus (*Pulsatilla patens*), brittle prickly pear (*Opuntia fragilis*), western sagewort (*Artemisia ludoviciana*), boreal sagewort (*Artemisia frigida*), and daisy (*Erigeron* species). Endemic species are common in drier, rocky sites along the northwestern edge of the Great Plains, e.g., Rocky Mountain douglasia (*Douglasia montana*), shining penstemon (*Penstemon nitidus*), and Alberta penstemon (*Penstemon albertinus*). Other graminoids present within this drier community includetimber oatgrass (*Danthonia intermedia*), prairie junegrass (*Koeleria macrantha*), Sandberg's bluegrass (*Poa secunda*), Indian ricegrass (*Achnatherum hymenoides*), Geyer's sedge (*Carex geyeri*), andthreadleaf sedge (*Carex filifolia*). Lesser spikemoss (*Selaginella densa*) may be present in high cover on some sites. Lichen cover can be high on ungrazed occurrences (Antos et al,1983) or where fire has been suppressed. Moss can be variable, depending on level of disturbance.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A2658 *Elymus repens* Ruderal Grassland Alliance
- **CEGL005868** *Elymus repens* Ruderal Grassland

A3965 *Festuca idahoensis - Carex scirpoidea - Danthonia intermedia* Central Rocky Mountain Subalpine Dry Grassland Alliance
- **CEGL001897** *Festuca idahoensis* Grassland

A3966 *Festuca idahoensis - Calamagrostis rubescens - Achnatherum nelsonii* Central Rocky Mountain Montane Mesic Grassland Alliance
- **CEGL001625** *Festuca idahoensis / Achnatherum richardsonii* Grassland
- **CEGL001898** *Festuca idahoensis / Carex filifolia* Grassland
- **CEGL005860** *Achnatherum nelsonii / Lupinus sericeus* Grassland
- **CEGL005862** *Calamagrostis rubescens* Grassland

A3986 *Festuca campestris - Festuca idahoensis* Mesic Grassland Alliance
- **CEGL001629** *Festuca campestris / Pseudoroegneria spicata* Grassland
- **CEGL005869** *Festuca campestris / (Festuca idahoensis) / Achnatherum richardsonii* Grassland
- **CEGL005870** *Festuca campestris / Festuca idahoensis / Geranium viscosissimum* Grassland
- **CEGL005875** *Festuca campestris / Festuca idahoensis* Grassland

A3987 *Festuca idahoensis - Pseudoroegneria spicata - Poa secunda* Dry Grassland Alliance
- **CEGL001624** *Festuca idahoensis / Pseudoroegneria spicata* Grassland
- **CEGL001665** *Pseudoroegneria spicata / Carex filifolia* Grassland

A3988 *Festuca idahoensis - Pseudoroegneria spicata - Pascopyrum smithii* Mesic Grassland Alliance
- **CEGL001621** *Festuca idahoensis / Pascopyrum smithii* Grassland

A4052 *Ephedra spp. - Leymus salinus - Eriogonum corymbosum* Badlands Cold Desert Sparse Vegetation Alliance

Axxxx

CEGL005874 *Phleum pratense / Poa pratensis / Bromus inermis* Ruderal Grassland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Shrubs may increase following heavy grazing and/or with fire suppression. Rough fescue is highly palatable throughout the grazing season. Summer overgrazing for 2 to 3 years can result in rough fescue loss. In one study, although a light stocking rate for 32 years did not affect range condition, a modest increase in stocking rate led to a marked decline in range condition (Willms and Rhode, 1998). Oatgrass tends to replace rough fescue under moderate or heavy grazing pressure. Long-term heavy grazing on moister sites can result in a shift to a Kentucky bluegrass (*Poa pratensis*)/timothy(*Phleum pratense*)/ smooth brome (*Bromus inermis*) type.

In Montana, many exotic species invaded these grasslands, and in some cases have completely replaced native species. On disturbed, drier sites, Japanese brome (*Bromus japonicus*), sulfur cinquefoil (*Potentilla recta*), leafy spurge (*Euphorbia esula*), spotted knapweed (*Centaurea biebersteinii*), Saint John's wort (*Hypericum perforatum*), and whitetop (*Cardaria draba*) are common. Mesic sites are threatened by meadow hawkweed complex (*Hieracium pratense*, *H.floribundum*, *H.piloselliodes*), orange hawkweed (*Hieracium aurantiacum*), ox-eye daisy (*Leucanthemum vulgare*), tall buttercup (*Ranunculus acris*) and Canada thistle (*Cirsium arvense*).

Management

In the absence of natural fire, periodic prescribed burns can be used to maintain this system.

Restoration Considerations

Restoration strategies will depend largely on disturbance severity.Modified grazing practices can allow this system to recover without additional restoration needs. Antos and others (1983) have suggested prescribed fires at intervals of every 5 to 10 years for sites in western Montana. Following burning and depending on fire intensity, rough fescue may recover at much slower rates than Idaho fescue (Antos et al., 1983). Short-term conditions after burning, e.g., precipitation and cold-stress days, appear important in controlling species responses and composition of plant communities (Gross and Romo, 2009).

On some sites, site preparation will require noxious species eradication and control for at least two seasons before and after restoration. On reclamation sites where soil preparation is required, soil disking techniques that discourage uniform soils and seed beds should be used. Feathering and smoothing topsoil may benefit invasive species such as Kentucky bluegrass (*Poa pratensis*) and smooth brome (*Bromus inermis*), while rough conditions may inhibit their growth, allowing rough fescue (*Festuca campestris*) and its associated grasses to establish more readily (Desserud, 2006).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Western Pygmy Shrew *(Sorex eximius)* SOC
Merriam's Shrew *(Sorex merriami)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Yuma Myotis *(Myotis yumanensis)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Grizzly Bear *(Ursus arctos)* SOC
American Bison *(Bos bison)* SOC	Prairie Shrew *(Sorex haydeni)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	Black-tailed Jackrabbit *(Lepus californicus)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC	Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC
Meadow Jumping Mouse *(Zapus hudsonius)* PSOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Western Water Shrew *(Sorex navigator)*
Northern Montane Shrew *(Sorex obscurus)*	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Snowshoe Hare *(Lepus americanus)*
White-tailed Jackrabbit *(Lepus townsendii)*	Least Chipmunk *(Neotamias minimus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Red-tailed Chipmunk *(Neotamias ruficaudus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Northwestern Jumping Mouse *(Zapus saltator)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	Raccoon *(Procyon lotor)*
Least Weasel *(Mustela nivalis)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC	Long-billed Curlew *(Numenius americanus)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC	Green-tailed Towhee *(Pipilo chlorurus)* SOC
Baird's Sparrow *(Centronyx bairdii)* SOC	Bobolink *(Dolichonyx oryzivorus)* SOC
Western Screech-Owl *(Megascops kennicottii)* PSOC	Short-eared Owl *(Asio flammeus)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Rufous Hummingbird *(Selasphorus rufus)* PSOC
Dickcissel *(Spiza americana)* PSOC	Canada Goose *(Branta canadensis)*
Northern Pintail *(Anas acuta)*	Blue-winged Teal *(Spatula discors)*
Cinnamon Teal *(Spatula cyanoptera)*	Northern Shoveler *(Spatula clypeata)*

Gadwall *(Mareca strepera)*
Turkey Vulture *(Cathartes aura)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*
Dusky Grouse *(Dendragapus obscurus)*
Sandhill Crane *(Antigone canadensis)*
Killdeer *(Charadrius vociferus)*
Wilson's Snipe *(Gallinago delicata)*
Mourning Dove *(Zenaida macroura)*
Snowy Owl *(Bubo scandiacus)*
Common Nighthawk *(Chordeiles minor)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Northern Flicker *(Colaptes auratus)*
Western Kingbird *(Tyrannus verticalis)*
Horned Lark *(Eremophila alpestris)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Common Raven *(Corvus corax)*
Rock Wren *(Salpinctes obsoletus)*
Western Bluebird *(Sialia mexicana)*
Northern Shrike *(Lanius borealis)*
Lazuli Bunting *(Passerina amoena)*
American Tree Sparrow *(Spizelloides arborea)*
Vesper Sparrow *(Pooecetes gramineus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Song Sparrow *(Melospiza melodia)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
House Finch *(Haemorhous mexicanus)*
American Goldfinch *(Spinus tristis)*

American Wigeon *(Mareca americana)*
Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Peregrine Falcon *(Falco peregrinus)*
Prairie Falcon *(Falco mexicanus)*
Ruffed Grouse *(Bonasa umbellus)*
Black-bellied Plover *(Pluvialis squatarola)*
Upland Sandpiper *(Bartramia longicauda)*
Short-billed Gull *(Larus brachyrhynchus)*
Great Horned Owl *(Bubo virginianus)*
Long-eared Owl *(Asio otus)*
White-throated Swift *(Aeronautes saxatalis)*
Calliope Hummingbird *(Selasphorus calliope)*
Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Northern House Wren *(Troglodytes aedon)*
Mountain Bluebird *(Sialia currucoides)*
European Starling *(Sturnus vulgaris)*
Spotted Towhee *(Pipilo maculatus)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
Grasshopper Sparrow *(Ammodramus savannarum)*
Lapland Longspur *(Calcarius lapponicus)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Rusty Blackbird *(Euphagus carolinus)*
Brown-headed Cowbird *(Molothrus ater)*
Lesser Goldfinch *(Spinus psaltria)*
Redpoll *(Acanthis flammea)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Northern Rubber Boa *(Charina bottae)*
Gophersnake *(Pituophis catenifer)*
Common Gartersnake *(Thamnophis sirtalis)*

Western Skink *(Plestiodon skiltonianus)* SOC
Western Fence Lizard *(Sceloporus occidentalis)*
North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*
Plains Spadefoot *(Spea bombifrons)*

Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Woodland Skipper *(Ochlodes sylvanoides)*
Greenish Blue *(Icaricia saepiolus)*

Pale Swallowtail *(Pterourus eurymedon)*

Vascular Plants

Linear-leaf Fleabane *(Erigeron linearis)* SOC
Howell's Gumweed *(Grindelia howellii)* SOC
Spiny Skeletonweed *(Pleiacanthus spinosus)* SOC
Sandweed *(Athysanus pusillus)* SOC
Spalding's Catchfly *(Silene spaldingii)* SOC
Railhead Milkvetch *(Astragalus terminalis)* SOC
Cusick's Horsemint *(Agastache cusickii)* SOC
Mat Buckwheat *(Eriogonum caespitosum)* SOC
Missoula Phlox *(Phlox missoulensis)* SOC
Lemhi Beardtongue *(Penstemon lemhiensis)* SOC
Wishbone Moonwort *(Botrychium furculatum)* SOC
Yellow-staining Collomia *(Collomia tinctoria)* PSOC

Parry's Fleabane *(Erigeron parryi)* SOC
Slender Hareleaf *(Lagophylla ramosissima)* SOC
Sapphire Rockcress *(Boechera fecunda)* SOC
Keeled Bladderpod *(Physaria carinata)* SOC
Lesser Rushy Milkvetch *(Astragalus convallarius)* SOC
Hollyleaf Clover *(Trifolium gymnocarpon)* SOC
Oregon Checker-mallow *(Sidalcea oregana)* SOC
Ballhead Ipomopsis *(Ipomopsis congesta ssp. crebrifolia)* SOC
Coville Indian Paintbrush *(Castilleja covilleana)* SOC
Frenchman's Bluff Moonwort *(Botrychium gallicomontanum)* SOC
Austin's Knotweed *(Polygonum austiniae)* PSOC
Macoun's Cinquefoil *(Potentilla macounii)*

Native Species Occasionally Associated with this Ecological System

Mammals

Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Swift Fox *(Vulpes velox)* SOC
American Pika *(Ochotona princeps)*
American Mink *(Neogale vison)*
Moose *(Alces alces)*

Columbia Plateau Pocket Mouse *(Perognathus parvus)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC
American Black Bear *(Ursus americanus)*
Northern River Otter *(Lontra canadensis)*
Mountain Goat *(Oreamnos americanus)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Burrowing Owl *(Athene cunicularia)* SOC
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC

Mountain Plover *(Anarhynchus montanus)* SOC
Sprague's Pipit *(Anthus spragueii)* SOC
Chestnut-collared Longspur *(Calcarius ornatus)* SOC

Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Lesser Scaup *(Aythya affinis)*
Wild Turkey *(Meleagris gallopavo)*
Marbled Godwit *(Limosa fedoa)*
Ring-billed Gull *(Larus delawarensis)*
Glaucous Gull *(Larus hyperboreus)*
Vaux's Swift *(Chaetura vauxi)*
Steller's Jay *(Cyanocitta stelleri)*
Common Yellowthroat *(Geothlypis trichas)*
Indigo Bunting *(Passerina cyanea)*
Lark Bunting *(Calamospiza melanocorys)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Common Grackle *(Quiscalus quiscula)*
Bullock's Oriole *(Icterus bullockii)*
Mallard *(Anas platyrhynchos)*
Cooper's Hawk *(Accipiter cooperii)*
Lesser Yellowlegs *(Tringa flavipes)*
Wilson's Phalarope *(Phalaropus tricolor)*
California Gull *(Larus californicus)*
Rock Pigeon *(Columba livia)*
Dusky Flycatcher *(Empidonax oberholseri)*
American Robin *(Turdus migratorius)*
Western Tanager *(Piranga ludoviciana)*
Chipping Sparrow *(Spizella passerina)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Harris's Sparrow *(Zonotrichia querula)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Baltimore Oriole *(Icterus galbula)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Plains Gartersnake *(Thamnophis radix)*
Common Sagebrush Lizard *(Sceloporus graciosus)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Great Plains Toad *(Anaxyrus cognatus)* SOC
Woodhouse's Toad *(Anaxyrus woodhousii)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Viceroy *(Limenitis archippus)*
One-eyed Sphinx *(Smerinthus astarte)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Purplish Copper *(Tharsalea helloides)*
Common Wood-Nymph *(Cercyonis pegala)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Autumn Meadowhawk *(Sympetrum vicinum)*

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.040, Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland

National Land Cover Dataset:
71: Grassland/Herbaceous

ReGAP:
7112: Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Desserud, Peggy Ann. 2006. *Restoration of rough fescue grassland on pipelines in southwestern Alberta*. Lethbridge, Alta: Alberta Sustainable Resource Development, Rangeland Management Branch, Public Lands and Forests Division.

Antos, J. A., B. McCune, and C. Bara. 1983. The effect of fire on an ungrazed Western Montana grassland. American Midland Naturalist 110:354-364.

Gross, D. V., and J. T. Romo. 2010. 'Temporal changes in species composition in Fescue Prairie: relationships with burning history, time of burning, and environmental conditions'. *Plant Ecology.* 208 (1): 137-153.

Willms, Walter D., and Lyle M. Rode. 1998. "Forage Selection by Cattle on Fescue Prairie in Summer or Winter". *Journal of Range Management.* 51 (5).

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Rocky Mountain Subalpine-Upper Montane Grassland

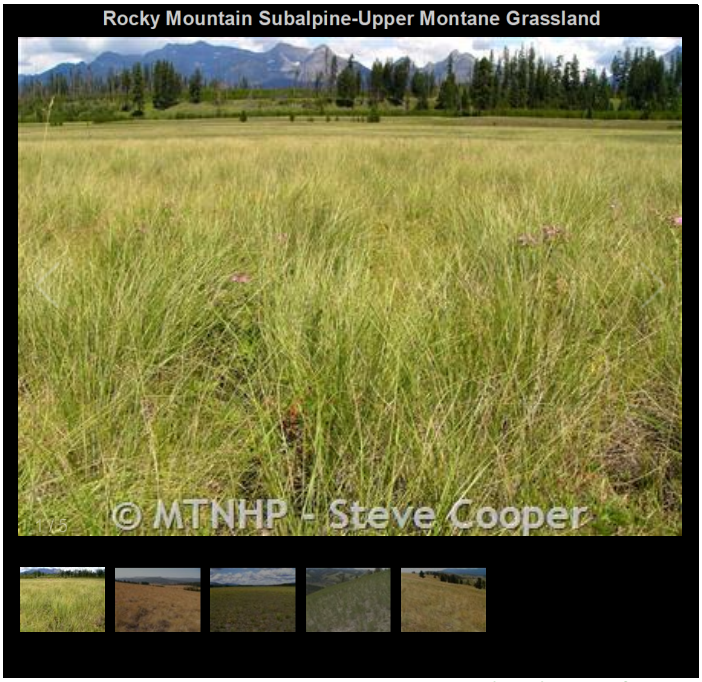


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State Rank Reason
This system faces fewer threats than the lower montane, foothill and valley systems.

General Description

These lush grassland systems are found in upper montane to subalpine, high-elevation,zones, and are shaped by short summers, cold winters, and young soils derived from recent glacial and alluvial material. In subalpine settings, dry grasslands may occur as small meadows or large open parks surrounded by higher elevational forests, but typicall will have no tree cover within them. In general, soil textures are much finer, and soils are often deeper than in the neighboring forests. Most precipitation occurs as heavy snowpack in the mountains with spring and early summer rains. This system is composed of bunch grass species, with a diversity of cool season forbs. It is similar to the Rocky Mountain Lower Montane, Foothill and Valley Grassland ecological system, but is found at higher elevations and has additional floristic components with more subalpine taxa. In Montana, this system generally occurs as two plant communities: a rough fescue-Idaho fescue (*Festuca campestris-Festuca idahoensis*) association occurring on moister sites, such as the north and east-facing slopes and benches in the mountains; and the Idaho Fescue-bluebunch wheatgrass (*Festuca idahoensis-Pseudoroegneria spicata*) association occurring on drier sites, such as ridges, hilltops, and south and west facing slopes and benches. At elevations greater than 2286 meters (7,500 feet), Idaho fescue becomes dominant, sometimes associated with slender wheatgrass (*Elymus trachycaulus*), or in certain areas, tufted hairgrass (*Deschampsia cespitosa*). Noxious species invasion, fire suppression, heavy grazing, and oil and gas development are major threats to this system.

Diagnostic Characteristics

Tussock forming grasses, montane to subalpine elevations, deep ustic soils, herbaceous cover greater than 25%, shrub cover less than 10%

Similar Systems

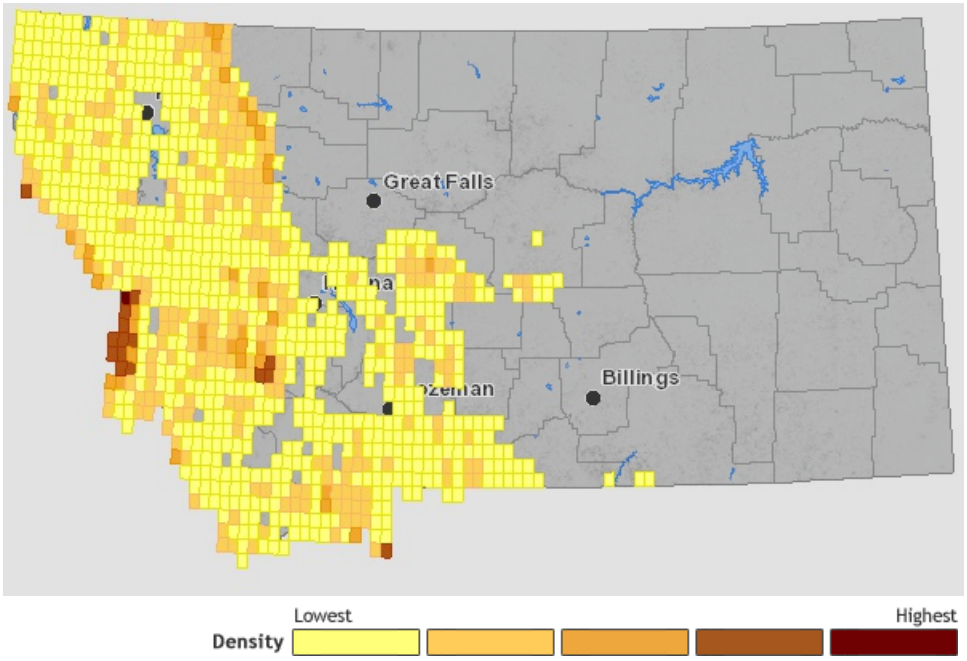
- Rocky Mountain Lower Montane, Foothill, and Valley Grassland

Range

Subalpine and upper montane grasslands are most extensive in the Canadian Rockies portion of the Rocky Mountain cordillera, extending south into western Montana, central and eastern Oregon, eastern Washington and Idaho, and the Bighorn Range of north-central Wyoming. In Montana, they occur in the Bitterroot, Mission, and Flathead mountains of western Montana and are very extensive in southwestern ranges such as the Anaconda-Pintlar, Pioneer, Snowcrest, Gravelley, Blacktail, Centennial and Beaverhead. East of the Continental Divide, the system is well represented on high exposed ridges on the Blackfeet Indian Reservation, from the Alberta border and along the eastern edge of Glacier National Park at montane to subalapine elevations (in the Belly River, Many Glacier, Saint Mary and Two Medicine valleys). It extends south along the Rocky Mountain Front to west-central Montana and south-central Montana (including the Gallatin, Madison, Absaroka, Beartooth, Pryor, and Bighorn Ranges). It also occurs in the island mountain ranges of central Montana.

Ecological System Distribution

Approximately 2,911 square kilometers are classified as Rocky Mountain Subalpine-Upper Montane Grassland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Cascade, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Large patch

Environment

This ecological system grades into the Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland ecological system at its lower elevational limit, and into Rocky Mountain Alpine Fellfield and Alpine Turf systems at its upper limit. In northwestern and west-central Montana it forms within upper elevation Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), spruce-fir (*Picea engelmannii-Abies lasiocarpa*) and whitebark pine (*Pinus albicaulis*) forests. Immediately east of the Continental Divide, it occurs on high ridges (5200 feet or higher) bordering the northwestern Great Plains and on steep mountain slopes and benches above 5200 feet along the Rocky Mountain Front to west-central Montana. Elevations represented by the northernmost extent of this system are approximately 2075-2200 meters (6,800-7, 200 feet). In southern Montana, this system is regularly found at elevations up to 2930 meters (9600 feet) with extremes at 3050 meters (10,000 feet). Sites range from small meadows to large open grasslands surrounded by high elevation forest types. Young soils are derived from recent glacial and alluvial material, but tend to be deeper than soils in adjacent forest communities or in alpine plant communities.

Vegetation

Rough fescue (*Festuca campestris*) and Idaho fescue (*Festuca idahoensis*) are the dominants of this system. In Montana, this system generally occurs as two plant community associations: 1) Rough Fescue-Idaho Fescue, found on moister sites such as the north- and east-facing slopes and benches in the mountains; and 2) Idaho Fescue-Bluebunch Wheatgrass, found on drier sites such as ridges, hilltops, and south and west facing slopes and benches. At elevations greater than 2,280 m (7500 feet), Idaho fescue becomes solely dominant or is associated with slender wheatgrass (*Elymus trachycaulus*); in some areas, it may associated with tufted hairgrass (*Deschampsia cespitosa*) (Cooper et al. 1999).

On relatively pristine, moist sites, rough fescue (*Festuca campestris*) canopy cover can approach 70% and form a nearly continuous cover. Rough fescue is most common in northwestern Montana, although it occurs as far south and east as the Anaconda-Pinlar Ranges. Other grasses are typically interspersed with the rough fescue, especially Idaho fescue (*Festuca idahoensis*) and other mesic site graminoids such as western needlegrass (*Achnatherum occidentale*), Richardson's needlegrass (*Achnatherum richardsonii*), basin wildrye (*Leymus cinereus*), Raynolds' sedge (*Carex reynoldsii*), Hood's sedge (*Carex hoodii*), and Liddon sedge (*C. petasata*). The rhizomatous ecotype of bluebunch wheatgrass (*Pseudogeneria spicata*) also occurs sporadically on mesic sites, whereas the purely tussock form is consistently represented only at the xeric extremes. Other graminoids include oatgrass (*Danthonia* species), prairie junegrass (*Koeleria macrantha*), Sandberg's bluegrass (*Poa secunda*), slender wheatgrass (*Elymus trachycaulus*), andneedle and thread (*Hesperostipa comata*). At higher subalpine elevations, alpine timothy (*Phleum alpinum*), tufted hairgrass (*Deschampsia cespitosa*), spike trisetum (*Trisetum spicatum*), obtuse sedge (*Carex obtusata*), and single spike sedge (*Carex scirpoidea)* become common.

These grasslands also supports a rich forb flora, including..subalpine taxa, that are absent from Rocky Mountain Montane grasslands. Species found in this system at upper montane elevations include arrowleaf balsamroot (*Balsamorhiza sagittata*), yarrow (*Achillea millefolium*), silky lupine (*Lupinus sericeus*), sticky geranium (*Geranium viscossisimum*), nine-leaf biscuitroot (*Lomatium triternatum*), prairie cinquefoil (*Potentilla gracilis*), sulphur penstemon (*Penstemon confertus*), little larkspur (*Delphinium bicolor*), wild strawberry (*Fragaria virginiana*), Indian paintbrush (*Castilleja* species), boreal bedstraw (*Galium boreale*), prairie smoke (*Geum triflorum*), prairie arnica (*Arnica sororia*), boreal sagewort (*Artemisia frigida*), western sagewort (*Artemisia ludoviciana*), prairie alumroot (*Huechera parviflora*), prairie crocus (*Pulsatilla patens*), rosy pussytoes (*Antennaria microphylla*), silver lupine (*Lupinus argenteus*), early biscuitroot (*Lomatium macrocarpum*), woolly groundsel (*Packera cana*), alyssum leaf phlox(*Phlox alyssifolia*),Hood's phlox (*Phlox hoodii*), buckwheat (*Eriogonum species*), fireweed(*Chamerion angustifolium),* and cut-leaf daisy (*Erigeron compositus*). Subalpine taxa include diverse leaf cinquefoil (*Potentilla diversifolia*), alpine goldenrod (*Solidago multiradiata),* boreal crazyweed (*Oxytropis borealis*), yellow sweetvetch (*Hedysarum sulphurescens*), smelowskia (*Smelowskia calycina*), subalpine buckwheat (*Eriogonum ovalifolium*), yellow buckwheat (*Eriogonum flavum*), yellow draba (*Draba aurea*), Rydberg's penstemon (*Penstemon rydbergii*), twinflower sandwort (*Minuartia obtusiloba*), and rock jasmine (*Androsace chamaejasme*). Species endemic to the northern Rocky Mountain subalpine and northwestern Great Plains are common in the drier, rocky sites, including Rocky Mountain douglasia (*Douglasia montana*), shining penstemon (*Penstemon nitidus*), Alberta penstemon (*Penstemon albertinus*), Parry's townsendia (*Townsendia parryi*) and alpine buckwheat (*Eriogonum androsaceum*).

Shrub species may be scattered among these grasslands, especially shrubby cinquefoil (*Dasiphora fruticosa*), Woods' rose (*Rosa woodsii*), snowberry (*Symphoricarpos species*), bearberry (*Arctostaphylos uva-ursi*), Canada buffaloberry (*Shepherdia canadensis*), and common juniper (*Juniperus communis*). Serviceberry (*Amelanchier alnifolia*), and common chokecherry (*Prunus virginiana*) often occur as patches on north-facing slopes where snow persists longer into the growing season.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3965 *Festuca idahoensis - Carex scirpoidea - Danthonia intermedia* Central Rocky Mountain Subalpine Dry Grassland Alliance
- **CEGL001611** *Festuca idahoensis / Carex obtusata* Grassland
- **CEGL001612** *Festuca idahoensis / Danthonia intermedia* Grassland
- **CEGL001623** *Festuca idahoensis / (Festuca campestris) - Potentilla diversifolia* Grassland
- **CEGL001899** *Festuca idahoensis / Carex scirpoidea* Grassland

A3966 *Festuca idahoensis - Calamagrostis rubescens - Achnatherum nelsonii* Central Rocky Mountain Montane Mesic Grassland Alliance
- **CEGL001614** *Festuca idahoensis / Elymus trachycaulus* Grassland
- **CEGL001898** *Festuca idahoensis / Carex filifolia* Grassland
- **CEGL001900** *Festuca idahoensis / Deschampsia cespitosa* Grassland
- **CEGL005862** *Calamagrostis rubescens* Grassland

A3986 *Festuca campestris - Festuca idahoensis* Mesic Grassland Alliance
- **CEGL001627** *Festuca campestris* Grassland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Fire return intervals in grassland- Douglas-fir ecotones in southwestern Montana are estimated at 35 to 40 years, although

they may be shorter in the grasslands proper (Arno and Gruell, 1983). With fire suppression, shrubs may increase, and trees may encroach on grasslands. Conversely, when fires eliminate shrublands, especially stands of Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) common in southwestern Montana, these grassland systems may develop.

Rough fescue is highly palatable throughout the grazing season, and so tends to attract livestock use. Summer overgrazing for a two to three year period can result in rough fescue loss (Willms and Rhode 1998). Even at moderate stocking rates, livestock grazing decreases cover of rough fescue, especially during summer months. Oatgrass tends to replace rough fescue under moderate or heavy grazing pressure (Willms and Rhode, 1998).

In Montana, noxious exotic species threaten this grassland system through invasion and potential complete replacement of native species. On drier sites,, sulfur cinquefoil (*Potentilla recta*), leafy spurge (*Euphorbia esula*), knapweed species (*Centaurea spp.*), Saint John's wort (*Hypericum perforatum*), and whitetop (*Cardaria draba*) are problematic. Mesic sites within this system are threatened by meadow hawkweed complex (*Hieracium pratense*, *H. floribundum*, *H. piloselliodes*), orange hawkweed (*Hieracium aurantiacum*), ox-eye daisy (*Leucanthemum vulgare*), tall buttercup (*Ranunculus acris*), and Canada thistle (*Cirsium arvense*). Introduced grasses like Kentucky bluegrass (*Poa pratensis*), common timothy (*Phleum pratense*), and smooth brome (*Bromus inermis*) occur on almost all sites within this system, and can pose significant threats.

Management

In the absence of natural fire, periodic prescribed burns and appropriate grazing management practices can be used to maintain this system. Grazing management can also avert the loss of rough fescue.

Restoration Considerations

Restoration strategies will depend largely on disturbance severity.Modified grazing practices and periodic prescribed fires can help this system to recover without additional restoration. On reclamation sites where soil preparation is required, soil disking techniques that discourage uniform soils and seed beds are preferable. Feathering and smoothing topsoil may benefit invasive species such as Kentucky bluegrass (*Poa pratensis)* and smooth brome (*Bromus inermis)*, while uneven soil conditions may inhibit their growth, allowing rough fescue (*Festuca campestris)* and its associated grasses to establish more readily (Desserud, 2006).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Wolverine *(Gulo gulo)* SOC	American Bison *(Bos bison)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC	Spotted Bat *(Euderma maculatum)* PSOC
Hoary Marmot *(Marmota caligata)* PSOC	Uinta Ground Squirrel *(Urocitellus armatus)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC	Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC
North American Water Vole *(Microtus richardsoni)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Western Water Shrew *(Sorex navigator)*
Northern Montane Shrew *(Sorex obscurus)*	American Pika *(Ochotona princeps)*
Snowshoe Hare *(Lepus americanus)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Raccoon *(Procyon lotor)*
Marten *(Martes americana)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*	Moose *(Alces alces)*
Pronghorn *(Antilocapra americana)*	Mountain Goat *(Oreamnos americanus)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	Northern Hawk Owl *(Surnia ulula)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC	Great Gray Owl *(Strix nebulosa)* PSOC
Short-eared Owl *(Asio flammeus)* PSOC	Boreal Owl *(Aegolius funereus)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC	Northern Shoveler *(Spatula clypeata)*
Turkey Vulture *(Cathartes aura)*	Northern Harrier *(Circus hudsonius)*
Cooper's Hawk *(Accipiter cooperii)*	Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Merlin *(Falco columbarius)*
Peregrine Falcon *(Falco peregrinus)*	Prairie Falcon *(Falco mexicanus)*
Spruce Grouse *(Canachites canadensis)*	Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*	Sandhill Crane *(Antigone canadensis)*
Killdeer *(Charadrius vociferus)*	Wilson's Snipe *(Gallinago delicata)*
Great Horned Owl *(Bubo virginianus)*	Snowy Owl *(Bubo scandiacus)*
Long-eared Owl *(Asio otus)*	Common Nighthawk *(Chordeiles minor)*
White-throated Swift *(Aeronautes saxatalis)*	Calliope Hummingbird *(Selasphorus calliope)*
Northern Flicker *(Colaptes auratus)*	Olive-sided Flycatcher *(Contopus cooperi)*
Say's Phoebe *(Sayornis saya)*	Horned Lark *(Eremophila alpestris)*
Tree Swallow *(Tachycineta bicolor)*	Violet-green Swallow *(Tachycineta thalassina)*
Cliff Swallow *(Petrochelidon pyrrhonota)*	Barn Swallow *(Hirundo rustica)*
Canada Jay *(Perisoreus canadensis)*	Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*	American Crow *(Corvus brachyrhynchos)*
Rock Wren *(Salpinctes obsoletus)*	Western Bluebird *(Sialia mexicana)*
Mountain Bluebird *(Sialia currucoides)*	American Robin *(Turdus migratorius)*
American Pipit *(Anthus rubescens)*	Northern Shrike *(Lanius borealis)*
European Starling *(Sturnus vulgaris)*	Common Yellowthroat *(Geothlypis trichas)*
Lazuli Bunting *(Passerina amoena)*	American Tree Sparrow *(Spizelloides arborea)*

Vesper Sparrow *(Pooecetes gramineus)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Lapland Longspur *(Calcarius lapponicus)*
Western Meadowlark *(Sturnella neglecta)*
American Goldfinch *(Spinus tristis)*
Savannah Sparrow *(Passerculus sandwichensis)*
Song Sparrow *(Melospiza melodia)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Snow Bunting *(Plectrophenax nivalis)*
Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Long-toed Salamander *(Ambystoma macrodactylum)*
Western Tiger Salamander *(Ambystoma mavortium)*

Invertebrates

Greenish Blue *(Icaricia saepiolus)*
Pacific Fritillary *(Boloria epithore)*
Hydaspe Fritillary *(Argynnis hydaspe)*
Field Crescent *(Phyciodes pulchella)*

Vascular Plants

Parry's Mountain Rabbitbrush *(Ericameria parryi var. montana)* SOC
Divide Bladderpod *(Physaria klausii)* SOC
Small-flowered Pennycress *(Noccaea parviflora)* SOC
Woolly-head Clover *(Trifolium eriocephalum)* SOC
Northern Buttercup *(Ranunculus pedatifidus)* SOC
Coville Indian Paintbrush *(Castilleja covilleana)* SOC
Selway Coil-beaked Lousewort *(Pedicularis contorta var. rubicunda)* SOC
Peculiar Moonwort *(Botrychium paradoxum)* SOC
Michigan Moonwort *(Botrychium michiganense)* SOC
Large-leaved Balsamroot *(Balsamorhiza macrophylla)* PSOC
Long-styled Thistle *(Cirsium longistylum)* SOC
Beautiful Bladderpod *(Physaria pulchella)* SOC
Parry's Locoweed *(Oxytropis parryi)* SOC
Small-flower Gymnosteris *(Gymnosteris parvula)* SOC
Platte Cinquefoil *(Potentilla plattensis)* SOC
Pink Coil-beaked Lousewort *(Pedicularis contorta var. ctenophora)* SOC
Least Moonwort *(Botrychium simplex)* SOC
Frenchman's Bluff Moonwort *(Botrychium gallicomontanum)* SOC
Wishbone Moonwort *(Botrychium furculatum)* SOC
Austin's Knotweed *(Polygonum austiniae)* PSOC

Native Species Occasionally Associated with this Ecological System

Mammals

Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Northern Bog Lemming *(Synaptomys borealis)* SOC
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Columbia Plateau Pocket Mouse *(Perognathus parvus)* SOC
Uinta Chipmunk *(Neotamias umbrinus)* PSOC
Western Small-footed Myotis *(Myotis ciliolabrum)*
Mule Deer *(Odocoileus hemionus)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Vaux's Swift *(Chaetura vauxi)*
Mountain Chickadee *(Poecile gambeli)*
Yellow-rumped Warbler *(Setophaga coronata)*
Spotted Towhee *(Pipilo maculatus)*
Grasshopper Sparrow *(Ammodramus savannarum)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Orange-crowned Warbler *(Leiothlypis celata)*
Western Tanager *(Piranga ludoviciana)*
Chipping Sparrow *(Spizella passerina)*
Dark-eyed Junco *(Junco hyemalis)*
Redpoll *(Acanthis flammea)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC
Gophersnake *(Pituophis catenifer)*
North American Racer *(Coluber constrictor)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Columbia Spotted Frog *(Rana luteiventris)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Woodland Skipper *(Ochlodes sylvanoides)*
Common Wood-Nymph *(Cercyonis pegala)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Freija Fritillary *(Boloria freija)* PSOC
Bog Fritillary *(Boloria eunomia)*
Magdalena Alpine *(Erebia magdalena)*
White-faced Meadowhawk *(Sympetrum obtrusum)*

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Montana Version Authors

L.K. Vance, T. Luna, S.V. Cooper

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.806, Northern Rocky Mountain Subalpine-Upper Montane Grassland

National Land Cover Dataset:
71: Grassland/Herbaceous

ReGAP:
7113: Northern Rocky Mountain Subalpine-Upper Montane Grassland

Additional References Legend: View Online Publication

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Desserud, Peggy Ann. 2006. *Restoration of rough fescue grassland on pipelines in southwestern Alberta*. Lethbridge, Alta: Alberta Sustainable Resource Development, Rangeland Management Branch, Public Lands and Forests Division.

Arno, S. F., and G. Gruell. 1983. Fire history at the forest -grassland ecotone in Southwestern Montana. Journal of Range Management 36:332-336.

Cooper, S.V., C. Jean, and B.L. Heidel. 1999. Plant associations and related botanical inventory of the Beaverhead Mountains Section, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena. 235 pp.

Willms, Walter D., and Lyle M. Rode. 1998. "Forage Selection by Cattle on Fescue Prairie in Summer or Winter". *Journal of Range Management.* 51 (5).

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Citation for data on this website:
Rocky Mountain Subalpine-Upper Montane Grassland — Northern Rocky Mountain Subalpine-Upper Montane Grassland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=7113

Rocky Mountain Subalpine-Montane Mesic Meadow



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Provisional State Rank: S5
(see reason below)

External Links

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State Rank Reason

This system may experience a decline if climate change results in a decrease in snowpack; currently grazing and hydrologic modification are threats

General Description

This system is restricted to sites from lower montane to subalpine elevations where finely textured soils, snow deposition, or windswept conditions limit tree establishment. Many occurrences are small patches, and are often found in mosaics within woodlands, dense shrublands, or just below alpine communities. Elevations range from 600 to2,011 meters (2,000-6,600 feet) in the northern Rocky Mountains and up to 2,286-2,682 meters (7,500-8,800 feet) in the mountains of southwestern Montana. This system occurs on gentle to moderate-gradient slopes and in relatively moist habitats. Soils are typically seasonally moist to saturated in the spring, but dry out later in the growing season. At montane elevations, soils are usually clays or silt loams, and some occurrences may have inclusions of hydric soils in low, depressional areas. At subalpine elevations, soils are derived a variety of parent materials, and are usually rocky or gravelly with good aeration and drainage, but with a well developed organic layer. Some occurrences are more heavily dominated by grasses, while others are more dominated by forbs. Common grasses include tufted hairgrass (*Deschampsia caespitosa*), showy oniongrass (*Melica spectabilis*), mountain brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*), awned sedge (*Carex atherodes*), and small wing sedge (*Carex microptera*). Forb dominated meadows usually comprise a wide species diversity which differs from montane to subalpine elevations. Shrubs such as shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*) and snowberry (*Symphoricarpos* species) are occasional but not abundant. This system differs from the Rocky Mountain Alpine Montane Wet Meadow system in that it soils dry out by mid-summer.

Diagnostic Characteristics

Montane, herbaceous, forb, udic, silt and clay soil texture

Similar Systems

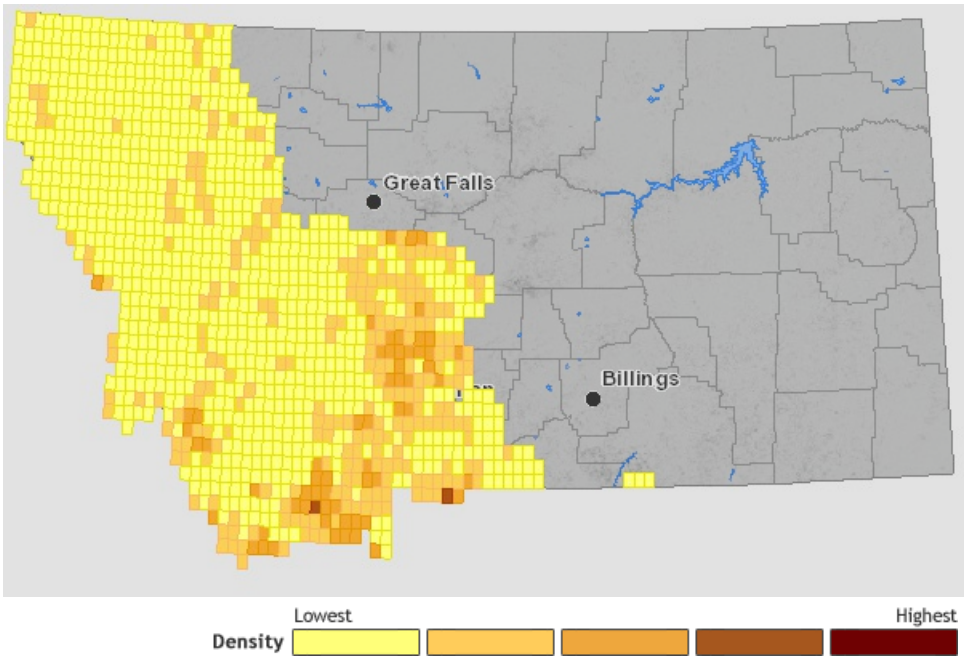
- Alpine-Montane Wet Meadow

Range

This system is very widespread in the Rocky Mountain cordillera from New Mexico north into Canada. It is found throughout the Rocky Mountains and occurs in island mountain ranges of Montana.

Ecological System Distribution

Approximately 3,063 square kilometers are classified as Rocky Mountain Subalpine-Montane Mesic Meadow in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Large patch

Environment

This system is restricted to sites from lower montane to subalpine elevations where finely textured soils, snow deposition, or windswept conditions limit tree establishment. Many occurrences are small patches, often found in mosaics within woodlands, dense shrublands, or just below alpine communities. Elevations range from 600 to 2,011 meters (2,000-6,600 feet) in the northern Rocky Mountains and from 2,286 to 2,682 meters (7,500-8,800 feet) in the mountains of southwestern Montana. This system occurs on gentle to moderate-gradient slopes and in relatively moist habitats. Soils are typically seasonally moist to saturated in the spring, but dry out later in the growing season. At montane elevations, soils are usually clays or silt loams with an A horizon greater than 10 centimeters (4 inches), and some occurrences may have inclusions of hydric soils in low, depressional areas. At subalpine elevations, soils are derived a variety of parent materials, and are usually rocky or gravelly with good aeration and drainage, but with a well developed organic layer.

Vegetation

Some occurrences are more heavily dominated by grasses, while others are more dominated by forbs, Tall forb dominated mesic meadows are typically comprised of a wide diversity of genera and contribute more to overall herbaceous cover than graminoids. At montane elevations, important flowering forbs include Siberian chives (*Allium schoenoprasum*), meadow arnica (*Arnica chamissonis*), common camas (*Camassia quamash*), aspen daisy (*Erigeron speciosus*), aster (*Eucephalus* and *Symphyotrichum* species), bluebells (*Mertensia* species), fireweed (*Chamerion angustifolium*), stickseed (*Hackelia*

species), small flowered penstemon (*Penstemon procerus*), large leaved avens (*Geum macrophyllum*), harebells (*Campanula rotundifolia*), Canadian goldenrod (*Solidago canadensis*), elegant death camas (*Zigadenus elegans*), western meadowrue (*Thalictrum occidentale*), tall groundsel (*Senecio hydrophiloides*) and tall ragwort (*Senecio serra*). Common camas (*Camassia quamash*) dominates some mesic meadows in western Montana and east of the Continental Divide in northwestern Montana. These meadows were important food gathering sites for indigenous people and were intensively managed for food production.

At subalpine elevations, arrowleaf groundsel (*Senecio triangularis*), subalpine wandering daisy *(Erigeron peregrinus*), glacier lily (*Erythronium grandiflorum*), lovage (*Ligusticum* species), green false hellebore (*Veratrum viride*) and valerian (*Valeriana* species) become a more significant component of the forb layer. Burrowing mammals can increase the forb diversity. Broad leaf deciduous shrubs such as shrubby cinquefoil and snowberry are occasional but not abundant.

Under natural disturbance regimes at montane elevations, early successional stages may be dominated by fireweed, horsemint (*Agastache urticifolia*), Virginia strawberry (*Fragaria virginiana*), stinging nettle (*Urtica dioica*), yarrow (*Achillea millefolium*), and other forbs, and small amounts of mesic grasses such as mountain brome (*Bromus carinatus*) and tufted hairgrass (*Deschamspia cespitosa*).

Graminoid-dominated meadows usually feature taxa with relatively broad and soft blades such as tufted hairgrass, mountain brome, showy oniongrass, blue wildrye, awned sedge, slender beaked sedge (*Carex athrostachya*), small wing sedge, Hood's sedge (*Carex hoodii*), Raynold's sedge (*Carex raynoldsonii*), and chamisso sedge (*Carex pachystachya*). Bluejoint reedgrass (*Calamagrostis canadensis*) may be present in some occurrences. At subalpine elevations, tufted hairgrass, alpine timothy (*Phleum alpinum*), poverty oatgrass (*Danthonia intermedia*) and purple mountain hairgrass (*Vahlodea atropurpurea*) become more common components of the graminoid layer. In the Beaverhead Mountains, some occurrences contain Idaho fescue (*Festuca idahoensis*) (Cooper et al, 1997).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3154 *Minuartia obtusiloba - Paronychia pulvinata - Silene acaulis* Alpine Fell-field Alliance
A3155 *Carex elynoides - Carex rupestris - Kobresia myosuroides* Rocky Mountain Alpine Turf Alliance
A3172 *Juncus drummondii - Juncus parryi - Sibbaldia procumbens* Rocky Mountain Alpine Snowbed Alliance
A3804 *Carex aquatilis - Carex utriculata - Deschampsia caespitosa* Wet meadow Alliance
  CEGL001889 *Deschampsia caespitosa / Potentilla diversifolia* Wet Meadow
A3809 *Heracleum maximum - Veratrum californicum - Rorippa spp.* Wet Meadow Alliance
  CEGL001940 *Heracleum maximum / Rudbeckia occidentalis* Wet Meadow
A3948 *Valeriana sitchensis - Luzula glabrata var. hitchcockii - Xerophyllum tenax* Subalpine Mesic Meadow Alliance
  CEGL005856 *Chamerion angustifolium* Rocky Mountain Meadow
  CEGL005859 *Xerophyllum tenax* Meadow
  CEGL005873 *Luzula glabrata var. hitchcockii / Erythronium grandiflorum* Meadow

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Communities associated with this ecological system are adapted to soils that may be flooded or saturated in the early growing season. Typically these associations are tolerant of moderate-intensity ground fires and late-season livestock grazing (Kovalchik 1987). Most appear to be relatively stable types, although in some areas these may be impacted by intensive livestock grazing.

Management

Herbaceous mesic meadows that have experienced a disturbance like intensive grazing are often susceptible to invasive non-native vegetation. Typically, disturbed meadows contain Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*) and common timothy (*Phleum pratense*) at lower to montane elevations. Common dandelion (*Taraxacum officinale*) can replace native forb diversity in areas of continued disturbance. Noxious species such as meadow hawkweed (*Hieracium caespitosum*), orange hawkweed (*Hieracium auranticum*), tall meadow buttercup (*Ranunculus acris*), and ox-eye daisy (*Leucanthemum vulgare*) are highly invasive and pose a real threat to the structure and diversity of these meadows.

Restoration Considerations

In areas of moderate disturbance, this system can be restored by eliminating or limiting grazing for two to three seasons. Areas that contain noxious species must be managed for these species prior to and after restoration practices.

Tufted hairgrass has been successfully established by seeding on higher elevation disturbances such as mined lands. Seeds from locally adapted populations have been most successful (Chambers and others 1990). For disturbances on well-developed soils containing minimum amounts of toxic substances, seeds can be selected from a broad range of relatively well-adapted populations. On sites with limiting soil characteristics, selection from metal and/or acid tolerant populations is more successful (Brown and Chambers 1990). Late fall seeding is most successful; seedling establishment is improved if seeds are exposed to cold dormancy over winter (Chambers and others 1987). Tufted hairgrass has high potential for long term revegetation due to its soil stabilization characteristics, persistence, and ability to reproduce on harsh sites at high

elevations (Brown and others 1988; Chambers and others 1990).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Wolverine *(Gulo gulo)* SOC	Spotted Bat *(Euderma maculatum)* PSOC
Hoary Marmot *(Marmota caligata)* PSOC	Uinta Ground Squirrel *(Urocitellus armatus)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC	Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC
North American Water Vole *(Microtus richardsoni)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Western Water Shrew *(Sorex navigator)*
Northern Montane Shrew *(Sorex obscurus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	American Pika *(Ochotona princeps)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Snowshoe Hare *(Lepus americanus)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Yellow-bellied Marmot *(Marmota flaviventris)*

Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Pocket Gopher *(Thomomys talpoides)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*
Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*
Raccoon *(Procyon lotor)*
Marten *(Martes americana)*
Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*
American Mink *(Neogale vison)*
American Ermine *(Mustela richardsonii)*
Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Moose *(Alces alces)*
Pronghorn *(Antilocapra americana)*
Mountain Goat *(Oreamnos americanus)*
Bighorn Sheep *(Ovis canadensis)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Short-eared Owl *(Asio flammeus)* PSOC
Boreal Owl *(Aegolius funereus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Northern Harrier *(Circus hudsonius)*
Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*
Prairie Falcon *(Falco mexicanus)*
Spruce Grouse *(Canachites canadensis)*
Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
Spotted Sandpiper *(Actitis macularius)*
Wilson's Snipe *(Gallinago delicata)*
Great Horned Owl *(Bubo virginianus)*
Snowy Owl *(Bubo scandiacus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Common Nighthawk *(Chordeiles minor)*
Calliope Hummingbird *(Selasphorus calliope)*
Northern Flicker *(Colaptes auratus)*
Olive-sided Flycatcher *(Contopus cooperi)*
Willow Flycatcher *(Empidonax traillii)*
Dusky Flycatcher *(Empidonax oberholseri)*
Horned Lark *(Eremophila alpestris)*
Tree Swallow *(Tachycineta bicolor)*
Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*
Rock Wren *(Salpinctes obsoletus)*
Northern House Wren *(Troglodytes aedon)*
Mountain Bluebird *(Sialia currucoides)*
Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*
American Pipit *(Anthus rubescens)*
Northern Shrike *(Lanius borealis)*
European Starling *(Sturnus vulgaris)*
Warbling Vireo *(Vireo gilvus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Yellow-rumped Warbler *(Setophaga coronata)*
American Redstart *(Setophaga ruticilla)*
Northern Waterthrush *(Parkesia noveboracensis)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Common Yellowthroat *(Geothlypis trichas)*
Wilson's Warbler *(Cardellina pusilla)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
Vesper Sparrow *(Pooecetes gramineus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Fox Sparrow *(Passerella iliaca)*
Song Sparrow *(Melospiza melodia)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Lapland Longspur *(Calcarius lapponicus)*
Snow Bunting *(Plectrophenax nivalis)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Brown-headed Cowbird *(Molothrus ater)*
American Goldfinch *(Spinus tristis)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Red-spotted Admiral *(Limenitis arthemis)* PSOC
Red-disked Alpine *(Erebia discoidalis)* PSOC
Purplish Copper *(Tharsalea helloides)*
Mariposa Copper *(Tharsalea mariposa)*
Greenish Blue *(Icaricia saepiolus)*
Hydaspe Fritillary *(Argynnis hydaspe)*
Pacific Fritillary *(Boloria epithore)*
Field Crescent *(Phyciodes pulchella)*
Common Wood-Nymph *(Cercyonis pegala)*
White-faced Meadowhawk *(Sympetrum obtrusum)*

Vascular Plants

Many-flowered Viguiera *(Viguiera multiflora)* SOC
Oregon Bluebells *(Mertensia bella)* SOC
Small-flowered Pennycress *(Noccaea parviflora)* SOC
Pale Corydalis *(Corydalis sempervirens)* SOC
Oregon Checker-mallow *(Sidalcea oregana)* SOC
Straightbeak Buttercup *(Ranunculus orthorhynchus)* SOC
Northern Buttercup *(Ranunculus pedatifidus)* SOC
Platte Cinquefoil *(Potentilla plattensis)* SOC
Selway Coil-beaked Lousewort *(Pedicularis contorta var. rubicunda)* SOC
Coville's Rush *(Juncus covillei)* SOC
California False-hellebore *(Veratrum californicum)* SOC
Least Moonwort *(Botrychium simplex)* SOC
Peculiar Moonwort *(Botrychium paradoxum)* SOC
Wavy Moonwort *(Botrychium crenulatum)* SOC

Upward-lobed Moonwort *(Botrychium ascendens)* SOC
Linearleaf Moonwort *(Botrychium lineare)* SOC
Mountain Moonwort *(Botrychium montanum)* PSOC
Hall's Rush *(Juncus hallii)*
Prairie Moonwort *(Botrychium campestre)* SOC
Michigan Moonwort *(Botrychium michiganense)* SOC
Globe Beardtongue *(Penstemon globosus)*

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Northern Bog Lemming *(Synaptomys borealis)* SOC
Canada Lynx *(Lynx canadensis)* SOC
California Myotis *(Myotis californicus)*
Northern River Otter *(Lontra canadensis)*
Fringed Myotis *(Myotis thysanodes)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Fisher *(Pekania pennanti)* SOC
Uinta Chipmunk *(Neotamias umbrinus)* PSOC
North American Deermouse *(Peromyscus maniculatus)*
Mule Deer *(Odocoileus hemionus)*

Birds

Long-billed Curlew *(Numenius americanus)* SOC
Peregrine Falcon *(Falco peregrinus)*
Vaux's Swift *(Chaetura vauxi)*
Western Wood-Pewee *(Contopus sordidulus)*
Bank Swallow *(Riparia riparia)*
Black-billed Magpie *(Pica hudsonia)*
Cassin's Vireo *(Vireo cassinii)*
Lark Bunting *(Calamospiza melanocorys)*
Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Red Crossbill *(Loxia curvirostra)*
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Mourning Dove *(Zenaida macroura)*
White-throated Swift *(Aeronautes saxatalis)*
Hammond's Flycatcher *(Empidonax hammondii)*
Barn Swallow *(Hirundo rustica)*
Mountain Chickadee *(Poecile gambeli)*
Chipping Sparrow *(Spizella passerina)*
Grasshopper Sparrow *(Ammodramus savannarum)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
House Finch *(Haemorhous mexicanus)*
Pine Siskin *(Spinus pinus)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Common Gartersnake *(Thamnophis sirtalis)*
North American Racer *(Coluber constrictor)*

Amphibians

Sierran Treefrog *(Pseudacris sierra)*
Columbia Spotted Frog *(Rana luteiventris)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Freija Fritillary *(Boloria freija)* PSOC
Zigzag Darner *(Aeshna sitchensis)* PSOC
Woodland Skipper *(Ochlodes sylvanoides)*
Milbert's Tortoiseshell *(Aglais milberti)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Brush-tipped Emerald *(Somatochlora walshii)* SOC
Colorado Alpine *(Erebia callias)* PSOC
Black-tipped Darner *(Aeshna tuberculifera)* PSOC
Bog Fritillary *(Boloria eunomia)*
Magdalena Alpine *(Erebia magdalena)*
Variegated Meadowhawk *(Sympetrum corruptum)*

Vascular Plants

Slender Indian Paintbrush *(Castilleja gracillima)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

T. Luna, L.K. Vance

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.829, Rocky Mountain Subalpine-Montane Mesic Meadow

ReGAP:
7118: Rocky Mountain Subalpine-Montane Mesic Meadow

Additional References Legend: View Online Publication
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Brown RW, Chambers JC, Wheeler RM. 1988. Adaptations of Deschampsia cespitosa (tufted hairgrass) for revegetation of

high elevation disturbances: some selection criteria. High altitude revegetation workshop no. 8: Proceedings; 1988 March 3-4; Fort Collins, CO. Information Series No. 59. Fort Collins, CO: Colorado Water Resources Research Institute; p 147-72.

- Brown RW, Chambers JC. 1990. Reclamation practices in high-mountain ecosystems. In: Schmidt WC, McDonald KJ, editors. Proceedings--symposium on whitebark pine ecosystems: ecology and management of a high-mountain resource; 1989 March 29-31; Bozeman, MT. General Technical Report. INT-270. Ogden, UT: U.S. Department of Agriculture. Forest Service. Intermountain Research Station; p 329-34.
- Chambers JC, MacMahon JA, Brown RW. 1987. Germination characteristics of alpine grasses and forbs: a comparison of early and late seral dominants with reclamation potential. Reclamation and Revegetation Research(6):235-49.

Chambers, Jeanne C., James A. MacMahon, and Ray W. Brown. 1990. "Alpine Seedling Establishment: The Influence of Disturbance Type". *Ecology.* 71 (4): 1323-1341.

Cooper, S.V., C. Jean, and B.L. Heidel. 1999. Plant associations and related botanical inventory of the Beaverhead Mountains Section, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena. 235 pp.

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Shale Badland



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Provisional State Rank: S4
(see reason below)

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State Rank Reason

There are numerous large patches of this system well-distributed across southwestern Montana, and although oil/gas exploration poses a threat, it has not yet been extensively realized. Grazing has the potential to cause significant damage to these systems, but the steep terrain and sparse vegetation generally deters livestock, except in areas where surrounding grasslands and steppe is in poor condition.

General Description

This system is represented in the Wyoming basin ecoregion of south-central Montana, and in the Missouri river region of east-central Montana. It is composed of barren and sparsely vegetated substrates with less than 10% plant cover. This system is primarily found on eroded, rounded hills and plains that form a rolling topography. A combination of factors such as elevation, rainfall, the carving action of water and wind, and parent material contribute to the development of this system. It is primarily a type of mature dissection with finely textured drainage pattern and moderately steep slopes. This system contains extremely dry and easily erodible, consolidated silty to clayey soils with bands of shale, siltstones, mudstones or isolated consolidates. Harsh soil properties and high rates of erosion and deposition are driving environmental variables supporting sparse dwarf-shrubs such as saltbush (Atriplex species), sagebrush (*Artemisia species*), green rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*), greasewood (*Sarcobatus vermiculatus*), and sparse herbaceous vegetation. Indian ricegrass (*Achnatherum hymenoides*) is characteristic of early-seral vegetation through much of this system's range. Grazing and oil and gas exploration constitute the major threats to this system.

Diagnostic Characteristics

Badland, shale and mudstone, alkaline silt or clay soils, less than 10% vegetation cover.

Similar Systems

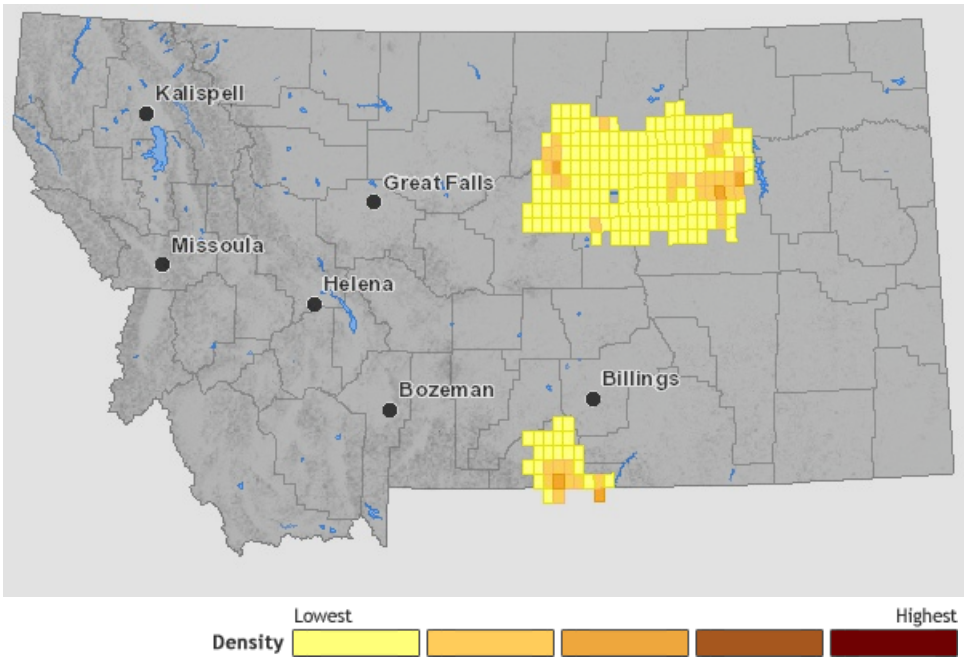
- Great Plains Badlands

Range

The system is common throughout the Wyoming Basin ecoregion in south-central Montana, especially on the southern and western flanks of the Pryor Mountains. It also occurs in the Missouri River breaks area around Fort Peck.

Ecological System Distribution

Approximately 343 square kilometers are classified as Shale Badland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Blaine, Carbon, Fergus, Garfield, Mccone, Petroleum, Phillips, Valley

Spatial Pattern

Large patch

Environment

This system is primarily found on eroded rounded hills and plains that form a rolling topography with moderately steep slopes. It is found within an arid to semi-arid climate where infrequent but torrential rains cause erosion. Shale badlands often occur on exposed ridges and steep colluvial slopes. They may take the form of fans or aprons at the base of steep areas or as barren badland hills with rolling topography (Colorado Natural Heritage Program 2005). Soils are extremely dry and easily erodible, usually consolidated silty to clayey soils with bands of shale, siltstones, mudstones, or isolated consolidates. Most commonly, the soils are alkaline silts or bentonite clays (water-weathered volcanic ash), typically derived from marine shales. Harsh soil properties and high rates of erosion and deposition are driving environmental variables supporting sparse vegetation cover.

Vegetation

This system is typically sparsely vegetated (less than 10 percent cover) with a mixture of shrub and herbaceous species. In southwestern Montana, common shrubs include big sagebrush (*Artemisia tridentata ssp. tridentata*), fourwing saltbush (*Atriplex canescens*), green rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*), greasewood (*Sarcobatus vermiculatus*), Gardner's saltbush (*Atriplex gardneri*), and horsebrush (*Tetradymia species*). Shrubs are commonly dominant on mid-to late-seral stands, and rubber rabbitbrush (*Ericameria nauseosa*) can be found at any stage. These shrub species are primarily found in drainage ways where water collects (Godfrey 1997). In Montana, graminoid cover is very sparse. Indian ricegrass (*Achnatherum hymenoides*) is characteristic of early-seral vegetation through much of this system's range. Other species include needle and thread (*Hesperostipa comata*), alkali sacaton (*Sporobolus airoides*), saline wildrye (*Leymus salinus*), bluebunch wheatgrass (*Pseudoroegneria spicata*), western wheatgrass (*Pascopyrum smithii*) and dry, upland muhly species (*Muhlenbergia* spp.). Common forbs include buckwheat

(*Eriogonum* species), western sagewort (*Artemisia ludoviciana*), knotweed (*Polygonum* species), threadleaf snakeweed(*Gutierrezia sarothrae*), bladder twinpod (*Physaria* species), sandwort (*Arenaria species*), stemless four nerve daisy (*Tetraneuris acaulis*), rock evening primrose (*Oenothera cespitosa*), and penstemon (*Penstemon* species).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1110 *Atriplex gardneri* Low Scrub Alliance
- **CEGL001438** *Atriplex gardneri* Dwarf-shrubland
- **CEGL001444** *Atriplex gardneri - Achnatherum hymenoides* Dwarf-shrubland

A1262 *Achnatherum hymenoides - Pseudoroegneria spicata - Muhlenbergia pungens* Grassland Alliance

A3221 *Artemisia arbuscula ssp. Longiloba* Steppe & Shrubland Alliance
- **CEGL002585** *Artemisia arbuscula ssp. longiloba - Elymus lanceolatus* Shrubland

A4052 *Ephedra spp. - Leymus salinus - Eriogonum corymbosum* Badlands Cold Desert Sparse Vegetation Alliance
- **CEGL001667** *Pseudoroegneria spicata / Eriogonum brevicaule* Sparse Vegetation

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Communities associated with this ecological system are adapted to highly erodible soils that may be dry throughout the growing season. They may also occur on shallow soils, with parent material and/or shale bedrock formation close to the surface. Surface soils are subject to yearly gravitational down-slope movement, especially after a rainstorm, where plants may get buried or uprooted due to silt movement (Colorado Natural Heritage Program 2005). Generally, the plant communities will be drought tolerant, grazing resistant, and winter hardy, and will be tolerant of managed grazing practices or light-intensity fires. Because of the erodible soils, the shale badlands system is not tolerant of heavy use.

Management

Grazing and oil and gas exploration constitute the major threats to this system. This system does not support intensive grazing practices due to sparse vegetation and highly erodible soils.

Restoration Considerations

Eliminating grazing may allow the sparse vegetation to recover. In areas of disturbance and heavy erosion, supplemental planting of shrubs may be required and should be limited to microsites where available soil moisture persists longer into the growing season.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur

as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	Desert Cottontail *(Sylvilagus audubonii)*
Least Chipmunk *(Neotamias minimus)*	North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*	Pronghorn *(Antilocapra americana)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Prairie Falcon *(Falco mexicanus)*
Mourning Dove *(Zenaida macroura)*	Common Nighthawk *(Chordeiles minor)*
White-throated Swift *(Aeronautes saxatalis)*	Say's Phoebe *(Sayornis saya)*
Horned Lark *(Eremophila alpestris)*	Common Raven *(Corvus corax)*
Rock Wren *(Salpinctes obsoletus)*	Mountain Bluebird *(Sialia currucoides)*
European Starling *(Sturnus vulgaris)*	Lark Sparrow *(Chondestes grammacus)*

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC	Western Milksnake *(Lampropeltis gentilis)* SOC
North American Racer *(Coluber constrictor)*	Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*	

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Plains Spadefoot *(Spea bombifrons)*

Vascular Plants

Gray's Milkvetch *(Astragalus grayi)* SOC	Raceme Milkvetch *(Astragalus racemosus)* SOC
Smooth Buckwheat *(Eriogonum salsuginosum)* SOC	

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Pallid Bat *(Antrozous pallidus)* SOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	

Birds

American Crow *(Corvus brachyrhynchos)*	Spotted Towhee *(Pipilo maculatus)*
Western Meadowlark *(Sturnella neglecta)*	

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC	Common Sagebrush Lizard *(Sceloporus graciosus)*
Plains Gartersnake *(Thamnophis radix)*	

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28626
System Code	CES304.789, Inter-Mountain Basins Shale Badland

National Land Cover Dataset:
31: Barren Land

ReGAP:
3139: Inter-Mountain Basins Shale Badland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Colorado Natural Heritage Program. 2005. Ecological System Descriptions and Viability Guidelines for Colorado. Colorado Natural Heritage Program, Colorado State University, Fort Collins, Colorado.
- Godfrey, A.E. 1997. Mass Movement of Mancos Shale Crust near Caineville, Utah: A 30-Year Record. Geografiska Annaler 79(3): 185-194

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Citation for data on this website:
Shale Badland — Inter-Mountain Basins Shale Badland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=3139

Great Plains Badlands

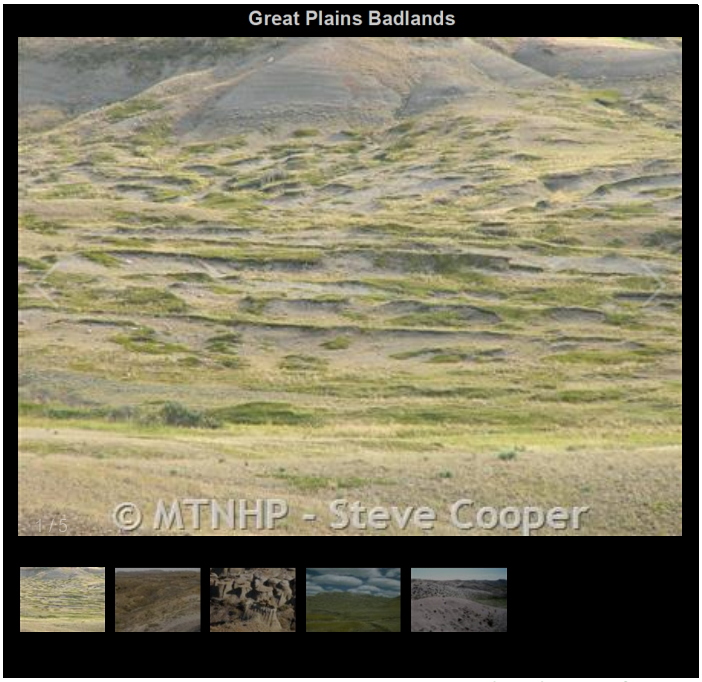


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General Description

The Western Great Plains Badlands ecological system occurs within the mixed grass and sand prairie regions of eastern and southeastern Montana, where the land lies well above or below its local base level, shaped by the carving action of streams, erosion, and erosible parent material. It is easily recognized by its rugged, eroded, and often colorful land formations, and the relative absence of vegetative cover. In those areas with vegetation, species can include scattered individuals of many dryland shrubs or herbaceous taxa, including curlycup gumweed (*Grindelia squarrosa*), threadleaf snakeweed (*Gutierrezia sarothrae*) (especially with overuse and grazing), greasewood (*Sarcobatus vermiculatus*), Gardner's saltbush (*Atriplex gardneri*), buckwheat (*Eriogonum* species), plains muhly (*Muhlenbergia cuspidata*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Hooker's sandwort (*Arenaria hookeri*). Patches of sagebrush (*Artemisia* spp.) can also occur. Climate is typical of mid continental regions with long severe winters and warm summers. Precipitation ranges from 7 to 14 inches per year, with two-thirds of the precipitation falling during the summer, and a third falling in the spring. The sedimentary parent material of exposed rocks and the resultant eroded clay soils are derived from Cretaceous sea beds and are often fossil-rich. Dominant soil types are in the order Entisols. These mineral soils are found primarily on uplands, slopes, and creek bottoms and are easily erodible. The growing season is short, averaging 115 days, with a range from 100 days on the Canadian border to 130 days on the Wyoming border. Land use is limited, except for off-highway vehicle recreation and incidental grazing.

Diagnostic Characteristics

Highly eroded landforms; less than 10% vegetated cover.

Similar Systems

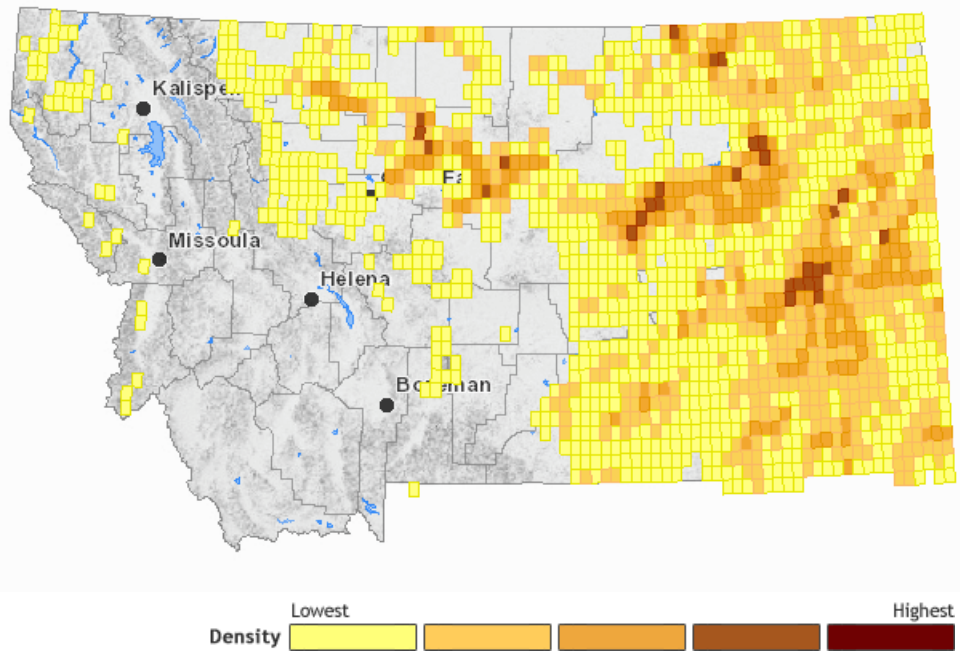
- Great Plains Cliff and Outcrop
- Shale Badland

Range

This system is scattered throughout eastern Montana where eroded landscapes limit the ability of vegetation to thrive. This system is well represented in Makoshika State Park near Glendive, in the Terry Badlands north of the Yellowstone River, and at scattered locations along tributaries of the Missouri river in the northwestern Great Plains. Similar landforms on the south flank of the Pryor Mountains are classified as Inter-Mountain Basins Shale Badland.

Ecological System Distribution

Approximately 8,404 square kilometers are classified as Great Plains Badlands in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fallon, Fergus, Flathead, Garfield, Glacier, Hill, Judith Basin, Lewis and Clark, Liberty, Lincoln, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Large patch

Environment

These systems are primarily found on eroded uplands, slopes, and creek bottoms throughout the northwestern Great Plains region of Montana. Soils are extremely dry and easily erodible consolidated clayey soils with bands of sandstone or isolated consolidates. The steep and deeply eroded slopes of bandland systems tend to be harsh environments, which support only species uniquely adapted to these conditions (Brown 1971). In these arid to semi-arid climates, infrequent but torrential rains cause rapid erosion, leaving a highly dissected landscape with a complex dendritic drainage pattern.

Vegetation

Vegetation within the Badlands region is sparse. Typically, less than 20% of the total land cover will be occupied by vegetation in this ecological system. In northeastern Montana, vegetation cover is at the higher end, but in southeastern Montana, portions of this system may have little to no vegetation. Local variations in geology, topography, and soil contribute to unique plant communities and vegetation composition (Brown 1971). Common plant associations include greasewood (*Sarcobatus vermiculatus*) - Gardner's saltbush (*Atriplex gardneri*) or few-flowered buckwheat (*Eriogonum pauciflorum*) - threadleaf snakweed (*Gutierrezia sarothrae*). Graminoid cover is very sparse, but may include western wheatgrass (*Pascopyrum smithii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Indian ricegrass (*Achnatherum hymenoides*). Common forbs include few-flowered buckwheat (*Eriogonum pauciflorum*), threadleaf snakweed (*Gutierrezia*

sarothrae), Hooker's sandwort (*Arenaria hookeri*), bud sagebrush (*Picrothamnus desertorum*), curlycup gumweed (*Grindelia squarrosa*), longleaf wormwood (*Artemisia longfolia*), and Nutall's povertyweed (*Monolepis nuttalliana*). Other shrubs that may be present include Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), silver sagebrush (*Artemisia cana*), rabbitbrush (*Chrysothamnus viscidiflorus* and *Ericameria nauseosa*), and saltbush (*Atriplex* species).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1046 *Sarcobatus vermiculatus* Intermountain Wet Shrubland Alliance
- **CEGL001360** *Sarcobatus vermiculatus - Atriplex gardneri* Wet Shrubland

A1110 *Atriplex gardneri* Low Scrub Alliance
- **CEGL001439** *Atriplex gardneri - Picrothamnus desertorum* Dwarf-shrubland
- **CEGL001440** *Atriplex gardneri - Artemisia tridentata* Dwarf-shrubland
- **CEGL001443** *Atriplex gardneri - Monolepis nuttalliana* Dwarf-shrubland
- **CEGL001445** *Atriplex gardneri - Pascopyrum smithii* Dwarf-shrubland

A1127 *Artemisia pedatifida* Low Scrub Alliance
- **CEGL001525** *Artemisia pedatifida / Atriplex gardneri* Shrubland

A1874 *Artemisia longifolia* Badlands Alliance

A3492 *Panicum virgatum - Pascopyrum smithii* Wet Meadow Alliance
- **CEGL001484** *Panicum virgatum / (Pascopyrum smithii)* Wet Meadow

A3590 *Shepherdia argentea* Wet Shrubland Alliance
- **CEGL001128** *Shepherdia argentea* Wet Shrubland

A3978 *Sarcobatus vermiculatus* Great Plains Badlands Alliance
- **CEGL001367** *Sarcobatus vermiculatus - Pseudoroegneria spicata* Shrubland

A3979 *Eriogonum pauciflorum - Gutierrezia sarothrae* Badlands Alliance
- **CEGL005270** *Eriogonum pauciflorum / Gutierrezia sarothrae* Badlands Sparse Vegetation

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Dynamic Processes

This system can occur where the land lies well above its local base level or below and is created by several factors, including elevation, rainfall, carving action of streams, and parent material. Vegetation communities associated with this ecological system are adapted to soils that are dry throughout the growing season. Typically soils of the badlands ecosystem are easily erodible consolidated clay or sandstone outcrops. They may also occur on shallow entisols, with parent material and/or bedrock formation close to the surface. These highly erodible soils can be strongly influenced by infrequent but often torrential rains.

Management

Because of the erodible soils, this system is easily damaged by off-road vehicle use, which has become increasingly widespread in southeastern Montana. Limiting such use to specified areas may be necessary to preserve the more sensitive communities found in the area, such as the birdsfoot sagebrush- Gardner's saltbush (*Artemisia pedatifida - Atriplex gardneri*) shrubland. In areas with more vegetation cover, heavy livestock grazing can also be detrimental.

Restoration Considerations

Eliminating off-road vehicle use will typically be necessary to restore damaged areas. In early stages of recovery, restricting grazing or implementing very light grazing regimes may be necessary to allow the sparse vegetation to recover. Supplemental planting of shrubs may be required and should be limited to microsites where available soil moisture persists into the growing season.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
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Literature Cited

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- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
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Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Pallid Bat *(Antrozous pallidus)* SOC	Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Black-footed Ferret *(Mustela nigripes)* SOC	Dwarf Shrew *(Sorex nanus)* PSOC
Prairie Shrew *(Sorex haydeni)* PSOC	Spotted Bat *(Euderma maculatum)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Eastern Cottontail *(Sylvilagus floridanus)*
Desert Cottontail *(Sylvilagus audubonii)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*	Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Ord's Kangaroo Rat *(Dipodomys ordii)*	North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Prairie Vole *(Microtus ochrogaster)*	Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Mountain Plover *(Anarhynchus montanus)* SOC	Burrowing Owl *(Athene cunicularia)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC	Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Turkey Vulture *(Cathartes aura)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*	Prairie Falcon *(Falco mexicanus)*
Killdeer *(Charadrius vociferus)*	Rock Pigeon *(Columba livia)*
Mourning Dove *(Zenaida macroura)*	Snowy Owl *(Bubo scandiacus)*
Common Nighthawk *(Chordeiles minor)*	White-throated Swift *(Aeronautes saxatalis)*
Say's Phoebe *(Sayornis saya)*	Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*	Bank Swallow *(Riparia riparia)*
Cliff Swallow *(Petrochelidon pyrrhonota)*	Common Raven *(Corvus corax)*
Rock Wren *(Salpinctes obsoletus)*	Canyon Wren *(Catherpes mexicanus)*
Mountain Bluebird *(Sialia currucoides)*	European Starling *(Sturnus vulgaris)*
Lark Sparrow *(Chondestes grammacus)*	House Finch *(Haemorhous mexicanus)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
North American Racer *(Coluber constrictor)*
Plains Gartersnake *(Thamnophis radix)*
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*
Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*
Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*

Vascular Plants

Double Bladderpod *(Physaria brassicoides)* SOC
Barr's Milkvetch *(Astragalus barrii)* SOC
Visher's Buckwheat *(Eriogonum visheri)* SOC
Woolly Twinpod *(Physaria didymocarpa var. lanata)* SOC
Raceme Milkvetch *(Astragalus racemosus)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Merriam's Shrew *(Sorex merriami)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Swift Fox *(Vulpes velox)* SOC
Northern Pocket Gopher *(Thomomys talpoides)*
Mountain Lion *(Puma concolor)*
Fringed Myotis *(Myotis thysanodes)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Mountain Cottontail *(Sylvilagus nuttallii)*
Western Harvest Mouse *(Reithrodontomys megalotis)*
Elk *(Cervus canadensis)*

Birds

Greater Sage-Grouse *(Centrocercus urophasianus)* SOC
Chimney Swift *(Chaetura pelagica)* PSOC
Northern Harrier *(Circus hudsonius)*
Marbled Godwit *(Limosa fedoa)*
Western Kingbird *(Tyrannus verticalis)*
Barn Swallow *(Hirundo rustica)*
American Robin *(Turdus migratorius)*
Field Sparrow *(Spizella pusilla)*
Western Meadowlark *(Sturnella neglecta)*
Common Grackle *(Quiscalus quiscula)*
Redpoll *(Acanthis flammea)*
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Willet *(Tringa semipalmata)*
Great Horned Owl *(Bubo virginianus)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
American Crow *(Corvus brachyrhynchos)*
Spotted Towhee *(Pipilo maculatus)*
Lark Bunting *(Calamospiza melanocorys)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Smooth Greensnake *(Opheodrys vernalis)* SOC
Common Gartersnake *(Thamnophis sirtalis)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC
Wandering Glider *(Pantala flavescens)*
Twelve-spotted Skimmer *(Libellula pulchella)*
White-faced Meadowhawk *(Sympetrum obtrusum)*

Original Concept Authors

S. Menard and K. Kindscher, mod. G. Kittel and M.S. Reid

Montana Version Authors

E. Luther, L.K. Vance

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28521
System Code	CES303.663, Western Great Plains Badlands

National Land Cover Dataset:
31: Barren Land

ReGAP:
3114: Western Great Plains Badlands

Additional References Legend: View Online Publication
Do you know of a citation we're missing?

Brown, R.W. 1971. Distribution of plant communities in southeastern Montana badlands. The American Midland Naturalist. 85(2): 458-477.

- Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.
- Von Loh, J., D. Cogan, D. Faber-Langendoen, D. Crawford, and M. Pucherelli. 1999. USGS-NPS Vegetation Mapping Program, Badlands National Park, South Dakota. USDI Bureau of Reclamation. Technical Memorandum No. 8260-99-02. Denver, CO.

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Citation for data on this website:
Great Plains Badlands — Western Great Plains Badlands. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=3114

Active and Stabilized Dune

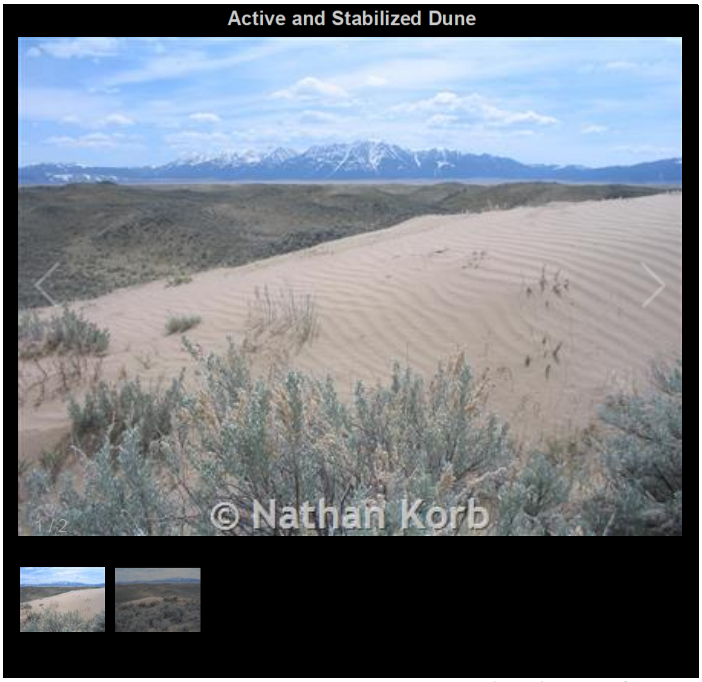


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General Description

This ecological system occurs in the intermountain western US and is composed of a mosaic of migrating, anchored, and stabilized dunes. In Montana, it is documented in the Centennial Valley and near Medicine Lake in the northeast part of the state. This system develops in environments subjected to high winds and sand substrates. Inland sand dunes are dynamic systems which contain three different functional stages: The migrating stage, characterized by large areas of active sand with minimal vegetation cover; the anchored stage, which has sparse vegetation cover (10 – 30%) and minimally active surface sands; and the stabilized stage, typified by dunes which lack active sands and have moderate vegetation cover (Hallock et al 2007). Sand dunes are naturally fluctuating systems where species composition is closely related to the processes of sand erosion, migration, and stabilization. Early and mid-seral species occupying these environments are adapted to moving sands and are generally dominated by green rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*), and needle and thread. Basin big sagebrush (*Artemisia tridentata ssp. tridentata*), mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) and three-tip sagebrush (*Artemisia tripartita ssp. tripartita*) contribute a moderate amount of cover on stabilized dunes and are associated with needle and thread (*Hesperostipa comata*) or, in more mesic conditions, Idaho fescue (*Festuca idahoensis*). Periodic drought, grazing, pocket gopher burrowing activity and fire are the main dynamics influencing this system.

Diagnostic Characteristics

Dune (landform), dune (substrate), sand soil texture, aridic, temperate

Similar Systems

Similar Systems

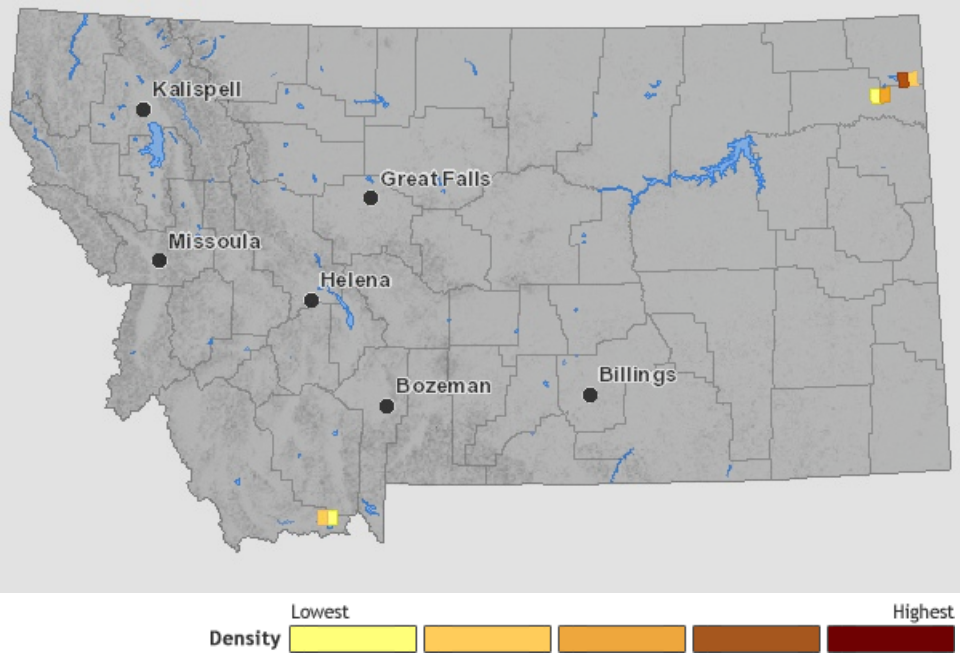
- Big Sagebrush Steppe
- Mixed Salt Desert Scrub
- Montane Sagebrush Steppe

Range

This system occurs in Intermountain Basins of the western United States including southwestern Montana in the Centennial Valley and northeastern Montana in Roosevelt and Sheridan counties.

Ecological System Distribution

Approximately 75 square kilometers are classified as Active and Stabilized Dune in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Roosevelt, Sheridan

Spatial Pattern

Large Patch

Environment

This is a minor system in Montana, found in the Centennial Valley of southwestern Montana and near medicine lake in northeastern Montana. It occurs as a mosaic, with land cover ranging from shifting, bare dunes with little to no vegetation (usually immediately post-disturbance) to anchored and stabilized dunes with sparse to moderate shrub cover in later successional stages. Throughout its North American range, the system develops in areas with sand substrates and high winds. The Centennial occurrence formed following the drying of post-Pleistocene lakes, when sediments were blown out of the lake basins and the remaining sands were distributed to the northeast of these sources.

Vegetation

Across the system's U.S. range, the typical primary successional sere on sands appears to be as follows: bare sand or sparse herbaceous vegetation on migrating sand; denser herbaceous vegetation or stands of rubber rabbitbrush (*Ericameria nauseosa*) on anchored or recently stabilized sand; and shrub vegetation of sagebrush (*Artemisia species*) on longer-stabilized sands. In Montana, early- and mid-seral shrub communities in dunes are dominated by green rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush, horse brush (*Tetradymia cancescens*) and needle and thread (*Hesperostipa comata*). Several plant species of concern occur in the Centennial Valley dunes and are associated with early-successional stages. In areas where the dunes are stabilized, basin big sagebrush (*Artemisia tridentata ssp. tridentata*) and three-tip sagebrush (*Artemisia tripartita ssp. tripartita*) contribute a moderate amount of cover and are associated with needle and thread (*Hesperostipa comata*) or, in more mesic conditions, mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) and Idaho fescue (*Festuca idahoensis*). These dunes bear a resemblance to the St. Anthony dunes in Idaho (Chadwick and Dalke 1965) but are distinct in many respects.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1046 *Sarcobatus vermiculatus* Intermountain Wet Shrubland Alliance
A1262 *Achnatherum hymenoides - Pseudoroegneria spicata - Muhlenbergia pungens* Grassland Alliance
A3179 *Purshia tridentata - Artemisia tridentata* Mesic Steppe & Shrubland Alliance
A3198 *Artemisia tridentata* - Mixed Shrub Dry Steppe & Shrubland Alliance
A3398 *Pinus ponderosa* Southern Rocky Mountain Forest & Woodland Alliance
A3446 *Pinus ponderosa* / Shrub Understory Central Rocky Mountain Woodland Alliance
A3759 *Populus angustifolia* Riparian Forest Alliance
A3985 *Elymus lanceolatus - Hesperostipa comata - Phacelia hastata* Central Rocky Mountain Sand Deposit Grassland Alliance
CEGL001745 *Elymus lanceolatus / Phacelia hastata* Grassland
A4011 *Redfieldia flexuosa - Leymus flavescens - Achnatherum hymenoides* Grassland Alliance
CEGL001650 *Achnatherum hymenoides / Psoralidium lanceolatum* Grassland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Sand dunes are highly dynamic systems in which sands migrate and vegetation communities shift naturally. Vegetation in these systems is often adapted to regular disturbance regimes and require it to persist. Disturbances by fire, grazing, and burrowing are important processes influencing successional dynamics (Lesica and Cooper 1998). Fire removes dominant shrubs in stabilized areas and maintains pocket gopher habitat, creating bare areas capable of supporting early successional species. In addition, periodic drought influences dune migration rates by reducing anchoring vegetation cover, thereby making way for early seral species (Marin, 2005; Jones 2006; Forman et al., 2006).

Management

Grazing and occasional wildfires are the primary forces affecting this system. Although not widespread in these areas, off-road travel can be detrimental to the sparse vegetation cover and can contribute to dispersal of invasive species. Invasive species are considered to be one of the primary threats to sand dune systems in the intermountain west. Cheatgrass invasion can reach numbers that stop sand movement and alter the crucial fluctuations of the system (Hallock et al 2007). Management must account for the dynamic nature of active and stabilized dunes. Substrate migration and shifting vegetation occur naturally in this system. Activities that change the amount and composition of vegetation can alter the dynamic process of sand movement and dune migration (Hallock et al 2007).

Restoration Considerations

Fire followed by intensive ungulate grazing may be the only way to restore early seral vegetation that supports plant species and associations of concern in low-lying areas. In stabilized areas of high topographic relief, restoring presettlement fire frequency will maintain pocket gopher habitat and thus promote a high proportion of early seral vegetation (Lesica and Cooper 1998).

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of

documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Columbia Plateau Pocket Mouse *(Perognathus parvus)* SOC	Prairie Shrew *(Sorex haydeni)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC	Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC
Masked Shrew *(Sorex cinereus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
White-tailed Jackrabbit *(Lepus townsendii)*	Least Chipmunk *(Neotamias minimus)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*	Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Ord's Kangaroo Rat *(Dipodomys ordii)*	North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Prairie Vole *(Microtus ochrogaster)*
Sagebrush Vole *(Lemmiscus curtatus)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Long-tailed Weasel *(Neogale frenata)*	American Ermine *(Mustela richardsonii)*
American Badger *(Taxidea taxus)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Pronghorn *(Antilocapra americana)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC	Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Northern Harrier *(Circus hudsonius)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Prairie Falcon *(Falco mexicanus)*
Upland Sandpiper *(Bartramia longicauda)*	Snowy Owl *(Bubo scandiacus)*
Common Nighthawk *(Chordeiles minor)*	Say's Phoebe *(Sayornis saya)*
Horned Lark *(Eremophila alpestris)*	Tree Swallow *(Tachycineta bicolor)*
Common Raven *(Corvus corax)*	European Starling *(Sturnus vulgaris)*
Lapland Longspur *(Calcarius lapponicus)*	

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC	Gophersnake *(Pituophis catenifer)*
Terrestrial Gartersnake *(Thamnophis elegans)*	Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*	

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Plains Spadefoot *(Spea bombifrons)*

Vascular Plants

Fendler Cat's-eye *(Cryptantha fendleri)* SOC	Silver Bladderpod *(Physaria ludoviciana)* SOC
Smooth Goosefoot *(Chenopodium subglabrum)* SOC	Painted Milkvetch *(Astragalus ceramicus var. apus)* SOC
Silky prairie clover *(Dalea villosa)* SOC	Pale Evening-primrose *(Oenothera pallida ssp. pallida)* SOC
Schweinitz's Flatsedge *(Cyperus schweinitzii)* SOC	Sand Wildrye *(Elymus flavescens)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Northern Hoary Bat *(Lasiurus cinereus)* SOC	Black-tailed Jackrabbit *(Lepus californicus)* PSOC
Northern Montane Shrew *(Sorex obscurus)*	California Myotis *(Myotis californicus)*
Northern Pocket Gopher *(Thomomys talpoides)*	

Birds

Sprague's Pipit *(Anthus spragueii)* SOC
Brewer's Blackbird *(Euphagus cyanocephalus)*
American Crow *(Corvus brachyrhynchos)*

Reptiles

Smooth Greensnake *(Opheodrys vernalis)* SOC
Common Gartersnake *(Thamnophis sirtalis)*
North American Racer *(Coluber constrictor)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

E. Luther, L. Vance, S.V. Cooper

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28613
System Code	CES304.775, Inter-Mountain Basins Active and Stabilized Dune

National Land Cover Dataset:
71: Grassland/Herbaceous

ReGAP:
3160: Inter-Mountain Basins Active and Stabilized Dune

Additional References Legend: View Online Publication

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Chadwick, H.W., and P.D. Dalke. 1965. Plant succession on dune sands in Fremont County, Idaho. Ecology 46(6):765-780.

- Forman, S L, M Spaeth, L Marîn, J Pierson, J Gómez, F Bunch, and A Valdez. 2006. "Episodic Late Holocene dune movements on the sand-sheet area, Great Sand Dunes National Park and Preserve, San Luis Valley, Colorado, USA". *Quaternary Research.* 66 (1): 97.
- Hallock, L. A., R. D. Haugo, and R. Crawford. 2007. Conservation strategy for Washington State inland sand dunes. Washington Natural Heritage Program, Natural Heritage Report 2007-05, prepared for Bureau of Land Management, Spokane, WA. 82 pp.
- Jones GP. 2006. Survey of tall sagebrush vegetation on stabilized sands in the Jack Morrow Hills Coordinated Management Area, BLM Rock Springs Field Office, Wyoming. Laramie, WY: Wyoming Natural Diversity Database; A report prepared for the Bureau of Land Management's Rock Springs Field Office.
- Lesica, P. & S. V. Cooper. 1998. Succession and disturbance in sandhills vegetation: constructing models for managing biological diversity. Conservation Biology 13:293-302.
- Marin, L, S L Forman, A Valdez, and F Bunch. 2005. "Twentieth century dune migration at the Great Sand Dunes National Park and Preserve, Colorado, relation to drought variability". *Geomorphology.* 70 (1): 163.

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Active and Stabilized Dune — Inter-Mountain Basins Active and Stabilized Dune. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=3160

Wyoming Basin Cliff and Canyon

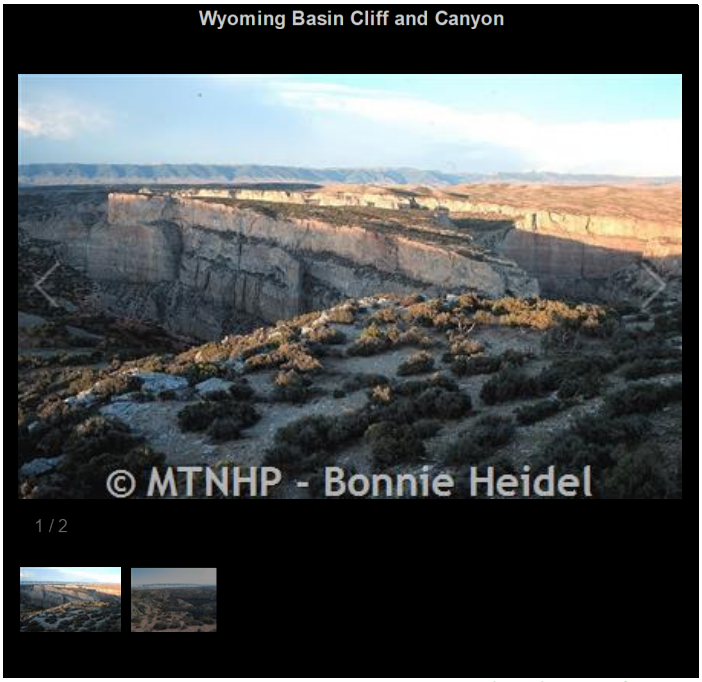


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Provisional State Rank: S3
(see reason below)

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State Rank Reason

If the areas mapped as Inter-Mountain Basin Cliff and Canyon within Montana are indeed different in their abiotic and biotic components from the Rocky Mountain Cliff, Canyon and Massive Bedrock system, then the Montana occurrences will be the northern extent of the system's range. Because it is not mapped as widespread, it can be considered to be uncommon, and has therefore been tentatively ranked as an S3.

General Description

This ecological system has been mapped in Montana in the Wyoming Basin from satellite image classification. However, none of its component associations or alliances have been documented, and the existence of this system needs to be verified in 2010. Elsewhere it has been described from Wyoming, Utah, Nevada, California, Idaho and eastern Washington and Oregon, where it can be found from foothill to subalpine elevations on landforms that contain steep cliff faces, canyon walls and rocky outcrops derived from a variety of parent materials. It includes talus and scree fields immediately below cliff and outcrop faces. Vegetation inhabiting this ecological system is typically sparse and may include conifers and woody shrubs adapted to limited soil moisture and soil development. Herbaceous cover is typically very sparse and limited to species adapted to inhabiting cliff faces and unstable talus slides. In Montana, this system may be more appropriately considered to be Rocky Mountain Cliff, Canyon and Bedrock.

Similar Systems

- Rocky Mountain Cliff, Canyon and Massive Bedrock

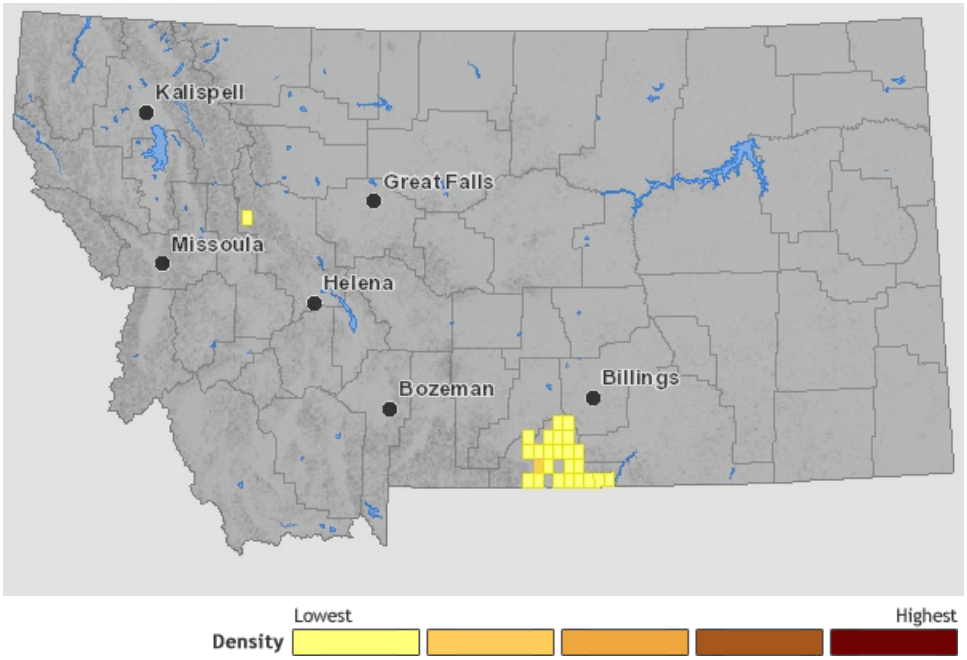
Range

Range

This ecological system has been documented from Wyoming, Utah, California, Nevada, and eastern Washington and Oregon. It has been mapped in Montana, but its occurrence needs to be verified.

Ecological System Distribution

Approximately 7 square kilometers are classified as Wyoming Basin Cliff and Canyon in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Carbon, Lewis and Clark

Spatial Pattern

Large patch

Environment

Environmental attributes of this system need to be defined. Refer to the Rocky Mountain Cliff, Canyon and Massive Bedrock system for more information.

Vegetation

Vegetation has not been described in Montana.

Dynamic Processes

Information incomplete

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
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Suggested Uses and Limitations

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Literature Cited

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- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
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- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Pallid Bat *(Antrozous pallidus)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	Western Spotted Skunk *(Spilogale gracilis)* PSOC
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Desert Cottontail *(Sylvilagus audubonii)*	Least Chipmunk *(Neotamias minimus)*
North American Deermouse *(Peromyscus maniculatus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Coyote *(Canis latrans)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Mountain Lion *(Puma concolor)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Turkey Vulture *(Cathartes aura)*
Red-tailed Hawk *(Buteo jamaicensis)*	American Kestrel *(Falco sparverius)*
Peregrine Falcon *(Falco peregrinus)*	Prairie Falcon *(Falco mexicanus)*
Rock Pigeon *(Columba livia)*	Mourning Dove *(Zenaida macroura)*
Common Nighthawk *(Chordeiles minor)*	White-throated Swift *(Aeronautes saxatalis)*
Say's Phoebe *(Sayornis saya)*	Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*	Common Raven *(Corvus corax)*
Rock Wren *(Salpinctes obsoletus)*	Canyon Wren *(Catherpes mexicanus)*
European Starling *(Sturnus vulgaris)*	Spotted Towhee *(Pipilo maculatus)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC	Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC	Common Sagebrush Lizard *(Sceloporus graciosus)*
Northern Rubber Boa *(Charina bottae)*	North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*	Terrestrial Gartersnake *(Thamnophis elegans)*
Prairie Rattlesnake *(Crotalus viridis)*	

Vascular Plants

Big Horn Fleabane *(Erigeron allocotus)* SOC	Matted Prickly-phlox *(Leptodactylon caespitosum)* SOC

Native Species Occasionally Associated with this Ecological System

Birds

American Crow *(Corvus brachyrhynchos)*

Reptiles

Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*

Original Concept Authors

NatureServe Western Ecology Team, mod. M.S. Reid

Montana Version Authors

E. Luther, L.K. Vance

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28617
System Code	CES304.779, Inter-Mountain Basins Cliff and Canyon

National Land Cover Dataset:
31: Barren Land

ReGAP:
3173: Inter-Mountain Basins Cliff and Canyon

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Citation for data on this website:
Wyoming Basin Cliff and Canyon — Inter-Mountain Basins Cliff and Canyon. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=3173

Rocky Mountain Cliff, Canyon and Massive Bedrock

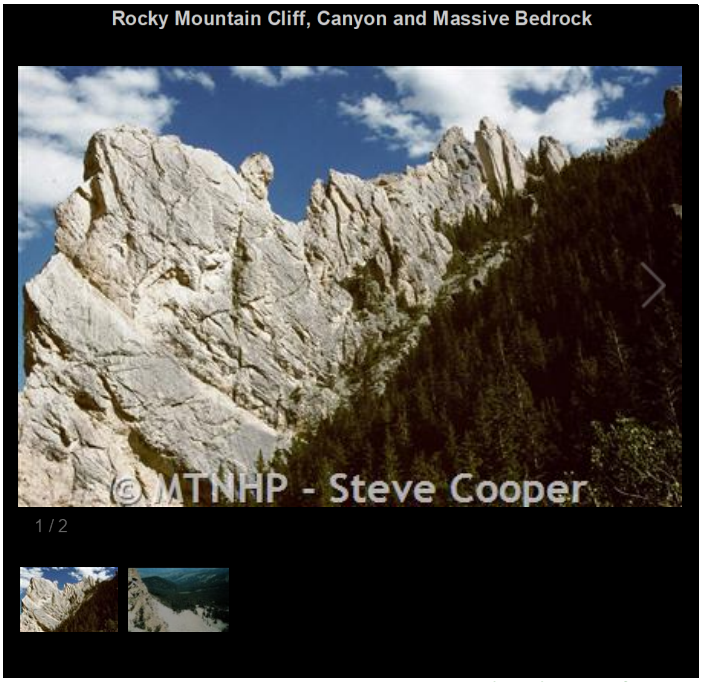


Image Copyright and Usage Information

Provisional State Rank: S4
(see reason below)

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State Rank Reason

Because these systems tend to occur in inaccessible locations, they have not been widely disturbed. However, warming and/or drying climatic patterns and loss of tree species to fire or insects may limit the range and distribution over the short term.

General Description

This ecological system of barren and sparsely vegetated landscapes is found from foothill to subalpine elevations throughout the Rocky Mountains and island mountain ranges of Montana. Its range overlaps with the Western Great Plains Cliff and Outcrop, which differs in having more developed soils and more vegetated cover. It occurs on steep cliff faces, in narrow canyons, and on smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types, and includes the unstable scree and talus slopes that typically occur below cliff faces. It is characteristically dry and sparsely vegetated, typically having less than 10% plant cover. Although there may be small patches of dense vegetation, the system usually consists of scattered trees and/or shrubs such as Douglas-fir (*Pseudotsuga menziesii*), Ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), aspen (*Populus tremuloides*), or subalpine fir (*Abies lasiocarpa*). Juniper (*Juniperus* spp.) is common at lower elevations. Shrubs adapted to xeric growing conditions and rocky soils are typically present, e.g. oceanspray (*Holodiscus discolor*), currant (*Ribes species*), common ninebark (*Physocarpus malvaceus*), wild rose (*Rosa* species), common juniper (*Juniperus communis*), Lewis mock orange (*Philadelphus lewisii*), creeping Oregon grape (*Mahonia repens*), three leaf sumac (*Rhus trilobata*), American wild raspberry (*Rubus idaeus*) or serviceberry (*Amelanchier alnifolia*). Soil development is limited, as is herbaceous cover. Forbs may include penstemon (*Penstemon species*), buckwheat (*Eriogonum* species), western sagewort (*Artemisia ludovicana*), Michaux's sagewort (*Artemisia michauxiana*), and spotted saxifrage (*Saxifraga bronchialis*). Because the elevation range is so broad, species composition may vary widely from occurrence to occurrence.

Diagnostic Characteristics

Canyon, cliff, bedrock outcrop, barrens or talus; shallow and/or poorly developed soils; less than 10% vascular plant cover.

Similar Systems

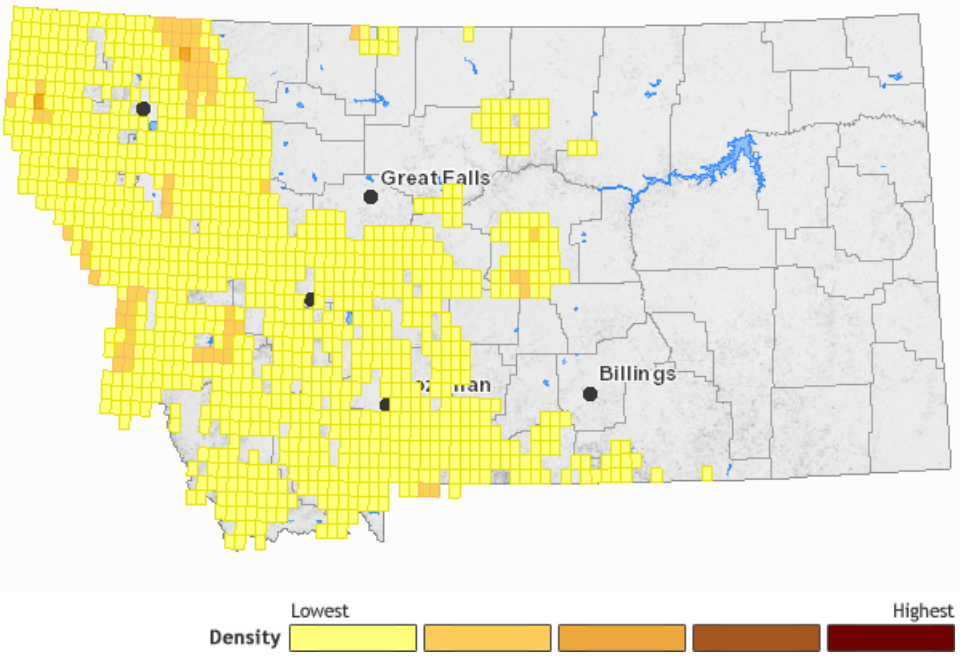
- Great Plains Cliff and Outcrop
- Wyoming Basin Cliff and Canyon

Range

This system is located throughout the Rocky Mountains, including the mountains of western Montana and the isolated island ranges of central Montana.

Ecological System Distribution

Approximately 691 square kilometers are classified as Rocky Mountain Cliff, Canyon and Massive Bedrock in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Phillips, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Wheatland

Spatial Pattern

Large Patch

Environment

The Rocky Mountain Cliff, Canyon and Massive Bedrock ecological system occurs on steep cliff faces, in narrow canyons, on smaller rock outcrops and on unstable scree and talus slopes. These systems are shaped by the parent rock material, climate, aspect, and physical weathering patterns making them distinct from neighboring ecosystems as well as from each other (Larson et al 2000). Soils are typically thin and/or poorly developed, and moisture for plant growth is primarily retained in crevices in the rock substrate. Limited soil availability, harsh weather extremes, and water stress impose physiological constraints on plants communities leading to plant species that are uniquely adapted to these conditions. Additionally, within the larger cliff habitat, steep slopes, small ledges, overhangs, cracks and crevices often form a mosaic of microhabitat types (Graham and Knight 2004).

Vegetation

This system is characteristically dry and sparsely vegetated, typically having less than 10% plant cover. Species composition includes individuals present in adjacent systems (unless exposed parent material is radically different) and herbaceous species specifically adapted to cliff faces and unstable talus slides. Soil development is limited, as is

herbaceous cover. Although there may be small patches of dense vegetation, the system usually consists of scattered trees and/or shrubs such as Douglas-fir (*Pseudotsuga menziesii*), Ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), aspen (*Populus tremuloides*), or subalpine fir (*Abies lasiocarpa*). Juniper (*Juniperus* spp.) is common at lower elevations. Shrubs adapted to xeric growing conditions and rocky soils are typically present, e.g. oceanspray (*Holodiscus discolor*), currant (*Ribes species*), common ninebark (*Physocarpus malvaceus*), wild rose (Rosa species), common juniper (Juniperus communis), Lewis mock orange (*Philadelphus lewisii*), creeping Oregon grape (*Mahonia repens*), three leaf sumac (*Rhus trilobata*), American wild raspberry (*Rubus idaeus*) or serviceberry (*Amelanchier alnifolia*). Woody colonizing vegetation is usually limited to the toeslopes of talus and scree slides or in protected pockets beneath cliff faces. Herbaceous plants inhabit both the talus and scree slides and fractures in the cliff faces. Forbs may include penstemon (*Penstemon* species), buckwheat (*Eriogonum* species), western sagewort (*Artemisia ludovicana*), Michaux's sagewort (Artemisia michauxiana), and spotted saxifrage (*Saxifraga bronchialis*). Graminoids may include slender wheatgrass (*Elymus trachycaulus*) and bluebunch wheatgrass (*Pseudoroegneria spicata*). Mosses and xeric-adapted ferns such as cliff fern (*Woodsia* species), holly fern (*Polystichium lonchitis*), and fragile fern (*Cystopteris fragilis*) occur in fractures of the bedrock, cliff faces or in toeslopes of unstable talus slides. Lichen cover can be high on larger size talus.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0540 *Pinus flexilis* Rocky Mountain Woodland Alliance
  CEGL000815 *Pinus flexilis* Scree Woodland
A2036 *Populus tremuloides* Rocky Mountain Forest & Woodland Alliance
  CEGL000945 *Populus tremuloides - Physocarpus malvaceus / Amelanchier alnifolia* Scree Woodland
A3154 *Minuartia obtusiloba - Paronychia pulvinata - Silene acaulis* Alpine Fell-field Alliance
A3398 *Pinus ponderosa* Southern Rocky Mountain Forest & Woodland Alliance
A3454 *Pseudotsuga menziesii* Southern Rocky Mountain Forest & Woodland Alliance
  CEGL000911 *Pseudotsuga menziesii* Scree Woodland
A3466 *Pinus ponderosa* Northwest Great Plains Open Woodland Alliance
A3616 *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Talus & Scree Woodland Alliance
A3644 *Abies lasiocarpa - Picea engelmannii* Dry-Mesic Scree & Talus Woodland Alliance
  CEGL000925 *Abies lasiocarpa* Scree Woodland
A4021 Rocky Mountain Alpine Sparse Herb Bedrock & Scree Alliance
A4022 Rocky Mountain Alpine Nonvascular Bedrock & Scree Alliance
A4079 *Pinus contorta* Rocky Mountain Woodland Alliance
  CEGL000766 *Pinus contorta* Scree Woodland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Cliff and canyon ecosystems are shaped by the strength and type of parent rock, aspect, climate, and both physical and chemical weathering patterns. Erosion by wind, water, and gravity is the primary disturbance process in these environment, and it can have a strong influence over which species occur on cliffs and talus (Larson et al 2000). Warming or drying climatic patterns will impact this system and the distribution of the peripheral species, northern Rocky Mountain endemics, and rare species that occur within it. Historically, stand-replacing fires occur frequently in adjacent forests, woodlands and shrublands. Lightning strikes can cause fire within these cliff and canyon systems, however due to minimal vegetation cover fire severity is generally low.

Management

This system is fragile due to extremely limited soil development and plant colonization. Because they are difficult to access these habitats are relatively free of anthropogenic disturbance, however climbing recreation, and mining have been known to impact this system (Colorado Natural Heritage Program 2005).

Restoration Considerations

Generally, human disturbances are extremely limited in this system due to inaccessibility and unstable landslides occurring below the cliff faces. Systems will generally recover over time if the disturbance is removed.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Pallid Bat *(Antrozous pallidus)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Least Chipmunk *(Neotamias minimus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
North American Deermouse *(Peromyscus maniculatus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Bobcat *(Lynx rufus)*	Mountain Lion *(Puma concolor)*
Mountain Goat *(Oreamnos americanus)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Black Swift *(Cypseloides niger)* SOC	Black Rosy-Finch *(Leucosticte atrata)* SOC
Gray-crowned Rosy-Finch *(Leucosticte tephrocotis)* SOC	Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Turkey Vulture *(Cathartes aura)*	Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*	Peregrine Falcon *(Falco peregrinus)*
Rock Pigeon *(Columba livia)*	White-throated Swift *(Aeronautes saxatalis)*
Say's Phoebe *(Sayornis saya)*	Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*	Common Raven *(Corvus corax)*
Rock Wren *(Salpinctes obsoletus)*	Canyon Wren *(Catherpes mexicanus)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC	Western Skink *(Plestiodon skiltonianus)* SOC
Northern Rubber Boa *(Charina bottae)*	Gophersnake *(Pituophis catenifer)*
Terrestrial Gartersnake *(Thamnophis elegans)*	

Amphibians

Coeur d'Alene Salamander *(Plethodon idahoensis)* SOC

Vascular Plants

Taper-tip Desert-parsley *(Lomatium attenuatum)* SOC
Western Joepye-weed *(Ageratina occidentalis)* SOC
Sandweed *(Athysanus pusillus)* SOC
Spiny Greasebush *(Glossopetalon spinescens)* SOC
Cusick's Horsemint *(Agastache cusickii)* SOC
Columbia Lewisia *(Lewisia columbiana)* SOC
Austin's Knotweed *(Polygonum austiniae)* PSOC
Mountain Bladder Fern *(Cystopteris montana)* PSOC
Whitestem Goldenbush *(Ericameria discoidea var. discoidea)* SOC
Idaho Goldenweed *(Tonestus aberrans)* SOC
Dense-leaf Draba *(Draba densifolia)* SOC
Hoary Phacelia *(Phacelia incana)* SOC
Alpine Collomia *(Collomia debilis var. camporum)* SOC
Kruckeberg's Swordfern *(Polystichum kruckebergii)* SOC
Yellow-staining Collomia *(Collomia tinctoria)* PSOC
Macoun's Cinquefoil *(Potentilla macounii)*

Native Species Occasionally Associated with this Ecological System

Mammals

Northern Hoary Bat *(Lasiurus cinereus)* SOC

Birds

American Crow *(Corvus brachyrhynchos)*

Reptiles

Western Milksnake *(Lampropeltis gentilis)* SOC
Common Gartersnake *(Thamnophis sirtalis)*
Common Sagebrush Lizard *(Sceloporus graciosus)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC

Vascular Plants

Rocky Mountain Twinpod *(Physaria saximontana var. dentata)* SOC

Montana Version Authors

E. Luther, L.K. Vance and T.A. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	CES306.815, Rocky Mountain Cliff, Canyon and Massive Bedrock

National Land Cover Dataset:
31: Barren Land

ReGAP:
3129: Rocky Mountain Cliff, Canyon and Massive Bedrock

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Resources Inventory Committee (Canada). 1998. *Standard for terrestrial ecosystem mapping in British Columbia*. [Victoria]: Resources Inventory Committee.
- Colorado Natural Heritage Program. 2005. Ecological System Descriptions and Viability Guidelines for Colorado. Colorado Natural Heritage Program, Colorado State University, Fort Collins, Colorado.
- Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.
- Graham, L. and R.L. Knight. 2004. Multi-Scale Comparisons of Cliff Vegetation in Colorado. Plant Ecology 170(2): 223-234
- Hess, K., and C. H. Wasser. 1982. Grassland, shrubland, and forest habitat types of the White River-Arapaho National Forest. Unpublished final report 53-82 FT-1-19. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, CO. 335 pp.
- Larson, D. W., U. Matthes, J. A. Gerrath, N. W. K. Larson, J. M. Gerrath, J. C. Nekola, G. L. Walker, S. Porembski, and A. Charlton. 2000. "Evidence for the Widespread Occurrence of Ancient Forests on Cliffs". *Journal of Biogeography.* 27 (2): 319-331.

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Citation for data on this website:

Rocky Mountain Cliff, Canyon and Massive Bedrock. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=3129

Great Plains Cliff and Outcrop



Image Copyright and Usage Information

Provisional State Rank: S5

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General Description

This system includes cliffs and outcrops throughout the Western Great Plains. Substrate can range from sandstone and limestone, which can often form bands in the examples of this system. This system includes cliffs and outcrops throughout the Western Great Plains. Substrate can range from sandstone and limestone, which can often form bands in the examples of this system. Vegetation is restricted to shelves, cracks and crevices in the rock. This system differs from Great Plains Badlands in that often the soil is slightly developed and less erodible, and some grass and shrub species can occur with a cover of more than 10 percent. Common species in this system include short shrubs such as three leaf sumac (*Rhus trilobata*) and sagebrush (Artemisia spp.), and mixed grass species such as sideoats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*) and prairie sandreed (*Calamovilfa longifolia*). This system is embedded within the mixed grass and sand prairie regions of eastern Montana and the fescue grasslands of the northwestern Great Plains region. Climate is typical of mid continental regions with long severe winters and warm summers. Precipitation ranges from 300 to 650 millimeters (12 to 26 inches) with two-thirds coming during the summer and most of the other third in the spring. The growing season is on average 115 days, although the growing season ranges from 100 days on the Canadian border to 130 days on the Wyoming border. Typical land use is grazing.

Diagnostic Characteristics

Less than 10% vegetation cover, cliff, ustic soils, very shallow soils, flood scouring

Similar Systems

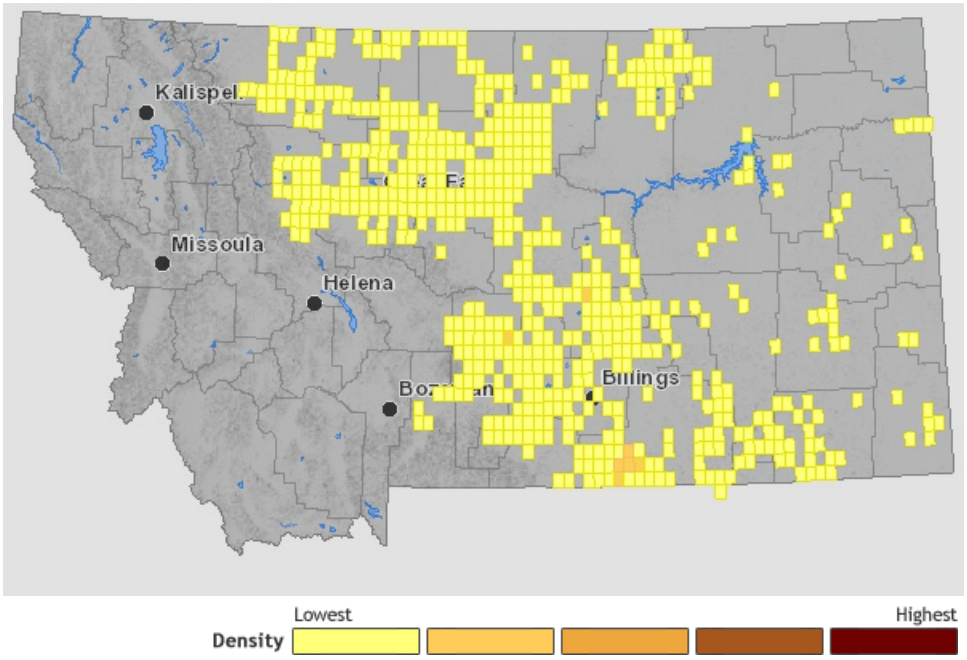
- Great Plains Badlands
- Rocky Mountain Cliff, Canyon and Massive Bedrock

Range

This system is scattered throughout eastern Montana and the northwestern glaciated plains where eroded landscapes impair the ability of vegetation to thrive. Elsewhere, this system is found at scattered locations from southern Manitoba and North Dakota, south to northwestern Texas and the eastern half of the Rocky Mountain states south to New Mexico.

Ecological System Distribution

Approximately 106 square kilometers are classified as Great Plains Cliff and Outcrop in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Fallon, Fergus, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Meagher, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Prairie, Richland, Roosevelt, Rosebud, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Small patch

Environment

These systems are primarily found on cliffs and outcrops throughout the western Great Plains region of Montana. Landforms such as buttes, mesas, and eroded cliff bands constitute the major landforms. It is found within an arid to semi-arid climate with infrequent, but torrential, rains that cause erosion. A combination of other factors such as elevation, wind erosion, and parent material can also contribute to its development. This system contains pockets of soil development below the cliff faces, usually derived from limestone and sandstone parent materials. Vegetation in these shallow soil communities are subject to conditions different from those of the surrounding ecosystems (Crow & Ware 2007). Soils are dry and easily erodible, and due to their shallow nature soil surface temperatures can vary widely. Thus, cliffs provide a unique environment for plants adapted to these conditions (Graham & Knight 2004).

Vegetation

Vegetation is restricted to shelves, cracks and crevices in the rock and is typically sparse. Endemic and other characteristic outcrop species have adapted well to the shallow soil habitat of outcrops (Crow & Ware 2007). Vegetation is typically a mixture of shrub and herbaceous species. Common shrubs include three leaf sumac, greasewood (*Sarcobatus vermiculatus*), Gardner's saltbush (*Atriplex gardneri*), big sagebrush (*Artemisia tridentata*), silver sagebrush (*Artemisia cana*), rabbitbrush (*Chrysothamnus species*) and saltbush (*Atriplex species*). In the northwestern Great Plains region of Montana, it can include horizontal juniper (*Juniperus horizontalis*), common juniper (*Juniperus communis*), bearberry (*Arctostaphylos uva-ursi*), and shrubby cinquefoil (*Dasiphora fruticosa*).

Forbs adapted to sandy soils and sandstone and limestone substrates inhabit this system. Common species include

buckwheat (*Eriogonum* species), threadleaf snakeweed (*Gutierrezia sarothrae*), Hooker's sandwort (*Arenaria hookeri*), bud sagebrush (*Picrothamnus desertorum*), curlycup gumweed (*Grindelia squarrosa*), bladderpod (*Lesquerella species*), twinpod (*Physariaspecies*), douglasia (*Douglasia montana*), rock evening primrose (*Oenothera cespitosa*), four-nerve daisy (*Tetraneuris acaulis*) and penstemon (*Penstemon* species). In Montana, graminoid cover is typically sparse. Species include sideoats grama, blue grama, prairie sandreed, western wheatgrass (*Pascopyrum smithii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Indian ricegrass (*Achnatherum hymenoides*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1874 *Artemisia longifolia* Badlands Alliance
  CEGL001521 *Artemisia longifolia / Calamovilfa longifolia* Sparse Vegetation
A3981 Great Plains Acidic Cliff Alliance
  CEGL002290 Sandstone Great Plains Xeric Butte - Bluff Sparse Vegetation

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Communities associated with this ecological system are adapted to soils that may be dry throughout the growing season. Typically, soils are more developed than in similar badlands systems and are derived from sandstone or limestone. Drought and wind erosion are the most common natural dynamics affecting this system (Colorado Natural Heritage Program 2005). Communities can be tolerant of managed grazing practices or light-intensity fires, but are not tolerant of heavy use on the landscape due to easily erodible conditions. Soils can also be strongly influenced by infrequent, but often torrential, rains. Invasive species can become established where there is frequent disturbance.

Management

This system is usually not subjected to heavy grazing or human disturbances. However, invasive species can out-compete existing herbaceous native vegetation within this system.

Restoration Considerations

Eliminating grazing or implementing light grazing regimes may allow the sparse vegetation to recover.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
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Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Pallid Bat *(Antrozous pallidus)* SOC	Prairie Shrew *(Sorex haydeni)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Desert Cottontail *(Sylvilagus audubonii)*	Least Chipmunk *(Neotamias minimus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*	Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Golden Eagle *(Aquila chrysaetos)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Turkey Vulture *(Cathartes aura)*
Red-tailed Hawk *(Buteo jamaicensis)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Peregrine Falcon *(Falco peregrinus)*
Prairie Falcon *(Falco mexicanus)*	Rock Pigeon *(Columba livia)*
Mourning Dove *(Zenaida macroura)*	Great Horned Owl *(Bubo virginianus)*
Common Nighthawk *(Chordeiles minor)*	White-throated Swift *(Aeronautes saxatalis)*
Say's Phoebe *(Sayornis saya)*	Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*	Common Raven *(Corvus corax)*
Rock Wren *(Salpinctes obsoletus)*	Canyon Wren *(Catherpes mexicanus)*
Northern Shrike *(Lanius borealis)*	European Starling *(Sturnus vulgaris)*
Spotted Towhee *(Pipilo maculatus)*	Lark Sparrow *(Chondestes grammacus)*
Western Meadowlark *(Sturnella neglecta)*	

Reptiles

Western Milksnake *(Lampropeltis gentilis)* SOC	Common Sagebrush Lizard *(Sceloporus graciosus)*
North American Racer *(Coluber constrictor)*	Gophersnake *(Pituophis catenifer)*
Terrestrial Gartersnake *(Thamnophis elegans)*	Plains Gartersnake *(Thamnophis radix)*
Common Gartersnake *(Thamnophis sirtalis)*	Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Northern Hoary Bat *(Lasiurus cinereus)* SOC	California Myotis *(Myotis californicus)*

Birds

American Crow *(Corvus brachyrhynchos)*	Lark Bunting *(Calamospiza melanocorys)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC	Northern Rubber Boa *(Charina bottae)*

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Natureserve Western Ecology Group

Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28522
System Code	CES303.665, Western Great Plains Cliff and Outcrop

National Land Cover Dataset:
31: Barren Land

ReGAP:
3142: Western Great Plains Cliff and Outcrop

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Colorado Natural Heritage Program. 2005. Ecological System Descriptions and Viability Guidelines for Colorado. Colorado Natural Heritage Program, Colorado State University, Fort Collins, Colorado.
- Crow, S.E. and S. Ware. 2007. Soil Type Tolerance in Rocky Outcrop Plants: Species of Non-Calcareous Substrates. The Southwest Naturalist 52(1): 120-125
- Graham, L. and R.L. Knight. 2004. Multi-Scale Comparisons of Cliff Vegetation in Colorado. Plant Ecology 170(2): 223-234

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Rocky Mountain Subalpine-Montane Fen

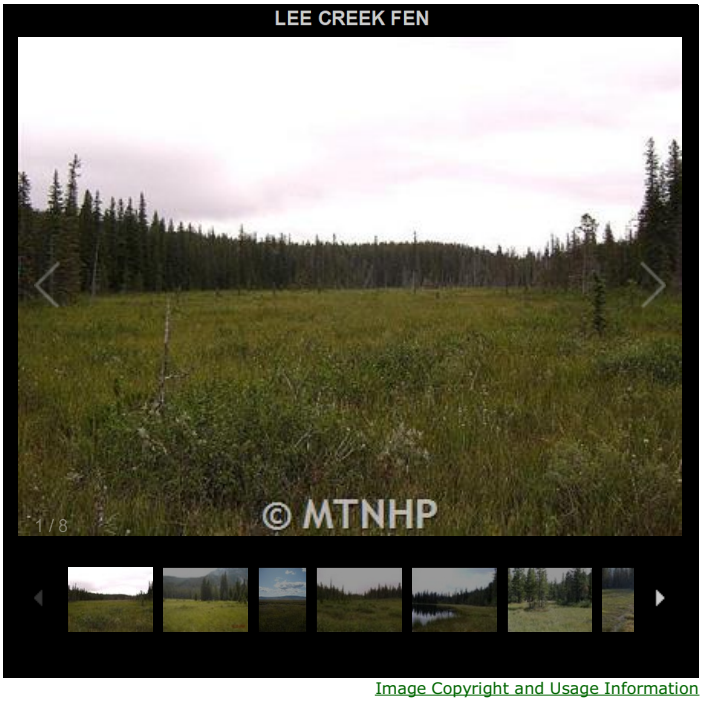


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State Rank Reason

Although fens are relatively uncommon, they are well distributed across Montana in small patches, and many occur within managed and protected areas. Climate change and loss of forest ecosystems to fire, insects and disease may alter the hydrology of fen systems in coming decades.

General Description

Fens occur infrequently throughout the Rocky Mountains from Colorado north into Canada. They are confined to specific environments defined by groundwater discharge, soil chemistry, and peat accumulation. This system includes poor fens, rich fens and extremely rich fens. Fens form at low points in the landscape or near slopes where groundwater intercepts the soil surface. Groundwater inflows maintain a fairly constant water level year-round, with water at or near the surface most of the time. Constant high water levels lead to accumulation of organic material, usually greater than 40 centimeters (15 inches), except on sites underlain by limestone bedrock. In addition to peat accumulation and perennially saturated soils, extremely rich and iron fens have distinct soil and water chemistry, with high levels of one or more minerals such as calcium, magnesium, or iron. Fens maintain stream water quality through denitrification and phosphorus absorption. They are among the most floristically diverse of all wetland types, supporting a large number of rare and uncommon bryophytes and vascular plant species, and provide habitat for uncommon mammals, mollusks and insects. Fens usually occur as a mosaic of herbaceous and woody plant communities. In herbaceous communities, there are several plant associations dominated by sedges (*Carex* species), spikerushes (*Eleocharis* species), and rushes (*Juncus* species). Bryophyte diversity is generally high and includes sphagnum (*Sphagnum* species). Forb diversity is especially high in extremely rich and iron fens. The woody community is typically composed of willow (*Salix* species) and birch (*Betula nana*) carr shrubland. The surrounding landscape may be ringed with other wetland systems: fens often grade into marshes, wet meadows or riparian shrublands, and can be surrounded by conifer swamps or wet to mesic coniferous forests. In very rare cases, fens

can occur within prairie grasslands in the glaciated Great Plains. Fens are found in scattered locations along the Rocky Mountain Front, in the Rocky Mountains and and intermountain valleys, in the small isolated central mountain ranges, and at higher elevations on the Beartooth Plateau in the southern portion of the state.

Diagnostic Characteristics

Seepage-fed slopes, montane to subalpine elevations, organic peat layer greater than 40 cm deep, extreme (mineral) rich and iron-rich, saturated soils, bryophytes, graminoids

Similar Systems

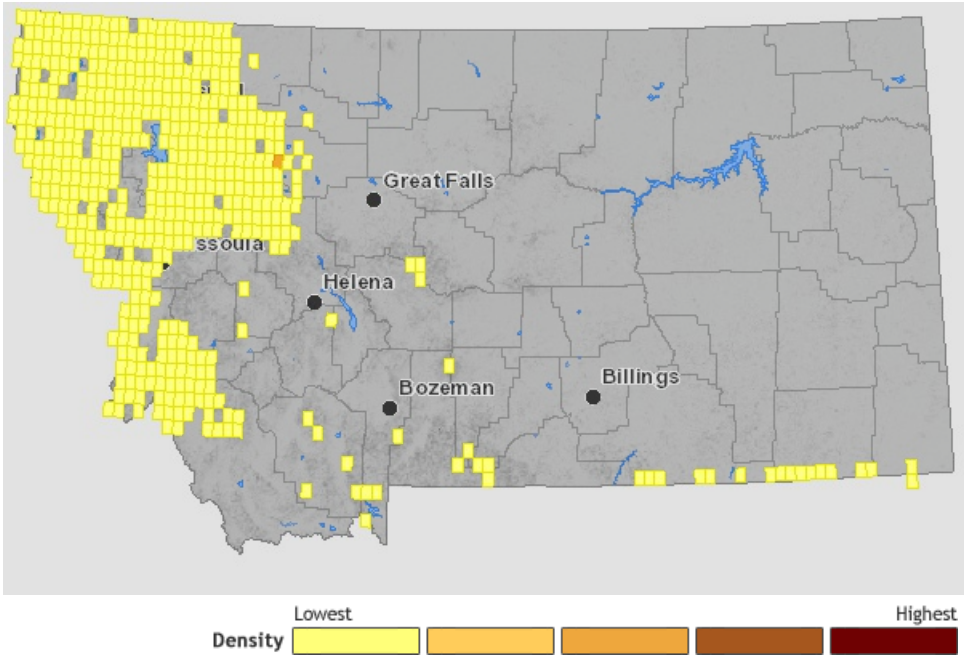
- Alpine-Montane Wet Meadow

Range

This system occurs infrequently throughout the Rocky Mountains from Colorado north into Canada. In Montana, small fens are found in scattered locations in the glaciated plains and in the small isolated mountain ranges of the central part of the state. The Swan, Stillwater and Flathead valleys have numerous rich and extremely rich fen systems due to the prevalence of limestone bedrock in the Whitefish, Mission, and Swan mountain ranges. Similarly, rich and extremely rich fens are found along the limestone-rich Front Range east of the Continental Divide. East of the Continental Divide, both small and large rich and extremely rich prairie fens occur on the extreme western Great Plains bordering the Rocky Mountain Front (Lesica, 1986) and rarely, within the northwestern mixed grass prairie (Heidel et al, 2000). Further south in western Montana, poor fen systems are more common in the Bitterroot, Lolo, and Beaverhead ranges, and are found in the granitic, isolated central Montana island ranges and the Beartooth Plateau in southwestern Montana.

Ecological System Distribution

Approximately 44 square kilometers are classified as Rocky Mountain Subalpine-Montane Fen in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Carbon, Carter, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powder River, Powell, Ravalli, Sanders, Stillwater, Sweet Grass, Teton

Spatial Pattern

Small Patch

Environment

The montane-subalpine fen ecological system is a small-patch system composed of mountain wetlands that support a unique community of plants not found in other types of wetlands. Fens are confined to specific environments defined by groundwater discharge, soil chemistry, and peat accumulation of at least 40 centimeters (15 inches), although peat accumulations in areas overlain by gravel, cobble or bedrock may be less. Soils are typically organic histosols with 40

centimeters or more of organic material if overlying a mineral soil, or less if overlying bedrock, cobbles or gravels. Histosols range in texture from clayey-skeletal to loamy-skeletal and fine-loams. Fens form at low points in the landscape or near slopes where groundwater intercepts the soil surface. Groundwater inflows maintain a fairly constant water level year-round, with water at or near the surface most of the time. Constant high water levels lead to accumulations of organic material. Rich and extremely rich fens are found in areas underlain by limestone. Water chemistry ranges from only slightly acidic to alkaline and is usually distinctly calcareous. Marl deposits (precipitated calcium carbonates) are common in these systems. Tufa deposits or terraces can be seen in some rich fens and are composed of virtually pure calcium carbonate at the soil surface, formed by continuous discharge and evaporation of calcite saturated groundwater. In northwestern Montana, pH values usually range from 5.9 to 8.4 (Chadde et al., 1998). Poor fens are more common in the northern Rocky Mountains and occur in areas overlain by non-calcareous bedrock, e.g., argillites and granite. These are usually flat, acidic, and saturated to the surface, sometimes with standing water. Iron rich fens are more rare in occurrence, and can be strongly acidic (as low as pH 2.98) and associated with geothermal features and bedrock of weathering pyrite, as found in some occurrences in the Yellowstone Plateau (Lemly, 2007). Iron rich fens support a diverse bryophyte community, typically have less vascular plant diversity, and are composed of species dependant on more acidic conditions.

Fens develop successionally through lake-filling, flow-through successional processes or by paludification (Chadde et al., 1998). Lake filling occurs in depressions and is often characterized by the presence of floating mats and a ring of carr vegetation on the outer margin of the peatland. Flow-through fens are the most common in the northern Rocky Mountains. They occur along springs, streams, slopes and benches with a constant inflow and outflow of calcium-rich water. They are characterized by a series of linear hummocks oriented perpendicular to the slope. Carr shrubland is well developed in flow-through fens due to well-aerated, nutrient-rich water near the inflow and outflow zones. Usually there is an open, nutrient- poor community in the central portion of the fen. Paludification occurs when fens expand due to a rise in the water table caused by peat accumulation. This process is most often observed near seeps and springs or adjacent to closed basin peatlands where peat accumulation causes wetter conditions along the outer edges. Higher water tables kill existing trees. In the northern Rocky Mountains, this successional process is limited due to prolonged summer droughts; however it may be seen in some fen systems at higher elevations.

In northwestern Montana, fens occur at montane to subalpine elevations, generally ranging from 985-2,165 meters (2,500-5,500 feet). In southwestern Montana, subalpine and alpine fens occur at higher elevations (Heidel and Rodemaker, 2008). These communities typically occur in seeps and wet sub-irrigated meadows in narrow to broad valley bottoms. Surface topography is typically smooth to concave with lake-fill peatlands or with slopes ranging from 0 to 10 percent in flow-through fens.

Vegetation

Floristically, rich and extremely rich fens support the greatest vascular plant species diversity of all peatland types in the Rocky Mountains. Extremely rich fens are characterized by high species diversity and a mosaic of herbaceous and woody plant communities. In contrast, poor fens have scattered vascular plant cover and lower species diversity but are characterized by a nearly continuous and diverse cover of mosses and other bryophytes.

Several vascular plants have been identified as extremely rich or rich fen indicators in Montana, and some of these species are uncommon or rare. Indicators include: sage-leaf willow (*Salix candida*), simple bog sedge (*Kobresia simpliciuscula*), Bellardii bog sedge (*Kobresia myosuroides*), Rolland's small clubrush (*Trichophorum pumilum*), little green sedge (*Carex viridula*), northern single spike sedge (*Carex scirpoidea*), pale sedge (*Carex livida*), bulblet-bearing water hemlock (*Cicuta bulbifera*), slender cottongrass (*Eriophorum gracile*), green keeled cottongrass (*Eriophorum viridicarinatum*), beaked spikerush (*Eleocharis rostellata*), northern bog violet (*Viola nephrophylla*), pale bog laurel (*Kalmia polifolia*), Kalm's lobelia (*Lobelia kalmii*), and yellow widelip orchid (*Liparis loeselii*). Other orchids such as giant helleborine orchid (*Epipactis gigantea*) are found in open sedge-dominated portions of the fen system, while one-leaf orchid (*Ameorchis rotundifolia*), sparrow's egg ladyslipper (*Cypripedium passerinum*) and small yellow ladyslipper (*Cypripedium parviflorum*) occur on raised sphagnum hummocks around trees and shrubs near the perimeter of the fen. These species are found almost exclusively in fens or wet forest habitats bordering fens. Poor fens often include species found in more acidic conditions such as pale bog laurel (*Kalmia polifolia*), rannoch rush (*Scheuchzeria palustris*) and sundews (*Drosera* species).

In extremely rich and rich fens, the herbaceous community is often dominated by beaked sedges (*Carex utriculata* or *Carex rostrata*), water sedge (*Carex aquatilis*), mud sedge (*Carex limosa*), woolyfruit sedge (*Carex lasiocarpa*), spikerush (*Eleocharis species*), cottongrass (*Eriophorum species*), rushes (*Scirpus* species and *Trichophorum* species) and bulrushes (*Shoenoplectus* species). Other frequent species include Buxbaum's sedge (*Carex buxbaumii*), analogue sedge (*Carex simulata*), northern bog sedge (*Carex gynocrates*), bristly-stalked sedge (*Carex leptalea*), poor sedge (*Carex paupercula*), yellow sedge (*Carex flava*), hair sedge (*Carex capillaris*), silvery sedge (*Carex canescens*), lens sedge (*Carex lenticularis*), Baltic rush (*Juncus balticus*), northern rush (*Juncus alpino-articulatus*), dagger leaf rush (*Juncus ensifolius*), threadleaf rush (*Juncus filiformis*), common spike rush (*Eleocharis palustris*), and few-flowered spike rush (*Eleocharis quinqueflora*). Common grasses include bluejoint reedgrass (*Calamagrostis canadensis*), tufted hairgrass (*Deschampsia cespitosa*), and fringed brome (*Bromus ciliatus*).

Rich and extremely rich fens also support high forb diversity. Common species include showy pussytoes (*Antenarria pulcherrima*), bog orchid (*Plantanthera* species), buckbean (*Menyanthes trifoliata*), elegant death camas (*Zigadenus elegans*), grass-of-parnassus (*Parnassia* species), beautiful shooting-star (*Dodecatheon pulcherrinum*), pink elephant's head (*Pedicularis groenlandica*), arrow-grass (*Triglochin palustris*), and Siberian chives (*Allium schoenoprasum*). At subalpine elevations, common butterwort (*Pinguicula vulgaris*) often occurs near seeps or springs, in areas where there is marl accumulation or on tufa deposits or terraces.

In Montana, wet, floating *Sphagnum*-dominated mats are associated with open water edges or depressional areas of fen systems. Bryophyte floating mats often consist of Meesia moss (*Meesia triquetra*), Scorpidium moss (*Scorpidium* species), Magellan's peatmoss (*Sphagnum magellanicum*) and brown peatmoss (*Sphagnum fuscum*). The bryophyte floating mat supports a very minor component of sedges such as mud sedge (*Carex limosa*) and smaller sedges such as grape sedge (*Carex aurea*), softleaf sedge (*Carex disperma*) and inland sedge (*Carex interior*), as well as cottongrass species (*Eriophorum* species). Fen indicators such as pale laurel (*Kalmia polifolia*), rannoch rush (*Scheuchzeria palustris*) and sundews (*Drosera* species) occur on these floating mats. Buckbean (*Menyanthes trifoliata*) is a late seral species from the sedge mat phase and is often present on floating mats.

Fens are frequently bordered by willow-bog birch (*Salix* species-*Betula nana glandulosa*) dominated carrs. Carr shrubland is well developed in flow-through fens due to highly-aerated nutrient-rich water near the inflow and outflow zones or the perimeter of basin fens. Sageleaf willow (*Salix candida*) is an indicator species, and sometimes the dominant willow species. Other willow species include autumn willow (*Salix serrissima*), Bebb's willow (*Salix bebbiana*), Drummond's willow (*Salix drummondiana*), plane-leaf willow (*Salix planifolia*), wolf willow (*Salix wolfii*), and undergreen willow (*Salix commutata*). Other common carr shrubs include alder (*Alnus* species), bog birch (*Betula nana*), alder buckthorn (*Rhamnus alnifolia*), shrubby cinquefoil (*Dasiphora fruticosa*), and western Labrador tea (*Ledum glandulosum*). Engelmann spruce (*Picea engelmannii*) is the most frequent conifer species associated with fens and forested fen margins of these systems (Hansen and others, 1996).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3434 *Betula nana* Alkaline Shrub Fen Alliance
A3435 *Carex limosa - Carex buxbaumii - Triglochin maritima* Alkaline Graminoid Fen Alliance
  CEGL001806 *Carex buxbaumii* Fen
  CEGL001811 *Carex limosa* Fen
A3436 *Kobresia myosuroides - Kobresia simpliciuscula* Alkaline Graminoid Fen Alliance
A3437 *Carex lasiocarpa - Carex livida - Dulichium arundinaceum* Acidic Graminoid Fen Alliance
  CEGL001810 *Carex lasiocarpa* Fen
  CEGL001831 *Dulichium arundinaceum* Shore Fen
A3770 *Salix wolfii - Salix brachycarpa - Betula glandulosa* Wet Shrubland Alliance
  CEGL005887 *Betula glandulosa - Carex spp.* Wet Shrubland
A3804 *Carex aquatilis - Carex utriculata - Deschampsia caespitosa* Wet meadow Alliance
  CEGL001562 *Carex utriculata* Wet Meadow
A3806 *Carex praegracilis - Carex scopulorum - Eleocharis quinqueflora* Wet Meadow Alliance
  CEGL001825 *Carex simulata* Fen

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Mountain fens act as natural filters, cleaning ground and surface water. Fens also act as sponges by absorbing heavy precipitation, then slowly releasing it downstream, minimizing erosion and recharging groundwater systems. Persistent groundwater and cold temperatures allow organic matter to accumulate, forming peat, which allows classification of wetlands within this system as fens. Peat accumulates at the rate of 8 to 11 inches per 1000 years, making peatlands a repository of 10,000 years of post-glacial history.

Management

Land uses surrounding fens can potentially alter the hydrology and nutrient inputs of these systems, thus changing their underlying processes. Increased land use within 100 meters has been found to be correlated with increased nutrient levels in peatlands in Montana, suggesting that setbacks should be 100 meters or more for adequate protection (Jones 2003). Draining, heavy cattle use, and irrigation practices can also alter hydrology and result in the loss of species diversity. Localized peat mining may occur on private lands.

Restoration Considerations

The degree of damage that has occurred in a fen has a significant impact on the prospects for restoration. Peat mining will cause irreversible damage to fen systems because Rocky Mountain fens build peat so slowly (8 to 11 inches per 1,000 years). In fen systems where water has been drained or altered, the original hydrology of the system must be restored before any vegetation restoration can be considered. If water levels are restored, re-growth and re-colonization of peat mosses can occur, although this is a very slow process. In deeper waters, regeneration depends on whether residual peat layers will become buoyant. Regeneration largely depends on water chemistry and residual peat layer quality. When peat quality is inadequate, shallow inundation is recommended (Smolders et al., 2002).

Heavy cattle use in a fen system can alter the hydrology by damaging soils within the fen system. Soil compaction and pugging within the peat layer will change surface water flow. Heavy cattle use can also alter the successional processes within the sedge- dominated area of a fen. Cattle hoof action can lead to pugging and hummocking, creating microsites where shrubs can become established, changing the sedge-dominated meadow to carr shrubland.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

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- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
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Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Bog Lemming *(Synaptomys borealis)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Fisher *(Pekania pennanti)* SOC	North American Water Vole *(Microtus richardsoni)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
Western Water Shrew *(Sorex navigator)*	Northern Montane Shrew *(Sorex obscurus)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Common Muskrat *(Ondatra zibethicus)*	Northwestern Jumping Mouse *(Zapus saltator)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	American Black Bear *(Ursus americanus)*
Raccoon *(Procyon lotor)*	Marten *(Martes americana)*
Long-tailed Weasel *(Neogale frenata)*	American Mink *(Neogale vison)*

American Ermine *(Mustela richardsonii)*
Elk *(Cervus canadensis)*
Moose *(Alces alces)*
Northern River Otter *(Lontra canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Mountain Goat *(Oreamnos americanus)*

Birds

American Bittern *(Botaurus lentiginosus)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Alder Flycatcher *(Empidonax alnorum)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Green-winged Teal *(Anas crecca)*
Mallard *(Anas platyrhynchos)*
Common Goldeneye *(Bucephala clangula)*
Northern Harrier *(Circus hudsonius)*
Rough-legged Hawk *(Buteo lagopus)*
Sandhill Crane *(Antigone canadensis)*
Common Nighthawk *(Chordeiles minor)*
Belted Kingfisher *(Megaceryle alcyon)*
Tree Swallow *(Tachycineta bicolor)*
Barn Swallow *(Hirundo rustica)*
Common Raven *(Corvus corax)*
Mountain Chickadee *(Poecile gambeli)*
Ruby-crowned Kinglet *(Corthylio calendula)*
American Robin *(Turdus migratorius)*
Cedar Waxwing *(Bombycilla cedrorum)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow-rumped Warbler *(Setophaga coronata)*
Common Yellowthroat *(Geothlypis trichas)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Dark-eyed Junco *(Junco hyemalis)*
Brown-headed Cowbird *(Molothrus ater)*
Great Blue Heron *(Ardea herodias)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
LeConte's Sparrow *(Ammospiza leconteii)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Canada Goose *(Branta canadensis)*
Blue-winged Teal *(Spatula discors)*
Ring-necked Duck *(Aythya collaris)*
Bufflehead *(Bucephala albeola)*
Red-tailed Hawk *(Buteo jamaicensis)*
Sora *(Porzana carolina)*
Wilson's Snipe *(Gallinago delicata)*
Vaux's Swift *(Chaetura vauxi)*
Willow Flycatcher *(Empidonax traillii)*
Violet-green Swallow *(Tachycineta thalassina)*
Canada Jay *(Perisoreus canadensis)*
American Crow *(Corvus brachyrhynchos)*
Northern House Wren *(Troglodytes aedon)*
Swainson's Thrush *(Catharus ustulatus)*
American Pipit *(Anthus rubescens)*
Cassin's Vireo *(Vireo cassinii)*
Yellow Warbler *(Setophaga petechia)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Western Tanager *(Piranga ludoviciana)*
Song Sparrow *(Melospiza melodia)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Red Crossbill *(Loxia curvirostra)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Boreal Chorus Frog *(Pseudacris maculata)*
Columbia Spotted Frog *(Rana luteiventris)*
Long-toed Salamander *(Ambystoma macrodactylum)*
Sierran Treefrog *(Pseudacris sierra)*

Invertebrates

Frigga Fritillary *(Boloria frigga)* SOC
Subarctic Darner *(Aeshna subarctica)* SOC
Boreal Whiteface *(Leucorrhinia borealis)* SOC
Red-disked Alpine *(Erebia discoidalis)* PSOC
Lance-tipped Darner *(Aeshna constricta)* PSOC
Sedge Darner *(Aeshna juncea)* PSOC
Black-tipped Darner *(Aeshna tuberculifera)* PSOC
Hudsonian Emerald *(Somatochlora hudsonica)* PSOC
Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Bronze Copper *(Tharsalea hyllus)*
Mariposa Copper *(Tharsalea mariposa)*
Hydaspe Fritillary *(Argynnis hydaspe)*
Relict Fritillary *(Boloria kriemhild)*
Myrina Fritillary *(Boloria myrina)*
Viceroy *(Limenitis archippus)*
Magdalena Alpine *(Erebia magdalena)*
American Emerald *(Cordulia shurtleffii)*
Hudsonian Whiteface *(Leucorrhinia hudsonica)*
Belted Whiteface *(Leucorrhinia proxima)*
Saffron-winged Meadowhawk *(Sympetrum costiferum)*
Striped Meadowhawk *(Sympetrum pallipes)*
Emerald Spreadwing *(Lestes dryas)*
Spotted Spreadwing *(Lestes congener)*
Lyre-tipped Spreadwing *(Lestes unguiculatus)*
Boreal Bluet *(Enallagma boreale)*
Sedge Sprite *(Nehalennia irene)*
Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Brush-tipped Emerald *(Somatochlora walshii)* SOC
Subarctic Bluet *(Coenagrion interrogatum)* SOC
Colorado Alpine *(Erebia callias)* PSOC
Lake Darner *(Aeshna eremita)* PSOC
Zigzag Darner *(Aeshna sitchensis)* PSOC
Ringed Emerald *(Somatochlora albicincta)* PSOC
Mountain Emerald *(Somatochlora semicircularis)* PSOC
Vivid Dancer *(Argia vivida)* PSOC
Purplish Copper *(Tharsalea helloides)*
Greenish Blue *(Icaricia saepiolus)*
Bog Fritillary *(Boloria eunomia)*
Pacific Fritillary *(Boloria epithore)*
Field Crescent *(Phyciodes pulchella)*
Common Wood-Nymph *(Cercyonis pegala)*
Canada Darner *(Aeshna canadensis)*
Whitehouse's Emerald *(Somatochlora whitehousei)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Band-winged Meadowhawk *(Sympetrum semicinctum)*
Sweetflag Spreadwing *(Lestes forcipatus)*
Northern Spreadwing *(Lestes disjunctus)*
Taiga Bluet *(Coenagrion resolutum)*
Northern Bluet *(Enallagma annexum)*

Vascular Plants

Arctic Sweet Coltsfoot *(Petasites frigidus var. frigidus)* SOC
Slenderleaf Sundew *(Drosera linearis)* SOC
Hiker's Gentian *(Gentianopsis simplex)* SOC
Flatleaf Bladderwort *(Utricularia intermedia)* SOC
English Sundew *(Drosera anglica)* SOC
Macoun's Gentian *(Gentianopsis macounii)* SOC
Marsh Felwort *(Lomatogonium rotatum)* SOC
Alpine Meadowrue *(Thalictrum alpinum)* SOC

Autumn Willow *(Salix serissima)* SOC
Creeping Sedge *(Carex chordorrhiza)* SOC
Hudson's Bay Bulrush *(Trichophorum alpinum)* SOC
Simple Kobresia *(Kobresia simpliciuscula)* SOC
Water Bulrush *(Schoenoplectus subterminalis)* SOC
Loesel's Twayblade *(Liparis loeselii)* SOC
Crested Shieldfern *(Dryopteris cristata)* SOC
Adder's Tongue *(Ophioglossum pusillum)* SOC
High Northern Buttercup *(Ranunculus hyperboreus)* PSOC
Primrose Monkeyflower *(Mimulus primuloides)* SOC
Beaked Spikerush *(Eleocharis rostellata)* SOC
Slender Cottongrass *(Eriophorum gracile)* SOC
Tufted Club-rush *(Trichophorum cespitosum)* SOC
Rolland's bulrush *(Trichophorum pumilum)* SOC
Pod Grass *(Scheuchzeria palustris)* SOC
Northern Bog Clubmoss *(Lycopodium inundatum)* SOC
Roundleaf Sundew *(Drosera rotundifolia)* PSOC

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
North American Deermouse *(Peromyscus maniculatus)*
Fringed Myotis *(Myotis thysanodes)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
North American Beaver *(Castor canadensis)*

Birds

Horned Grebe *(Podiceps auritus)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
White-throated Swift *(Aeronautes saxatalis)*
Pine Siskin *(Spinus pinus)*
Trumpeter Swan *(Cygnus buccinator)* SOC
Tundra Swan *(Cygnus columbianus)*
Chipping Sparrow *(Spizella passerina)*

Reptiles

Painted Turtle *(Chrysemys picta)*

Amphibians

Northern Leopard Frog *(Lithobates pipiens)* SOC

Invertebrates

Freija Fritillary *(Boloria freija)* PSOC
Melissa Arctic *(Oeneis melissa)* PSOC
Variable Darner *(Aeshna interrupta)*
Shadow Darner *(Aeshna umbrosa)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Black Meadowhawk *(Sympetrum danae)*
Tule Bluet *(Enallagma carunculatum)*
Western Forktail *(Ischnura perparva)*
Tadpole Physa *(Physella gyrina)*
White-veined Arctic *(Oeneis bore)* PSOC
Crimson-ringed Whiteface *(Leucorrhinia glacialis)* PSOC
Paddle-tailed Darner *(Aeshna palmata)*
Eight-spotted Skimmer *(Libellula forensis)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Pacific Forktail *(Ischnura cervula)*
Western Red Damsel *(Amphiagrion abbreviatum)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Emergent or Scrub Shrub
Water Regime	Saturated
Geographically Isolated Wetland	

NatureServe Identifiers:

Element Global ID	28666
System Code	CES306.831, Rocky Mountain Subalpine-Montane Fen

National Land Cover Dataset:
95: Emergent Herbaceous Wetland

ReGAP:
9234: Rocky Mountain Subalpine-Montane Fen

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Lemly, Joanna M. 2007. *Fens of Yellowstone National Park, USA: regional and local controls over plant species distribution*.
- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.
- Heidel, B. and E. Rodemayer. 2008. Inventory of Peatland Systems in the Beartooth Mountains. Report to the Environmental Protection Agency. Wyoming Natural Diversity Database, Laramie, WY. 43 pp.
- Heidel, B.L., S.V. Cooper and C. Jean. 2000. Plant species of special concern and plant associations of Sheridan County, Montana. Report to U.S. Fish and Wildlife Service. Montana Natural Heritage Program, Helena, Montana. 96 p.
- Jones, W.M. 2003. Kootenai National Forest peatlands: Description and effects of forest management. Report to the Kootenai National Forest, Montana. Montana Natural Heritage Program, Helena. 14 pp. plus appendices.
- Lesica, P. 1986. Vegetation and flora of Pine Butte fen, Teton County, Montana. The Great Basin Naturalist 46(1): 22-32.
- Mitsch WJ, Gosselink JG. 2000. Peatlands. In: Wetlands. 3rd Edition. John Wiley and Sons, Inc. 920 p.
- Smolders, Alfons J. P., Hilde B. M. Tomassen, Leon P. M. Lamers, Bart P. Lomans, and Jan G. M. Roelofs. 2002. "Peat Bog Restoration by Floating Raft Formation: The Effects of Groundwater and Peat Quality". *Journal of Applied Ecology.* 39 (3): 391-401.
- Trlica, M. J., M. Buwai, and J. W. Menke. 1977. "Effects of Rest following Defoliations on the Recovery of Several Range Species". *Journal of Range Management.* 30 (1): 21-27.

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Great Plains Closed Depressional Wetland



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General Description

This system includes a variety of depressional wetlands generally found in complexes in central and eastern Montana. This type of wetland differs from Western Great Plains Open Depressional Wetlands and Great Plains Prairie Potholes by being completely isolated from both the regional groundwater system and inter-wetland surface drainage systems. They occur in depressional basins found in flat, enclosed upland areas or on level shallow lake basins. The major sources of input water are precipitation and snow melt, and water loss occurs through evapotranspiration. The basins are typified by the presence of an impermeable layer, such as dense clay formed in alluvium that is poorly drained. Subsurface soil layers are restrictive to water movement and root penetration. Ponds and lakes associated with this system can experience periodic drawdowns during dry years, but are replenished by spring rains. Closed depressions experience irregular hydroperiods, most filling with water only occasionally and drying quickly, influencing the plant communities that are present. The drawdown zone is typically dominated by western wheatgrass (*Pascopyrum smithii*) and foxtail barley (*Hordeum jubatum*). Povertyweed (*Iva axillaris*) and willow dock (*Rumex salicifolius*) occupy the broad, low gradient basins which are shallowly inundated in the spring and draw down every year to reveal bottoms of gray bentonite. Common spikerush (*Eleocharis palustris*) occurs within the drawdown area where there is more organic matter in the substrate. Hardstem bulrush (*Schoenoplectus acutus*) typifies closed depressions sufficiently deep to remain permanently inundated during most years. Species richness can vary considerably among individual examples of this system and it is especially influenced by adjacent land use like agriculture and grazing.

Diagnostic Characteristics

lowland, herbaceous, depression, depressional, playa, clay subsoil, impermeable layer, saturated, isolated wetland, strictly isolated wetland

Similar Systems

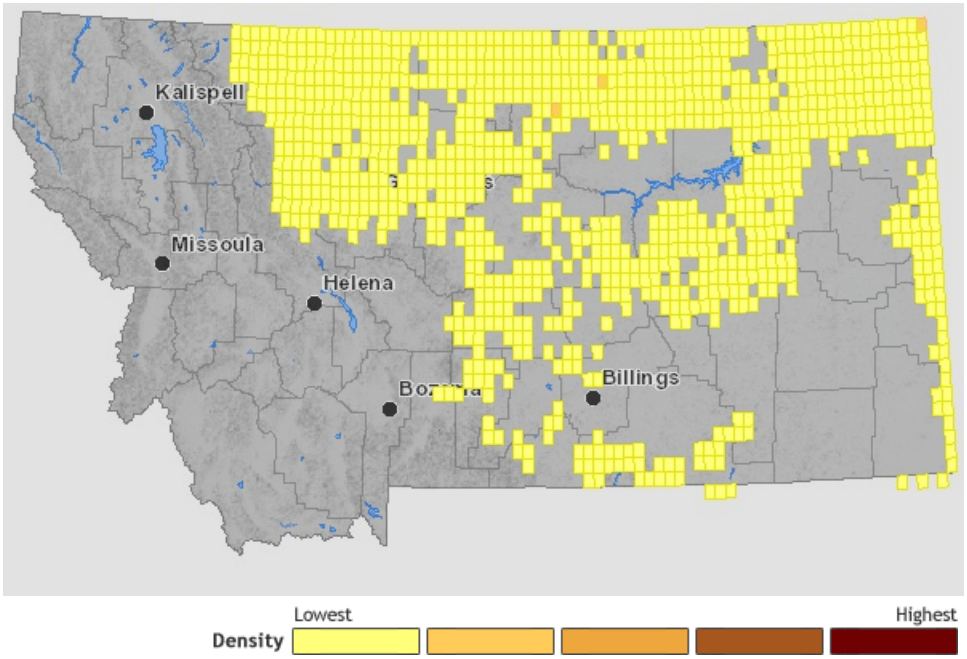
- Emergent Marsh
- Great Plains Open Freshwater Depression Wetland
- Great Plains Prairie Pothole
- Great Plains Saline Depression Wetland

Range

This system can be found throughout the eastern portion of the Western Great Plains; however, it is most prevalent in the central states of Nebraska, Kansas and Oklahoma. In Montana, closed depressions are most concentrated to the north of the HiLine and Route 2, from the Blackfeet Reservation to the North Dakota border. Individual depressions can also be found across the Northwestern Glaciated Plains north of the Missouri River.

Ecological System Distribution

Approximately 161 square kilometers are classified as Great Plains Closed Depressional Wetland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fallon, Fergus, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Meagher, Musselshell, Park, Petroleum, Phillips, Pondera, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Small patch

Environment

This system is typified by depressional basins found in flat enclosed upland areas and level shallow lake basins, with an impermeable layer such as dense clay isolating the wetland from the regional groundwater system. It differs from Western Great Plains Open Depression Wetlands and Great Plains Prairie Potholes by being completely isolated from both the regional groundwater system and inter-wetland surface drainage systems. These wetlands occur in depressional basins found in flat enclosed upland areas or on level shallow lake basins. The major sources of input water are precipitation and snow melt; water loss occurs through evapotranspiration. The basins are typified by the presence of an impermeable layer, such as dense clay formed in alluvium that is poorly drained. Subsurface soil layers are restrictive to water movement and root penetration (Cook and Hauer, 2007). Ponds and lakes associated with this system can experience periodic drawdowns during dry years, but are replenished by spring rains. Closed depressions experience irregular hydroperiods, filling water only occasionally and drying quickly, which influences the plant communities that are present.

Vegetation

Vegetation within this system is highly influenced by hydrology, salinity, fire and adjacent land uses. The drawdown zone is typically dominated by western wheatgrass (*Pascopyrum smithii*) and foxtail barley (*Hordeum jubatum*), the most common wet meadow component of this landscape. Needle spikerush (*Eleocharis acicularis*) and the small annual forbs slender plantain (*Plantago elongata*) and purslane speedwell (*Veronica peregrina*) are common in most stands. Povertyweed (*Iva axillaris*) and willow dock (*Rumex salicifolius*) occupy the broad, low gradient basins which are shallowly inundated in the spring and draw down every year to reveal bottoms of gray bentonite. The common spikerush (*Eleocharis palustris*) association is also within the drawdown zone but occurs at sites where there is more organic matter in the substrate. Foxtail barley (*Hordeum jubatum*) and needle spikerush (*Eleocharis acicularis*) are typically well represented in drier stands, while water knotweed (*Polygonum amphibium*) stands are found at wetter sites. Marsh vegetation, dominated by hardstem bulrush (*Schoenoplectus acutus*), typifies depressions sufficiently deep to remain permanently inundated during most years. Forbs commonly associated with these marsh communities include water knotweed *(Polygonum amphibium*), common spikerush (*Eleocharis palustris*) and two headed water-starwort (*Callitriche heterophylla*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1046 *Sarcobatus vermiculatus* Intermountain Wet Shrubland Alliance
- **CEGL001366** *Sarcobatus vermiculatus - Leymus cinereus* Wet Shrubland

A1341 *Distichlis spicata - Hordeum jubatum* Wet Meadow Alliance

A1354 *Pascopyrum smithii - Distichlis spicata - Hordeum jubatum* Wet Meadow Alliance
- **CEGL001580** *Pascopyrum smithii / Distichlis spicata* Wet Meadow
- **CEGL001581** *Pascopyrum smithii / Eleocharis spp.* Wet Meadow
- **CEGL001582** *Pascopyrum smithii / Hordeum jubatum* Wet Meadow

A2642 *Argentina anserina* Wet Meadow Alliance
- **CEGL005825** *Argentina anserina* Wet Meadow

A3492 *Panicum virgatum - Pascopyrum smithii* Wet Meadow Alliance

A3493 *Spartina pectinata* Great Plains Wet Meadow Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

These systems developed under Northern Great Plains climatic conditions, which included natural disturbances by large herbivores, periodic flooding events and occasional fire. Wet-drought year climatic cycles in Montana, often in 10 to 20 year intervals, influence the ecological communities in these systems (Hansen et al., 1995). Each year seeds from annuals and perennials germinate and cover exposed mud flats, but when precipitation floods the depressions, the annuals drown and the perennials survive. Over a series of years the perennials dominate. The drawdown to mudflats is necessary so that emergent vegetation can become reestablished. This flooding, drawdown and the eventual exposure of mud flats drive the water-level vegetation cycle.

Management

Changes will occur in the plant communities due to climatic conditions and/or management actions. Due to the nature of the soils, these sites are considered moderately resilient. With continued adverse impacts, a moderate decline in vegetative vigor and composition will occur. Heavy continuous grazing and/or continuous seasonal (spring) grazing, without adequate recovery periods, will eventually lead to loss of the Western wheatgrass-foxtail barley wetland community, and inland saltgrass will begin to increase. Western wheatgrass will increase initially, but then will begin to decrease. In time, heavy continuous grazing will cause inland saltgrass, fowl bluegrass (*Poa palustris*), and other pioneer perennials and annuals to increase. This replacement plant community is resistant to change, due to the grazing tolerance of inland saltgrass and increased surface salts. However, a significant amount of production and diversity has been lost compared to the Western wheatgrass -foxtail barley community, and the loss of key cool season grasses and increased bare ground will affect energy flow and nutrient cycling. Water infiltration will be reduced significantly due to the massive shallow root system "root pan" characteristic of inland saltgrass, and the increased amount of bare ground. It will take a long time to bring this plant community back with management alone (USDA NRCS, 2003).

Restoration Considerations

The major barriers to restoration are isolation, infrequent flooding, impermeable soils and invasive species. These factors must be addressed during the planning and long term management of restored wetlands.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat

requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Arctic Shrew *(Sorex arcticus)* PSOC
Prairie Shrew *(Sorex haydeni)* PSOC	Northern Short-tailed Shrew *(Blarina brevicauda)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
Masked Shrew *(Sorex cinereus)*	Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Eastern Cottontail *(Sylvilagus floridanus)*	Western Harvest Mouse *(Reithrodontomys megalotis)*
White-footed Deermouse *(Peromyscus leucopus)*	Northern Grasshopper Mouse *(Onychomys leucogaster)*
Meadow Vole *(Microtus pennsylvanicus)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Prairie Vole *(Microtus ochrogaster)*
Common Muskrat *(Ondatra zibethicus)*	Northwestern Jumping Mouse *(Zapus saltator)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	Raccoon *(Procyon lotor)*
Least Weasel *(Mustela nivalis)*	Long-tailed Weasel *(Neogale frenata)*
American Mink *(Neogale vison)*	Striped Skunk *(Mephitis mephitis)*
Pronghorn *(Antilocapra americana)*	

Birds

Horned Grebe *(Podiceps auritus)* SOC	Clark's Grebe *(Aechmophorus clarkii)* SOC
American White Pelican *(Pelecanus erythrorhynchos)* SOC	American Bittern *(Botaurus lentiginosus)* SOC
Great Blue Heron *(Ardea herodias)* SOC	Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
White-faced Ibis *(Plegadis chihi)* SOC	Yellow Rail *(Coturnicops noveboracensis)* SOC
Whooping Crane *(Grus americana)* SOC	Piping Plover *(Charadrius melodus)* SOC

Black-necked Stilt *(Himantopus mexicanus)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Forster's Tern *(Sterna forsteri)* SOC
Sedge Wren *(Cistothorus stellaris)* SOC
Nelson's Sparrow *(Ammospiza nelsoni)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Western Grebe *(Aechmophorus occidentalis)*
Snowy Egret *(Egretta thula)*
Greater White-fronted Goose *(Anser albifrons)*
Ross's Goose *(Anser rossii)*
Green-winged Teal *(Anas crecca)*
Blue-winged Teal *(Spatula discors)*
Northern Shoveler *(Spatula clypeata)*
Eurasian Wigeon *(Mareca penelope)*
Mallard *(Anas platyrhynchos)*
Redhead *(Aythya americana)*
Greater Scaup *(Aythya marila)*
Common Goldeneye *(Bucephala clangula)*
Ruddy Duck *(Oxyura jamaicensis)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Peregrine Falcon *(Falco peregrinus)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Willet *(Tringa semipalmata)*
Upland Sandpiper *(Bartramia longicauda)*
Marbled Godwit *(Limosa fedoa)*
Semipalmated Sandpiper *(Calidris pusilla)*
Least Sandpiper *(Calidris minutilla)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Snowy Owl *(Bubo scandiacus)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Western Kingbird *(Tyrannus verticalis)*
Horned Lark *(Eremophila alpestris)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Common Raven *(Corvus corax)*
Northern House Wren *(Troglodytes aedon)*
American Robin *(Turdus migratorius)*
European Starling *(Sturnus vulgaris)*
Palm Warbler *(Setophaga palmarum)*
Common Yellowthroat *(Geothlypis trichas)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Vesper Sparrow *(Pooecetes gramineus)*
Savannah Sparrow *(Passerculus sandwichensis)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Common Grackle *(Quiscalus quiscula)*
Orchard Oriole *(Icterus spurius)*
Bullock's Oriole *(Icterus bullockii)*
American Goldfinch *(Spinus tristis)*
Solitary Sandpiper *(Tringa solitaria)* SOC
Common Tern *(Sterna hirundo)* SOC
Black Tern *(Chlidonias niger)* SOC
LeConte's Sparrow *(Ammospiza leconteii)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC
Pied-billed Grebe *(Podilymbus podiceps)*
Eared Grebe *(Podiceps nigricollis)*
Double-crested Cormorant *(Nannopterum auritum)*
Tundra Swan *(Cygnus columbianus)*
Snow Goose *(Anser caerulescens)*
Canada Goose *(Branta canadensis)*
Northern Pintail *(Anas acuta)*
Cinnamon Teal *(Spatula cyanoptera)*
Gadwall *(Mareca strepera)*
American Wigeon *(Mareca americana)*
Canvasback *(Aythya valisineria)*
Ring-necked Duck *(Aythya collaris)*
Lesser Scaup *(Aythya affinis)*
Bufflehead *(Bucephala albeola)*
Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Virginia Rail *(Rallus limicola)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
American Avocet *(Recurvirostra americana)*
Lesser Yellowlegs *(Tringa flavipes)*
Spotted Sandpiper *(Actitis macularius)*
Whimbrel *(Numenius phaeopus)*
Sanderling *(Calidris alba)*
Western Sandpiper *(Calidris mauri)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Rock Pigeon *(Columba livia)*
Common Nighthawk *(Chordeiles minor)*
Belted Kingfisher *(Megaceryle alcyon)*
Eastern Kingbird *(Tyrannus tyrannus)*
Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
American Crow *(Corvus brachyrhynchos)*
Marsh Wren *(Cistothorus palustris)*
Brown Thrasher *(Toxostoma rufum)*
Yellow Warbler *(Setophaga petechia)*
Blackpoll Warbler *(Setophaga striata)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
Song Sparrow *(Melospiza melodia)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Lapland Longspur *(Calcarius lapponicus)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Baltimore Oriole *(Icterus galbula)*
House Finch *(Haemorhous mexicanus)*
Redpoll *(Acanthis flammea)*

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Painted Turtle *(Chrysemys picta)*
Plains Gartersnake *(Thamnophis radix)*
Smooth Greensnake *(Opheodrys vernalis)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*
Northern Leopard Frog *(Lithobates pipiens)* SOC
Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Eyed Brown *(Lethe eurydice)* PSOC
Familiar Bluet *(Enallagma civile)* PSOC
Cherry-faced Meadowhawk *(Sympetrum internum)*
Striped Meadowhawk *(Sympetrum pallipes)*
Tule Bluet *(Enallagma carunculatum)*
Marsh Bluet *(Enallagma ebrium)*
Tadpole Physa *(Physella gyrina)*
Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Myrina Fritillary *(Boloria myrina)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Boreal Bluet *(Enallagma boreale)*
Northern Bluet *(Enallagma annexum)*
Eastern Forktail *(Ischnura verticalis)*

Vascular Plants

Slender-branched Popcorn-flower *(Plagiobothrys leptocladus)* SOC
Great Basin Downingia *(Downingia laeta)* SOC
Chaffweed *(Centunculus minimus)* SOC
Slender Bulrush *(Schoenoplectus heterochaetus)* SOC
Poison Suckleya *(Suckleya suckleyana)*
Persistent-sepal Yellow-cress *(Rorippa calycina)* SOC
Scarlet Ammannia *(Ammannia robusta)* SOC
Short-pointed Flatsedge *(Cyperus acuminatus)* SOC
Long-sheath Waterweed *(Elodea bifoliata)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Fringed Myotis *(Myotis thysanodes)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
North American Deermouse *(Peromyscus maniculatus)*

Birds

Long-billed Curlew *(Numenius americanus)* SOC
Sprague's Pipit *(Anthus spragueii)* SOC
Baird's Sparrow *(Centronyx bairdii)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Prairie Falcon *(Falco mexicanus)*
White-throated Swift *(Aeronautes saxatalis)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Least Tern *(Sternula antillarum)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC
Chimney Swift *(Chaetura pelagica)* PSOC
Great Horned Owl *(Bubo virginianus)*
Lazuli Bunting *(Passerina amoena)*

Invertebrates

California Darner *(Rhionaeschna californica)* PSOC
Prairie Bluet *(Coenagrion angulatum)* PSOC
Bronze Copper *(Tharsalea hyllus)*
Common Wood-Nymph *(Cercyonis pegala)*
Paddle-tailed Darner *(Aeshna palmata)*
Eight-spotted Skimmer *(Libellula forensis)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Wandering Glider *(Pantala flavescens)*
Saffron-winged Meadowhawk *(Sympetrum costiferum)*
Band-winged Meadowhawk *(Sympetrum semicinctum)*
Emerald Spreadwing *(Lestes dryas)*
Spotted Spreadwing *(Lestes congener)*
Lyre-tipped Spreadwing *(Lestes unguiculatus)*
Pacific Forktail *(Ischnura cervula)*
Blue-eyed Darner *(Rhionaeschna multicolor)* PSOC
Alkali Bluet *(Enallagma clausum)* PSOC
Purplish Copper *(Tharsalea helloides)*
Variable Darner *(Aeshna interrupta)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Twelve-spotted Skimmer *(Libellula pulchella)*
Common Whitetail *(Plathemis lydia)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Black Meadowhawk *(Sympetrum danae)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Sweetflag Spreadwing *(Lestes forcipatus)*
Northern Spreadwing *(Lestes disjunctus)*
Hagen's Bluet *(Enallagma hageni)*
Western Forktail *(Ischnura perparva)*

Vascular Plants

Roundleaf Water-hyssop *(Bacopa rotundifolia)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

C. McIntyre, L. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Emergent
Water Regime	Temporarily flooded, seasonally flooded, semi-permanently flooded, intermittently exposed
Geographically Isolated Wetland	Isolated and strictly isolated

NatureServe Identifiers:

Element Global ID	
System Code	CES303.666, Western Great Plains Closed Depressional Wetland

National Land Cover Dataset:
95: Emergent Herbaceous Wetland

ReGAP:
9252: Western Great Plains Closed Depressional Wetland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Cook, Bradley J., and F. Richard Hauer. 2007. "Effects of hydrologic connectivity on water chemistry, soils, and vegetation structure and function in an intermontane depressional wetland landscape". *Wetlands.* 27 (3): 719-738.
- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.
- USDA NRCS - ND SM. 2003. R054XY022ND Section II - FOTG Closed Depression Ecological Site Description.

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Citation for data on this website:
Great Plains Closed Depressional Wetland — Western Great Plains Closed Depressional Wetland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=9252

Great Plains Saline Depression Wetland



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General Description

This ecological system is very similar to both the Western Great Plains Open Freshwater Depression Wetland and the Western Great Plains Closed Depression Wetland found in wetland complexes in the central and northeastern portion of Montana. However, this system differs due to increased soil salinity, which causes these systems to become brackish. This high salinity is attributed to high evaporation and the accumulation of minerals dissolved in the water. Wetlands in this system are discharge wetlands, where water high in dissolved salts has moved from the regional groundwater system into the depression. Hydroperiods vary depending on precipitation and snowmelt, the primary source of water. Water is prevented from percolating out of the depression due to impermeable dense clay, and salt encrustations can occur on the surface with drying. Species that typify this system are salt-tolerant and halophytic graminoids such as alkali bulrush (*Schoenoplectus maritimus*), common three square (*Schoenoplectus pungens*), inland saltgrass (*Distichlis spicata*), Nuttall's alkali grass (*Puccinellia nuttalliana)*, foxtail barley (*Hordeum jubatum*), red swampfire (*Salicornia rubra*) and freshwater cordgrass (*Spartina pectinata*), and shrubs such as black greasewood (*Sarcobatus vermiculatus)*. During exceptionally wet years, an increase in precipitation can dilute the salt concentration in the soils in some cases, allowing for less salt-tolerant species to occur. The distribution of this system extends into central Montana, where it occurs in the matrix of the Northwestern Great Plains Mixed Grass Prairie. However, these depressions are most concentrated to the north of the HiLine and Route 2, from the Blackfeet Reservation to the North Dakota Border. Individual occurrences can also be found across the Northwest Glaciated Plains north of the Missouri River.

Diagnostic Characteristics

Isolated to partially isolated wetland, depression, saline conditions

Similar Systems

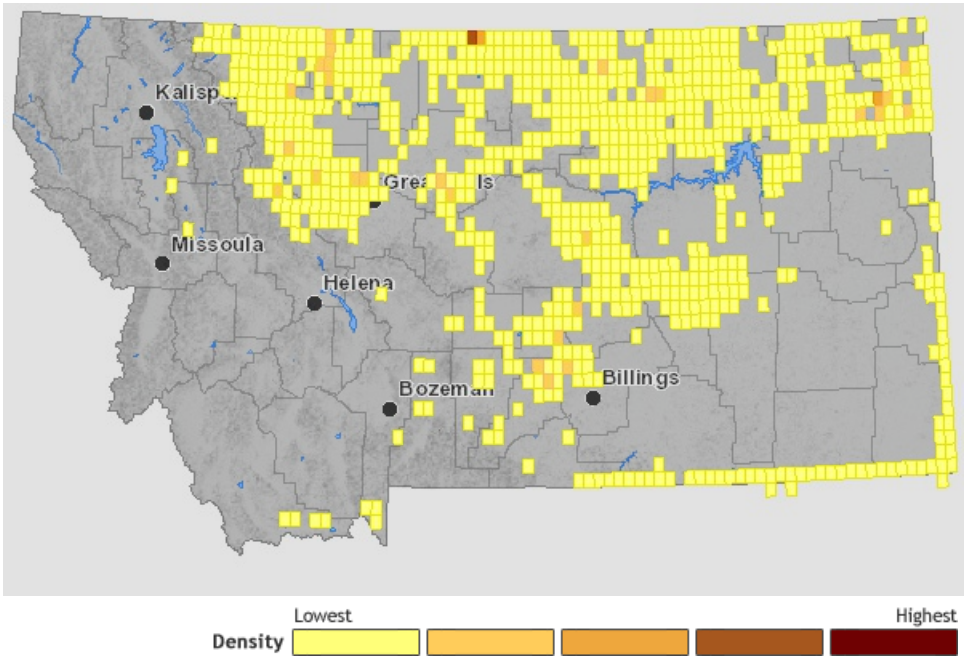
- Emergent Marsh
- Great Plains Closed Depressional Wetland
- Great Plains Open Freshwater Depression Wetland
- Great Plains Prairie Pothole

Range

This system can occur throughout the western Great Plains but is more prevalent in the south-central portions of the division. Its distribution extends into central Montana where it occurs in the matrix of the Northwestern Great Plains Mixed Grass Prairie. These saline depressions are most concentrated to the north of the HiLine and Route 2, from the Blackfeet Reservation to the North Dakota Border. Individual depressions can also be found across the Northwestern Glaciated Plains north of the Missouri River.

Ecological System Distribution

Approximately 464 square kilometers are classified as Great Plains Saline Depression Wetland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lake, Lewis and Clark, Liberty, Mccone, Meagher, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Small patch

Environment

This system is distinguished from the freshwater depression systems by brackish water caused by strongly saline and alkaline soils. This high salinity is attributed to excessive evaporation and the accumulation of minerals dissolved in groundwater discharge. Water is prevented from percolating out of the depression due to an impermeable dense clay soil. Salt encrustations can occur on the surface due to slow water movement (Hansen et al, 1995). On the Blackfeet Indian reservation, water samples collected from saline depressions had conductivity values that ranged from 1,550-40,000 uhmos/cm (Lesica and Shelley, 1988).

Vegetation

Vegetation within this system is highly influenced by soil salinity and soil moisture. Salt-tolerant and halophytic species that typify this system include alkali bulrush (*Schoenoplectus maritimus*), common three square (*Schoenoplectus pungens*), inland saltgrass (*Distichlis spicata*), Nuttall's alkali grass (*Puccinellia nuttalliana*), foxtail barley (*Hordeum jubatum)*, red swampfire (*Salicornia rubra)* and freshwater cordgrass (*Spartina pectinata*), and shrubs such as black greasewood (*Sarcobatus vermiculatus*). Other species include western wheatgrass (*Pascopyrum smithii)* and foxtail barley

(*Hordeum jubatum*). Plant zonation related to soil salinity is often apparent in these systems. with distinct rings occurring around the fringe of the depression. In deeper, more depressed halophytic habitats, red swampfire or prairie cordgrass will dominate with Nuttall's alkali grass found directly upslope, followed by inland saltgrass. Shrubs such as greasewood and winterfat (*Krascheninnikovia lanata*) are common around the outer margins of this system. Pursh seepweed (*Suaeda calceoliformis*), annual goosefoot (*Chenopodium* species) and seaside arrowgrass (*Triglochin maritima*) are common forbs.

In northeastern Montana, the alkali bulrush association occurs as an emergent band around open water or as zonal vegetation around other plant associations. Water tables are often high, often remaining above the soil surface at least through late summer. Soils are poorly drained, alkaline Entisols. Alkali bulrush forms dense, monotypic stands with up to 91% cover. In some areas along the wetland edge, very minor amounts of common spikerush (*Eleocharis palustris*) may be present. Alkali bulrush can survive periods of total inundation up to 1 meter (3.3 feet) deep, as well as drought periods where the water table remains less than 1 meter below the soil surface. It is a vigorously rhizomatous species that colonizes and spreads when the water table is within 10 centimeters (4 inches) of the surface. Cover of alkali bulrush may be replaced by red swampfire and other associated species during drought years.

Red swampfire occurs in the drawdown zone that is flooded during the early part of the growing season but where the water table drops below soil surface by late spring or early summer. Soils in this zone usually have silty-clay to clay texture, and the soil surface is covered with salt crusts. Principle salts are sulfates and chlorides of sodium and magnesium. It is one of a very few species that can persist in these hyper-saline conditions when the water table drops below the soil surface (Dodd and Coupland,1966).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1332 *Distichlis spicata* Alkaline Wet Meadow Alliance
- **CEGL001770** *Distichlis spicata* Alkaline Wet Meadow

A1334 *Sporobolus airoides - Muhlenbergia asperifolia - Spartina gracilis* Alkaline Wet Meadow Alliance
- **CEGL001685** *Sporobolus airoides* Southern Plains Wet Meadow
- **CEGL001799** *Puccinellia nuttalliana* Salt Marsh

A1341 *Distichlis spicata - Hordeum jubatum* Wet Meadow Alliance
- **CEGL002273** *Distichlis spicata / Hordeum jubatum / Puccinellia nuttalliana / Suaeda calceoliformis* Wet Meadow

A1354 *Pascopyrum smithii - Distichlis spicata - Hordeum jubatum* Wet Meadow Alliance
- **CEGL001580** *Pascopyrum smithii / Distichlis spicata* Wet Meadow
- **CEGL001582** *Pascopyrum smithii / Hordeum jubatum* Wet Meadow

A3484 *Carex atherodes - Carex aquatilis - Scolochloa festucacea* Marsh Alliance
- **CEGL002260** *Scolochloa festucacea* Marsh

A3493 *Spartina pectinata* Great Plains Wet Meadow Alliance
- **CEGL001478** *Spartina pectinata / Schoenoplectus pungens* Wet Meadow

A3895 *Schoenoplectus americanus - Schoenoplectus acutus - Schoenoplectus californicus* Marsh Alliance
- **CEGL001587** *Schoenoplectus pungens* Marsh
- **CEGL001843** *Schoenoplectus maritimus* Marsh

A3904 *Sporobolus airoides* Great Plains Marsh Alliance
- **CEGL002274** *Sporobolus airoides* Northern Plains Marsh

A3905 *Sarcobatus vermiculatus* Great Plains Wet Shrubland Alliance
- **CEGL001508** *Sarcobatus vermiculatus - Pascopyrum smithii / (Elymus lanceolatus)* Shrub Wet Meadow

A4067 *Stuckenia pectinata - Potamogeton spp. - Ceratophyllum demersum* Aquatic Vegetation Alliance
- **CEGL002004** *Stuckenia pectinata / Ruppia maritima* Aquatic Vegetation
- **CEGL002005** *Stuckenia pectinata / Zannichellia palustris* Aquatic Vegetation

A4071 *Salicornia rubra* Wet Meadow Alliance
- **CEGL001999** *Salicornia rubra* Salt Flat

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

These systems developed under Northern Great Plains climatic conditions that include natural influence of periodic flooding events and occasional fire. Climate has an important effect on saline areas because precipitation and snowmelt transport salts to the depressions and can dilute the soil solution while temperature and wind influence the rate of evapotranspiration. Increased precipitation and/or runoff can dilute the salt concentration and allow for less salt-tolerant species to occur while increased evapotranspiration increases soil salinity leading to a more brackish habitat type.

Management

Changes will occur in the plant communities due to climatic conditions and/or management activities.

Restoration Considerations

In saline depression wetland systems where water has been drained or altered, the original hydrology of the system must be restored. If hydrology is restored, re-growth and re-colonization from dormant rhizomatous root systems of common emergent species can occur during periods of flooding. Cattle grazing should be deferred or controlled to allow regrowth, recolonization and resprouting from existing root systems. Annuals such as red swampfire and annual goosefoots require periods of inundation and drawdown to initiate germination and to complete their life cycles at the end of the growing season.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC
Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
Northern Montane Shrew *(Sorex obscurus)*
Big Brown Bat *(Eptesicus fuscus)*
Western Harvest Mouse *(Reithrodontomys megalotis)*
White-footed Deermouse *(Peromyscus leucopus)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Least Weasel *(Mustela nivalis)*
Little Brown Myotis *(Myotis lucifugus)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Arctic Shrew *(Sorex arcticus)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC
Masked Shrew *(Sorex cinereus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Eastern Cottontail *(Sylvilagus floridanus)*
North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*
Montane Vole *(Microtus montanus)*
Prairie Vole *(Microtus ochrogaster)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*

American Mink *(Neogale vison)*
Striped Skunk *(Mephitis mephitis)*
Pronghorn *(Antilocapra americana)*

Birds

American White Pelican *(Pelecanus erythrorhynchos)* SOC
American Bittern *(Botaurus lentiginosus)* SOC
Great Blue Heron *(Ardea herodias)* SOC
Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
White-faced Ibis *(Plegadis chihi)* SOC
Ferruginous Hawk *(Buteo regalis)* SOC
Yellow Rail *(Coturnicops noveboracensis)* SOC
Whooping Crane *(Grus americana)* SOC
Piping Plover *(Charadrius melodus)* SOC
Black-necked Stilt *(Himantopus mexicanus)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Common Tern *(Sterna hirundo)* SOC
Forster's Tern *(Sterna forsteri)* SOC
Sedge Wren *(Cistothorus stellaris)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC
Baird's Sparrow *(Centronyx bairdii)* SOC
LeConte's Sparrow *(Ammospiza leconteii)* SOC
Nelson's Sparrow *(Ammospiza nelsoni)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Pied-billed Grebe *(Podilymbus podiceps)*
Red-necked Grebe *(Podiceps grisegena)*
Eared Grebe *(Podiceps nigricollis)*
Western Grebe *(Aechmophorus occidentalis)*
Double-crested Cormorant *(Nannopterum auritum)*
Snowy Egret *(Egretta thula)*
Tundra Swan *(Cygnus columbianus)*
Greater White-fronted Goose *(Anser albifrons)*
Snow Goose *(Anser caerulescens)*
Ross's Goose *(Anser rossii)*
Canada Goose *(Branta canadensis)*
Green-winged Teal *(Anas crecca)*
Northern Pintail *(Anas acuta)*
Blue-winged Teal *(Spatula discors)*
Cinnamon Teal *(Spatula cyanoptera)*
Northern Shoveler *(Spatula clypeata)*
Gadwall *(Mareca strepera)*
Eurasian Wigeon *(Mareca penelope)*
American Wigeon *(Mareca americana)*
Mallard *(Anas platyrhynchos)*
Canvasback *(Aythya valisineria)*
Redhead *(Aythya americana)*
Ring-necked Duck *(Aythya collaris)*
Lesser Scaup *(Aythya affinis)*
Common Goldeneye *(Bucephala clangula)*
Bufflehead *(Bucephala albeola)*
Red-breasted Merganser *(Mergus serrator)*
Ruddy Duck *(Oxyura jamaicensis)*
Northern Harrier *(Circus hudsonius)*
Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*
Peregrine Falcon *(Falco peregrinus)*
Virginia Rail *(Rallus limicola)*
Sora *(Porzana carolina)*
American Coot *(Fulica americana)*
Sandhill Crane *(Antigone canadensis)*
Black-bellied Plover *(Pluvialis squatarola)*
American Golden-Plover *(Pluvialis dominica)*
Semipalmated Plover *(Charadrius semipalmatus)*
Killdeer *(Charadrius vociferus)*
American Avocet *(Recurvirostra americana)*
Greater Yellowlegs *(Tringa melanoleuca)*
Lesser Yellowlegs *(Tringa flavipes)*
Willet *(Tringa semipalmata)*
Spotted Sandpiper *(Actitis macularius)*
Upland Sandpiper *(Bartramia longicauda)*
Whimbrel *(Numenius phaeopus)*
Marbled Godwit *(Limosa fedoa)*
Sanderling *(Calidris alba)*
Semipalmated Sandpiper *(Calidris pusilla)*
Western Sandpiper *(Calidris mauri)*
Least Sandpiper *(Calidris minutilla)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Baird's Sandpiper *(Calidris bairdii)*
Pectoral Sandpiper *(Calidris melanotos)*
Dunlin *(Calidris alpina)*
Stilt Sandpiper *(Calidris himantopus)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Snipe *(Gallinago delicata)*
Wilson's Phalarope *(Phalaropus tricolor)*
Red-necked Phalarope *(Phalaropus lobatus)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
Ring-billed Gull *(Larus delawarensis)*
California Gull *(Larus californicus)*
Snowy Owl *(Bubo scandiacus)*
Common Nighthawk *(Chordeiles minor)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Belted Kingfisher *(Megaceryle alcyon)*
Western Kingbird *(Tyrannus verticalis)*
Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*
Purple Martin *(Progne subis)*
Tree Swallow *(Tachycineta bicolor)*
Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Bank Swallow *(Riparia riparia)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*
Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*
Marsh Wren *(Cistothorus palustris)*
American Robin *(Turdus migratorius)*
European Starling *(Sturnus vulgaris)*
Clay-colored Sparrow *(Spizella pallida)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Sparrow *(Chondestes grammacus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Snow Bunting *(Plectrophenax nivalis)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Western Meadowlark *(Sturnella neglecta)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Rusty Blackbird *(Euphagus carolinus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*
Orchard Oriole *(Icterus spurius)*
Bullock's Oriole *(Icterus bullockii)*
American Goldfinch *(Spinus tristis)*

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Northern Leopard Frog *(Lithobates pipiens)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Boreal Chorus Frog *(Pseudacris maculata)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Alkali Bluet *(Enallagma clausum)* PSOC
White-faced Meadowhawk *(Sympetrum obtrusum)*
Tule Bluet *(Enallagma carunculatum)*
Western Forktail *(Ischnura perparva)*
Familiar Bluet *(Enallagma civile)* PSOC
Eight-spotted Skimmer *(Libellula forensis)*
Boreal Bluet *(Enallagma boreale)*
Pacific Forktail *(Ischnura cervula)*

Vascular Plants

Scarlet Ammannia *(Ammannia robusta)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Fringed Myotis *(Myotis thysanodes)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
California Myotis *(Myotis californicus)*
Long-legged Myotis *(Myotis volans)* SOC
American Bison *(Bos bison)* SOC

Birds

Horned Grebe *(Podiceps auritus)* SOC
Greater Sage-Grouse *(Centrocercus urophasianus)* SOC
Long-billed Curlew *(Numenius americanus)* SOC
Burrowing Owl *(Athene cunicularia)* SOC
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Great Horned Owl *(Bubo virginianus)*
Common Yellowthroat *(Geothlypis trichas)*
House Finch *(Haemorhous mexicanus)*
Clark's Grebe *(Aechmophorus clarkii)* SOC
Mountain Plover *(Anarhynchus montanus)* SOC
Black Tern *(Chlidonias niger)* SOC
Sprague's Pipit *(Anthus spragueii)* SOC
Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Prairie Falcon *(Falco mexicanus)*
White-throated Swift *(Aeronautes saxatalis)*
Song Sparrow *(Melospiza melodia)*

Reptiles

Painted Turtle *(Chrysemys picta)*
Gophersnake *(Pituophis catenifer)*

Invertebrates

California Darner *(Rhionaeschna californica)* PSOC
Blue-eyed Darner *(Rhionaeschna multicolor)* PSOC
Variable Darner *(Aeshna interrupta)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Saffron-winged Meadowhawk *(Sympetrum costiferum)*
Striped Meadowhawk *(Sympetrum pallipes)*
Spotted Spreadwing *(Lestes congener)*
Lyre-tipped Spreadwing *(Lestes unguiculatus)*
Marsh Bluet *(Enallagma ebrium)*
Tadpole Physa *(Physella gyrina)*
Lance-tipped Darner *(Aeshna constricta)* PSOC
Common Wood-Nymph *(Cercyonis pegala)*
Paddle-tailed Darner *(Aeshna palmata)*
Twelve-spotted Skimmer *(Libellula pulchella)*
Wandering Glider *(Pantala flavescens)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Black Meadowhawk *(Sympetrum danae)*
Emerald Spreadwing *(Lestes dryas)*
Northern Spreadwing *(Lestes disjunctus)*
Northern Bluet *(Enallagma annexum)*
Eastern Forktail *(Ischnura verticalis)*

Vascular Plants

Roundleaf Water-hyssop *(Bacopa rotundifolia)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

T. Luna, C. McIntyre, L.K. Vance

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Emergent Wetland
Water Regime	Temporarily flooded
Geographically Isolated Wetland	Isolated to partially isolated

NatureServe Identifiers:

Element Global ID	28526
System Code	CES303.669, Western Great Plains Saline Depression Wetland

ReGAP:
9256: Western Great Plains Saline Depression Wetland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Dodd, J.D., and R.T. Coupland. 1966. Vegetation of saline areas in Saskatchewan. Ecology 47(6):958-968.

Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

Lesica, P. 1989. The vegetation and flora of glaciated prairie potholes on the Blackfeet Indian Reservation, Montana. Unpublished report to Big Sky Field Office, The Nature Conservancy, Helena, MT, 26 pp.

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Citation for data on this website:
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Great Plains Prairie Pothole

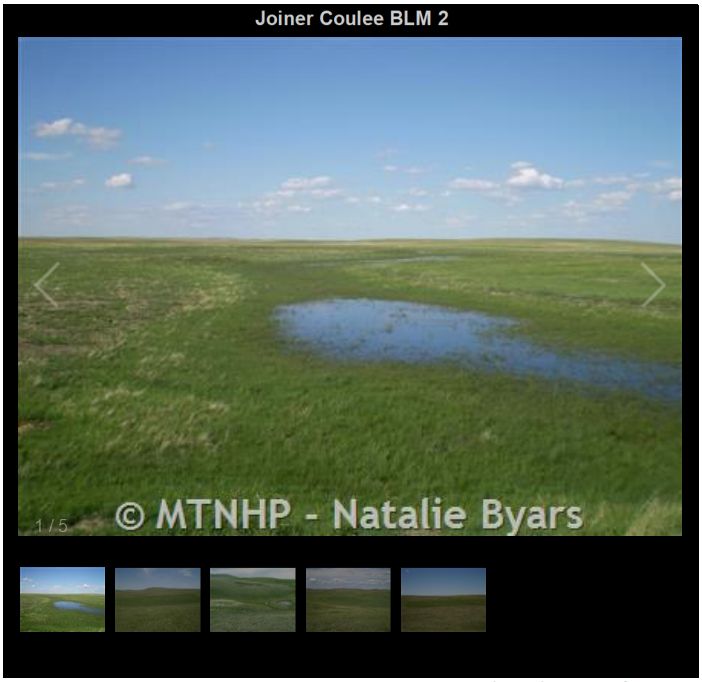


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General Description

Prairie potholes occur in shallow depressions scraped out by glaciers in the northern Great Plains of Montana. The region is characterized by a glacial landscape of end moraines, stagnation moraines, outwash plains and lake plains. The glacial drift forms steep to slight local relief with fine-grained, silty to clayey soils. Limestone, sandstone, and shales are the predominant parent materials, and highly mineralized water can discharge from these rocks. The hydrology of this system is complex, and the concentration of dissolved solids results in water that ranges from fresh to extremely saline, with chemical characteristics varying seasonally and annually. Most prairie potholes and associated lakes contain alkaline water, which accumulates rapidly in during spring months, especially when soil frost is sufficiently deep to forestall all infiltration until after the ground thaws. Most water loss occurs through evapotranspiration, which exceeds precipitation during summer months. Vegetation within this system is highly influenced by hydrology, salinity and dynamics. Potholes can vary in depth and duration, which determines the local gradient of plant species. Similarly, species found within individual potholes will be strongly influenced by periodic drought and wet periods. The wettest sites, where water stands through summer, are characterized by hardstem bulrush (*Schoenoplectus acutus*), often occurring as a near monoculture, or with softstem bulrush (*Schoenoplectus tabernaemontani*) or common threesquare (*Schoenoplectus pungens)* along slightly drier margins. In permanently flooded sites, aquatic buttercups (*Ranunculus* species), aquatic smartweeds (*Polygonum* species), pondweeds (*Potamogeton* species) or duckweeds (*Lemna* species) are common. At the drier extremes, pothole vegetation generally occurs in a concentric pattern from a wetter middle dominated by spikerush (*Eleocharis* species) through a drier ring of foxtail barley (*Hordeum jubatum*) and an outer margin of western wheatgrass (*Pascopyrum smithii*) or thickspike wheatgrass (*Elymus lanceolatus*). Prairie potholes are considered to be the most important breeding habitat for waterfowl in North America, with production estimates ranging from 50% to 80% of the continent's main species. However, the extreme variability in climate and pothole water levels also results in extreme fluctuations in waterfowl

populations from year to year. Prairie pothole wetlands also support a diverse assemblage of water-dependent birds.

Diagnostic Characteristics

Lowland, herbaceous depressional, pothole, isolated wetland, temperate

Similar Systems

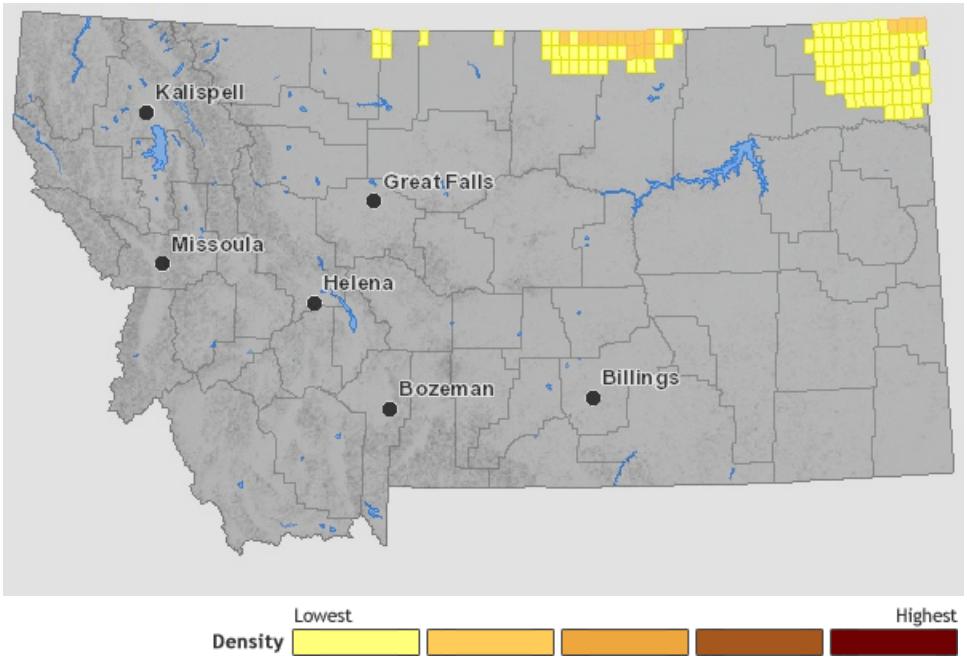
- Great Plains Closed Depressional Wetland
- Great Plains Saline Depression Wetland

Range

In Montana, most prairie potholes are concentrated north of the HiLine and Route 2, from the Blackfeet Reservation to the North Dakota border, although individual potholes occur across the Northwest Glaciated Plains north of the Missouri River. Elsewhere, this system occurs throughout the northern Great Plains from central Iowa northeast to southern Saskatchewan and Alberta. It encompasses approximately 870,000 square kilometers with approximately 80% of its range in southern Canada. It is also prevalent in North Dakota, South Dakota, and northern Minnesota.

Ecological System Distribution

Approximately 145 square kilometers are classified as Great Plains Prairie Pothole in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Blaine, Daniels, Hill, Liberty, Phillips, Roosevelt, Sheridan, Toole

Spatial Pattern

Large patch

Environment

The prairie pothole ecological system is dominated by closed basins that receive irregular inputs of water from the surroundings and export water as groundwater. The climate is characterized by mid-continental temperature and precipitation extremes. The region is distinguished by a thin mantle of glacial drift with overlying stratified sedimentary rocks of the Mesozoic and Cenozoic ages; these form a glacial landscape of end moraines, stagnation moraines, outwash plains and lake plains. The glacial drift is from 30 meters to 120 meters thick and forms steep to slight local relief with fine-grained, silty to clayey soils. Limestone, sandstone, and shales are predominant, and highly mineralized water can discharge from these rocks. Precipitation and runoff from snowmelt are often the principal water sources, with groundwater inflow as a secondary source. Evapotranspiration is the primary source of water loss, with seepage loss secondary. The hydrology of this system is complex, and the concentration of dissolved solids results in water that ranges from fresh to extremely saline, with chemical characteristics varying seasonally and annually. Most prairie potholes and associated lakes contain water that is alkaline (pH >7.4). Surrounding uplands are generally in cropland (small grains), hay, or range.

Prairie potholes are considered to be the most important breeding habitat for waterfowl in North America, with production estimates ranging from 50% to 80% of the continent's main species. However, the extreme variability in climate and pothole water levels also results in extreme fluctuations in waterfowl populations from year to year. Prairie wetlands also support a diverse assemblage of water-dependent birds including Montana species of concern such as the black-crowned night heron (*Nycticorax nycticorax*), white-faced ibis (*Plegadis chihi*), Franklin's gull (*Larus pipixcan*), common tern (*Sterna hirundo*), Forster's tern (*Sterna forsteri*), and black tern (*Chlidonias niger*). American white pelicans (*Pelecanus erythrorhynchos*) feed extensively on tiger salamanders (*Ambystoma tigrinum*) found in prairie potholes. Sparsely-vegetated alkali potholes, especially in Sheridan County, are attractive to piping plovers *(Charadrius melodus*).

Vegetation

Vegetation within this system is highly influenced by hydrology, salinity and dynamics. This system includes elements of emergent marshes and wet, sedge meadows that develop into a pattern of concentric rings. Potholes can vary in depth and duration, which determines the local gradient of species. Similarly, plant species found within individual potholes will be strongly influenced by periodic drought and wet periods. The wettest sites, where water stands into or through summer, are characterized by hardstem bulrush (*Schoenoplectus acutus*), often occurring as a near monoculture, or with a fringe of softstem bulrush (*Schoenoplectus tabernaemontani*) or common threesquare (*Schoenoplectus pungens)* along slightly drier margins. Cattails (*Typha spp*) are also seen in these wetter systems, although they are typically a minor component. During spring or in permanently flooded sites, aquatic buttercups (*Ranunculus* species), aquatic smartweeds (*Polygonum* species), pondweeds (*Potamogeton* species) or duckweeds (*Lemna* species) may be abundant. At the drier extremes, pothole vegetation generally occurs in a concentric pattern from a wetter middle dominated by spikerush (*Eleocharis*species) through a drier ring of foxtail barley (*Hordeum jubatum*) and an outer margin of western wheatgrass (*Pascopyrum smithii*) or thickspike wheatgrass (*Elymus lanceolatus*) (Hansen et al, 1996; Lesica 1989). Grazing, draining, and mowing of this system can influence vegetation distribution.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3895 *Schoenoplectus americanus - Schoenoplectus acutus - Schoenoplectus californicus* Marsh Alliance
CEGL001843 *Schoenoplectus maritimus* Marsh

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Flooding is the primary natural dynamic influencing this system. Snowmelt in the spring often floods this system and can cause the prominent potholes within the system to overflow. Greater than normal precipitation can flood out emergent vegetation and/or increase herbivory by animal species such as muskrats. Periodic wet and droughty periods cause shifts in vegetation. Vegetation zones are evident, and each zone responds to changing environmental conditions. Draining and conversion to agriculture can also significantly impact this system. Much of the original extent of this system has been converted to cropland, and many remaining examples are under pressure to be drained.

Management

Livestock use of potholes is limited by low palatability of characteristic species, although open water attracts livestock for both drinking and cooling. When upland vegetation becomes sparse, cattle will graze on spikerush and bulrush. Wet soils are easily trampled. Grazing, when properly planned and executed, can be a management tool, preventing cattail encroachment into open water, limiting the spread of exotics such as crested wheat (*Agropyron cristatum*) and smooth brome (*Bromus inermis*), and avoiding excessive litter buildup. Prescribed burning can be used to the same ends. Prairie potholes are primarily threatened by crop agriculture, by unrestricted grazing, and by oil and gas development. Region-wide, nearly half of this system has been lost.

Restoration Considerations

In Great Plains prairie pothole wetland systems where water has been drained or altered, the original hydrology of the system must be restored. If water levels are restored, re-growth and re-colonization from dormant rhizomatous root systems of common emergent species can occur within a few years. Many of the characteristic species found in marsh systems are rhizomatous, thus exhibit excellent erosion control properties. However, species that are infrequent in these wetland systems may not re-occur or re-establish in a given time frame. The major barriers to prairie pothole restoration are isolation, infrequent flooding and invasive species. These factors must be addressed during the planning and long term management of restored prairie pothole wetlands.

During restoration, cattle grazing needs to eliminated or controlled to allow regrowth, recolonization and resprouting from existing root systems. In some cases, if hydric soils are heavily altered due to pugging or compaction, addition of organic material may be needed to facilitate plant recolonization.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC
Masked Shrew *(Sorex cinereus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
White-tailed Jackrabbit *(Lepus townsendii)*
Western Harvest Mouse *(Reithrodontomys megalotis)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*
Long-tailed Vole *(Microtus longicaudus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
American Badger *(Taxidea taxus)*
Mule Deer *(Odocoileus hemionus)*
Pronghorn *(Antilocapra americana)*
Little Brown Myotis *(Myotis lucifugus)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Arctic Shrew *(Sorex arcticus)* PSOC
Northern Short-tailed Shrew *(Blarina brevicauda)* PSOC
Northern Montane Shrew *(Sorex obscurus)*
Big Brown Bat *(Eptesicus fuscus)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*
White-footed Deermouse *(Peromyscus leucopus)*
Meadow Vole *(Microtus pennsylvanicus)*
Prairie Vole *(Microtus ochrogaster)*
Northwestern Jumping Mouse *(Zapus saltator)*
Red Fox *(Vulpes vulpes)*
Least Weasel *(Mustela nivalis)*
American Mink *(Neogale vison)*
Striped Skunk *(Mephitis mephitis)*
White-tailed Deer *(Odocoileus virginianus)*

Birds

Horned Grebe *(Podiceps auritus)* SOC
American White Pelican *(Pelecanus erythrorhynchos)* SOC
Great Blue Heron *(Ardea herodias)* SOC
White-faced Ibis *(Plegadis chihi)* SOC
Whooping Crane *(Grus americana)* SOC
Black-necked Stilt *(Himantopus mexicanus)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Sedge Wren *(Cistothorus stellaris)* SOC
LeConte's Sparrow *(Ammospiza leconteii)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC
Pied-billed Grebe *(Podilymbus podiceps)*
Western Grebe *(Aechmophorus occidentalis)*
Snowy Egret *(Egretta thula)*
Greater White-fronted Goose *(Anser albifrons)*
Ross's Goose *(Anser rossii)*
Green-winged Teal *(Anas crecca)*
Blue-winged Teal *(Spatula discors)*
Northern Shoveler *(Spatula clypeata)*
Eurasian Wigeon *(Mareca penelope)*
Mallard *(Anas platyrhynchos)*
Redhead *(Aythya americana)*
Lesser Scaup *(Aythya affinis)*
Bufflehead *(Bucephala albeola)*
Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Virginia Rail *(Rallus limicola)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
American Avocet *(Recurvirostra americana)*
Lesser Yellowlegs *(Tringa flavipes)*
Spotted Sandpiper *(Actitis macularius)*
Whimbrel *(Numenius phaeopus)*
Sanderling *(Calidris alba)*
Western Sandpiper *(Calidris mauri)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Rock Pigeon *(Columba livia)*
Common Nighthawk *(Chordeiles minor)*
Belted Kingfisher *(Megaceryle alcyon)*
Eastern Kingbird *(Tyrannus tyrannus)*
Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
American Crow *(Corvus brachyrhynchos)*
European Starling *(Sturnus vulgaris)*
Clay-colored Sparrow *(Spizella pallida)*
Savannah Sparrow *(Passerculus sandwichensis)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
American Goldfinch *(Spinus tristis)*
Clark's Grebe *(Aechmophorus clarkii)* SOC
American Bittern *(Botaurus lentiginosus)* SOC
Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
Yellow Rail *(Coturnicops noveboracensis)* SOC
Piping Plover *(Charadrius melodus)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Black Tern *(Chlidonias niger)* SOC
Baird's Sparrow *(Centronyx bairdii)* SOC
Nelson's Sparrow *(Ammospiza nelsoni)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Eared Grebe *(Podiceps nigricollis)*
Double-crested Cormorant *(Nannopterum auritum)*
Tundra Swan *(Cygnus columbianus)*
Snow Goose *(Anser caerulescens)*
Canada Goose *(Branta canadensis)*
Northern Pintail *(Anas acuta)*
Cinnamon Teal *(Spatula cyanoptera)*
Gadwall *(Mareca strepera)*
American Wigeon *(Mareca americana)*
Canvasback *(Aythya valisineria)*
Ring-necked Duck *(Aythya collaris)*
Common Goldeneye *(Bucephala clangula)*
Ruddy Duck *(Oxyura jamaicensis)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Peregrine Falcon *(Falco peregrinus)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Willet *(Tringa semipalmata)*
Upland Sandpiper *(Bartramia longicauda)*
Marbled Godwit *(Limosa fedoa)*
Semipalmated Sandpiper *(Calidris pusilla)*
Least Sandpiper *(Calidris minutilla)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Snowy Owl *(Bubo scandiacus)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Western Kingbird *(Tyrannus verticalis)*
Horned Lark *(Eremophila alpestris)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Common Raven *(Corvus corax)*
Marsh Wren *(Cistothorus palustris)*
Common Yellowthroat *(Geothlypis trichas)*
Lark Sparrow *(Chondestes grammacus)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Painted Turtle *(Chrysemys picta)*
Smooth Greensnake *(Opheodrys vernalis)* SOC
Plains Gartersnake *(Thamnophis radix)*

Amphibians

Northern Leopard Frog *(Lithobates pipiens)* SOC
Boreal Chorus Frog *(Pseudacris maculata)*
Western Tiger Salamander *(Ambystoma mavortium)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Eyed Brown *(Lethe eurydice)* PSOC
Prairie Bluet *(Coenagrion angulatum)* PSOC
Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Northern Bluet *(Enallagma annexum)*

Vascular Plants

Slender-branched Popcorn-flower *(Plagiobothrys leptocladus)* SOC
Scarlet Ammannia *(Ammannia robusta)* SOC
Short-pointed Flatsedge *(Cyperus acuminatus)* SOC
Great Basin Downingia *(Downingia laeta)* SOC
Chaffweed *(Centunculus minimus)* SOC
Long-sheath Waterweed *(Elodea bifoliata)* SOC

Northern Blue-eyed-grass *(Sisyrinchium septentrionale)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Swift Fox *(Vulpes velox)* SOC
North American Deermouse *(Peromyscus maniculatus)*

Birds

Long-billed Curlew *(Numenius americanus)* SOC
Sprague's Pipit *(Anthus spragueii)* SOC
Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Wood Duck *(Aix sponsa)*
Song Sparrow *(Melospiza melodia)*
Forster's Tern *(Sterna forsteri)* SOC
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Prairie Falcon *(Falco mexicanus)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC

Invertebrates

Blue-eyed Darner *(Rhionaeschna multicolor)* PSOC
Alkali Bluet *(Enallagma clausum)* PSOC
Purplish Copper *(Tharsalea helloides)*
Common Wood-Nymph *(Cercyonis pegala)*
Common Green Darner *(Anax junius)*
Common Whitetail *(Plathemis lydia)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Saffron-winged Meadowhawk *(Sympetrum costiferum)*
Striped Meadowhawk *(Sympetrum pallipes)*
Emerald Spreadwing *(Lestes dryas)*
Lyre-tipped Spreadwing *(Lestes unguiculatus)*
Tule Bluet *(Enallagma carunculatum)*
Hagen's Bluet *(Enallagma hageni)*
Tadpole Physa *(Physella gyrina)*
Familiar Bluet *(Enallagma civile)* PSOC
Bronze Copper *(Tharsalea hyllus)*
Myrina Fritillary *(Boloria myrina)*
Variable Darner *(Aeshna interrupta)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Wandering Glider *(Pantala flavescens)*
Variegated Meadowhawk *(Sympetrum corruptum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Band-winged Meadowhawk *(Sympetrum semicinctum)*
Spotted Spreadwing *(Lestes congener)*
Boreal Bluet *(Enallagma boreale)*
Marsh Bluet *(Enallagma ebrium)*
Pacific Forktail *(Ischnura cervula)*

Vascular Plants

Roundleaf Water-hyssop *(Bacopa rotundifolia)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, C. McIntyre, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Emergent wetland
Water Regime	Seasonally flooded, semi-permanently flooded or permanently flooded
Geographically Isolated Wetland	Partially isolated

NatureServe Identifiers:

Element Global ID	28519
System Code	CES303.661, Great Plains Prairie Pothole

ReGAP:
9203: Great Plains Prairie Pothole

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

Lesica, P. 1989. The vegetation and flora of glaciated prairie potholes on the Blackfeet Indian Reservation, Montana. Unpublished report to Big Sky Field Office, The Nature Conservancy, Helena, MT, 26 pp.

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Citation for data on this website:
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Great Plains Open Freshwater Depression Wetland



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General Description

This Great Plains system occurs in lowland depressions and along lake borders with open basins and a permanent water source through most of the year. This system is distinguished from the Western Great Plains Closed Depression Wetlands by having a larger watershed and/or significant connection to the groundwater table. Soils are typically Mollisols, Entisols or occasionally Histosols. Soil pH varies from neutral to slightly alkaline. In Montana, this system is especially well represented along major and secondary tributaries of the Milk, Marias and Two Medicine rivers in the northwestern Great Plains glaciated pothole region. Throughout Montana, most sites within this system are found at elevations of 664-2,027 meters (2,180-6,650 feet). Species diversity can be high in some occurrences. These wetlands usually contain emergent graminoids such as cattails (*Typha* species), sedges (*Carex* species), spikerushes (*Eleocharis* species), rushes (*Juncus* species) and bulrushes (*Schoenoplectus* species), as well as floating vegetation such as pondweeds (*Potamogeton* species), arrowhead (*Sagittaria* species), or common hornwort (*Ceratophyllum demersum*). At montane elevations, these systems can be moderately complex with a variety of species and communities. Increased grazing pressure in and adjacent to these systems will change the plant communities that are present. In semi-permanent systems, the drawdown zone is typically dominated by beaked sedge (*Carex utriculata*) water sedge (*Carex aquatilis*), and Nebraska sedge (*Carex nebrascensis*). In seasonal ponds that draw down annually, and in semipermanent wetlands during drought years, buried seeds of both annuals and perennials will germinate in exposed mud flats.

Diagnostic Characteristics

Herbaceous, depression, depressional, saturated soils, partially isolated

Similar Systems

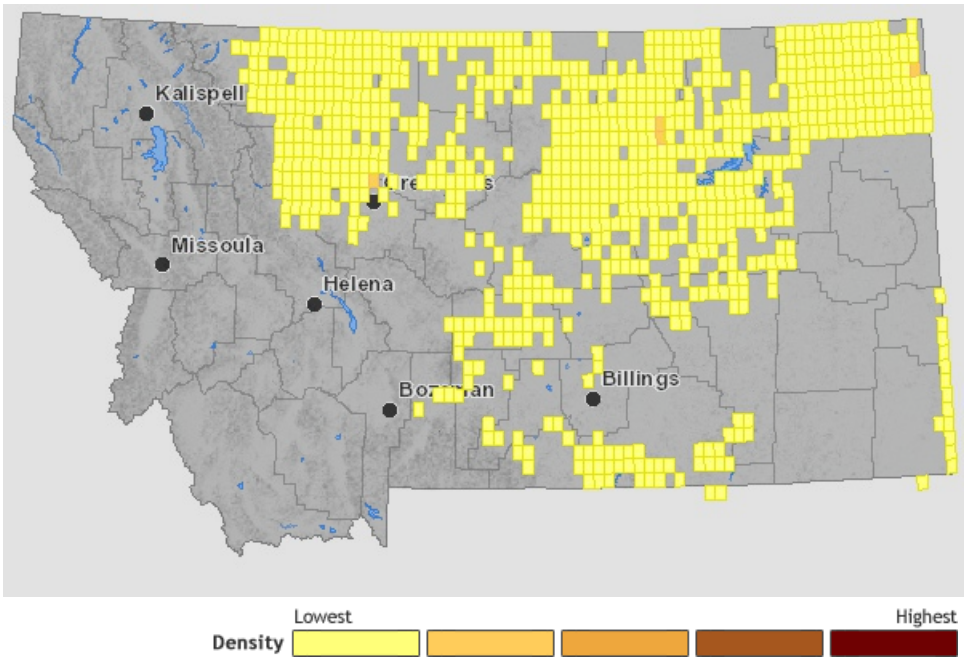
- Emergent Marsh
- Great Plains Closed Depressional Wetland
- Great Plains Saline Depression Wetland

Range

This system occurs across the western Great Plains from North Dakota and Kansas west to Montana and south to Texas. This system can occur throughout the western Great Plains but is likely more prevalent in the south-central portions of the division. Its distribution extends into central Montana, where it occurs in the matrix of the Northwestern Great Plains Mixed Grass Prairie. However, these depressions are most concentrated to the north of the Hi-Line and Route 2, from the Blackfeet Reservation to the North Dakota border. Individual depressions can also be found across the Northwest Glaciated Plains north of the Missouri River.

Ecological System Distribution

Approximately 138 square kilometers are classified as Great Plains Open Freshwater Depression Wetland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Daniels, Fallon, Fergus, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Musselshell, Park, Petroleum, Phillips, Pondera, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Yellowstone

Spatial Pattern

Small

Environment

Open depression wetlands are found throughout the Northwestern Glaciated Great Plains region of Montana. They form in lowlands, and along lake borders and stream margins. They generally have more open basins, a large watershed, and a permanent water source throughout most of the year, except during exceptional drought years. This system differs from closed depressional wetlands by having a larger watershed and/or significant connection to the groundwater table (Cook and Hauer 2007). In Montana, most sites within this system are found at elevations of 664-2,027 meters (2,180-6,650 feet). Soils are typically Mollisols, Entisols or occasionally Histosols. Soil pH varies from neutral to slightly alkaline.

Vegetation

Open depression wetlands often have submerged aquatic plants in the open water zone including common hornwort (*Ceratophyllum demersum*), short spikewater milfoil (*Myriophyllum sibiricum*), and horned pondweed (*Zannichellia palustris*), as well as floating-leaved plants including pondweeds (*Stuckenia* and *Potamogeton* species), white water crowfoot (*Ranunculus aquatilis*) and arrowheads (*Sagittaria* species). The central marsh zone is typically dominated by

hardstem bulrush (*Schoenoplectus acutus*), but softstem bulrush (*Schoenoplectus tabernaemontani*), common threesquare (*Schoenoplectus pungens*) and alkali bulrush (*Schoenoplectus maritimus*), often co-dominate. Also found in the marsh zone are cattails (*Typha* species), water knotweed (*Polygonum amphibium*), and hemlock water parsnip (*Sium suave*). The seasonally flooded zones are typically dominated by graminoids including common spikerush (*Eleocharis palustris*), needle spikerush (*Eleocharis acicularis*), American sloughgrass (*Beckmannia syzigachne*), wheat sedge (*Carex atherodes*), foxtail barley (*Hordeum jubatum*), shortawn foxtail (*Alopecurus aequalis*), and water foxtail (*Alopecurus geniculatus*). Open depressional systems are often bordered by wet prairie zones characterized by species such as slimstem reedgrass (*Calamagrostis stricta*),
clustered field sedge (*Carex praegracilis*), bluejoint (*Calamagrostis canadensis*) and fowl bluegrass (*Poa palustris*). Open depressions with more alkaline or saline water and soil chemistry will typically be bordered by species such as saltgrass (*Distichlis spicata*), western wheatgrass (*Pascopyrum smithii*), and freshwater cordgrass (*Spartina pectinata*). Sites that have been moderately grazed often have an increase in Baltic rush (*Juncus balticus*), knotted rush (*Juncus nodosus*), foxtail barley (*Hordeum jubatum*), American sloughgrass (*Beckmannia syzigachne*), and western wheatgrass (*Pascopyrum smithii*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1374 *Juncus balticus - Juncus mexicanus* Wet Meadow Alliance
- **CEGL001838** *Juncus balticus* Wet Meadow

A3484 *Carex atherodes - Carex aquatilis - Scolochloa festucacea* Marsh Alliance
- **CEGL002260** *Scolochloa festucacea* Marsh

A3492 *Panicum virgatum - Pascopyrum smithii* Wet Meadow Alliance
- **CEGL001484** *Panicum virgatum / (Pascopyrum smithii)* Wet Meadow

A3493 *Spartina pectinata* Great Plains Wet Meadow Alliance
- **CEGL001477** *Spartina pectinata / Carex spp.* Wet Meadow
- **CEGL001478** *Spartina pectinata / Schoenoplectus pungens* Wet Meadow
- **CEGL002220** *Carex atherodes* Wet Meadow
- **CEGL002254** *Carex pellita / Calamagrostis stricta* Wet Meadow

A3669 *Peltandra virginica - Pontederia cordata - Sagittaria spp.* Marsh Alliance
- **CEGL005240** *Sagittaria latifolia / Leersia oryzoides* Marsh

A3772 *Betula occidentalis* Wet Shrubland Alliance
- **CEGL001083** *Betula occidentalis - Dasiphora fruticosa ssp. Floribunda* Wet Shrubland

A3804 *Carex aquatilis - Carex utriculata - Deschampsia caespitosa* Wet meadow Alliance
- **CEGL001802** *Carex aquatilis* Wet Meadow

A3805 *Carex nebrascensis - Carex vesicaria - Carex pellita* Wet meadow Alliance
- **CEGL001813** *Carex nebrascensis* Wet Meadow

A3808 *Glyceria grandis - Glyceria striata - Glyceria borealis* Wet Meadow Alliance
- **CEGL001569** *Glyceria borealis* Wet Meadow

A3846 *Phalaris arundinacea* Western Ruderal Marsh Alliance
- **CEGL001474** *Phalaris arundinacea* Western Marsh

A3895 *Schoenoplectus americanus - Schoenoplectus acutus - Schoenoplectus californicus* Marsh Alliance
- **CEGL002623** *Schoenoplectus tabernaemontani* Temperate Marsh

A3896 *Typha domingensis - Typha latifolia - Typha angustifolia* Western Marsh Alliance
- **CEGL002010** *Typha (latifolia, angustifolia)* Western Marsh

A3927 *Potamogeton natans - Polygonum amphibium* Aquatic Vegetation Alliance
- **CEGL002002** *Polygonum amphibium* Aquatic Vegetation [Placeholder]
- **CEGL002006** *Potamogeton richardsonii - Myriophyllum spicatum* Aquatic Vegetation

A4067 *Stuckenia pectinata - Potamogeton spp. - Ceratophyllum demersum* Aquatic Vegetation Alliance
- **CEGL002003** *Stuckenia pectinata / Myriophyllum (sibiricum, spicatum)* Aquatic Vegetation
- **CEGL002005** *Stuckenia pectinata / Zannichellia palustris* Aquatic Vegetation

A4129 *Carex interior - Carex pellita* Central Plains Graminoid Fen Alliance
- **CEGL002268** *Carex spp. / Triglochin maritima / Eleocharis quinqueflora* Marl Fen

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

These systems developed under Northern Great Plains climatic conditions, and experienced the natural influence of large herbivores, periodic flooding events and occasional fire. Wet-drought year climatic cycles in Montana, often in 10 to 20 year intervals, influence the ecological communities (Hansen et al., 1996). Seeds from annuals and perennials germinate and cover exposed mud flats, but when precipitation floods the depressions, the annuals drown and the perennials survive. Over a series of years the perennials dominate. The drawdown to mudflats is necessary so that emergent vegetation can become reestablished. Flooding, drawdown and the eventual exposure of mud flats drive the water-level vegetation cycle. Species richness can vary considerably among individual examples and is especially influenced by adjacent land use. Agriculture may provide nutrient and herbicide runoff. In saline soil wetlands, the increase in precipitation during exceptionally wet years can dilute the salt concentration in the soils, which may allow for less salt-tolerant species to occur.

Management

Changes will occur in the plant communities due to climatic conditions and/or management activities. Conversion to agriculture and pastureland can impact this system when it alters the hydrology of the system.

Restoration Considerations

Restoration Considerations

In open depression wetland systems where water has been drained or diverted, the original hydrology of the system must be restored. If water levels are restored, re-growth and re-colonization from dormant rhizomatous root systems of common emergent species can occur within a few years. Livestock grazing should be controlled to allow regrowth, recolonization and resprouting from existing root systems. Many of the characteristic species found in these systems are rhizomatous, and exhibit excellent erosion control properties. In some cases, if hydric soils are heavily altered due to pugging or compaction, addition of organic material may be needed to facilitate vegetation recolonization.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Arctic Shrew *(Sorex arcticus)* PSOC	Prairie Shrew *(Sorex haydeni)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
Masked Shrew *(Sorex cinereus)*	Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*

Western Harvest Mouse *(Reithrodontomys megalotis)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*
Long-tailed Vole *(Microtus longicaudus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Least Weasel *(Mustela nivalis)*
American Mink *(Neogale vison)*
White-footed Deermouse *(Peromyscus leucopus)*
Meadow Vole *(Microtus pennsylvanicus)*
Prairie Vole *(Microtus ochrogaster)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*

Birds

Horned Grebe *(Podiceps auritus)* SOC
American White Pelican *(Pelecanus erythrorhynchos)* SOC
Great Blue Heron *(Ardea herodias)* SOC
White-faced Ibis *(Plegadis chihi)* SOC
Whooping Crane *(Grus americana)* SOC
Black-necked Stilt *(Himantopus mexicanus)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Forster's Tern *(Sterna forsteri)* SOC
Sedge Wren *(Cistothorus stellaris)* SOC
Nelson's Sparrow *(Ammospiza nelsoni)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Pied-billed Grebe *(Podilymbus podiceps)*
Eared Grebe *(Podiceps nigricollis)*
Double-crested Cormorant *(Nannopterum auritum)*
Tundra Swan *(Cygnus columbianus)*
Snow Goose *(Anser caerulescens)*
Canada Goose *(Branta canadensis)*
Northern Pintail *(Anas acuta)*
Cinnamon Teal *(Spatula cyanoptera)*
Gadwall *(Mareca strepera)*
American Wigeon *(Mareca americana)*
Canvasback *(Aythya valisineria)*
Lesser Scaup *(Aythya affinis)*
Ruddy Duck *(Oxyura jamaicensis)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Peregrine Falcon *(Falco peregrinus)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Willet *(Tringa semipalmata)*
Upland Sandpiper *(Bartramia longicauda)*
Marbled Godwit *(Limosa fedoa)*
Semipalmated Sandpiper *(Calidris pusilla)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Rock Pigeon *(Columba livia)*
Common Nighthawk *(Chordeiles minor)*
Belted Kingfisher *(Megaceryle alcyon)*
Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
American Crow *(Corvus brachyrhynchos)*
Brown Thrasher *(Toxostoma rufum)*
Yellow Warbler *(Setophaga petechia)*
Lazuli Bunting *(Passerina amoena)*
Lark Sparrow *(Chondestes grammacus)*
Song Sparrow *(Melospiza melodia)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Rusty Blackbird *(Euphagus carolinus)*
Orchard Oriole *(Icterus spurius)*
Clark's Grebe *(Aechmophorus clarkii)* SOC
American Bittern *(Botaurus lentiginosus)* SOC
Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
Yellow Rail *(Coturnicops noveboracensis)* SOC
Piping Plover *(Charadrius melodus)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Common Tern *(Sterna hirundo)* SOC
Black Tern *(Chlidonias niger)* SOC
LeConte's Sparrow *(Ammospiza leconteii)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Western Grebe *(Aechmophorus occidentalis)*
Snowy Egret *(Egretta thula)*
Greater White-fronted Goose *(Anser albifrons)*
Ross's Goose *(Anser rossii)*
Green-winged Teal *(Anas crecca)*
Blue-winged Teal *(Spatula discors)*
Northern Shoveler *(Spatula clypeata)*
Eurasian Wigeon *(Mareca penelope)*
Mallard *(Anas platyrhynchos)*
Redhead *(Aythya americana)*
Common Goldeneye *(Bucephala clangula)*
Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Virginia Rail *(Rallus limicola)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
American Avocet *(Recurvirostra americana)*
Lesser Yellowlegs *(Tringa flavipes)*
Spotted Sandpiper *(Actitis macularius)*
Whimbrel *(Numenius phaeopus)*
Sanderling *(Calidris alba)*
Western Sandpiper *(Calidris mauri)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Snowy Owl *(Bubo scandiacus)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Eastern Kingbird *(Tyrannus tyrannus)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Common Raven *(Corvus corax)*
Marsh Wren *(Cistothorus palustris)*
European Starling *(Sturnus vulgaris)*
Common Yellowthroat *(Geothlypis trichas)*
Clay-colored Sparrow *(Spizella pallida)*
Savannah Sparrow *(Passerculus sandwichensis)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
American Goldfinch *(Spinus tristis)*

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Painted Turtle *(Chrysemys picta)*
Plains Gartersnake *(Thamnophis radix)*
Smooth Greensnake *(Opheodrys vernalis)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*
Northern Leopard Frog *(Lithobates pipiens)* SOC
Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Eyed Brown *(Lethe eurydice)* PSOC
Blue-eyed Darner *(Rhionaeschna multicolor)* PSOC
Prairie Bluet *(Coenagrion angulatum)* PSOC
Alkali Bluet *(Enallagma clausum)* PSOC
Myrina Fritillary *(Boloria myrina)*
Paddle-tailed Darner *(Aeshna palmata)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Twelve-spotted Skimmer *(Libellula pulchella)*
Wandering Glider *(Pantala flavescens)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Black Meadowhawk *(Sympetrum danae)*
Striped Meadowhawk *(Sympetrum pallipes)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Boreal Bluet *(Enallagma boreale)*
Northern Bluet *(Enallagma annexum)*
Tadpole Physa *(Physella gyrina)*
California Darner *(Rhionaeschna californica)* PSOC
Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Familiar Bluet *(Enallagma civile)* PSOC
Arroyo Bluet *(Enallagma praevarum)* PSOC
Common Wood-Nymph *(Cercyonis pegala)*
Common Green Darner *(Anax junius)*
Eight-spotted Skimmer *(Libellula forensis)*
Common Whitetail *(Plathemis lydia)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Saffron-winged Meadowhawk *(Sympetrum costiferum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Band-winged Meadowhawk *(Sympetrum semicinctum)*
Lyre-tipped Spreadwing *(Lestes unguiculatus)*
Tule Bluet *(Enallagma carunculatum)*
Pacific Forktail *(Ischnura cervula)*

Vascular Plants

Slender-branched Popcorn-flower *(Plagiobothrys leptocladus)* SOC
Great Basin Downingia *(Downingia laeta)* SOC
Chaffweed *(Centunculus minimus)* SOC
Slender Bulrush *(Schoenoplectus heterochaetus)* SOC
Persistent-sepal Yellow-cress *(Rorippa calycina)* SOC
Scarlet Ammannia *(Ammannia robusta)* SOC
Short-pointed Flatsedge *(Cyperus acuminatus)* SOC
Long-sheath Waterweed *(Elodea bifoliata)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Fringed Myotis *(Myotis thysanodes)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC
North American Deermouse *(Peromyscus maniculatus)*
Long-legged Myotis *(Myotis volans)* SOC
North American Beaver *(Castor canadensis)*

Birds

Green-tailed Towhee *(Pipilo chlorurus)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
American Robin *(Turdus migratorius)*
Western Meadowlark *(Sturnella neglecta)*
Baird's Sparrow *(Centronyx bairdii)* SOC
White-throated Swift *(Aeronautes saxatalis)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Snapping Turtle *(Chelydra serpentina)* SOC
Gophersnake *(Pituophis catenifer)*

Invertebrates

Lance-tipped Darner *(Aeshna constricta)* PSOC
Horned Clubtail *(Arigomphus cornutus)* PSOC
Purplish Copper *(Tharsalea helloides)*
Viceroy *(Limenitis archippus)*
Shadow Darner *(Aeshna umbrosa)*
Emerald Spreadwing *(Lestes dryas)*
Spotted Spreadwing *(Lestes congener)*
Marsh Bluet *(Enallagma ebrium)*
Eastern Forktail *(Ischnura verticalis)*
Sedge Sprite *(Nehalennia irene)*
Paiute Dancer *(Argia alberta)* PSOC
Bronze Copper *(Tharsalea hyllus)*
Greenish Blue *(Icaricia saepiolus)*
Variable Darner *(Aeshna interrupta)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Sweetflag Spreadwing *(Lestes forcipatus)*
Northern Spreadwing *(Lestes disjunctus)*
Hagen's Bluet *(Enallagma hageni)*
Western Forktail *(Ischnura perparva)*

Vascular Plants

Roundleaf Water-hyssop *(Bacopa rotundifolia)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L. Vance, C. McIntyre, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine

Class	Emergent wetland
Water Regime	Temporarily to seasonally flooded
Geographically Isolated Wetland	Partially isolated

NatureServe Identifiers:

Element Global ID	28532
System Code	CES303.675, Western Great Plains Open Freshwater Depression Wetland

ReGAP:
9218: Western Great Plains Open Freshwater Depression Wetland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Cook, Bradley J., and F. Richard Hauer. 2007. "Effects of hydrologic connectivity on water chemistry, soils, and vegetation structure and function in an intermontane depressional wetland landscape". *Wetlands.* 27 (3): 719-738.
- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

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Citation for data on this website:
Great Plains Open Freshwater Depression Wetland — Western Great Plains Open Freshwater Depression Wetland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=9218

Rocky Mountain Wooded Vernal Pool



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General Description

In northwestern Montana, wooded vernal pools occur from valley bottoms to montane elevations ranging from 866-1,585 meters (2,840-5,200 feet). Wooded vernal pools are small, shallow, circumneutral freshwater wetlands of glacial origin that partially or totally dry up as the growing season progresses. Pools are generally found on valley bottoms, lower benches, toe slopes, and flat sites. This system is well represented in the Seeley-Swan Valley in northwestern Montana. Depending on annual patterns of temperature and precipitation, the drying of the pond may be complete or partial by the fall. These sites are usually shallow and less than 1 meter in depth, but can be as much as 2 meters deep. The pool substrate is a poorly drained, often clayey layer with shallow organic sediments. Wooded vernal pools have a ring of trees surrounding the ponds that provide shade and influence their hydrology. The surrounding forest generally includes grand fir (*Abies grandis*), subalpine fir (*Abies lasiocarpa*), western larch (*Larix occidentalis*), Engelmann spruce (*Picea engelmannii*), lodgepole pine (*Pinus contorta*), Douglas-fir (*Pseudotsuga menziesii*), black cottonwood (*Populus balsamifera ssp. trichocarpa*), and, to a lesser extent, quaking aspen (*Populus tremuloides*) and paper birch (*Betula papyrifera*). In Montana, water howellia (*Howellia aquatilis*), a federally threatened species, is found only in wooded vernal pools. Other common species include water starwort (*Callitriche heterophylla*), inflated sedge (*Carex vesicaria*), common spikerush (*Eleocharis palustris)*, and reed canarygrass (*Phalaris arundinacea*).

Diagnostic Characteristics

Depressional isolated wetland

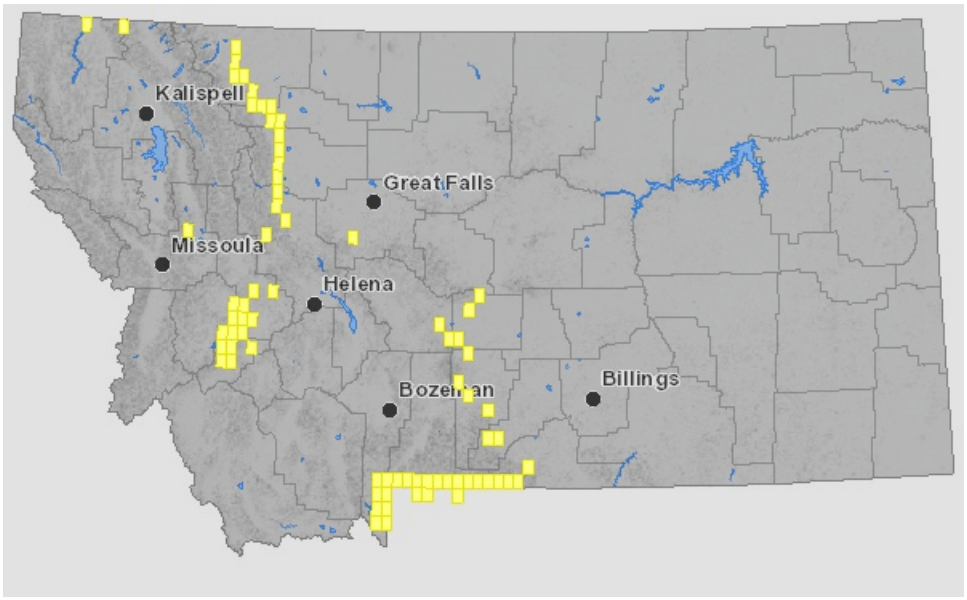
Range

Range

This system occurs in northern Idaho and western Montana. West of the Continental Divide, in the Seeley-Swan Valley, there is a large concentration of pools and ponds occurring within forested environments. East of the Continental Divide, glaciated pools and ponds occur at elevations up to 1585 m (5,200 feet), particularly in the forested foothill and montane zones of the glaciated pothole region.

Ecological System Distribution

Approximately 3 square kilometers are classified as Rocky Mountain Wooded Vernal Pool in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Lewis and Clark, Lincoln, Meagher, Missoula, Park, Pondera, Powell, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Small

Environment

In northwestern Montana, these ponds and pools occur in forested environments. Occurrences are found from valley bottoms to montane elevations ranging from 866 to 1,585 m (2,840-5,200 feet) (Mincemoyer, 2005). This system is well represented in the Seeley-Swan valley in northwestern Montana. Pools are generally found on valley bottoms, lower benches, toeslopes, and flat sites, often in glaciated kettleholes that vary in size and depth.

Depending on annual patterns of temperature and precipitation, the drying of the pond may be complete or partial by the fall or during drought years. However, many of these ponds remain at fairly constant water levels throughout the growing season. These sites can be shallow and less than 1 meter (3.3 feet) in depth, but can be as much as 2 meters (6 feet) deep. The pool substrate is a poorly drained, often clayey layer with shallow organic sediments. Parent materials are typically clay alluvium or clay colluvium (Mincemoyer, 2005). These freshwater ponds have pH ranges from 6.2 to 7.8 with most measurements between 6.5 and 7.5. The size of the pools/ponds can range from .4 to 4 hectares (1-10 acres) in size.

Vegetation

The overstory surrounding vernal wooded pools is typically a mixed coniferous forest consisting of grand fir,, subalpine fir, western larch, Engelmannspruce,lodgepolepine, Douglas-fir, and deciduous trees like black cottonwood and, to a lesser extent, quaking aspen and paper birch. Western red cedar (*Thuja plicata*) often borders the ponds, especially in the northern Swan Valley. Common shrubs occurring in the forest edges surrounding the pools include thinleaf alder (*Alnus incana*), redoiser dogwood (*Cornus sericea*), buckthorn alder (*Rhamnus alnifolia*), and willows (*Salix spp.*).

The herbaceous component is dominated by graminoids such as shortawn foxtail (*Alopecurus aequalis*), water sedge(*Carex aquatilis*), beaked sedge (*Carex utriculata*), inflated sedge, common spikerush, and rushes (*Juncus spp.).* Other characteristic species include woolyfruit sedge (*Carex lasiocarpa*), awned sedge (*Carex atherodes*), and wooly sedge (*Carex pellita*). Reed canarygrass is invasive in this system.

Water starwort (*Callitriche* species), pondweeds (*Potamogeton spp.*), burr reed (*Sparganium spp.*), white water crowfoot

(*Ranunculus aquatilis*), common mare's tail (*Hippuris vulgaris*), bladderworts (*Utricularia spp.*), field mint (*Mentha arvensis*), and yellowcress (*Rorippa spp.)* are common herbaceous plant associates. Horsetails (*Equisetum spp.)* are often present. In Lake and Missoula counties, wooded vernal pools are habitat for water howellia, a federally threatened species. This annual aquatic may undergo dramatic yearly fluctuations in population size.

Dynamic Processes

Many of the pools in the Swan Valley remain at a fairly constant water level year round. In some cases, these pools can partially or completely dry down, depending on temperature, precipitation patterns and pool depth, by late fall. Prolonged drought caused by changing climatic patterns will impact the populations of species such as water howellia occurring within these pools.

Management

Adjacent land uses surrounding wooded vernal pool can potentially alter their hydrology, including grazing and timber harvest. Due to the lack of genetic variability in sampled water howellia populations, multiple pond clusters of inhabited and potential water howellia pools should be protected (Lesica et al., 1988.)

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Northern Bog Lemming *(Synaptomys borealis)* SOC
Fisher *(Pekania pennanti)* SOC
Masked Shrew *(Sorex cinereus)*
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
North American Beaver *(Castor canadensis)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*
Northern River Otter *(Lontra canadensis)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Little Brown Myotis *(Myotis lucifugus)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Grizzly Bear *(Ursus arctos)* SOC
North American Water Vole *(Microtus richardsoni)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
North American Deermouse *(Peromyscus maniculatus)*
Western Heather Vole *(Phenacomys intermedius)*
Montane Vole *(Microtus montanus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
American Mink *(Neogale vison)*
Striped Skunk *(Mephitis mephitis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*

Birds

Great Blue Heron *(Ardea herodias)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Wood Duck *(Aix sponsa)*
Blue-winged Teal *(Spatula discors)*
American Wigeon *(Mareca americana)*
Ring-necked Duck *(Aythya collaris)*
Lesser Scaup *(Aythya affinis)*
Bufflehead *(Bucephala albeola)*
Red-breasted Merganser *(Mergus serrator)*
Sharp-shinned Hawk *(Accipiter striatus)*
American Coot *(Fulica americana)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
Belted Kingfisher *(Megaceryle alcyon)*
Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*
Western Flycatcher *(Empidonax difficilis)*
Violet-green Swallow *(Tachycineta thalassina)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Marsh Wren *(Cistothorus palustris)*
Hermit Thrush *(Catharus guttatus)*
Gray Catbird *(Dumetella carolinensis)*
Northern Shrike *(Lanius borealis)*
Cassin's Vireo *(Vireo cassinii)*
Yellow-rumped Warbler *(Setophaga coronata)*
Common Yellowthroat *(Geothlypis trichas)*
Canada Warbler *(Cardellina canadensis)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Song Sparrow *(Melospiza melodia)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Brown-headed Cowbird *(Molothrus ater)*
Solitary Sandpiper *(Tringa solitaria)* SOC
Alder Flycatcher *(Empidonax alnorum)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC
Great Gray Owl *(Strix nebulosa)* PSOC
Pied-billed Grebe *(Podilymbus podiceps)*
Canada Goose *(Branta canadensis)*
Green-winged Teal *(Anas crecca)*
Eurasian Wigeon *(Mareca penelope)*
Mallard *(Anas platyrhynchos)*
Greater Scaup *(Aythya marila)*
Common Goldeneye *(Bucephala clangula)*
Common Merganser *(Mergus merganser)*
Osprey *(Pandion haliaetus)*
Cooper's Hawk *(Accipiter cooperii)*
Spotted Sandpiper *(Actitis macularius)*
Great Horned Owl *(Bubo virginianus)*
Barred Owl *(Strix varia)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Vaux's Swift *(Chaetura vauxi)*
Northern Flicker *(Colaptes auratus)*
Willow Flycatcher *(Empidonax traillii)*
Dusky Flycatcher *(Empidonax oberholseri)*
Tree Swallow *(Tachycineta bicolor)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Northern House Wren *(Troglodytes aedon)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Cedar Waxwing *(Bombycilla cedrorum)*
Warbling Vireo *(Vireo gilvus)*
Yellow Warbler *(Setophaga petechia)*
Northern Waterthrush *(Parkesia noveboracensis)*
Wilson's Warbler *(Cardellina pusilla)*
Western Tanager *(Piranga ludoviciana)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Dark-eyed Junco *(Junco hyemalis)*
Bullock's Oriole *(Icterus bullockii)*

Reptiles

Painted Turtle *(Chrysemys picta)*
Common Gartersnake *(Thamnophis sirtalis)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Columbia Spotted Frog *(Rana luteiventris)*
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Subarctic Bluet *(Coenagrion interrogatum)* SOC	Freija Fritillary *(Boloria freija)* PSOC
Lake Darner *(Aeshna eremita)* PSOC	Zigzag Darner *(Aeshna sitchensis)* PSOC
Black-tipped Darner *(Aeshna tuberculifera)* PSOC	Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Bronze Copper *(Tharsalea hyllus)*	Mariposa Copper *(Tharsalea mariposa)*
Milbert's Tortoiseshell *(Aglais milberti)*	Viceroy *(Limenitis archippus)*
Shadow Darner *(Aeshna umbrosa)*	Common Green Darner *(Anax junius)*
White-faced Meadowhawk *(Sympetrum obtrusum)*	

Vascular Plants

Water Howellia *(Howellia aquatilis)* SOC	

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC	Canada Lynx *(Lynx canadensis)* SOC

Birds

Bald Eagle *(Haliaeetus leucocephalus)*	Common Loon *(Gavia immer)* SOC
Horned Grebe *(Podiceps auritus)* SOC	Trumpeter Swan *(Cygnus buccinator)* SOC
Boreal Owl *(Aegolius funereus)* PSOC	Eared Grebe *(Podiceps nigricollis)*
Western Grebe *(Aechmophorus occidentalis)*	Tundra Swan *(Cygnus columbianus)*
Greater White-fronted Goose *(Anser albifrons)*	Redhead *(Aythya americana)*
Northern Harrier *(Circus hudsonius)*	White-throated Swift *(Aeronautes saxatalis)*
Hairy Woodpecker *(Dryobates villosus)*	Lark Sparrow *(Chondestes grammacus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*	

Amphibians

Northern Leopard Frog *(Lithobates pipiens)* SOC	Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*	

Invertebrates

Subarctic Darner *(Aeshna subarctica)* SOC	Brush-tipped Emerald *(Somatochlora walshii)* SOC
Boreal Whiteface *(Leucorrhinia borealis)* SOC	Lance-tipped Darner *(Aeshna constricta)* PSOC
Sedge Darner *(Aeshna juncea)* PSOC	Spiny Baskettail *(Epitheca spinigera)* PSOC
Ringed Emerald *(Somatochlora albicincta)* PSOC	Hudsonian Emerald *(Somatochlora hudsonica)* PSOC
Mountain Emerald *(Somatochlora semicircularis)* PSOC	Crimson-ringed Whiteface *(Leucorrhinia glacialis)* PSOC
Purplish Copper *(Tharsalea helloides)*	Bog Fritillary *(Boloria eunomia)*
Relict Fritillary *(Boloria kriemhild)*	Myrina Fritillary *(Boloria myrina)*
Common Wood-Nymph *(Cercyonis pegala)*	Canada Darner *(Aeshna canadensis)*
Variable Darner *(Aeshna interrupta)*	Paddle-tailed Darner *(Aeshna palmata)*
American Emerald *(Cordulia shurtleffii)*	Whitehouse's Emerald *(Somatochlora whitehousei)*
Hudsonian Whiteface *(Leucorrhinia hudsonica)*	Dot-tailed Whiteface *(Leucorrhinia intacta)*
Belted Whiteface *(Leucorrhinia proxima)*	Eight-spotted Skimmer *(Libellula forensis)*
Four-spotted Skimmer *(Libellula quadrimaculata)*	Cherry-faced Meadowhawk *(Sympetrum internum)*
Variegated Meadowhawk *(Sympetrum corruptum)*	Saffron-winged Meadowhawk *(Sympetrum costiferum)*
Striped Meadowhawk *(Sympetrum pallipes)*	Band-winged Meadowhawk *(Sympetrum semicinctum)*
Autumn Meadowhawk *(Sympetrum vicinum)*	Emerald Spreadwing *(Lestes dryas)*
Sweetflag Spreadwing *(Lestes forcipatus)*	Spotted Spreadwing *(Lestes congener)*
Northern Spreadwing *(Lestes disjunctus)*	Lyre-tipped Spreadwing *(Lestes unguiculatus)*
Taiga Bluet *(Coenagrion resolutum)*	Boreal Bluet *(Enallagma boreale)*
Tule Bluet *(Enallagma carunculatum)*	Northern Bluet *(Enallagma annexum)*
Pacific Forktail *(Ischnura cervula)*	Tadpole Physa *(Physella gyrina)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, C. McIntyre, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Emergent
Water Regime	Seasonally flooded, semipermanently flooded

Geographically Isolated Wetland	Strictly isolated

NatureServe Identifiers:

Element Global ID	
System Code	CES304.060, Northern Rocky Mountain Wooded Vernal Pool

National Land Cover Dataset:
90: Woody Wetlands

ReGAP:
9162: Northern Rocky Mountain Wooded Vernal Pool

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

Lesica, P., R.F. Leary, F.W. Allendorf, and D.E. Bilderback. 1988. Lack of genetic diversity within and among populations of an endangered plant, Howellia aquatilis. Conservation Biology 2: 275-282.

Mincemoyer, S. 2005. Range-wide status assessment of Howellia aquatilis (water howellia). Prepared for the U.S.F.W.S. Helena, MT: Montana Natural Heritage Program. 21 p. + appendices.

- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Rocky Mountain Subalpine-Montane Riparian Woodland

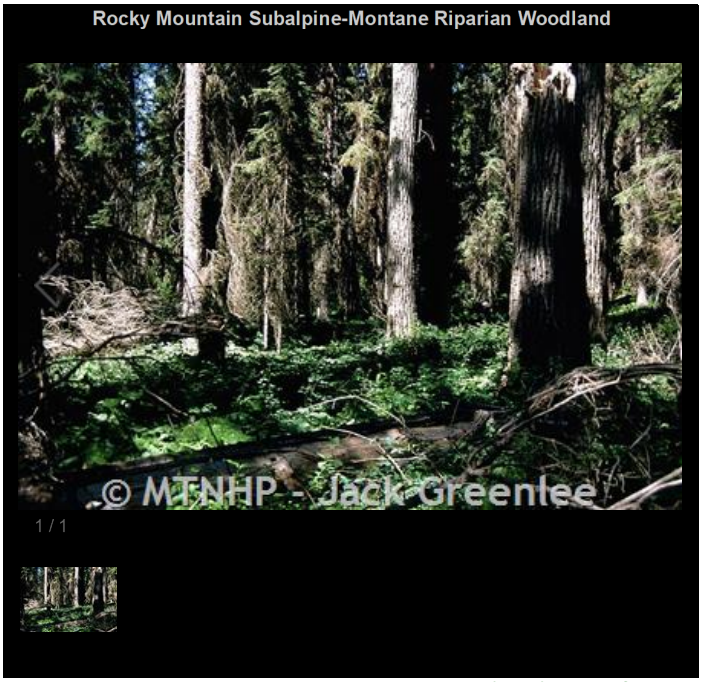


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General Description

This riparian woodland system includes seasonally flooded forests and woodlands found at montane to subalpine elevations in the Rocky Mountains. This habitat ranges from narrow streamside forests lining, confined low-order mountain streams to stands along broader, meandering tributaries, but they are typically dominated by coniferous tree species. Stands generally occur at elevations between 4,600 and 8,800 feet. In subalpine environments where there are steep gradients and high-energy flows controlled by precipitation and hydrological events, the transport and accumulation of sediments constantly creates and destroys sites for the establishment of vegetation (Melanson and Butler, 1991). In western Montana, this system is typically dominated by grand fir (*Abies grandis*), subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) in moister sites, and by Douglas-fir (*Pseudotsuga menziesi*), ponderosa pine (*Pinus ponderosa*), and Rocky Mountain juniper (*Juniperus scopulorum*) in drier areas (Ellis and Richard, 2003). The understory in this riparian system is typically sparse, but along the banks and on gravel bars, willow (*Salix spp.*), alder (*Alnus* spp.) and redosier dogwood (*Cornus sericea*) can be found. These riparian conifer types contribute to animal and plant diversity because they tend to have a more diverse forest structure than adjacent upland habitats. Although riparian areas make up a relatively small percent of cover in the Rocky Mountain West, they provide important migratory corridors, foraging areas and shade cover for Montana's birds, fish, insects and mammals (Ellis and Richard, 2003).

Diagnostic Characteristics

Montane, forest and woodland, riverine, alluvial, short flooding interval (< 5 years)

Similar Systems

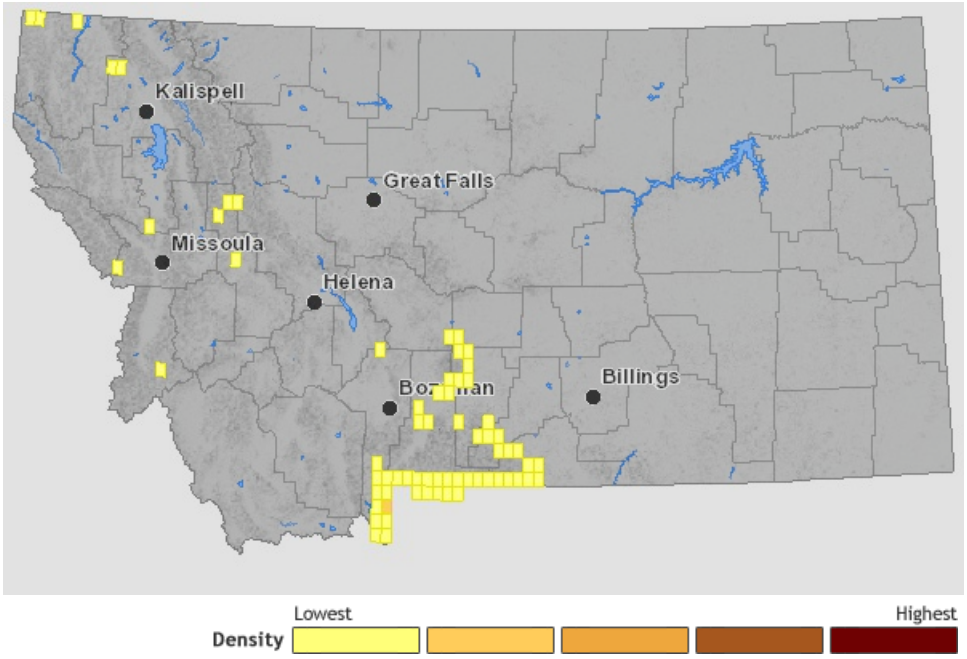
- Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland
- Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland
- Rocky Mountain Subalpine-Montane Riparian Shrubland

Range

This system is found at montane to subalpine elevations in the Rocky Mountains, from southern New Mexico north into Montana, Alberta and British Columbia, and west into the Intermountain region and the Colorado Plateau. In Montana, riparian conifer systems are found throughout the state, but are more common in the moister forested regions west of the Continental Divide.

Ecological System Distribution

Approximately 21 square kilometers are classified as Rocky Mountain Subalpine-Montane Riparian Woodland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Broadwater, Carbon, Flathead, Gallatin, Lincoln, Meagher, Missoula, Park, Powell, Ravalli, Stillwater, Sweet Grass, Wheatland

Spatial Pattern

Linear

Environment

This riparian woodland system includes seasonally flooded forests and woodlands found at montane to subalpine elevations of the Rocky Mountains. Stands typically occur at elevations between 4,600-8,800 feet. This system is common to the poorly-developed floodplains and terraces of V-shaped, narrow valleys and canyons, and less frequently, it occurs in moderate to wide valley bottoms on large floodplains along broad, meandering rivers such as the South Fork of the Flathead, and on pond or lake margins. In subalpine environments where there are steep gradients and high-energy flows controlled by precipitation and hydrological events, the transport and accumulation of sediments constantly creates and destroys sites for the establishment of vegetation (Melanson and Butler, 1991).

Vegetation

Vegetation composition and structure can vary depending on latitude, elevation and climate. A woody riparian area in the subalpine zone of the Rocky Mountains in Montana is typically dominated by grand fir, subalpine fir and Engelmann spruce. Grand fir and Engelmann spruce are considered late seral species, while subalpine fir is predominantly found in climax communities at higher elevations or at lower elevations in frost pockets (Hansen et al., 1995). In the montane zone, dominant vegetation changes to a community dominated by ponderosa pine, western larch (*Larix occidentalis*) and Douglas fir (*Pseudotsuga menziesii*). Western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) occur in moister sites west of the Continental Divide, and Some sites support Rocky Mountain juniper. The understory is typically sparse, but along the banks and on gravel bars, willow, alder and redosier dogwood can be present. Some sites support

scattered black cottonwood (*Populus balsamnifera*) and/or small stands of quaking aspen (*Populus tremuloides*). The vegetation in these systems relies on a consistent shallow water table to meet individual plant requirements; however, periodic flooding is necessary for community maintenance. Flooding transports sediments and creates establishment sites for plant colonization. Many plants have acquired adaptive traits as a result of this disturbance regime. Mechanical adaptations such as stem flexibility and specialized oxygen-holding cells assist riparian plants to endure through the physical strains of flooding. Reproductive adaptations, including water-dispersible seeds, vegetative budding, and adventitious roots allow plants to colonize and regenerate by seed and asexual methods.

The understory shrub species often form in a narrow band in the gravel bars and embankments along the stream channel. In the montane zone, species such as thinleaf alder (*Alnus incana*), redoiser dogwood and willows such as Bebb's willow (*Salix bebbiana*), Booth's willow (*Salix boothii*), Drummond's willow (*Salix drummondiana*), dusky willow (*Salix melanopsis*), and Geyer's willow (*Salix geyeriana*) are common. In western Montana riparian forests dominated by spruce or subalpine fir, devil's club (*Oplopanax horridus*) may be a codominate in the understory, but this is an infrequent plant association. Other minor shrubs include thimbleberry (*Rubus parviflorus*), elderberry (*Sambucus species*), Douglas hawthorn (*Crataegus douglasii*), black twinberry (*Lonicera involucrata*), alder buckthorn (*Rhamnus alnifolia*), serviceberry (*Amelanchier alnifolia*), common snowberry (*Symphoricarpos albus*) and Woods' rose (*Rosa woodsii*).

In the subalpine elevations, sitka alder (*Alnus viridis*) and Drummond's willow are frequently dominant. Water birch (*Betula occidentalis*) or resin birch (*Betula glandulosa*) may also be present. Planeleaf willow (*Salix planifolia*), undergreen willow (*Salix commutata*), Barclay's willow (*Salix barclayi*), shortfruit willow (*Salix brachycarpa*) and grayleaf willow (*Salix glauca*) become common at higher elevations. Herbaceous vegetation forms a minor component of this system but may include small patches of bluejoint reedgrass (*Calamagrostis canadensis*), drooping woodreed (*Cinna latifolia*) and sedges such water sedge (*Carex aquatilis*). Common forbs include arrowleaf groundsel (*Senecio triangularis*), angelica (*Angelica spp.)* baneberry (*Actaea rubra*) western meadow rue (*Thalictrum occidentale*), starry solomon's seal (*Maianthemum stellatum*), fragrant bedstraw (*Galium triflorum*), Virginia strawberry (*Fragaria virginiana*), sweet-cicely (*Osmorhiza* species), common cow parsnip (*Heracleum maximum*), clasp-leaf twistedstalk (*Streptopus amplexifolius*) and green false hellebore (*Veratrum viride*). Common ferns and fern allies are often present, such as horsetail (*Equisetum* species), American ladyfern (*Athryium filix-femina*), and oak fern (*Gymnocarpium dryopteris*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0311 *Populus balsamifera ssp. Trichocarpa* Northern Rocky Mountain Riparian Forest Alliance
- **CEGL005905** *Populus balsamifera ssp. trichocarpa / Populus tremuloides / Conifer - Cornus sericea* Riparian Forest
- **CEGL005907** *Populus balsamifera ssp. trichocarpa / Picea engelmannii - Equisetum arvense* Riparian Forest
- **CEGL005909** *Populus balsamifera ssp. trichocarpa / Populus tremuloides / Conifer - Calamagrostis canadensis* Riparian Forest
- **CEGL005910** *Populus balsamifera ssp. trichocarpa / Populus tremuloides / Conifer - Heracleum maximum* Riparian Forest

A2036 *Populus tremuloides* Rocky Mountain Forest & Woodland Alliance

A3614 *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Moist Forest Alliance
- **CEGL005908** *Populus tremuloides / Abies lasiocarpa / Picea engelmannii - Streptopus amplexifolius* Forest

A3757 *Abies lasiocarpa - Picea engelmannii* Swamp Forest Alliance
- **CEGL000297** *Abies lasiocarpa / Picea engelmannii - Alnus viridis ssp. Sinuata* Swamp Forest
- **CEGL000322** *Abies lasiocarpa / Picea engelmannii - Oplopanax horridus* Swamp Forest
- **CEGL000336** *Abies lasiocarpa / Picea engelmannii - Streptopus amplexifolius* Swamp Forest
- **CEGL000357** *Picea engelmannii - Caltha leptosepala* Swamp Forest
- **CEGL002663** *Abies lasiocarpa / Picea engelmannii - Mertensia ciliata* Swamp Forest
- **CEGL002677** *Picea engelmannii - Cornus sericea* Swamp Woodland
- **CEGL005843** *Picea engelmannii - Salix drummondiana* Swamp Woodland

A3758 *Pinus contorta var. murrayana - Pinus contorta var. latifolia* Swamp Forest Alliance
- **CEGL000138** *Pinus contorta - Calamagrostis canadensis* Swamp Forest
- **CEGL005929** *Pinus contorta - Cornus sericea* Swamp Woodland

A3760 *Populus tremuloides* Riparian Forest Alliance
- **CEGL000574** *Populus tremuloides - Calamagrostis canadensis* Riparian Forest
- **CEGL000582** *Populus tremuloides - Cornus sericea* Riparian Forest

A3797 *Pinus ponderosa - Juniperus scopulorum - Abies concolor* Riparian Woodland Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Stochastic flood events and variable fluvial conditions are crucial to the development of establishment sites for riparian plants, and actl as a primary control on plant succession. Steep gradients and high-energy flows controlled by precipitation causes flooding events that transport sediments. The scouring out and accumulation of sediments creates and destroys sites for the establishment of vegetation (Melanson and Butler, 1991). Sediment accumulating in more meandering examples of these systems often creates gravel bars at or near the surface of the water where colonizing vegetation creates bands of mixed vegetation that occupies different stages of succession (Melanson and Butler, 1991). Ground water seepage from snowmelt may create shallow water tables or seeps that vegetation depends on for a portion of the growing season

Management

Grazing along narrow, low order streams can result in increased erosion and channel downcutting (Mitsch and Gosellink, 2000). Sites that are subjected to heavy grazing practices may transition to an herbaceous understory consisting of introduced grasses and forbs such as Kentucky bluegrass (*Poa pratensis*) and Canadian thistle (*Cirsium arvense*). In addition, fire suppression, timber harvest and reduced flood frequency can affect the succession of riparian communities.

Restoration Considerations

Restoration strategies are dependent on the degree and type of disturbance event. Restoration efforts must first concentrate on *restoring* the*stream's hydrology*, so floods can re-occur. In-stream habitat enhancement (e.g., additions of logs or boulders) should be employed after restoring natural processes or where short-term improvements in habitat are needed (e.g., for species in recovery).

Removing or strictly limiting grazing by livestock and wildlife will allow the system to recover if hydric soils have not been lost due to extensive soil compaction, pugging, or down cutting of stream channels, and if there are existing populations of herbaceous native species (*Carex*, *Juncus*, and native grasses) that possess rhizomatous root systems capable of re-colonizing bare soils. Rhizomatous, highly adaptable exotic grasses such as Kentucky bluegrass, common timothy and smooth brome and pasture forbs such as clovers (*Trifolium*species) and common dandelion (*Taraxacum officinale*) will persist on the site and may compete with existing populations of native graminiods and forbs. In these cases, land managers must determine whether the exotic density is small enough that an adequate stand of native graminoids and forbs can become established on the site if reseeding efforts are used. In all cases, grazing must be excluded for several years to allow adequate re-growth and recovery of existing shrubs and the herbaceous understory.

Because all major shrub species within this riparian system are capable of re-sprouting and typically possess extensive, spreading root systems, modified land management practices in areas of low to moderate impact can minimize additional restoration needs. Vigor, health and degree of vegetative regeneration of existing trees and shrubs must be evaluated to determine if these components of the community are capable of recovery in an acceptable time frame. Intensive revegetation efforts should be limited to sites where a catastrophic wildfire or prolonged heavy grazing has destroyed existing trees, shrubs and the seed bank.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service,

Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Northern Bog Lemming *(Synaptomys borealis)* SOC
Fisher *(Pekania pennanti)* SOC
Canada Lynx *(Lynx canadensis)* SOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC
Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Flying Squirrel *(Glaucomys sabrinus)*
North American Beaver *(Castor canadensis)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Western Heather Vole *(Phenacomys intermedius)*
Montane Vole *(Microtus montanus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*
Little Brown Myotis *(Myotis lucifugus)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Wolverine *(Gulo gulo)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
North American Water Vole *(Microtus richardsoni)* PSOC
Masked Shrew *(Sorex cinereus)*
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Snowshoe Hare *(Lepus americanus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Marten *(Martes americana)*
American Mink *(Neogale vison)*
American Badger *(Taxidea taxus)*
Northern River Otter *(Lontra canadensis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Great Blue Heron *(Ardea herodias)* SOC
Harlequin Duck *(Histrionicus histrionicus)* SOC
Yellow-billed Cuckoo *(Coccyzus americanus)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC
Pileated Woodpecker *(Dryocopus pileatus)* SOC
Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Boreal Chickadee *(Poecile hudsonicus)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC
Western Screech-Owl *(Megascops kennicottii)* PSOC
Boreal Owl *(Aegolius funereus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Double-crested Cormorant *(Nannopterum auritum)*
Green-winged Teal *(Anas crecca)*
American Wigeon *(Mareca americana)*
Ring-necked Duck *(Aythya collaris)*
Lesser Scaup *(Aythya affinis)*
Bufflehead *(Bucephala albeola)*
Red-breasted Merganser *(Mergus serrator)*
Osprey *(Pandion haliaetus)*
American Bittern *(Botaurus lentiginosus)* SOC
Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC
Black-backed Woodpecker *(Picoides arcticus)* SOC
Alder Flycatcher *(Empidonax alnorum)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Brown Creeper *(Certhia americana)* SOC
Veery *(Catharus fuscescens)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Great Gray Owl *(Strix nebulosa)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Wood Duck *(Aix sponsa)*
Blue-winged Teal *(Spatula discors)*
Mallard *(Anas platyrhynchos)*
Greater Scaup *(Aythya marila)*
Common Goldeneye *(Bucephala clangula)*
Common Merganser *(Mergus merganser)*
Turkey Vulture *(Cathartes aura)*
Sharp-shinned Hawk *(Accipiter striatus)*

Cooper's Hawk *(Accipiter cooperii)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*
Dusky Grouse *(Dendragapus obscurus)*
Wild Turkey *(Meleagris gallopavo)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
Spotted Sandpiper *(Actitis macularius)*
Semipalmated Sandpiper *(Calidris pusilla)*
Least Sandpiper *(Calidris minutilla)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Glaucous Gull *(Larus hyperboreus)*
American Barn Owl *(Tyto furcata)*
Snowy Owl *(Bubo scandiacus)*
Barred Owl *(Strix varia)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Vaux's Swift *(Chaetura vauxi)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Belted Kingfisher *(Megaceryle alcyon)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Kingbird *(Tyrannus verticalis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Steller's Jay *(Cyanocitta stelleri)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Northern House Wren *(Troglodytes aedon)*
American Dipper *(Cinclus mexicanus)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Red-eyed Vireo *(Vireo olivaceus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Yellow-rumped Warbler *(Setophaga coronata)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*
Yellow-breasted Chat *(Icteria virens)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Snow Bunting *(Plectrophenax nivalis)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Pine Grosbeak *(Pinicola enucleator)*

Broad-winged Hawk *(Buteo platypterus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Gyrfalcon *(Falco rusticolus)*
Spruce Grouse *(Canachites canadensis)*
Ruffed Grouse *(Bonasa umbellus)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Whimbrel *(Numenius phaeopus)*
Western Sandpiper *(Calidris mauri)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Herring Gull *(Larus argentatus)*
Rock Pigeon *(Columba livia)*
Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
White-throated Swift *(Aeronautes saxatalis)*
Calliope Hummingbird *(Selasphorus calliope)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Olive-sided Flycatcher *(Contopus cooperi)*
Willow Flycatcher *(Empidonax traillii)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Canada Jay *(Perisoreus canadensis)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Canyon Wren *(Catherpes mexicanus)*
Marsh Wren *(Cistothorus palustris)*
Golden-crowned Kinglet *(Regulus satrapa)*
Western Bluebird *(Sialia mexicana)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Townsend's Warbler *(Setophaga townsendi)*
Blackpoll Warbler *(Setophaga striata)*
Northern Waterthrush *(Parkesia noveboracensis)*
Common Yellowthroat *(Geothlypis trichas)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Song Sparrow *(Melospiza melodia)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Lapland Longspur *(Calcarius lapponicus)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Rusty Blackbird *(Euphagus carolinus)*
Brown-headed Cowbird *(Molothrus ater)*
Purple Finch *(Haemorhous purpureus)*

House Finch *(Haemorhous mexicanus)*
Red Crossbill *(Loxia curvirostra)*
American Goldfinch *(Spinus tristis)*
White-winged Crossbill *(Loxia leucoptera)*
Pine Siskin *(Spinus pinus)*
Redpoll *(Acanthis flammea)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Columbia Spotted Frog *(Rana luteiventris)*
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Giant Sulphur *(Colias gigantea)* PSOC
Pacific Fritillary *(Boloria epithore)*
Viceroy *(Limenitis archippus)*
Common Wood-Nymph *(Cercyonis pegala)*
Gray Comma *(Polygonia progne)* SOC
Freija Fritillary *(Boloria freija)* PSOC
Field Crescent *(Phyciodes pulchella)*
Weidemeyer's Admiral *(Limenitis weidemeyerii)*
One-eyed Sphinx *(Smerinthus astarte)*

Vascular Plants

Red Alder *(Alnus rubra)* SOC
Great-spurred Violet *(Viola selkirkii)* SOC
Sparrow's-egg Lady's-slipper *(Cypripedium passerinum)* SOC
Peculiar Moonwort *(Botrychium paradoxum)* SOC
Stalked Moonwort *(Botrychium pedunculosum)* SOC
Northern Twayblade *(Listera borealis)*
Swamp Red Currant *(Ribes triste)* SOC
California False-hellebore *(Veratrum californicum)* SOC
Crested Shieldfern *(Dryopteris cristata)* SOC
Upward-lobed Moonwort *(Botrychium ascendens)* SOC
Mountain Moonwort *(Botrychium montanum)* PSOC

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Mountain Goat *(Oreamnos americanus)*
Uinta Chipmunk *(Neotamias umbrinus)* PSOC

Birds

Trumpeter Swan *(Cygnus buccinator)* SOC
Flammulated Owl *(Psiloscops flammeolus)* SOC
Eared Grebe *(Podiceps nigricollis)*
Redhead *(Aythya americana)*
Mourning Dove *(Zenaida macroura)*
American Pipit *(Anthus rubescens)*
Western Meadowlark *(Sturnella neglecta)*
Bullock's Oriole *(Icterus bullockii)*
American Goshawk *(Accipiter atricapillus)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Canada Goose *(Branta canadensis)*
Northern Harrier *(Circus hudsonius)*
Eastern Kingbird *(Tyrannus tyrannus)*
Vesper Sparrow *(Pooecetes gramineus)*
Common Grackle *(Quiscalus quiscula)*

Reptiles

Northern Rubber Boa *(Charina bottae)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*
Sierran Treefrog *(Pseudacris sierra)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Western Pondhawk *(Erythemis collocata)* SOC
Red-spotted Admiral *(Limenitis arthemis)* PSOC
Black-tipped Darner *(Aeshna tuberculifera)* PSOC
Hudsonian Emerald *(Somatochlora hudsonica)* PSOC
Crimson-ringed Whiteface *(Leucorrhinia glacialis)* PSOC
Emma's Dancer *(Argia emma)* PSOC
Pale Swallowtail *(Pterourus eurymedon)*
Hydaspe Fritillary *(Argynnis hydaspe)*
Pacific Spiketail *(Zoraena dorsalis)*
Variable Darner *(Aeshna interrupta)*
Common Green Darner *(Anax junius)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Northern Spreadwing *(Lestes disjunctus)*
Northern Bluet *(Enallagma annexum)*
Subarctic Bluet *(Coenagrion interrogatum)* SOC
Sinuous Snaketail *(Ophiogomphus occidentis)* PSOC
Ringed Emerald *(Somatochlora albicincta)* PSOC
Ocellated Emerald *(Somatochlora minor)* PSOC
Flame Skimmer *(Libellula saturata)* PSOC
Woodland Skipper *(Ochlodes sylvanoides)*
Mariposa Copper *(Tharsalea mariposa)*
Milbert's Tortoiseshell *(Aglais milberti)*
Canada Darner *(Aeshna canadensis)*
Paddle-tailed Darner *(Aeshna palmata)*
Hudsonian Whiteface *(Leucorrhinia hudsonica)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Boreal Bluet *(Enallagma boreale)*

Vascular Plants

Adder's Tongue *(Ophioglossum pusillum)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, C. McIntyre, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Forested Wetland
Water Regime	Temporarily to seasonally flooded
Geographically Isolated Wetland	No

NatureServe Identifiers:

Element Global ID	28668
System Code	CES306.833, Rocky Mountain Subalpine-Montane Riparian Woodland

ReGAP:
9171: Rocky Mountain Subalpine-Montane Riparian Woodland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Ellis, Janet H., and Jim Richards. 2003. *A planning guide for protecting Montana's wetlands and riparian areas*. Bozeman, MT: Montana Watercourse.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Washington, D.C.: U.S. Fish and Wildlife Service. 103pp.

Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

Malanson, George P., and David R. Butler. 1991. "Floristic Variation among Gravel Bars in a Subalpine River, Montana, U.S.A.". *Arctic and Alpine Research.* 23 (3): 273-278.

Mitsch WJ, Gosselink JG. 2000. Riparian Ecosystems. In: Wetlands. 3rd Edition. John Wiley and Sons, Inc. 920 p.

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Rocky Mountain Subalpine-Montane Riparian Shrubland

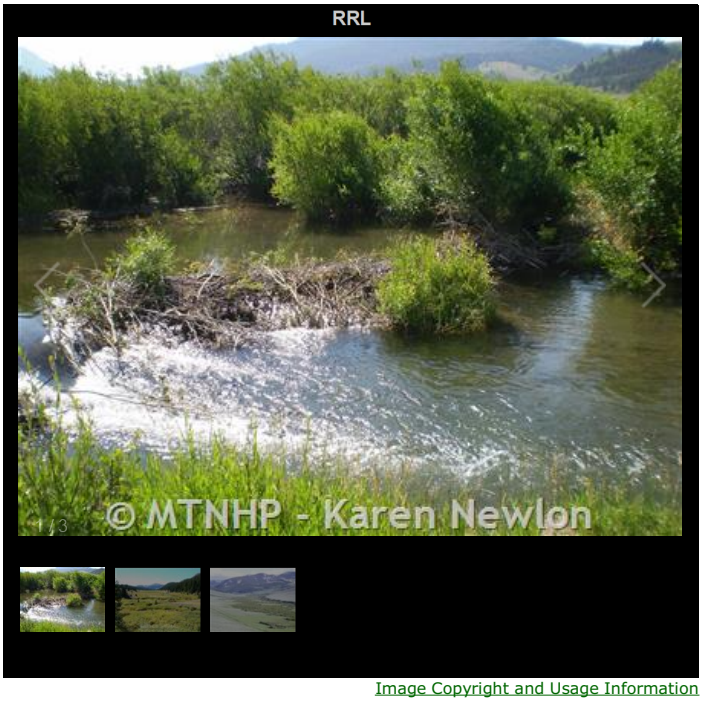


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General Description

This riparian system is a seasonally flooded shrubland found at montane to subalpine elevations of the Rocky Mountains. Shrubs dominate this system, with total shrub cover ranging from 20 to 100 percent. It occurs as linear bands of shrub vegetation lining streambanks and alluvial terraces in narrow to wide, low-gradient valley bottoms and floodplains with sinuous stream channels. Flooding creates and destroys sites for the establishment of vegetation through the transport and accumulation of coarse sediment (Melanson and Butler, 1991). Sediment accumlating in these systems can form gravel bars at or near the surface of the river, creating bands of mixed vegetation that occupy different stages of succession (Melanson and Butler, 1991). Ground water seepage from snowmelt may create shallow water tables or seeps that vegetation depends on for a portion of the growing season. This system often occurs as a mosaic of multiple communities that are shrub and herb dominated. The structure of vegetative communities in these systems can vary depending on latitude, elevation and climate. In Montana, these systems are dominated by willows, including Drummond's willow (*Salix drummondiana*), Bebb's willow (*Salix bebbiana*), planeleaf willow (*Salix planifolia* ssp. *planifolia*), undergreen willow (*Salix commutata*), Idaho willow (*Salix wolfii*), booth willow (*Salix boothi*) and Geyer's willow (*Salix geyeriana*). Typical herbaceous vegetation found in the understory includes beaked sedge (*Carex utriculata*), bluejoint reedgrass (*Calamagrostis canadensis*), and northern reedgrass (*Calamagrostis stricta*). Generally, the upland vegetation surrounding these riparian systems are conifer dominated forests. Shrubland riparian systems are important for bank stabilization, organic inputs to the adjacent stream, shade cover and wildlife habitat values.

Diagnostic Characteristics

Montane, shrubland, riverine, alluvial, broad leaf shrub, short flooding interval (< 5 years), short persistence

Similar Systems

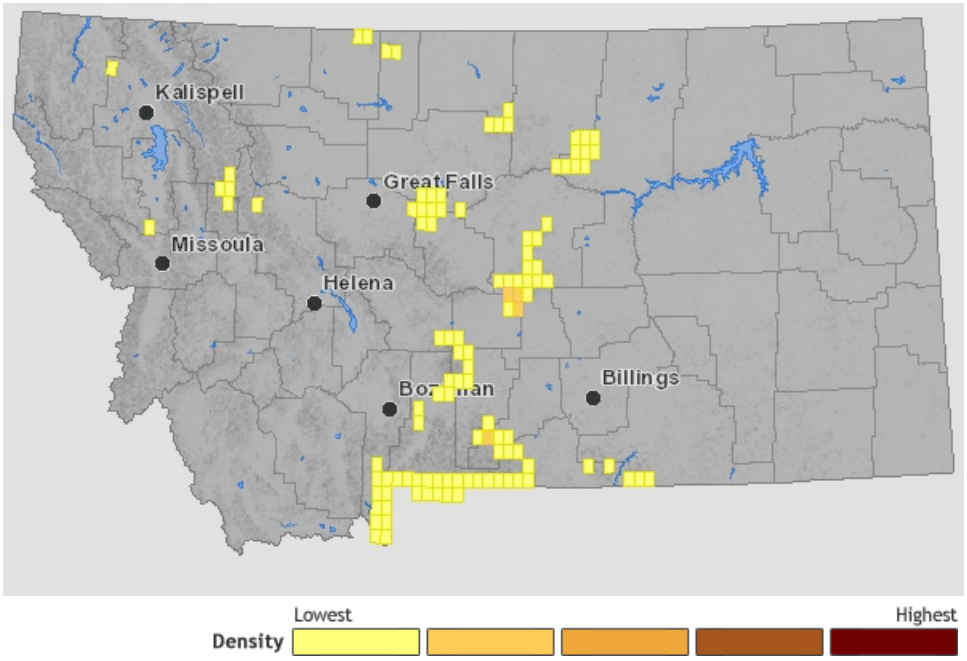
- Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland
- Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland
- Rocky Mountain Subalpine-Montane Riparian Woodland

Range

This system is found throughout the Rocky Mountain cordillera from New Mexico north into Montana, and occurs in the isolated island mountain ranges of central and eastern Montana. It is found throughout the western states and provinces of North America; including the Intermountain Basin and Colorado Plateau states.

Ecological System Distribution

Approximately 43 square kilometers are classified as Rocky Mountain Subalpine-Montane Riparian Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Cascade, Chouteau, Fergus, Flathead, Gallatin, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Meagher, Missoula, Park, Phillips, Powell, Stillwater, Sweet Grass, Toole, Wheatland

Spatial Pattern

Linear

Environment

This riparian system is a seasonally flooded shrubland found at montane to subalpine elevations of the Rocky Mountains. In Montana, this system typically occurs at elevations between 1,750 and 2,693 meters (5,740-8,830 feet). This system consists of narrow bands of shrub vegetation lining streambanks and alluvial terraces in narrow to wide, low-gradient valley bottoms and floodplains with sinuous stream channels. This system is also typical around seeps, fens, and isolated springs on hillslopes away from valley bottoms. Sediment that accumulates in these systems may create gravel bars at or near the surface of the river where colonizing vegetation creates bands of mixed vegetation that occupy different stages of succession (Melanson and Butler, 1991). Ground water seepage from snowmelt may create shallow water tables or seeps that vegetation depends on for a portion of the growing season.

Vegetation

Plant community composition and structure can vary depending on latitude, elevation and climate. For example, in southwest Montana Drummond's willow occupies higher elevations while Geyer's willow and booth willow are found at more intermediate elevations. In the northwest region of Montana, Geyer's and booth willow are barely present and Drummond's willow dominates most riparian areas (Hansen et al, 1995). Bebb's willow, planeleaf willow, undergreen willow and Idaho willow are frequent associates. Barclay's willow (*Salix barclayi*), shortfruit willow (*Salix brachycarpa*) and

grayleaf willow (*Salix glauca*) become common at higher subalpine elevations. Sageleaf willow (*Salix candida*) is indicative of fens and occurs in association with other willow species to form the shrub-dominated carr layers within riparian areas feeding into or out of fens. Redoiser dogwood (*Cornus sericea*), shrubby cinquefoil (*Dasiphora fruticosa*), alder (*Alnus spp.*), currant (*Ribes spp.)* and Rocky Mountain maple (*Acer glabrum*) are common associates. Water birch (*Betula occidentalis*) or bog birch (*Betula nana, glandulosa*) may also be present.

Dominant graminoid vegetation in the herbaceous stratum of these shrubland riparian systems includes bluejoint reedgrass, northern reedgrass and Northwest Territory sedge. Common forbs include dwarf fireweed (*Chamerion latifolium*), field mint (*Mentha arvensis*), glaucous willowherb (*Epilobium glaberrimum*), western mountain aster (*Symphyotrichum spathulatum*), and tiny trumpets (*Collomia linearis*). Sharptooth angelica (*Angelica arguta*), starry solomon's seal (*Maianthemum stellatum*), sweet-cicely (*Osmorhiza* species), common cow parsnip (*Heracleum maximum*), clasp-leaf twisted stalk (*Streptopus amplexifolius*) and green false hellebore (*Veratrum viride*) are frequent at higher elevations. Within rich fen-carr shrublands, graminoid and forb species diversity is typically higher than other sites supporting these riparian shrublands.

Flooding in these systems influences vegetative communities by transporting sediments and creating establishment sites for colonization. Many plants in these high-energy systems that experience large disturbances from floods have acquired adaptive traits. Some have flexible, resilient stems and specialized cells to hold oxygen so that they can survive large flood events. These species also have reproductive adaptations such as water-dispersed seeds and are able to sprout quickly from flood damaged stumps. Ground water seepage from snowmelt may create shallow water tables or seeps that vegetation depends on for a portion of the growing season. Sites that are over-browsed will become dominated by Bebb willow, a shrub that is more resilient to heavy grazing. In sites where there is prolonged disturbance, willow coverage will decrease, resulting in a more open canopy. Herbaceous vegetation will transition to a grass-dominated system including fowl bluegrass (*Poa palustris*), Kentucky bluegrass (*Poa pratensis*) and field horsetail (*Equisetum arvense*) (Hansen et al, 1995).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1003 *Salix commutata* Wet Shrubland Alliance
- **CEGL003497** *Salix commutata* - Mesic Graminoid Wet Shrubland

A2658 *Elymus repens* Ruderal Grassland Alliance
- **CEGL005868** *Elymus repens* Ruderal Grassland

A3434 *Betula nana* Alkaline Shrub Fen Alliance
- **CEGL001188** *Salix candida - Carex utriculata* Shrub Fen

A3769 *Salix boothii - Salix geyeriana - Salix lutea* Montane Wet Shrubland Alliance
- **CEGL001173** *Salix bebbiana* Wet Shrubland
- **CEGL001174** *Salix bebbiana* - Mesic Graminoids Wet Shrubland
- **CEGL001175** *Salix boothii - Calamagrostis canadensis* Wet Shrubland
- **CEGL001178** *Salix boothii - Carex utriculata* Wet Shrubland
- **CEGL001180** *Salix boothii* - Mesic Forbs Wet Shrubland
- **CEGL001181** *Salix boothii* - Mesic Graminoids Wet Shrubland
- **CEGL001190** *Salix drummondiana* Wet Shrubland [Placeholder]
- **CEGL001192** *Salix drummondiana* - Mesic Forbs Wet Shrubland
- **CEGL001205** *Salix geyeriana - Calamagrostis canadensis* Wet Shrubland
- **CEGL001206** *Salix geyeriana - Carex aquatilis* Wet Shrubland
- **CEGL001207** *Salix geyeriana - Carex utriculata* Wet Shrubland
- **CEGL001208** *Salix geyeriana - Deschampsia caespitosa* Wet Shrubland
- **CEGL001215** *Salix lucida ssp. caudata* Wet Shrubland
- **CEGL001219** *Salix lutea - Calamagrostis canadensis* Wet Shrubland
- **CEGL001220** *Salix lutea - Carex utriculata* Wet Shrubland
- **CEGL002621** *Salix lucida ssp. caudata - Rosa woodsii* Wet Shrubland
- **CEGL002624** *Salix lutea - Rosa woodsii* Wet Shrubland
- **CEGL002631** *Salix drummondiana - Carex utriculata* Wet Shrubland
- **CEGL002666** *Salix geyeriana* - Mesic Forbs Wet Shrubland
- **CEGL002667** *Salix drummondiana - Calamagrostis canadensis* Wet Shrubland

A3770 *Salix wolfii - Salix brachycarpa - Betula glandulosa* Wet Shrubland Alliance
- **CEGL001225** *Salix planifolia - Calamagrostis canadensis* Wet Shrubland
- **CEGL001227** *Salix planifolia - Carex aquatilis* Wet Shrubland
- **CEGL001229** *Salix planifolia - Carex scopulorum* Wet Shrubland
- **CEGL001234** *Salix wolfii - Carex aquatilis* Wet Shrubland
- **CEGL001238** *Salix wolfii - Deschampsia caespitosa* Wet Shrubland
- **CEGL001244** *Salix brachycarpa - Carex aquatilis* Wet Shrubland

A3771 *Alnus incana - Alnus viridis* Wet Shrubland Alliance
- **CEGL001141** *Alnus incana* Wet Shrubland
- **CEGL001142** *Alnus incana - Betula occidentalis* Wet Shrubland
- **CEGL001143** *Alnus incana - Calamagrostis canadensis* Wet Shrubland
- **CEGL001144** *Alnus incana - Carex (aquatilis, lenticularis, luzulina, pellita)* Wet Shrubland
- **CEGL001145** *Alnus incana - Cornus sericea* Wet Shrubland
- **CEGL001147** *Alnus incana* - Mesic Forbs Wet Shrubland
- **CEGL001156** *Alnus viridis ssp. sinuata - Athyrium filix-femina / Cinna latifolia* Wet Shrubland
- **CEGL002628** *Alnus incana - Athyrium filix-femina* Wet Shrubland
- **CEGL002629** *Alnus incana - Lysichiton americanus* Wet Shrubland

A3772 *Betula occidentalis* Wet Shrubland Alliance
- **CEGL001080** *Betula occidentalis* Wet Shrubland
- **CEGL001083** *Betula occidentalis - Dasiphora fruticosa ssp. Floribunda* Wet Shrubland

CEGL001161 *Betula occidentalis - Cornus sericea* Wet Shrubland
A3773 *Cornus sericea - Dasiphora fruticosa ssp. floribunda - Ribes spp.* Wet Shrubland Alliance
CEGL001107 *Dasiphora fruticosa ssp. floribunda - Deschampsia caespitosa* Wet Shrubland
CEGL001165 *Cornus sericea* Rocky Mountain Wet Shrubland
CEGL001166 *Cornus sericea - Galium triflorum* Wet Shrubland
A3796 *Acer negundo - Fraxinus anomala - Celtis laevigata var. reticulata* Riparian Woodland Alliance
A3799 *Rhus trilobata - Crataegus rivularis - Forestiera pubescens* Shrubland Alliance
A3833 *Alnus viridis ssp. sinuata - Alnus viridis ssp. fruticosa - Acer circinatum* Shrub Swamp Alliance
CEGL001154 *Alnus viridis ssp. Sinuata* Shrub Swamp
A3968 *Abies lasiocarpa - Populus tremuloides / Acer glabrum* Central Rocky Mountain Avalanche Chute Shrubland Alliance
CEGL001062 *Acer glabrum* Drainage Bottom Wet Shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Stochastic flood events and variable fluvial conditions are crucial to the development of establishment sites for riparian plants, and act as a primary control on plant succession. Steep gradients and high-energy flows controlled by precipitation cause flooding events that transport coarse sediments. Scouring out and accumulation of sediments constantly creates and destroys sites for the establishment of vegetation (Melanson and Butler, 1991). Accumulating sediments often create gravel bars at or near the surface of the water where colonizing vegetation creates bands of mixed vegetation occupying different stages of succession (Melanson and Butler, 1991). Ground water seepage from snowmelt may create shallow water tables or seeps that vegetation depends on for a portion of the growing season when stream flow is low.

Management

Grazing along narrow low order streams results in increased erosion and channel downcutting (Mitsch and Gosellink, 2000). Sites that are over-browsed will become dominated by Bebb's willow, a shrub that is more resilient to heavy grazing. In sites where there is prolonged disturbance, willow coverage will decrease, and herbaceous vegetation will transition to a grass dominated system including fowl bluegrass, Kentucky bluegrass and field horsetail. In addition, fire suppression, timber harvest and reduced flood frequency can affect the succession of riparian communities.

Restoration Considerations

Restoration strategies will vary based on the degree and type of disturbance event. Restoration efforts must first concentrate on restoring the stream's hydrology, so the floods can re-occur. In-stream habitat enhancement (e.g., additions of logs or boulders) should be employed after restoring natural processes or where short-term improvements in habitat are needed (e.g, for species in recovery).

Removing grazing from this ecological system will allow the system to recover if hydric soils have not been lost due to extensive soil compaction, pugging, or down cutting of stream channels, and if there are existing populations of herbaceous native species (*Carex*, *Juncus*, and native grasses) that possess rhizomatous root systems capable of re-colonizing bare soils. However, rhizomatous, highly adaptable exotic grasses such as Kentucky bluegrass, common timothy and smooth brome, and pasture forbs such as clovers (*Trifolium* species) and common dandelion (*Taraxacum officinale*) will persist on the site and may compete with existing populations of native graminoids and forbs. In these cases, land managers must decide if the exotic density is sufficiently small that an adequate stand of native graminoids and forbs can become established on the site if reseeding efforts are used. In all cases, grazing by cattle and wildlife should be excluded for several years to allow adequate re-growth and recovery of existing shrubs and the herbaceous understory.

Because all major shrub species within this riparian system are capable of re-sprouting and typically possess extensive, spreading root systems, modified land management practices in areas of low to moderate impact can minimize additional restoration needs. Vigor, health and degree of vegetative regeneration of existing shrubs must be evaluated to determine if these components of the community are capable of recovery in an acceptable time frame. Intensive revegetation efforts should be limited to sites where a catastrophic wildfire or prolonged heavy grazing has destroyed existing shrubs and the seed bank.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each

ecological system;

4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Yuma Myotis *(Myotis yumanensis)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Northern Bog Lemming *(Synaptomys borealis)* SOC
Grizzly Bear *(Ursus arctos)* SOC	Fisher *(Pekania pennanti)* SOC
Wolverine *(Gulo gulo)* SOC	Canada Lynx *(Lynx canadensis)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC	Spotted Bat *(Euderma maculatum)* PSOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC	Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
North American Water Vole *(Microtus richardsoni)* PSOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
Western Water Shrew *(Sorex navigator)*	Northern Montane Shrew *(Sorex obscurus)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Snowshoe Hare *(Lepus americanus)*	White-tailed Jackrabbit *(Lepus townsendii)*
Yellow-pine Chipmunk *(Neotamias amoenus)*	Red-tailed Chipmunk *(Neotamias ruficaudus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Northern Pocket Gopher *(Thomomys talpoides)*
North American Beaver *(Castor canadensis)*	Western Harvest Mouse *(Reithrodontomys megalotis)*
North American Deermouse *(Peromyscus maniculatus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Western Heather Vole *(Phenacomys intermedius)*
Meadow Vole *(Microtus pennsylvanicus)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Common Muskrat *(Ondatra zibethicus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Raccoon *(Procyon lotor)*
Marten *(Martes americana)*	Long-tailed Weasel *(Neogale frenata)*

American Mink *(Neogale vison)*
American Badger *(Taxidea taxus)*
Northern River Otter *(Lontra canadensis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*
American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*

Birds

American Bittern *(Botaurus lentiginosus)* SOC
Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Yellow-billed Cuckoo *(Coccyzus americanus)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Boreal Owl *(Aegolius funereus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Blue-winged Teal *(Spatula discors)*
Mallard *(Anas platyrhynchos)*
Lesser Scaup *(Aythya affinis)*
Bufflehead *(Bucephala albeola)*
Red-breasted Merganser *(Mergus serrator)*
Northern Harrier *(Circus hudsonius)*
Cooper's Hawk *(Accipiter cooperii)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*
Dusky Grouse *(Dendragapus obscurus)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Whimbrel *(Numenius phaeopus)*
Western Sandpiper *(Calidris mauri)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Glaucous Gull *(Larus hyperboreus)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Barred Owl *(Strix varia)*
Common Nighthawk *(Chordeiles minor)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Belted Kingfisher *(Megaceryle alcyon)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Olive-sided Flycatcher *(Contopus cooperi)*
Willow Flycatcher *(Empidonax traillii)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Red-breasted Nuthatch *(Sitta canadensis)*
Northern House Wren *(Troglodytes aedon)*
American Dipper *(Cinclus mexicanus)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Palm Warbler *(Setophaga palmarum)*
Great Blue Heron *(Ardea herodias)* SOC
Harlequin Duck *(Histrionicus histrionicus)* SOC
Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC
Alder Flycatcher *(Empidonax alnorum)* SOC
Veery *(Catharus fuscescens)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Eastern Screech-Owl *(Megascops asio)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Green-winged Teal *(Anas crecca)*
American Wigeon *(Mareca americana)*
Ring-necked Duck *(Aythya collaris)*
Common Goldeneye *(Bucephala clangula)*
Common Merganser *(Mergus merganser)*
Turkey Vulture *(Cathartes aura)*
Sharp-shinned Hawk *(Accipiter striatus)*
Broad-winged Hawk *(Buteo platypterus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Peregrine Falcon *(Falco peregrinus)*
Spruce Grouse *(Canachites canadensis)*
Ruffed Grouse *(Bonasa umbellus)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
Spotted Sandpiper *(Actitis macularius)*
Semipalmated Sandpiper *(Calidris pusilla)*
Least Sandpiper *(Calidris minutilla)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Rock Pigeon *(Columba livia)*
American Barn Owl *(Tyto furcata)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
White-throated Swift *(Aeronautes saxatalis)*
Calliope Hummingbird *(Selasphorus calliope)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Canada Jay *(Perisoreus canadensis)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Rock Wren *(Salpinctes obsoletus)*
Marsh Wren *(Cistothorus palustris)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Yellow-rumped Warbler *(Setophaga coronata)*
American Redstart *(Setophaga ruticilla)*

Northern Waterthrush *(Parkesia noveboracensis)*
Common Yellowthroat *(Geothlypis trichas)*
Canada Warbler *(Cardellina canadensis)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Savannah Sparrow *(Passerculus sandwichensis)*
Song Sparrow *(Melospiza melodia)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
House Finch *(Haemorhous mexicanus)*
Pine Siskin *(Spinus pinus)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*
Western Tanager *(Piranga ludoviciana)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Vesper Sparrow *(Pooecetes gramineus)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Harris's Sparrow *(Zonotrichia querula)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Bullock's Oriole *(Icterus bullockii)*
Red Crossbill *(Loxia curvirostra)*
American Goldfinch *(Spinus tristis)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Columbia Spotted Frog *(Rana luteiventris)*
Western Tiger Salamander *(Ambystoma mavortium)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Freija Fritillary *(Boloria freija)* PSOC
Pacific Fritillary *(Boloria epithore)*
Canada Darner *(Aeshna canadensis)*
Gray Comma *(Polygonia progne)* SOC
Woodland Skipper *(Ochlodes sylvanoides)*
Viceroy *(Limenitis archippus)*

Vascular Plants

Desert Groundsel *(Senecio eremophilus)* SOC
Hutchinsia *(Hornungia procumbens)* SOC
Swamp Red Currant *(Ribes triste)* SOC
Sitka Columbine *(Aquilegia formosa)* SOC
Platte Cinquefoil *(Potentilla plattensis)* SOC
Coville's Rush *(Juncus covillei)* SOC
Upward-lobed Moonwort *(Botrychium ascendens)* SOC
Mountain Moonwort *(Botrychium montanum)* PSOC
Slender Thelypody *(Thelypodium sagittatum)* SOC
Hiker's Gentian *(Gentianopsis simplex)* SOC
Mealy Primrose *(Primula incana)* SOC
Alpine Meadowrue *(Thalictrum alpinum)* SOC
Slender Indian Paintbrush *(Castilleja gracillima)* SOC
California False-hellebore *(Veratrum californicum)* SOC
High Northern Buttercup *(Ranunculus hyperboreus)* PSOC

Native Species Occasionally Associated with this Ecological System

Mammals

Uinta Chipmunk *(Neotamias umbrinus)* PSOC
Mountain Goat *(Oreamnos americanus)*
Least Chipmunk *(Neotamias minimus)*

Birds

Trumpeter Swan *(Cygnus buccinator)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Canada Goose *(Branta canadensis)*
American Pipit *(Anthus rubescens)*
Western Meadowlark *(Sturnella neglecta)*
White-winged Crossbill *(Loxia leucoptera)*
Great Gray Owl *(Strix nebulosa)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Redhead *(Aythya americana)*
Townsend's Warbler *(Setophaga townsendi)*
Common Grackle *(Quiscalus quiscula)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Plains Gartersnake *(Thamnophis radix)*
Gophersnake *(Pituophis catenifer)*

Amphibians

Northern Leopard Frog *(Lithobates pipiens)* SOC
Boreal Chorus Frog *(Pseudacris maculata)*
Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Boreal Whiteface *(Leucorrhinia borealis)* SOC
Red-spotted Admiral *(Limenitis arthemis)* PSOC
Lance-tipped Darner *(Aeshna constricta)* PSOC
Mountain Emerald *(Somatochlora semicircularis)* PSOC
Flame Skimmer *(Libellula saturata)* PSOC
Emma's Dancer *(Argia emma)* PSOC
Pale Swallowtail *(Pterourus eurymedon)*
Purplish Copper *(Tharsalea helloides)*
Relict Fritillary *(Boloria kriemhild)*
Common Wood-Nymph *(Cercyonis pegala)*
Variable Darner *(Aeshna interrupta)*
Common Green Darner *(Anax junius)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Northern Spreadwing *(Lestes disjunctus)*
Northern Bluet *(Enallagma annexum)*
Subarctic Bluet *(Coenagrion interrogatum)* SOC
Sinuous Snaketail *(Ophiogomphus occidentis)* PSOC
Black-tipped Darner *(Aeshna tuberculifera)* PSOC
Crimson-ringed Whiteface *(Leucorrhinia glacialis)* PSOC
Chalk-fronted Corporal *(Ladona julia)* PSOC
Vivid Dancer *(Argia vivida)* PSOC
Bronze Copper *(Tharsalea hyllus)*
Mariposa Copper *(Tharsalea mariposa)*
Field Crescent *(Phyciodes pulchella)*
Pacific Spiketail *(Zoraena dorsalis)*
Paddle-tailed Darner *(Aeshna palmata)*
Hudsonian Whiteface *(Leucorrhinia hudsonica)*
Belted Whiteface *(Leucorrhinia proxima)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Boreal Bluet *(Enallagma boreale)*

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC

Adder's Tongue *(Ophioglossum pusillum)* SOC

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Natureserve Western Ecology Group

Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Scrub Shrub
Water Regime	Temporarily to seasonally flooded
Geographically Isolated Wetland	No

NatureServe Identifiers:

Element Global ID	28667
System Code	CES306.832, Rocky Mountain Subalpine-Montane Riparian Shrubland

ReGAP:
9187: Rocky Mountain Subalpine-Montane Riparian Shrubland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Ellis, Janet H., and Jim Richards. 2003. *A planning guide for protecting Montana's wetlands and riparian areas*. Bozeman, MT: Montana Watercourse.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Washington, D.C.: U.S. Fish and Wildlife Service. 103pp.

Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

Malanson, George P., and David R. Butler. 1990. "Woody Debris, Sediment, and Riparian Vegetation of a Subalpine River, Montana, U.S.A.". *Arctic and Alpine Research.* 22 (2): 183-194.

Malanson, George P., and David R. Butler. 1991. "Floristic Variation among Gravel Bars in a Subalpine River, Montana, U.S.A.". *Arctic and Alpine Research.* 23 (3): 273-278.

Mitsch WJ, Gosselink JG. 2000. Riparian Ecosystems. In: Wetlands. 3rd Edition. John Wiley and Sons, Inc. 920 p.

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Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland



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State Rank Reason

This system faces multiple threats: residential and agricultural development, invasives, climate change, drought, etc. However, it is still widespread.

General Description

This ecological system is found throughout the Rocky Mountain and Colorado Plateau regions. In Montana, sites occur at elevations of 609-1,219 meters (2,000-4,000 feet) west of the Continental Divide. East of the Continental Divide, this system ranges up to 1,676 meters (5,500 feet). It generally comprises a mosaic of multiple communities that are tree-dominated with a diverse shrub component. It is dependent on a natural hydrologic regime with annual to episodic flooding, so it is usually found within the flood zone of rivers, on islands, sand or cobble bars, and along streambanks. It can form large, wide occurrences on mid-channel islands in larger rivers, or narrow bands on small, rocky canyon tributaries and well-drained benches. It is also typically found in backwater channels and other perennially wet but less scoured sites, such as floodplains, swales and irrigation ditches. In some locations, occurrences extend into moderately high intermountain basins where the adjacent vegetation is sage steppe. Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) is the key indicator species. Other dominant trees may include boxelder maple (*Acer negundo*), narrowleaf cottonwood (*Populus angustifolia*), eastern cottonwood (*Populus deltoides*), Douglas-fir (*Pseudotsuga menziesii*), peachleaf willow (*Salix amygdaloides*), or Rocky Mountain juniper (*Juniperus scopulorum*). Dominant shrubs include Rocky Mountain maple (*Acer glabrum*), thinleaf alder (*Alnus incana*), river birch (*Betula occidentalis*), redoiser dogwood (*Cornus sericea*), hawthorne (*Crataegus* species), chokecherry (*Prunus virginiana*), skunkbush sumac (*Rhus trilobata*), willows (*Salix* species), rose (*Rosa* species), silver buffaloberry (*Shepherdia argentea*), or snowberry (*Symphoricarpos* species).

Diagnostic Characteristics

Forest and Woodland, shrub dominated, lower montane to montane elevations, riverine-alluvial, short flooding interval (<5 yrs)

Similar Systems

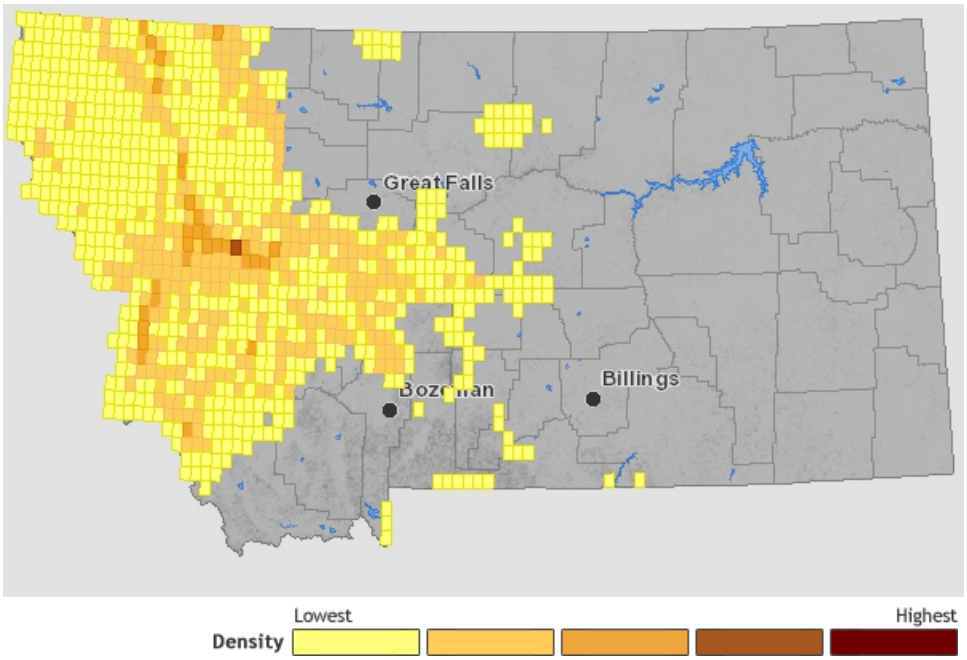
- Great Plains Riparian
- Rocky Mountain Mesic Montane Mixed Conifer Forest
- Rocky Mountain Subalpine-Montane Riparian Shrubland
- Rocky Mountain Subalpine-Montane Riparian Woodland

Range

This system is found at low to mid elevation throughout the mountains and foothills of Montana.

Ecological System Distribution

Approximately 2,666 square kilometers are classified as Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Wheatland

Spatial Pattern

Linear

Environment

This riparian system is a seasonally flooded shrubland and woodland found throughout the northern Rocky Mountain region. It occurs at lower montane elevations in valleys and foothills on alluvial terraces, streambanks, and floodplains along moderate to high gradient streams and rivers. Soils are usually Entisols overlying river cobbles and gravel. Inceptisols and Mollisols can be found on older sites of relative stability that have had significant time for soil development. Soil texture varies from loam to coarse sand. Water tables may drop in late summer to 50 centimeters (20 inches) below the soil surface, but surface horizons remain moist due to capillary action. The coarse textured soils, stream gradients, and large amounts of coarse rock fragments create rapid movement of highly aerated water. Sites occur at elevations of 609-1,219 meters (2,000-4,000 feet) west of the Continental Divide. East of the Continental Divide, this system ranges up to 1,676 meters (5,500 feet) (Hansen et al., 1995).

Vegetation

Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) is the key indicator species. Several other tree species can be mixed in the canopy, including boxelder maple (*Acer negundo*), narrowleaf cottonwood (*Populus angustifolia*), eastern cottonwood (*Populus deltoides*), Douglas-fir (*Pseudotsuga menziesii*), peachleaf willow (*Salix amygdaloides*), or Mountain juniper (*Juniperus scopulorum*). Quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), water birch (*Betula occidentalis*) and white spruce (*Picea glauca*) also occur. Grand fir (*Abies grandis*), western red cedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*) are commonly co-dominant canopy species in western Montana occurrences, particularly in lower montane riparian zones. Shrub understory components include red-oiser dogwood (*Cornus sericea*), Rocky Mountain maple (*Acer glabrum*), thinleaf alder (*Alnus incana*), devil's club (*Oplopanax horridus*), and common snowberry (*Symphoricarpos albus*). Other shrubs may include currant (*Ribes* species), Douglas hawthorn (*Crataegus douglasii*), plane leaf willow (*Salix planifolia*) yellow willow (*Salix lutea*), Woods' rose (*Rosa woodsii*), alder buckthorn (*Rhamnus alnifolia*), and common chokecherry (*Prunus virginiana*). Shrubby cinquefoil (*Dasiphora fruticosa)*, Drummond's willow (*Salix drummondii*), and sandbar willow (*Salix exigua*) are often present on recent alluvial bars.

Dominant graminoid vegetation in the herbaceous stratum includes bluejoint reedgrass (*Calamagrostis canadensis*), and to a much lesser extent, blue wildrye (*Elymus glaucus*) and Bebb's sedge (*Carex bebbii*). Common forbs include yarrow (*Achillea millefolium*), fireweed (*Chamerion angustifolium*), swamp willow herb (*Epilobium palustre*), common cowparsnip (*Heracleum maximum*), aster (*Symphyotrichum* species), western meadow rue (*Thalictrum occidentale*), Canada goldenrod (*Solidago canadensis*), starry solomon's seal (*Maianthemum stellatum*), clasping-leaf twisted stalk (*Streptopus amplexicaulus*) and western sagewort (*Artemisia ludoviciana*). Fern and fern ally cover is often high and includes species such as American ladyfern (*Athyrium filix-femina*), oak fern (*Gymnocarpium dryopteris*), and horsetails (*Equisetum* species).

Flooding in these systems influences community composition by transporting sediments and creating establishment sites for colonization. Plants have acquired adaptive traits to survive in these high-energy flood-disturbance settings. Many plants have flexible, resilient stems and specialized cells to hold oxygen so that they can survive large flood events; some have reproductive adaptations like water-dispersed seeds and are able to sprout quickly from damaged stumps.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0311 *Populus balsamifera ssp. Trichocarpa* Northern Rocky Mountain Riparian Forest Alliance
- **CEGL000542** *Populus balsamifera ssp. trichocarpa / (Populus tremuloides) - Heracleum maximum* Riparian Forest
- **CEGL000670** *Populus balsamifera ssp. trichocarpa - Betula papyrifera* Riparian Forest
- **CEGL000672** *Populus balsamifera ssp. trichocarpa - Cornus sericea* Riparian Forest
- **CEGL000677** *Populus balsamifera (ssp. trichocarpa, ssp. balsamifera) - Symphoricarpos (albus, oreophilus, occidentalis)* Riparian Forest
- **CEGL005845** *Populus balsamifera ssp. trichocarpa - Calamagrostis canadensis* Riparian Forest

A3367 *Betula papyrifera* Rocky Mountain Forest & Woodland Alliance
- **CEGL000520** *Betula papyrifera* Forest

A3613 *Tsuga heterophylla - Thuja plicata* Warm-Mesic Central Rocky Mountain Forest & Woodland Alliance
- **CEGL000476** *Thuja plicata - Gymnocarpium dryopteris* Forest
- **CEGL000491** *Tsuga heterophylla - Athyrium filix-femina* Forest
- **CEGL000494** *Tsuga heterophylla - Gymnocarpium dryopteris* Forest

A3762 *Abies grandis* Rocky Mountain Riparian Forest Alliance
- **CEGL000270** *Abies grandis - Athyrium filix-femina* Riparian Forest
- **CEGL000280** *Abies grandis - Senecio triangularis* Riparian Forest

A3776 *Thuja plicata - Tsuga heterophylla* Rocky Mountain Swamp Forest Alliance
- **CEGL000479** *Thuja plicata / Tsuga heterophylla - Oplopanax horridus* Rocky Mountain Swamp Forest

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Stochastic flood events and variable fluvial conditions are crucial to the development of establishment sites for riparian plants, and exert a primary control on plant succession. In areas with steep gradients, high-energy flows precipitated by snowmelt, rain-on-snow events or convective thunderstorms lead to floods, which in turn scour and transport coarse sediments. The scouring out and downstream accumulation constantly creates and destroys sites for the establishment of vegetation. Gravel bars are created at or near the surface of the river, where vegetation colonizes. As the gravel and point bars extend, mixed vegetation bands grow up, representing different stages of succession. The vegetation traps even more sediment, so that over time the size and height of the gravel bar increases. As gravel bar height increases, backwater channels can establish. These channels hold early runoff for an extended time, and are also fed by ground water seepage. Further from the channel, groundwater recharge from snowmelt may create shallow water tables or seeps that support vegetation when stream flow is low.

Management

Grazing, timber harvest, recreation and residential development can all alter structure, composition, and function of this system. Poor grazing practices can result in increased erosion and channel downcutting, limiting the overbank flows that drive succession. Where grazing is excessive, shrub cover will decrease, resulting in a more open canopy. Continued heavy grazing can completely eliminate cottonwood regeneration, and herbaceous vegetation will eventually transition to a system dominated by grasses such as redtop (*Agrostis stolonifera*), fowl bluegrass (*Poa palustris*), Canada bluegrass (*Poa compressa*), Kentucky bluegrass (*Poa pratensis*) and other exotic perennial forbs. Any activity that alters the hydrology of

these systems (e.g., improperly sized culverts, land clearing and compaction, water diversion and withdrawal, and rip-rap installation) can eventually lead to a loss of characteristic disturbance-prone vegetation communities.

Restoration Considerations

Restoration strategies are dependent on the level and type of disturbance event. Because all shrub species within this system are capable of resprouting, modified land management practices in areas of low to moderate impact can minimize additional restoration needs. Highly impacted sites and areas of potential soil erosion may require soil stabilization and, in some cases, reseeding or replanting.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Yuma Myotis *(Myotis yumanensis)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Northern Bog Lemming *(Synaptomys borealis)* SOC
Grizzly Bear *(Ursus arctos)* SOC	Fisher *(Pekania pennanti)* SOC

Canada Lynx *(Lynx canadensis)* SOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Masked Shrew *(Sorex cinereus)*
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Snowshoe Hare *(Lepus americanus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Marten *(Martes americana)*
American Mink *(Neogale vison)*
American Badger *(Taxidea taxus)*
Northern River Otter *(Lontra canadensis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*

Spotted Bat *(Euderma maculatum)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Mountain Cottontail *(Sylvilagus nuttallii)*
White-tailed Jackrabbit *(Lepus townsendii)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Eastern Fox Squirrel *(Sciurus niger)*
Northern Flying Squirrel *(Glaucomys sabrinus)*
North American Beaver *(Castor canadensis)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Western Heather Vole *(Phenacomys intermedius)*
Montane Vole *(Microtus montanus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Great Blue Heron *(Ardea herodias)* SOC
White-faced Ibis *(Plegadis chihi)* SOC
Harlequin Duck *(Histrionicus histrionicus)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC
Black-backed Woodpecker *(Picoides arcticus)* SOC
Alder Flycatcher *(Empidonax alnorum)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Brown Creeper *(Certhia americana)* SOC
Veery *(Catharus fuscescens)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Western Screech-Owl *(Megascops kennicottii)* PSOC
Short-eared Owl *(Asio flammeus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Snowy Egret *(Egretta thula)*
Wood Duck *(Aix sponsa)*
Blue-winged Teal *(Spatula discors)*
Northern Shoveler *(Spatula clypeata)*
Eurasian Wigeon *(Mareca penelope)*
Mallard *(Anas platyrhynchos)*
Greater Scaup *(Aythya marila)*
Long-tailed Duck *(Clangula hyemalis)*
Bufflehead *(Bucephala albeola)*
Red-breasted Merganser *(Mergus serrator)*
Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*
Cooper's Hawk *(Accipiter cooperii)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*
Spruce Grouse *(Canachites canadensis)*
Ruffed Grouse *(Bonasa umbellus)*
Virginia Rail *(Rallus limicola)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Spotted Sandpiper *(Actitis macularius)*

American Bittern *(Botaurus lentiginosus)* SOC
Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
Trumpeter Swan *(Cygnus buccinator)* SOC
Golden Eagle *(Aquila chrysaetos)* SOC
Common Tern *(Sterna hirundo)* SOC
Yellow-billed Cuckoo *(Coccyzus americanus)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC
Pileated Woodpecker *(Dryocopus pileatus)* SOC
Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Boreal Chickadee *(Poecile hudsonicus)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC
Eastern Screech-Owl *(Megascops asio)* PSOC
Great Gray Owl *(Strix nebulosa)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Pied-billed Grebe *(Podilymbus podiceps)*
Double-crested Cormorant *(Nannopterum auritum)*
Canada Goose *(Branta canadensis)*
Green-winged Teal *(Anas crecca)*
Cinnamon Teal *(Spatula cyanoptera)*
Gadwall *(Mareca strepera)*
American Wigeon *(Mareca americana)*
Ring-necked Duck *(Aythya collaris)*
Lesser Scaup *(Aythya affinis)*
Common Goldeneye *(Bucephala clangula)*
Common Merganser *(Mergus merganser)*
Ruddy Duck *(Oxyura jamaicensis)*
Osprey *(Pandion haliaetus)*
Sharp-shinned Hawk *(Accipiter striatus)*
Broad-winged Hawk *(Buteo platypterus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Peregrine Falcon *(Falco peregrinus)*
Prairie Falcon *(Falco mexicanus)*
Dusky Grouse *(Dendragapus obscurus)*
Wild Turkey *(Meleagris gallopavo)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Lesser Yellowlegs *(Tringa flavipes)*
Whimbrel *(Numenius phaeopus)*

Semipalmated Sandpiper *(Calidris pusilla)*
Least Sandpiper *(Calidris minutilla)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Glaucous Gull *(Larus hyperboreus)*
Rock Pigeon *(Columba livia)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
White-throated Swift *(Aeronautes saxatalis)*
Calliope Hummingbird *(Selasphorus calliope)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Olive-sided Flycatcher *(Contopus cooperi)*
Willow Flycatcher *(Empidonax traillii)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Eastern Kingbird *(Tyrannus tyrannus)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Steller's Jay *(Cyanocitta stelleri)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Canyon Wren *(Catherpes mexicanus)*
Marsh Wren *(Cistothorus palustris)*
Golden-crowned Kinglet *(Regulus satrapa)*
Western Bluebird *(Sialia mexicana)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Townsend's Warbler *(Setophaga townsendi)*
Blackpoll Warbler *(Setophaga striata)*
Northern Waterthrush *(Parkesia noveboracensis)*
Common Yellowthroat *(Geothlypis trichas)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Common Grackle *(Quiscalus quiscula)*
Baltimore Oriole *(Icterus galbula)*
Pine Grosbeak *(Pinicola enucleator)*
House Finch *(Haemorhous mexicanus)*
Red Crossbill *(Loxia curvirostra)*
American Goldfinch *(Spinus tristis)*
Western Sandpiper *(Calidris mauri)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Herring Gull *(Larus argentatus)*
Short-billed Gull *(Larus brachyrhynchus)*
Eurasian Collared-Dove *(Streptopelia decaocto)*
American Barn Owl *(Tyto furcata)*
Snowy Owl *(Bubo scandiacus)*
Barred Owl *(Strix varia)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Vaux's Swift *(Chaetura vauxi)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Belted Kingfisher *(Megaceryle alcyon)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Kingbird *(Tyrannus verticalis)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Canada Jay *(Perisoreus canadensis)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Rock Wren *(Salpinctes obsoletus)*
Northern House Wren *(Troglodytes aedon)*
American Dipper *(Cinclus mexicanus)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Red-eyed Vireo *(Vireo olivaceus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Yellow-rumped Warbler *(Setophaga coronata)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*
Yellow-breasted Chat *(Icteria virens)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Vesper Sparrow *(Pooecetes gramineus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Song Sparrow *(Melospiza melodia)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Lapland Longspur *(Calcarius lapponicus)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Bullock's Oriole *(Icterus bullockii)*
Purple Finch *(Haemorhous purpureus)*
White-winged Crossbill *(Loxia leucoptera)*
Pine Siskin *(Spinus pinus)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Northern Rubber Boa *(Charina bottae)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Western Skink *(Plestiodon skiltonianus)* SOC
Gophersnake *(Pituophis catenifer)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Columbia Spotted Frog *(Rana luteiventris)*
American Bullfrog *(Lithobates catesbeianus)*
Sierran Treefrog *(Pseudacris sierra)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Brush-tipped Emerald *(Somatochlora walshii)* SOC
Sinuous Snaketail *(Ophiogomphus occidentis)* PSOC
Pale Swallowtail *(Pterourus eurymedon)*
Field Crescent *(Phyciodes pulchella)*
One-eyed Sphinx *(Smerinthus astarte)*
Gray Comma *(Polygonia progne)* SOC
Red-spotted Admiral *(Limenitis arthemis)* PSOC
Woodland Skipper *(Ochlodes sylvanoides)*
Pacific Fritillary *(Boloria epithore)*
Viceroy *(Limenitis archippus)*
Pacific Spiketail *(Zoraena dorsalis)*

Vascular Plants

Arctic Sweet Coltsfoot *(Petasites frigidus var. frigidus)* SOC
Wedge-leaf Saltbush *(Atriplex truncata)* SOC
Big-leaf Sedge *(Carex amplifolia)* SOC
Red-root Flatsedge *(Cyperus erythrorhizos)* SOC
Desert Groundsel *(Senecio eremophilus)* SOC
Toothcup *(Rotala ramosior)* SOC
Short-pointed Flatsedge *(Cyperus acuminatus)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Wolverine *(Gulo gulo)* SOC

Birds

American Goshawk *(Accipiter atricapillus)* SOC
Black-necked Stilt *(Himantopus mexicanus)* SOC
Caspian Tern *(Hydroprogne caspia)* SOC
Flammulated Owl *(Psiloscops flammeolus)* SOC
Boreal Owl *(Aegolius funereus)* PSOC
Tundra Swan *(Cygnus columbianus)*
Snow Goose *(Anser caerulescens)*
Redhead *(Aythya americana)*
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Forster's Tern *(Sterna forsteri)* SOC
Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Eared Grebe *(Podiceps nigricollis)*
Greater White-fronted Goose *(Anser albifrons)*
Canvasback *(Aythya valisineria)*

Reptiles

Painted Turtle *(Chrysemys picta)*
Prairie Rattlesnake *(Crotalus viridis)*
North American Racer *(Coluber constrictor)*

Amphibians

Coeur d'Alene Salamander *(Plethodon idahoensis)* SOC
Northern Leopard Frog *(Lithobates pipiens)* SOC
Boreal Chorus Frog *(Pseudacris maculata)*
Idaho Giant Salamander *(Dicamptodon aterrimus)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Giant Sulphur *(Colias gigantea)* PSOC
Ringed Emerald *(Somatochlora albicincta)* PSOC
Crimson-ringed Whiteface *(Leucorrhinia glacialis)* PSOC
Paiute Dancer *(Argia alberta)* PSOC
Purplish Copper *(Tharsalea helloides)*
Milbert's Tortoiseshell *(Aglais milberti)*
Lorquin's Admiral *(Limenitis lorquini)*
Paddle-tailed Darner *(Aeshna palmata)*
Hudsonian Whiteface *(Leucorrhinia hudsonica)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
River Jewelwing *(Calopteryx aequabilis)*
Northern Spreadwing *(Lestes disjunctus)*
Northern Bluet *(Enallagma annexum)*
Black-tipped Darner *(Aeshna tuberculifera)* PSOC
Ocellated Emerald *(Somatochlora minor)* PSOC
Flame Skimmer *(Libellula saturata)* PSOC
Vivid Dancer *(Argia vivida)* PSOC
Mariposa Copper *(Tharsalea mariposa)*
Weidemeyer's Admiral *(Limenitis weidemeyerii)*
Common Wood-Nymph *(Cercyonis pegala)*
American Emerald *(Cordulia shurtleffii)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Sweetflag Spreadwing *(Lestes forcipatus)*
Boreal Bluet *(Enallagma boreale)*

Vascular Plants

Adder's Tongue *(Ophioglossum pusillum)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, C. McIntyre, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	28640
System Code	CES306.804, Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland

ReGAP:
9155: Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

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Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland



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State Rank Reason

This system has an extensive distribution across Montana, although many occurrences have been impacted by hydrologic modification and adjacent land use, especially in valleys.

General Description

This ecological system is found throughout the Rocky Mountain and Colorado Plateau regions. In Montana, it ranges from approximately 945 to 2,042 meters (3,100 to 6,700 feet), characteristically occurring as a mosaic of multiple communities that are tree-dominated with a diverse shrub component. It is dependent on a natural hydrologic regime, especially annual to episodic flooding. Occurrences are found within the flood zone of rivers, on islands, sand or cobble bars, and on immediate streambanks. It can form large, wide occurrences on mid-channel islands in larger rivers or narrow bands on small, rocky canyon tributaries and well-drained benches. It is also typically found in backwater channels and other perennially wet but less scoured sites, such as floodplains swales and irrigation ditches. In some locations, occurrences extend into moderately high intermountain basins where the adjacent vegetation is sage steppe. Dominant trees may include boxelder maple (*Acer negundo*), narrowleaf cottonwood (*Populus angustifolia*), Plains cottonwood (*Populus deltoides*), Douglas-fir (*Pseudotsuga menziesii*), peachleaf willow (*Salix amygdaloides*), or Rocky Mountain juniper (*Juniperus scopulorum*). Dominant shrubs include Rocky Mountain maple (*Acer glabrum*), thinleaf alder (*Alnus incana*), river birch (*Betula occidentalis*), redoiser dogwood (*Cornus sericea*), hawthorn (*Crataegus spp.*), chokecherry (*Prunus virginiana*), skunkbush sumac (*Rhus trilobata*), Drummond's willow (*Salix drummondiana*), sandbar willow (*Salix exigua*), Pacific willow (*Salix lucida*), rose (*Rosa* species), silver buffaloberry (*Shepherdia argentea*), or snowberry (*Symphoricarpos* species). Exotic trees of Russian olive (*Elaeagnus angustifolia*) and saltcedar (*Tamarix* species) may invade some stands

in southeastern and south-central Montana.

Diagnostic Characteristics

Montane, riverine/alluvial, mineral with A horizon less than 10 cm, unconsolidated, short flooding interval (less than 5 years), short persistence (50 to 100 years)

Similar Systems

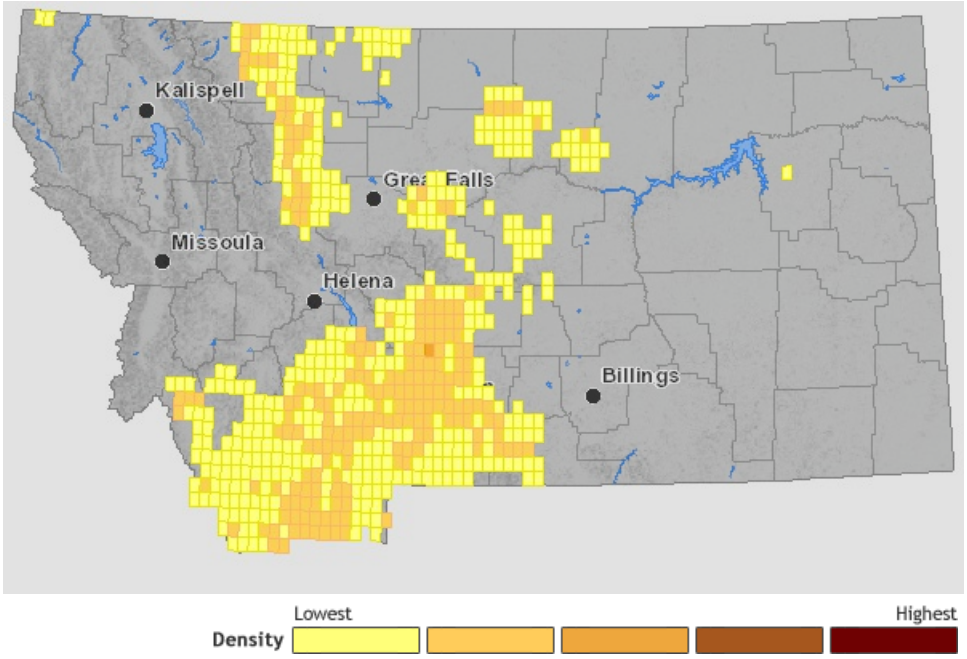
- Great Plains Riparian
- Rocky Mountain Subalpine-Montane Riparian Shrubland
- Rocky Mountain Subalpine-Montane Riparian Woodland

Range

This system is found throughout the mid to low elevations of central and eastern Montana

Ecological System Distribution

Approximately 1,457 square kilometers are classified as Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Gallatin, Glacier, Golden Valley, Hill, Jefferson, Judith Basin, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Park, Phillips, Pondera, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Wheatland

Spatial Pattern

Linear

Environment

This system is dependent on a natural hydrologic regime, especially annual to episodic flooding. Occurrences are found within the flood zone of major rivers and the associated islands, sand or cobble bars, and along adjacent streambanks. It can occur as a large, wide patch on mid-channel islands in larger rivers or as narrow bands along small, rocky canyon tributaries and on well-drained benches. It is also typically found in backwater channels and other perennially wet but less scoured sites, such as floodplains swales and irrigation ditches. Elevations generally range from 945 to 2,042 meters (3,100 to 6,700 feet) (Hansen et al., 1995). Soils are usually Entisols or, less commonly, Inceptisols with an organic A horizon of less than ten centimeters. Coarse textured substrates allow for rapid movement of highly aerated water. The water table can drop during late summer, but soils remain moist due to capillary action.

Vegetation

Because of the frequent disturbance regime, this system usually occurs as a mosaic of shrub and tree dominant

communities. Dominant trees may include boxelder maple, narrowleaf cottonwood, Plains cottonwood, Douglas-fir, peachleaf willow, or Rocky Mountain juniper. In central and eastern Montana, narrowleaf cottonwood frequently dominates the overstory. Dominant shrubs include Rocky Mountain maple, thinleaf alder, river birch, redoiser dogwood, hawthorn, chokecherry, skunkbush, Drummond's willow, sandbar willow, Pacific willow, silver buffaloberry, rose or snowberry. Russian olive and saltcedar may invade some stands in southeastern and south-central Montana.

The herbaceous understory usually includes colonizing native forbs such as yarrow (*Achillea millefolium*), Canada goldenrod (*Solidago canadensis*), American licorice (*Glycyrrhiza lepidota*), Canada horseweed (*Conyza canadensis*) and exotics such as Canada thistle (*Cirsium arvense*) and common dandelion (*Taraxacum officinale*). Exotic grasses such as redtop (*Agrostis stolonifera*), Canada bluegrass (*Poa compressa*), Kentucky bluegrass (*Poa pratensis*), common timothy (*Phleum pratense*) and reed canarygrass (*Phalaris arundinacea*) can dominate the graminoid layer if this system adjoins cultivated areas or disturbed upland communities. Generally, some stands may have a small component of native graminoid species like slimstem reedgrass (*Calamagrostis stricta*) or wheatgrasses (*Elymus* species) (Hansen et al., 1995). Wet meadow patches adjoining or asscociated with this system often contain woolly sedge (*Carex pellita*), clustered field sedge (*Carex praegracilis*), Baltic rush (*Juncus balticus*), and bluejoint reedgrass (*Calamagrostis canadensis*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0636 *Populus deltoides* Floodplain Woodland Alliance
- **CEGL000660** *Populus deltoides - Symphoricarpos occidentalis* Floodplain Woodland

A0842 *Tamarix spp.* Ruderal Riparian Scrub Alliance
- **CEGL003114** *Tamarix* spp. Ruderal Riparian Shrubland

A1332 *Distichlis spicata* Alkaline Wet Meadow Alliance
- **CEGL001770** *Distichlis spicata* Alkaline Wet Meadow

A1334 *Sporobolus airoides - Muhlenbergia asperifolia - Spartina gracilis* Alkaline Wet Meadow Alliance
- **CEGL001588** *Spartina gracilis* Wet Meadow

A1374 *Juncus balticus - Juncus mexicanus* Wet Meadow Alliance
- **CEGL001838** *Juncus balticus* Wet Meadow

A2557 *Artemisia cana* Wet Shrubland Alliance

A2658 *Elymus repens* Ruderal Grassland Alliance
- **CEGL005868** *Elymus repens* Ruderal Grassland

A3590 *Shepherdia argentea* Wet Shrubland Alliance
- **CEGL001128** *Shepherdia argentea* Wet Shrubland

A3759 *Populus angustifolia* Riparian Forest Alliance
- **CEGL002648** *Populus angustifolia - Symphoricarpos (albus, occidentalis, oreophilus)* Riparian Woodland
- **CEGL002664** *Populus angustifolia - Cornus sericea* Riparian Woodland

A3761 *Picea pungens* Riparian Forest Alliance
- **CEGL000899** *Pseudotsuga menziesii - Cornus sericea* Riparian Woodland

A3769 *Salix boothii - Salix geyeriana - Salix lutea* Montane Wet Shrubland Alliance

A3772 *Betula occidentalis* Wet Shrubland Alliance

A3796 *Acer negundo - Fraxinus anomala - Celtis laevigata var. reticulata* Riparian Woodland Alliance

A3797 *Pinus ponderosa - Juniperus scopulorum - Abies concolor* Riparian Woodland Alliance
- **CEGL000746** *Juniperus scopulorum - Cornus sericea* Riparian Woodland
- **CEGL000853** *Pinus ponderosa - Cornus sericea* Riparian Woodland
- **CEGL000855** *Pinus ponderosa - Crataegus douglasii* Riparian Woodland

A3798 *Populus deltoides ssp. wislizeni - Populus deltoides ssp. monilifera - Salix amygdaloides* Riparian Woodland Alliance
- **CEGL000947** *Salix amygdaloides* Riparian Woodland

A3799 *Rhus trilobata - Crataegus rivularis - Forestiera pubescens* Shrubland Alliance

A3800 *Salix exigua - Salix irrorata* Shrubland Alliance
- **CEGL001203** *Salix exigua* - Mesic Graminoids Western Wet Shrubland
- **CEGL005656** *Salix exigua* - Gravel Bar Wet Shrubland

A3805 *Carex nebrascensis - Carex vesicaria - Carex pellita* Wet meadow Alliance
- **CEGL001809** *Carex pellita* Wet Meadow

A3806 *Carex praegracilis - Carex scopulorum - Eleocharis quinqueflora* Wet Meadow Alliance
- **CEGL002660** *Carex praegracilis* Wet Meadow

A3807 *Eleocharis palustris - Eleocharis acicularis* Marsh Alliance
- **CEGL001833** *Eleocharis palustris* Marsh

A3846 *Phalaris arundinacea* Western Ruderal Marsh Alliance
- **CEGL001474** *Phalaris arundinacea* Western Marsh

A3847 *Phragmites australis - Arundo donax - Alopecurus pratensis* Ruderal Marsh Alliance
- **CEGL001475** *Phragmites australis* Western Ruderal Wet Meadow

A3848 *Poa pratensis - Agrostis gigantea - Agrostis stolonifera* Ruderal Marsh Alliance
- **CEGL001558** *Agrostis (gigantea, stolonifera)* Ruderal Marsh
- **CEGL003081** *Poa pratensis* Ruderal Marsh

A3849 *Conyza canadensis - Cirsium arvense - Lactuca serriola* Ruderal Wet Meadow Alliance

A4131 *Fraxinus pennsylvanica - Ulmus americana - Populus deltoides* Floodplain Forest Alliance
- **CEGL000628** *Acer negundo - Prunus virginiana* Floodplain Forest

A4154 *Acer negundo - Alnus incana ssp. tenuifolia - Cornus sericea* Riparian Woodland Alliance

A4155 *Acer negundo - Populus spp. - Picea spp.* Ruderal Riparian Forest Alliance
- **CEGL003749** *Populus angustifolia* - Invasive Perennial Grasses Ruderal Riparian Woodland

A4217 *Salix spp. - Artemisia cana* Ruderal Understory Wet Shrubland Alliance
- **CEGL001199** *Salix exigua - Agrostis stolonifera* Ruderal Wet Shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Flooding is crucial to the development of establishment sites for cottonwood, and acts as primary control on plant succession. Steep gradients and high-energy flows driven by precipitation cause flooding events that transport coarse sediments. The scouring out and downstream accumulation of sediments constantly creates and destroys sites for the establishment of vegetation. Sediment accumulating in these systems often creates gravel bars at or near the surface of the river, creating bands of mixed vegetation occupying different stages of succession. Increasing vegetation traps even more sediment, so that over time the size and height of the gravel bar increases. Cottonwood and the associated shrub understory are adapted to these flooding events.

Management

Alteration of hydrology by dams and diversions are major influences on the structure, composition, and function of this community. In Montana, dams have eliminated the ability of cottonwood to regenerate by seeds in many places. As the cottonwood stand dies, successional processes will tend toward other communities unless flooding deposits new sediments that support seedling regeneration. Heavy grazing by cattle, or in some cases by elk and deer, along these streams and rivers can result in increased erosion and eliminate the vegetative regeneration of cottonwood sprouts. In sites where there is prolonged disturbance, shrub cover will decrease, resulting in a more open canopy.

Restoration Considerations

Maintaining an undisturbed buffer strip of cottonwood species adjacent to rivers and streams can stabilize riverbanks and will serve as a source for seedling and branch colonization if the hydrology of the river system is restored. Cottonwood requires full sunlight and a moist seed bed for colonization. If the site still has a fairly high water table and a remnant shrub population, the shrubs are capable of resprouting and will stabilize embankments and reduce sedimentation. If the site is highly impacted, seedlings or live cuttings can be used for more intensive restoration practices.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and

R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Northern Bog Lemming *(Synaptomys borealis)* SOC
Fisher *(Pekania pennanti)* SOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Mountain Cottontail *(Sylvilagus nuttallii)*
White-tailed Jackrabbit *(Lepus townsendii)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Pocket Gopher *(Thomomys talpoides)*
Western Harvest Mouse *(Reithrodontomys megalotis)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Montane Vole *(Microtus montanus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Bighorn Sheep *(Ovis canadensis)*
Little Brown Myotis *(Myotis lucifugus)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Masked Shrew *(Sorex cinereus)*
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Snowshoe Hare *(Lepus americanus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Northern Flying Squirrel *(Glaucomys sabrinus)*
North American Beaver *(Castor canadensis)*
White-footed Deermouse *(Peromyscus leucopus)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Marten *(Martes americana)*
American Mink *(Neogale vison)*
American Badger *(Taxidea taxus)*
Northern River Otter *(Lontra canadensis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Great Blue Heron *(Ardea herodias)* SOC
Harlequin Duck *(Histrionicus histrionicus)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Yellow-billed Cuckoo *(Coccyzus americanus)* SOC
Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Veery *(Catharus fuscescens)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Western Screech-Owl *(Megascops kennicottii)* PSOC
Short-eared Owl *(Asio flammeus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Double-crested Cormorant *(Nannopterum auritum)*
Canada Goose *(Branta canadensis)*
Green-winged Teal *(Anas crecca)*
Northern Shoveler *(Spatula clypeata)*
Mallard *(Anas platyrhynchos)*
Lesser Scaup *(Aythya affinis)*
Bufflehead *(Bucephala albeola)*
Red-breasted Merganser *(Mergus serrator)*
Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*
Cooper's Hawk *(Accipiter cooperii)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*
Ruffed Grouse *(Bonasa umbellus)*
American Bittern *(Botaurus lentiginosus)* SOC
Trumpeter Swan *(Cygnus buccinator)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC
Alder Flycatcher *(Empidonax alnorum)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC
Eastern Screech-Owl *(Megascops asio)* PSOC
Great Gray Owl *(Strix nebulosa)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Snowy Egret *(Egretta thula)*
Wood Duck *(Aix sponsa)*
Blue-winged Teal *(Spatula discors)*
American Wigeon *(Mareca americana)*
Ring-necked Duck *(Aythya collaris)*
Common Goldeneye *(Bucephala clangula)*
Common Merganser *(Mergus merganser)*
Ruddy Duck *(Oxyura jamaicensis)*
Osprey *(Pandion haliaetus)*
Sharp-shinned Hawk *(Accipiter striatus)*
Broad-winged Hawk *(Buteo platypterus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Gyrfalcon *(Falco rusticolus)*
Dusky Grouse *(Dendragapus obscurus)*
Wild Turkey *(Meleagris gallopavo)*

Virginia Rail *(Rallus limicola)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Spotted Sandpiper *(Actitis macularius)*
Semipalmated Sandpiper *(Calidris pusilla)*
Least Sandpiper *(Calidris minutilla)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Glaucous Gull *(Larus hyperboreus)*
Eurasian Collared-Dove *(Streptopelia decaocto)*
American Barn Owl *(Tyto furcata)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
White-throated Swift *(Aeronautes saxatalis)*
Calliope Hummingbird *(Selasphorus calliope)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
Northern Flicker *(Colaptes auratus)*
Willow Flycatcher *(Empidonax traillii)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Kingbird *(Tyrannus verticalis)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Red-breasted Nuthatch *(Sitta canadensis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Canyon Wren *(Catherpes mexicanus)*
Marsh Wren *(Cistothorus palustris)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Yellow-rumped Warbler *(Setophaga coronata)*
Blackpoll Warbler *(Setophaga striata)*
Northern Waterthrush *(Parkesia noveboracensis)*
Common Yellowthroat *(Geothlypis trichas)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Savannah Sparrow *(Passerculus sandwichensis)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Harris's Sparrow *(Zonotrichia querula)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Common Grackle *(Quiscalus quiscula)*
Baltimore Oriole *(Icterus galbula)*
Purple Finch *(Haemorhous purpureus)*
Pine Siskin *(Spinus pinus)*
Redpoll *(Acanthis flammea)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Lesser Yellowlegs *(Tringa flavipes)*
Whimbrel *(Numenius phaeopus)*
Western Sandpiper *(Calidris mauri)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Herring Gull *(Larus argentatus)*
Rock Pigeon *(Columba livia)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Barred Owl *(Strix varia)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Vaux's Swift *(Chaetura vauxi)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Belted Kingfisher *(Megaceryle alcyon)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*
Western Flycatcher *(Empidonax difficilis)*
Eastern Kingbird *(Tyrannus tyrannus)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
White-breasted Nuthatch *(Sitta carolinensis)*
Rock Wren *(Salpinctes obsoletus)*
Northern House Wren *(Troglodytes aedon)*
American Dipper *(Cinclus mexicanus)*
Western Bluebird *(Sialia mexicana)*
Townsend's Solitaire *(Myadestes townsendi)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Red-eyed Vireo *(Vireo olivaceus)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*
Yellow-breasted Chat *(Icteria virens)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Lark Sparrow *(Chondestes grammacus)*
Song Sparrow *(Melospiza melodia)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Bullock's Oriole *(Icterus bullockii)*
House Finch *(Haemorhous mexicanus)*
American Goldfinch *(Spinus tristis)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Prairie Rattlesnake *(Crotalus viridis)*
Gophersnake *(Pituophis catenifer)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Boreal Chorus Frog *(Pseudacris maculata)*
Columbia Spotted Frog *(Rana luteiventris)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC
Gray Comma *(Polygonia progne)* SOC
Red-spotted Admiral *(Limenitis arthemis)* PSOC
Sinuous Snaketail *(Ophiogomphus occidentis)* PSOC
Paiute Dancer *(Argia alberta)* PSOC
Woodland Skipper *(Ochlodes sylvanoides)*
Pale Swallowtail *(Pterourus eurymedon)*
Pacific Fritillary *(Boloria epithore)*
Field Crescent *(Phyciodes pulchella)*
Viceroy *(Limenitis archippus)*
One-eyed Sphinx *(Smerinthus astarte)*
Variable Dancer *(Argia fumipennis)*

Vascular Plants

Desert Groundsel *(Senecio eremophilus)* SOC
Slender Thelypody *(Thelypodium sagittatum)* SOC
Wedge-leaf Saltbush *(Atriplex truncata)* SOC
Chaffweed *(Centunculus minimus)* SOC
Mealy Primrose *(Primula incana)* SOC
Alpine Meadowrue *(Thalictrum alpinum)* SOC
Annual Indian Paintbrush *(Castilleja exilis)* SOC
Scallop-leaf Lousewort *(Pedicularis crenulata)* SOC
Big-leaf Sedge *(Carex amplifolia)* SOC
Short-pointed Flatsedge *(Cyperus acuminatus)* SOC
Red-root Flatsedge *(Cyperus erythrorhizos)* SOC
Shining Flatsedge *(Cyperus bipartitus)* SOC
Coville's Rush *(Juncus covillei)* SOC
Ute Ladies'-tresses *(Spiranthes diluvialis)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Wolverine *(Gulo gulo)* SOC
North American Deermouse *(Peromyscus maniculatus)*

Birds

Lewis's Woodpecker *(Melanerpes lewis)* SOC
Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Tundra Swan *(Cygnus columbianus)*
Gadwall *(Mareca strepera)*
Canvasback *(Aythya valisineria)*
Redhead *(Aythya americana)*
Marbled Godwit *(Limosa fedoa)*
Golden-crowned Kinglet *(Regulus satrapa)*
Vesper Sparrow *(Pooecetes gramineus)*

Reptiles

Painted Turtle *(Chrysemys picta)*
Plains Gartersnake *(Thamnophis radix)*

Amphibians

Northern Leopard Frog *(Lithobates pipiens)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Western Tiger Salamander *(Ambystoma mavortium)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Western Pondhawk *(Erythemis collocata)* SOC
Giant Sulphur *(Colias gigantea)* PSOC
Plains Clubtail *(Gomphurus externus)* PSOC
Pronghorn Clubtail *(Phanogomphus graslinellus)* PSOC
Ringed Emerald *(Somatochlora albicincta)* PSOC
Ocellated Emerald *(Somatochlora minor)* PSOC
Crimson-ringed Whiteface *(Leucorrhinia glacialis)* PSOC
Flame Skimmer *(Libellula saturata)* PSOC
Emma's Dancer *(Argia emma)* PSOC
Vivid Dancer *(Argia vivida)* PSOC
Purplish Copper *(Tharsalea helloides)*
Mariposa Copper *(Tharsalea mariposa)*
Hydaspe Fritillary *(Argynnis hydaspe)*
Milbert's Tortoiseshell *(Aglais milberti)*
Weidemeyer's Admiral *(Limenitis weidemeyerii)*
Lorquin's Admiral *(Limenitis lorquini)*
Common Wood-Nymph *(Cercyonis pegala)*
Pacific Spiketail *(Zoraena dorsalis)*
Pale Snaketail *(Ophiogomphus severus)*
Paddle-tailed Darner *(Aeshna palmata)*
American Emerald *(Cordulia shurtleffii)*
Hudsonian Whiteface *(Leucorrhinia hudsonica)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Common Whitetail *(Plathemis lydia)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Autumn Meadowhawk *(Sympetrum vicinum)*
River Jewelwing *(Calopteryx aequabilis)*
Sweetflag Spreadwing *(Lestes forcipatus)*
Northern Spreadwing *(Lestes disjunctus)*
Boreal Bluet *(Enallagma boreale)*
Northern Bluet *(Enallagma annexum)*

Vascular Plants

Adder's Tongue *(Ophioglossum pusillum)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, C. McIntyre, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine, Riverine or Riparian (non-wetland)
Class	Forested, Scrub-Shrub, Emergent, Unconsolidated Shore
Water Regime	Temporarily flooded, seasonally flooded, semipermanently flooded
Geographically Isolated Wetland	No

NatureServe Identifiers:

Element Global ID	
System Code	CES306.821, Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland

ReGAP:
9156: Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

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Citation for data on this website:
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Great Plains Floodplain



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General Description

This system occurs along the Missouri and Yellowstone Rivers and their larger tributaries, including parts of the Little Missouri, Clark's Fork Yellowstone, Powder, Tongue, Bighorn, Milk, and Musselshell rivers. These are the big perennial rivers of the region, with hydrologic dynamics largely driven by snowmelt and rainfall originating in their headwater watersheds, rather than local precipitation events. In the absence of disturbance, periodic flooding of fluvial and alluvial soils and channel migration will create depressions and backwaters that support a mosaic of wetland and riparian vegetation, whose composition and structure is sustained, altered and redistributed by hydrology. Dominant communities within this system range from floodplain forests to wet meadows to gravel/sand flats, linked by underlying soils and flooding regimes. In the western part of the system's range in Montana, the overstory dominant species is black cottonwood (*Populus balsamifera ssp. trichocarpa*) with narrowleaf cottonwood (*Populus angustifolia*) and eastern cottonwood (*Populus deltoides*) occurring as co-dominants in the riparian/floodplain interface near the mountains. Further east, narrowleaf cottonwood and Plains cottonwood become dominant. In relatively undisturbed stands, willow (*Salix* species), red-osier dogwood (*Cornus sericea*) and common chokecherry (*Prunus virginiana*) form a thick, multi-layered shrub understory, with a mixture of cool and warm season graminoid species below. Box elder (*Acer negundo*) and green ash (*Fraxinus pennsylvanica*) form a tree understory in mid-seral and late-seral stands.

In Montana, many occurrences are now degraded to the point where the cottonwood overstory is the only remaining natural component. The hydrology of these floodplain systems has been affected by dams, highways, railroads and agricultural ditches, and as a result, they have lost their characteristic wetland /riparian mosaic structure. This has resulted in a highly altered community consisting of relict cottonwood stands with little regeneration. The understory

vegetation is dominated by non-native pasture grasses, legumes and other introduced forbs, or by the disclimax western snowberry (*Symphoricarpos occidentalis*) and rose (*Rosa* species) shrub community.

Diagnostic Characteristics

Floodplains; meandering channels with alluvial bar formation; vegetation occuring in bands or zones reflecting past deposition

Similar Systems

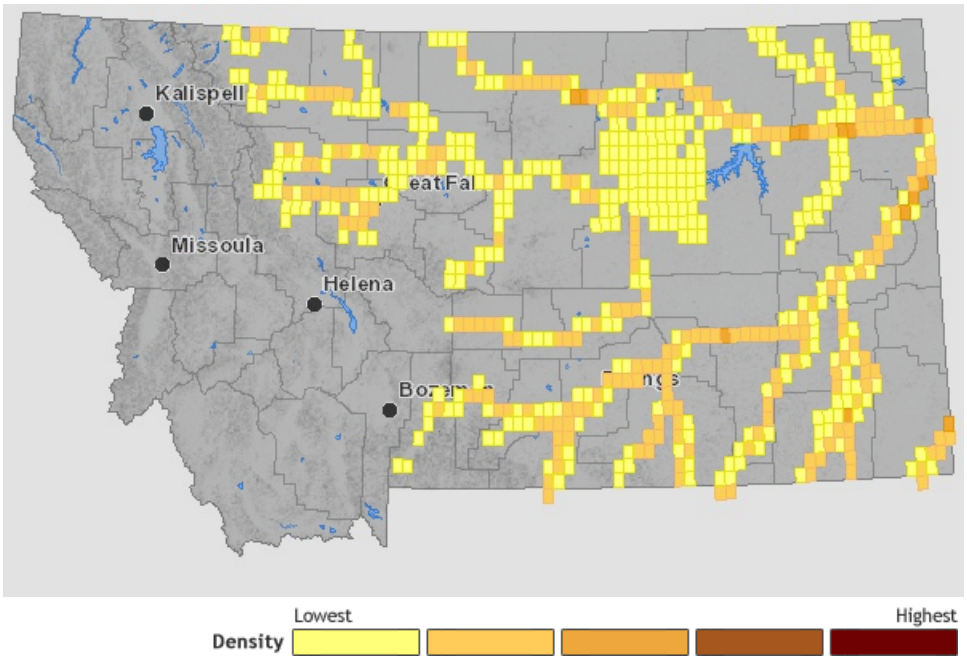
- Great Plains Riparian

Range

This system is found in the northwestern Great Plains through southern Canada. In Montana, it is characteristic of the big river floodplains in the Missouri River Basin. It is found along the Missouri and Yellowstone Rivers and their larger tributaries, including parts of the Little Missouri, Clark's Fork Yellowstone, Powder, Tongue, Bighorn, Milk, and Musselshell rivers. Elsewhere, this system is found in northern Nebraska and the Dakotas on the Niobrara, upper Missouri, White, Cheyenne, and Little Missouri rivers; and in the prairie provinces of Canada on the Saskatchewan River.

Ecological System Distribution

Approximately 1,712 square kilometers are classified as Great Plains Floodplain in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fergus, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Linear

Environment

This system may occur as relatively broad and extensive forests, as seen along the lower stretches of the Missouri and Yellowstone Rivers, or more narrow bands, as seen along the Milk, Little Missouri, Tongue and Powder Rivers. The elevational range of this system is from 579-1,310 meters (1,900-4,300 feet) (Hansen et al., 1996). These are the big perennial rivers of the region, with hydrologic dynamics largely driven by snowmelt and rainfall originating in their headwater watersheds, rather than by local precipitation events. In an undisturbed state, periodic flooding of the fluvial and alluvial soils and channel migration will create alluvial bars, depressions and backwaters supporting zones or mosaics of wetland and riparian vegetation, whose composition and structure is sustained, altered and redistributed by hydrology. Soils can be Entisols, Inceptisols and Mollisols on older stabilized sites. Often there is up to 1 meter of soil overlying river gravels and cobble. Water tables can drop to within 1 meter of the soil surface in summer months.

Vegetation

In the western part of the system's range in Montana, the overstory dominant species is black cottonwood, with narrowleaf cottonwood and Plains cottonwood occurring as co-dominants in the riparian/floodplain interface near the mountains. Further east, narrowleaf cottonwood and Plains cottonwood become dominant.

In less disturbed occurrences, willow species such as yellow willow (*Salix lutea*) planeleaf willow (*Salix planifolia*), and peachleaf willow (*Salix amygdaloides*) co-dominate the shrub layer with common chokecherry (*Prunus virginiana*), redosier dogwood (*Cornus sericea*), serviceberry (*Amelanchier alnifolia*) and currant (*Ribes* spps). Boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), and American elm (*Ulmus americana*) are common in mid- to late-seral stands, and will generally succeed Plains cottonwood in the rivers of the Southeast. Sandbar willow (*Salix exigua*) and shrubby cinquefoil (*Dasiphora fruticosa*) frequently colonize recent alluvial bars in central and eastern Montana, while silverberry (*Elaeagnus commutata*), thinleaf alder (*Alnus incana*) and Drummond's willow (*Salix drummondiana*) are colonizers in black cottonwood-dominated floodplains near the mountains and riparian/floodplain interface. Common graminoids associated with these floodplain systems include big bluestem (*Andropogon gerardii*), wooly sedge (*Carex pellita*), streamside wild rye (*Elymus lanceolatus*), old switch panicgrass (*Panicum virgatum*), western wheatgrass (*Pascopyrum smithii*), little bluestem (*Schizachyrium scoparium*), and sand dropseed (*Sporobolus cryptandrus*). Forbs include Drummond's dryad (*Dryas drummondii*), yarrow (*Achillea millefolium*), starry solomon's seal (*Maianthemum stellatum*) and aster (*Symphyotrichum* species). Because of the disturbance regimes typical in these systems, they are highly susceptible to invasion by exotic species. Russian olive (*Elaeagnus angustifolia*) and cheatgrass (*Bromus tectorum*) have become established in many stands, and leafy spurge (*Euphorbia esula*) is a common invasive.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0636 *Populus deltoides* Floodplain Woodland Alliance
A3423 *Populus deltoides* Floodplain Forest Alliance
  CEGL000657 *Populus deltoides - Cornus sericea* Floodplain Forest
  CEGL000658 *Populus deltoides - Fraxinus pennsylvanica* Floodplain Forest
A3493 *Spartina pectinata* Great Plains Wet Meadow Alliance
  CEGL001477 *Spartina pectinata / Carex spp.* Wet Meadow
A3769 *Salix boothii - Salix geyeriana - Salix lutea* Montane Wet Shrubland Alliance
A3800 *Salix exigua - Salix irrorata* Shrubland Alliance
A3805 *Carex nebrascensis - Carex vesicaria - Carex pellita* Wet meadow Alliance
  CEGL001813 *Carex nebrascensis* Wet Meadow
A4036 *Prunus virginiana - Symphoricarpos occidentalis - Amelanchier alnifolia* Great Plains Shrubland Alliance
  CEGL001131 *Symphoricarpos occidentalis* Shrubland
A4131 *Fraxinus pennsylvanica - Ulmus americana - Populus deltoides* Floodplain Forest Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

In Montana, many occurrences are now degraded to the point where the cottonwood overstory is the only remaining natural component. The hydrology of these floodplain systems has been affected by dams, highways, railroads and agricultural ditches. As a result, they have lost their characteristic wetland /riparian mosaic structure. This has resulted in a highly altered community consisting of relict cottonwood stands with little regeneration. In the system's disturbed/altered hydrological state and/or under heavy grazing pressure, there will be an increase in shrub species such as western snowberry and rose and a corresponding decrease in willow species, redosier dogwood, currant, serviceberry and common chokecherry.

Successional processes create a community resembling adjacent upland communities; western snowberry and rose may persist, but will be joined by other native shrubs from adjacent upland communities, such as silver sagebrush (*Artemisia cana*)and big sagebrush (*Artemisia tridentata*). In addition, exotic shrub species such as salt cedar (*Tamarix ramosissima*) can invade disturbed floodplain systems. Russian olive has become a dominant overstory tree in many areas, shading out native species. In these disturbed floodplains, the understory vegetation is dominated by a mixture of pasture grasses such as smooth brome (*Bromus inermis*), common timothy (*Phleum pratense*), redtop (*Agrostis stolonifera*) and Kentucky bluegrass (*Poa pratensis*), as well as non-native forbs such as sweetclover (*Melilotus* species), clovers (*Trifolium* species), Canadian thistle (*Cirsium canadensis*) and common dandelion (*Taraxacum officinale*). Once exotic grasses become dominant, especially in the absence of episodic flooding, these systems cannot return to their original state without substantial management intervention.

Management

Cottonwoods and willows are the dominant tree species in these Great Plains Floodplain Systems, creating a highly productive and important habitat type. Since they are specifically adapted to infrequent large flooding events that promote dispersion and colonization of newly formed alluvial bars, management efforts need to begin with identifying the frequency and duration of the flows necessary for colonization to succeed (Scott et al, 1994). Great Plains floodplain systems have been substantially impacted by the development of both groundwater and surface water for irrigation, isolating rivers from

their adjacent floodplains. Unless water management can restore periodic flooding, floodplains and riparian areas may become dominated by late-seral communities, and nutrient cycles may be disrupted without floodwaters depositing organic material (Decker, 2007). In addition, management efforts need to target aggressive non-native shrubs like salt cedar and Russian olive that can drastically alter ecological processes. Tamarisk is an early successional species with dispersal strategies and habitat requirements similar to native cottonwood and willow (Lesica and Miles, 2004). It can replace the native cottonwood and willow where natural flow regimes have been altered. Early detection and rapid response are necessary to prevent its spread. Prescribed spring grazing by sheep has been effective in controlling leafy spurge along some rivers, particularly the upper Powder.

Restoration Considerations

Restoration strategies are dependent on the degree and type of disturbance event. Restoration efforts must first concentrate on restoring hydrologic processes or simulating large flood events. Instream habitat enhancement (e.g., additions of logs or boulders) can be employed after restoring natural processes or where short-term improvements in habitat are needed (e.g., for species in recovery).

Removing or limiting grazing will allow the system to recover if hydric soils have not been lost due to soil compaction, pugging, or downcutting of stream channels, and if there are existing populations of herbaceous native species (*Carex*, *Juncus*, and native grasses) with rhizomatous root systems capable of re-colonizing bare soils. Presence of rhizomatous, highly adaptable exotic grasses such as Kentucky bluegrass (*Poa pratensis*), common timothy (*Phleum pratense*) and smooth brome (*Bromus inermis*) and pasture forbs such as clovers (*Trifolium*species) and common dandelion (*Taraxacum officinale*) however, will persist on the site and may compete with existing populations of native graminoids and forbs. In these cases, land managers must decide if the exotic density is small enough that an adequate stand of native graminoids and forbs can become established on the site if reseeding efforts are used. With reseeding, grazing must be excluded for several years to allow adequate re-growth and recovery of existing shrubs and the herbaceous understory.

Because all major shrub species within this floodplain system are capable of re-sprouting and typically possess extensive, spreading root systems, modified land management practices in areas of low to moderate impact can minimize additional restoration needs. Vigor, health and degree of vegetative regeneration of existing trees and shrubs must be evaluated to determine if these components of the community are capable of recovery in an acceptable time frame. Intensive revegetation efforts should be limited to sites where a catastrophic wildfire or prolonged heavy grazing has destroyed existing trees, shrubs and the seed bank.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Merriam's Shrew *(Sorex merriami)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC
Western Water Shrew *(Sorex navigator)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Eastern Cottontail *(Sylvilagus floridanus)*
White-tailed Jackrabbit *(Lepus townsendii)*
Eastern Fox Squirrel *(Sciurus niger)*
North American Beaver *(Castor canadensis)*
White-footed Deermouse *(Peromyscus leucopus)*
Meadow Vole *(Microtus pennsylvanicus)*
Prairie Vole *(Microtus ochrogaster)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Least Weasel *(Mustela nivalis)*
American Mink *(Neogale vison)*
Northern River Otter *(Lontra canadensis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*
Moose *(Alces alces)*
Little Brown Myotis *(Myotis lucifugus)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Northern Myotis *(Myotis septentrionalis)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC
Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
Masked Shrew *(Sorex cinereus)*
Northern Montane Shrew *(Sorex obscurus)*
Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Least Chipmunk *(Neotamias minimus)*
Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Long-tailed Vole *(Microtus longicaudus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Great Blue Heron *(Ardea herodias)* SOC
White-faced Ibis *(Plegadis chihi)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Piping Plover *(Charadrius melodus)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Least Tern *(Sternula antillarum)* SOC
Yellow-billed Cuckoo *(Coccyzus americanus)* SOC
Alder Flycatcher *(Empidonax alnorum)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC
Eastern Screech-Owl *(Megascops asio)* PSOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Plumbeous Vireo *(Vireo plumbeus)* PSOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Double-crested Cormorant *(Nannopterum auritum)*
Canada Goose *(Branta canadensis)*
Green-winged Teal *(Anas crecca)*
Cinnamon Teal *(Spatula cyanoptera)*
American Wigeon *(Mareca americana)*
Ring-necked Duck *(Aythya collaris)*
Long-tailed Duck *(Clangula hyemalis)*
Bufflehead *(Bucephala albeola)*
Red-breasted Merganser *(Mergus serrator)*
American Bittern *(Botaurus lentiginosus)* SOC
Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
Golden Eagle *(Aquila chrysaetos)* SOC
Whooping Crane *(Grus americana)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Common Tern *(Sterna hirundo)* SOC
Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC
Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Veery *(Catharus fuscescens)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Short-eared Owl *(Asio flammeus)* PSOC
Chimney Swift *(Chaetura pelagica)* PSOC
Eastern Bluebird *(Sialia sialis)* PSOC
Black-and-white Warbler *(Mniotilta varia)* PSOC
Dickcissel *(Spiza americana)* PSOC
Eared Grebe *(Podiceps nigricollis)*
Snowy Egret *(Egretta thula)*
Wood Duck *(Aix sponsa)*
Blue-winged Teal *(Spatula discors)*
Northern Shoveler *(Spatula clypeata)*
Mallard *(Anas platyrhynchos)*
Lesser Scaup *(Aythya affinis)*
Common Goldeneye *(Bucephala clangula)*
Common Merganser *(Mergus merganser)*
Ruddy Duck *(Oxyura jamaicensis)*

Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*
Broad-winged Hawk *(Buteo platypterus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Peregrine Falcon *(Falco peregrinus)*
Prairie Falcon *(Falco mexicanus)*
Virginia Rail *(Rallus limicola)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Willet *(Tringa semipalmata)*
Upland Sandpiper *(Bartramia longicauda)*
Least Sandpiper *(Calidris minutilla)*
Wilson's Snipe *(Gallinago delicata)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Glaucous Gull *(Larus hyperboreus)*
Eurasian Collared-Dove *(Streptopelia decaocto)*
American Barn Owl *(Tyto furcata)*
Snowy Owl *(Bubo scandiacus)*
Common Nighthawk *(Chordeiles minor)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Belted Kingfisher *(Megaceryle alcyon)*
Downy Woodpecker *(Dryobates pubescens)*
Northern Flicker *(Colaptes auratus)*
Willow Flycatcher *(Empidonax traillii)*
Western Flycatcher *(Empidonax difficilis)*
Western Kingbird *(Tyrannus verticalis)*
Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
White-breasted Nuthatch *(Sitta carolinensis)*
Northern House Wren *(Troglodytes aedon)*
Mountain Bluebird *(Sialia currucoides)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Blackpoll Warbler *(Setophaga striata)*
Common Yellowthroat *(Geothlypis trichas)*
Yellow-breasted Chat *(Icteria virens)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
White-throated Sparrow *(Zonotrichia albicollis)*
Lapland Longspur *(Calcarius lapponicus)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Baltimore Oriole *(Icterus galbula)*
House Finch *(Haemorhous mexicanus)*
American Goldfinch *(Spinus tristis)*

Osprey *(Pandion haliaetus)*
Cooper's Hawk *(Accipiter cooperii)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*
Wild Turkey *(Meleagris gallopavo)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Lesser Yellowlegs *(Tringa flavipes)*
Spotted Sandpiper *(Actitis macularius)*
Whimbrel *(Numenius phaeopus)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Rock Pigeon *(Columba livia)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Long-eared Owl *(Asio otus)*
White-throated Swift *(Aeronautes saxatalis)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*
Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Rock Wren *(Salpinctes obsoletus)*
American Dipper *(Cinclus mexicanus)*
Swainson's Thrush *(Catharus ustulatus)*
Gray Catbird *(Dumetella carolinensis)*
Brown Thrasher *(Toxostoma rufum)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Red-eyed Vireo *(Vireo olivaceus)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*
Canada Warbler *(Cardellina canadensis)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Blue Grosbeak *(Passerina caerulea)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Field Sparrow *(Spizella pusilla)*
Song Sparrow *(Melospiza melodia)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Common Grackle *(Quiscalus quiscula)*
Orchard Oriole *(Icterus spurius)*
Bullock's Oriole *(Icterus bullockii)*
Lesser Goldfinch *(Spinus psaltria)*
Redpoll *(Acanthis flammea)*

Reptiles

Snapping Turtle *(Chelydra serpentina)* SOC
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC
North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Spiny Softshell *(Apalone spinifera)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Painted Turtle *(Chrysemys picta)*
Gophersnake *(Pituophis catenifer)*
Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
American Bullfrog *(Lithobates catesbeianus)*

Northern Leopard Frog *(Lithobates pipiens)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*

Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC
Plains Clubtail *(Gomphurus externus)* PSOC
Viceroy *(Limenitis archippus)*
Pale Snaketail *(Ophiogomphus severus)*
Eyed Brown *(Lethe eurydice)* PSOC
Horned Clubtail *(Arigomphus cornutus)* PSOC
Lorquin's Admiral *(Limenitis lorquini)*
Plains Emerald *(Somatochlora ensigera)*

Vascular Plants

Swamp Milkweed *(Asclepias incarnata)* SOC
Bittersweet *(Celastrus scandens)* SOC
Chaffweed *(Centunculus minimus)* SOC
Short-pointed Flatsedge *(Cyperus acuminatus)* SOC
Green Ash *(Fraxinus pennsylvanica)*
Persistent-sepal Yellow-cress *(Rorippa calycina)* SOC
Nannyberry *(Viburnum lentago)* SOC
Square-stem Monkeyflower *(Mimulus ringens)* SOC
Poison Suckleya *(Suckleya suckleyana)*

Native Species Occasionally Associated with this Ecological System

Mammals

American Bison *(Bos bison)* SOC
Olive-backed Pocket Mouse *(Perognathus fasciatus)*

Birds

Caspian Tern *(Hydroprogne caspia)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC
Tundra Swan *(Cygnus columbianus)*
Redhead *(Aythya americana)*
Sora *(Porzana carolina)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Chipping Sparrow *(Spizella passerina)*
Lark Bunting *(Calamospiza melanocorys)*
Forster's Tern *(Sterna forsteri)* SOC
Pacific Loon *(Gavia pacifica)*
Canvasback *(Aythya valisineria)*
Sharp-shinned Hawk *(Accipiter striatus)*
American Coot *(Fulica americana)*
Wilson's Warbler *(Cardellina pusilla)*
Vesper Sparrow *(Pooecetes gramineus)*
Lincoln's Sparrow *(Melospiza lincolnii)*

Amphibians

Columbia Spotted Frog *(Rana luteiventris)*

Invertebrates

Brimstone Clubtail *(Stylurus intricatus)* SOC
California Darner *(Rhionaeschna californica)* PSOC
Vivid Dancer *(Argia vivida)* PSOC
Alkali Bluet *(Enallagma clausum)* PSOC
Weidemeyer's Admiral *(Limenitis weidemeyerii)*
Paddle-tailed Darner *(Aeshna palmata)*
Eight-spotted Skimmer *(Libellula forensis)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Wandering Glider *(Pantala flavescens)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Striped Meadowhawk *(Sympetrum pallipes)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Spotted Spreadwing *(Lestes congener)*
Boreal Bluet *(Enallagma boreale)*
Rainbow Bluet *(Enallagma antennatum)*
Hagen's Bluet *(Enallagma hageni)*
Eastern Forktail *(Ischnura verticalis)*
Tadpole Physa *(Physella gyrina)*
Pronghorn Clubtail *(Phanogomphus graslinellus)* PSOC
Blue-eyed Darner *(Rhionaeschna multicolor)* PSOC
Familiar Bluet *(Enallagma civile)* PSOC
Greenish Blue *(Icaricia saepiolus)*
Common Wood-Nymph *(Cercyonis pegala)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Twelve-spotted Skimmer *(Libellula pulchella)*
Common Whitetail *(Plathemis lydia)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Band-winged Meadowhawk *(Sympetrum semicinctum)*
American Rubyspot *(Hetaerina americana)*
Northern Spreadwing *(Lestes disjunctus)*
Tule Bluet *(Enallagma carunculatum)*
Northern Bluet *(Enallagma annexum)*
River Bluet *(Enallagma anna)*
Western Forktail *(Ischnura perparva)*

Vascular Plants

Smooth Goosefoot *(Chenopodium subglabrum)* SOC
Roundleaf Water-hyssop *(Bacopa rotundifolia)* SOC

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, C. McIntyre, T. Luna,

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine, Riverine or Riparian (non-wetland)
Class	Forested, Scrub-Shrub, Emergent, Unconsolidated Shore

Water Regime	Temporarily flooded, seasonally flooded, semipermanently flooded
Geographically Isolated Wetland	No

NatureServe Identifiers:

Element Global ID	28533
System Code	CES303.676, Northwestern Great Plains Floodplain

ReGAP:
9159: Northwestern Great Plains Floodplain

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Decker, Karin. 2007. *Western Great Plains riparian woodland and shrubland ecological system ecological integrity assessment*. Ft. Collins, Colo: Colorado State University, Colorado Natural Heritage Program.

Friedman, J. M., M. L. Scott, and G. T. Auble. 1997. Water management and cottonwood dynamics along prairie streams. Pages 49-71 in: F. L. Knopf and F. B. Samson. Ecology and Conservation of Great Plains Vertebrates. Springer-Verlag, New York, NY.

- Friedman, J. M., W. R. Osterkamp, M. L. Scott, and G. T. Auble. 1998. Downstream effects of dams on channel geometry and bottomland vegetation: regional patterns in the Great Plains. Wetlands 18:619-633.
- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.
- Hauer, F Richard, and Mark S Lorang. 2004. "River regulation, decline of ecological resources, and potential for restoration in a semi-arid lands river in the western USA". *Aquatic Sciences.* 66 (4): 388.
- Junk WJ, Welcomme RL. 1990. Floodplains. p 491-524 in: Patten BC, editor. Wetlands and Shallow Continental Water Bodies. The Hague, The Netherlands: SPB Academic Pub.
- Lesica, P., and S. Miles. 2004. "Ecological strategies for managing tamarisk on the C.M. Russell National Wildlife Refuge, Montana, USA". *Biological Conservation.* 119 (4): 535-543.

Scott, M. L., G. T. Auble, and J. M. Friedman. 1997. Flood dependency of cottonwood establishment along the Missouri River, Montana, USA. Ecological Applications7:677-690.

- Ward, J V, and J A Stanford. 1995. 'Ecological Connectivity in Alluvial River Ecosystems and its Disruption by Flow Regulation'. *Regulated Rivers.* 11 (1): 105.

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Citation for data on this website:
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Greasewood Flat



Image Copyright and Usage Information

Provisional State Rank: S4
(see reason below)

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State Rank Reason

The major threat to this system is drought, followed by grazing effects (trampling, pugging, hummocking)

General Description

This system occurs in central, north-central and eastern Montana and as a minor occurrence in southwestern Montana. Elsewhere, it occurs throughout the western U.S. including the Intermountain Basin states, the Columbia Plateau, the Rocky Mountains and the western Great Plains. It is found on nearly level, older alluvial terraces on broad or narrow floodplains and coalescing alluvial fans in valleys. It may also occur on broad expanses along lake shores and playas. Sites typically have saline soil and a shallow water table. They flood intermittently, but the surface is dry for most of the growing season. The water table remains high enough to maintain vegetation, despite salt accumulations. Sites occur where overland flow or soils or a combination of both allow for greater than normal moisture regime. In many cases, fine textured soils result in a perched water table. The structure of this system usually consists of open to moderately dense shrubs dominated by greasewood (*Sarcobatus vermiculatus*) with a sparse graminoid understory most commonly consisting of western wheatgrass (*Pascopyrum smithii*).

Diagnostic Characteristics

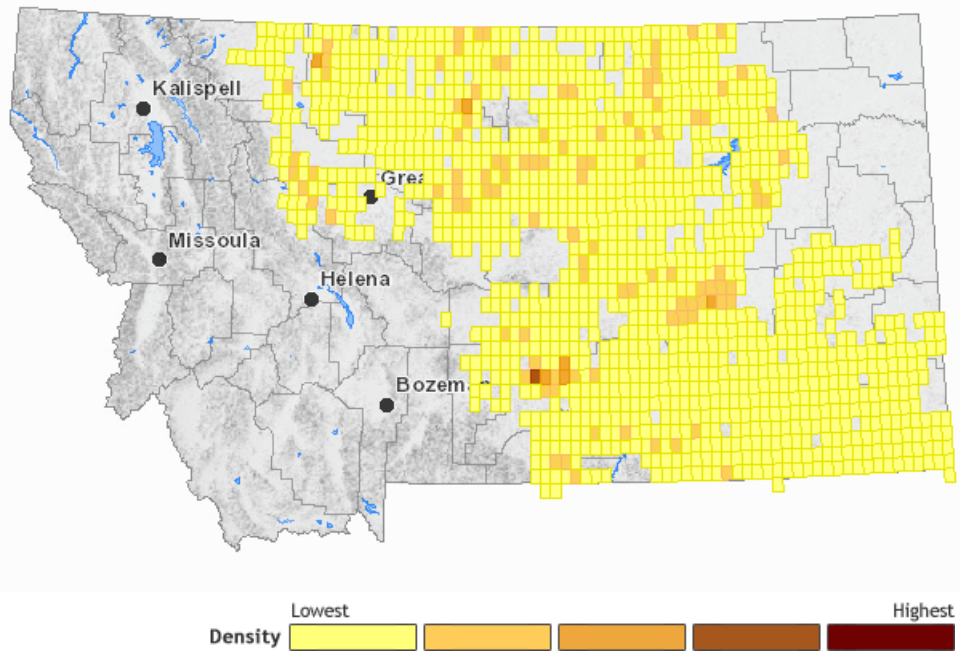
Partially isolated wetland, shrubland, lowland, toeslope/valley bottom, alkaline soil, deep soil, xeromorphic shrub

Range

This system occurs throughout the western U.S. including the Intermountain Basin states, the Columbia Plateau, the Rocky Mountains and the western Great Plains. It occurs in central, north-central and eastern Montana and as a minor occurrence in southwestern Montana.

Ecological System Distribution

Approximately 1,187 square kilometers are classified as Greasewood Flat in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Fallon, Fergus, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Meagher, Musselshell, Petroleum, Phillips, Pondera, Powder River, Prairie, Rosebud, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Large or Small Patch

Environment

In Montana, this ecological system represents one of the driest extremes of the riparian/wetland zone. It occurs on nearly level, older alluvial terraces on broad or narrow floodplains and coalescing alluvial fans in valleys. It may also occur on broad expanses along lake shores and playas. Sites typically have saline or alkaline soils and a shallow water table. They flood intermittently, but remain dry for most of the growing season. However, the underlying water table stays high enough to maintain vegetation, despite salt accumulations. The system occurs where overland flow or soils or a combination of both allow for a greater than normal moisture regime. High water tables are common, typically within 25 to 30 centimeters (10 to 12 inches) of the soil surface. Soils are fine textured, poorly drained and are alkaline or saline. Soil texture ranges from silt to clay. Sites range in elevation from 655 to 1,067 meters (2,150 to 3,500 feet) (Hansen et al., 1995).

Vegetation

Greasewood (*Sarcobatus vermiculatus*) is the dominant shrub, although overall canopy cover may be low. Other shrubs present in some occurrences include four-wing saltbush (*Atriplex canescens*), shadscale saltbush (*Atriplex confertifolia),* Gardner's saltbush (*Atriplex gardneri*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), big sagebrush (*Artemisia tridentata ssp. tridentata*), silver sage (*Artemisia cana ssp. cana*), green rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*) or winterfat (*Krascheninnikovia lanata*).

Perennial grasses are the most common herbaceous cover, with western wheatgrass (*Pascopyrum smithii*) tending to dominate in undisturbed communities. Other graminoids commonly occurring in this system include slender wheatgrass (*Elymus trachycaulus*), prairie cordgrass (*Spartina pectinata*), Nutall's alkaligrass (*Puccinellia nuttalliana*), Sandberg's bluegrass (*Poa secunda*), inland saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), prairie sandgrass (*Calamovilfa longifolia*), basin wildrye (*Leymus cinereus*) and occasionally common spikerush (*Eleocharis palustris*). Common forb species include yarrow (*Achillea millefolium*), one-flowered groundsel (*Pyrrocoma uniflora),* boreal sagewort (*Artemisia frigida*), western sagewort (*Artemisia ludoviciana*), goosefoot (*Chenopodium* species), scarlet globe mallow (*Sphaeralcea coccinea*), western saltwort (*Salicornia rubra*) and curlycup gumweed (*Grindelia squarrosa*).

Adjacent drier communities are dominated by upland shrub or grassland communities such as mixed salt desert scrub, big sagebrush (*Artemisia tridentata*) shrublands, or three tip sagebrush (*Artemisia tripartita*) shrublands. Wetter adjacent communities may be dominated by inland salt grass (*Distichlis spicata*) or willow-cottonwood (*Salix-Populus* species) dominated communities. In Montana, this system can occur near alkaline lakes or in overflow washes.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0870 *Atriplex confertifolia* Scrub Alliance
A1046 *Sarcobatus vermiculatus* Intermountain Wet Shrubland Alliance
  CEGL001359 *Sarcobatus vermiculatus - Artemisia tridentata* Wet Shrubland
  CEGL001360 *Sarcobatus vermiculatus - Atriplex gardneri* Wet Shrubland
  CEGL001363 *Sarcobatus vermiculatus - Distichlis spicata* Wet Shrubland
  CEGL001366 *Sarcobatus vermiculatus - Leymus cinereus* Wet Shrubland
A1329 *Leymus cinereus - Leymus triticoides* Alkaline Wet Meadow Alliance
  CEGL001479 *Leymus cinereus* Alkaline Wet Meadow
A1332 *Distichlis spicata* Alkaline Wet Meadow Alliance
  CEGL001770 *Distichlis spicata* Alkaline Wet Meadow
A1334 *Sporobolus airoides - Muhlenbergia asperifolia - Spartina gracilis* Alkaline Wet Meadow Alliance
  CEGL001685 *Sporobolus airoides* Southern Plains Wet Meadow
  CEGL001799 *Puccinellia nuttalliana* Salt Marsh
A3196 *Ericameria nauseosa* Steppe & Shrubland Alliance
A3807 *Eleocharis palustris - Eleocharis acicularis* Marsh Alliance
  CEGL001833 *Eleocharis palustris* Marsh
A3905 *Sarcobatus vermiculatus* Great Plains Wet Shrubland Alliance
  CEGL001508 *Sarcobatus vermiculatus - Pascopyrum smithii / (Elymus lanceolatus)* Shrub Wet Meadow
A3978 *Sarcobatus vermiculatus* Great Plains Badlands Alliance
  CEGL001367 *Sarcobatus vermiculatus - Pseudoroegneria spicata* Shrubland
A4071 *Salicornia rubra* Wet Meadow Alliance
  CEGL001999 *Salicornia rubra* Salt Flat

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Soil-water dynamics within this system support a restricted range of species. Communities in good condition typically have 30 to 40 % shrub cover. Under continued disturbance, greasewood and western wheatgrass decrease in cover, while species such as foxtail barley (*Hordeum jubatum*) and yarrow (*Achillea millefolium*), and exotics like cheatgrass (*Bromus tectorum*), Japanese brome (*Bromus japonicus*) and Kentucky bluegrass (*Poa pratensis*), increase in cover.

Management

Overgrazing practices can significantly impact vigor and cover of principal shrub species, leading to an increase in cheatgrass and other exotics, although herbaceous cover in this system is often too low to attract cattle away from surrounding uplands. Off road travel can be a disturbance, especially in the early season, when clayey soils are still soft. In any season, heavy off road travel can be harmful to very slow growing dominant shrub species.

Restoration Considerations

In cases where the system has been impacted by heavy grazing, a rest-rotation regime with limited fall grazing may allow this system to recover by allowing regrowth of principal graminoid and shrub species. Severely impacted sites should be re-seeded to decrease soil erosion potential, to re-establish a native community, and to decrease weedy invasion by exotic species. Western wheatgrass can be used as the principal restoration species and can be seeded or transplanted as plugs. Once established this species spreads vigorously by rhizomes. Both greasewood and western wheatgrass exhibit excellent soil erosion control characteristics. Replanting with greasewood shrub seedlings may be necessary due to the slow recovery time within this system and low rates of natural seedling recruitment.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only

evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC	Spotted Bat *(Euderma maculatum)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Desert Cottontail *(Sylvilagus audubonii)*
Least Chipmunk *(Neotamias minimus)*	Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Western Harvest Mouse *(Reithrodontomys megalotis)*	North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*	Prairie Vole *(Microtus ochrogaster)*
Sagebrush Vole *(Lemmiscus curtatus)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	

Birds

American Bittern *(Botaurus lentiginosus)* SOC	Ferruginous Hawk *(Buteo regalis)* SOC
Golden Eagle *(Aquila chrysaetos)* SOC	Greater Sage-Grouse *(Centrocercus urophasianus)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC	Mountain Plover *(Anarhynchus montanus)* SOC
Black-necked Stilt *(Himantopus mexicanus)* SOC	Solitary Sandpiper *(Tringa solitaria)* SOC
Burrowing Owl *(Athene cunicularia)* SOC	Loggerhead Shrike *(Lanius ludovicianus)* SOC
Short-eared Owl *(Asio flammeus)* PSOC	Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Pied-billed Grebe *(Podilymbus podiceps)*	Snowy Egret *(Egretta thula)*
Greater White-fronted Goose *(Anser albifrons)*	Ross's Goose *(Anser rossii)*
Cinnamon Teal *(Spatula cyanoptera)*	Gadwall *(Mareca strepera)*
Eurasian Wigeon *(Mareca penelope)*	American Wigeon *(Mareca americana)*
Mallard *(Anas platyrhynchos)*	Lesser Scaup *(Aythya affinis)*
Northern Harrier *(Circus hudsonius)*	Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*

American Kestrel *(Falco sparverius)*
Peregrine Falcon *(Falco peregrinus)*
Prairie Falcon *(Falco mexicanus)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Willet *(Tringa semipalmata)*
Upland Sandpiper *(Bartramia longicauda)*
Marbled Godwit *(Limosa fedoa)*
Western Sandpiper *(Calidris mauri)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Red-necked Phalarope *(Phalaropus lobatus)*
California Gull *(Larus californicus)*
Mourning Dove *(Zenaida macroura)*
Common Nighthawk *(Chordeiles minor)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Western Kingbird *(Tyrannus verticalis)*
Horned Lark *(Eremophila alpestris)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Northern Shrike *(Lanius borealis)*
Palm Warbler *(Setophaga palmarum)*
American Tree Sparrow *(Spizelloides arborea)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Bunting *(Calamospiza melanocorys)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Common Grackle *(Quiscalus quiscula)*
Bullock's Oriole *(Icterus bullockii)*
Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*
Virginia Rail *(Rallus limicola)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
American Avocet *(Recurvirostra americana)*
Lesser Yellowlegs *(Tringa flavipes)*
Spotted Sandpiper *(Actitis macularius)*
Whimbrel *(Numenius phaeopus)*
Semipalmated Sandpiper *(Calidris pusilla)*
Least Sandpiper *(Calidris minutilla)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Ring-billed Gull *(Larus delawarensis)*
Rock Pigeon *(Columba livia)*
Snowy Owl *(Bubo scandiacus)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Common Raven *(Corvus corax)*
Mountain Bluebird *(Sialia currucoides)*
European Starling *(Sturnus vulgaris)*
Blue Grosbeak *(Passerina caerulea)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Lapland Longspur *(Calcarius lapponicus)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
American Goldfinch *(Spinus tristis)*

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
North American Racer *(Coluber constrictor)*
Plains Gartersnake *(Thamnophis radix)*
Western Milksnake *(Lampropeltis gentilis)* SOC
Gophersnake *(Pituophis catenifer)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*
Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Hudsonian Whiteface *(Leucorrhinia hudsonica)*

Vascular Plants

Slender Thelypody *(Thelypodium sagittatum)* SOC
Spiny Hopsage *(Grayia spinosa)* SOC
Hutchinsia *(Hornungia procumbens)* SOC
Red Sage *(Kochia americana)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Fringed Myotis *(Myotis thysanodes)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Black-footed Ferret *(Mustela nigripes)* SOC
White-tailed Jackrabbit *(Lepus townsendii)*
Long-legged Myotis *(Myotis volans)* SOC
Pallid Bat *(Antrozous pallidus)* SOC
Swift Fox *(Vulpes velox)* SOC
Mountain Cottontail *(Sylvilagus nuttallii)*
Mountain Lion *(Puma concolor)*

Birds

Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
Long-billed Curlew *(Numenius americanus)* SOC
Brewer's Sparrow *(Spizella breweri)* SOC
Red-necked Grebe *(Podiceps grisegena)*
Snow Goose *(Anser caerulescens)*
Green-winged Teal *(Anas crecca)*
Northern Shoveler *(Spatula clypeata)*
Redhead *(Aythya americana)*
Common Goldeneye *(Bucephala clangula)*
Ruddy Duck *(Oxyura jamaicensis)*
American Coot *(Fulica americana)*
White-throated Swift *(Aeronautes saxatalis)*
White-faced Ibis *(Plegadis chihi)* SOC
Caspian Tern *(Hydroprogne caspia)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Eared Grebe *(Podiceps nigricollis)*
Canada Goose *(Branta canadensis)*
Blue-winged Teal *(Spatula discors)*
Canvasback *(Aythya valisineria)*
Ring-necked Duck *(Aythya collaris)*
Bufflehead *(Bucephala albeola)*
Sora *(Porzana carolina)*
Great Horned Owl *(Bubo virginianus)*
Tree Swallow *(Tachycineta bicolor)*

American Robin *(Turdus migratorius)*
Common Yellowthroat *(Geothlypis trichas)*
Yellow-breasted Chat *(Icteria virens)*
Spotted Towhee *(Pipilo maculatus)*
Song Sparrow *(Melospiza melodia)*
House Finch *(Haemorhous mexicanus)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Northern Leopard Frog *(Lithobates pipiens)* SOC

Invertebrates

Cherry-faced Meadowhawk *(Sympetrum internum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

C. McIntyre, L.K. Vance, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Scrub-Shrub
Water Regime	Temporarily flooded to intermittently flooded
Geographically Isolated Wetland	Partially isolated

NatureServe Identifiers:

Element Global ID	28618
System Code	CES304.780, Inter-Mountain Basins Greasewood Flat

ReGAP:
9103: Inter-Mountain Basins Greasewood Flat

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

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Citation for data on this website:
Greasewood Flat — Inter-Mountain Basins Greasewood Flat. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=9103

Great Plains Riparian

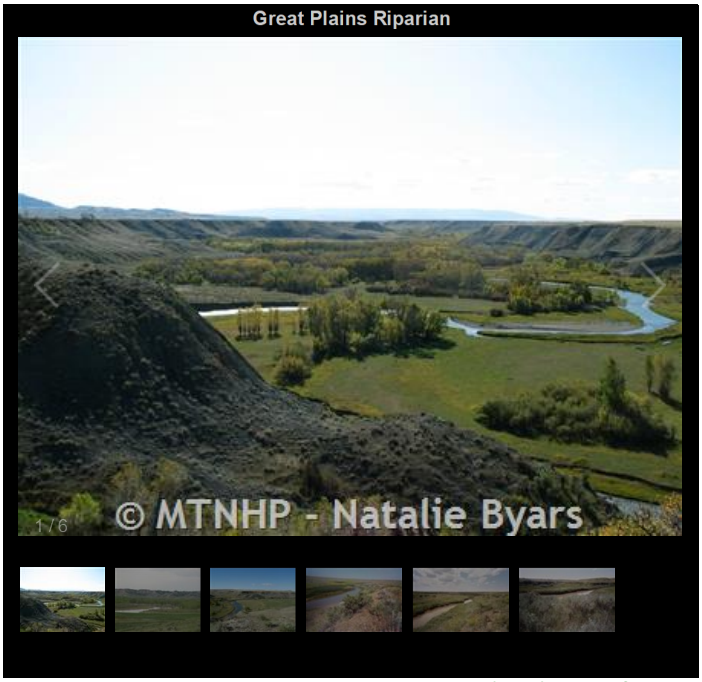


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General Description

This system is associated with perennial to intermittent or ephemeral streams throughout the northwestern Great Plains. In Montana, it occurs along smaller tributaries of the Yellowstone and Missouri rivers, as well as tributaries to the large floodplain rivers that feed them (e.g. the Milk, Marias, Musselshell, Powder, Clark's Fork Yellowstone, Tongue, etc). In areas adjacent to the mountain ranges of central and southeastern Montana, and near the Rocky Mountain Front, it grades into Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland systems. This system is found on alluvial soils in highly variable landscape settings, from confined, deep cut ravines to wide, braided streambeds. Channel migration occurs in less-confined areas, but within a more narrow range than would occur in broad, alluvial floodplains. Typically, the rivers are wadeable by mid-summer.

The primary inputs of water to these systems include groundwater discharge, overland flow, and subsurface interflow from the adjacent upland. Flooding is the key ecosystem process, creating suitable sites for seed dispersal and seedling establishment, and controlling vegetation succession. Communities within this system range from riparian forests and shrublands to tallgrass wet meadows and gravel/sand flats. Dominant species are similar to those found in the Great Plains Floodplain System. In the western part of the system's range in Montana, the dominant overstory species is black cottonwood (*Populus balsamifera ssp. trichocarpa*) with narrowleaf cottonwood *(Populus angustifolia)* and Plains cottonwood (*Populus deltoides)* occurring as co-dominants in the riparian/floodplain interface near the mountains. Further east, narrowleaf cottonwood and Plains cottonwood become dominant. In wetter systems, the understory is typically willow (*Salix spp*.) and redosier dogwood (*Cornus stolonifera*) with graminoids such as western wheatgrass (*Pascopyrum smithii*) and forbs like American licorice (*Glycyrrhiza lepidota*). In areas where the channel is incised, the understory may be dominated by big sagebrush (*Artemisia tridentata*) or silver sagebrush (*Artemisia cana*). Like floodplain systems,

riparian systems are often subjected to overgrazing and/or agriculture and can be heavily degraded, with salt cedar (*Tamarix ramosissima*) and Russian olive (*Eleagnus angustifolia*) replacing native woody vegetation and regrowth. Groundwater depletion and lack of fire have resulted in additional species changes.

Diagnostic Characteristics

Forest and Woodland

Similar Systems

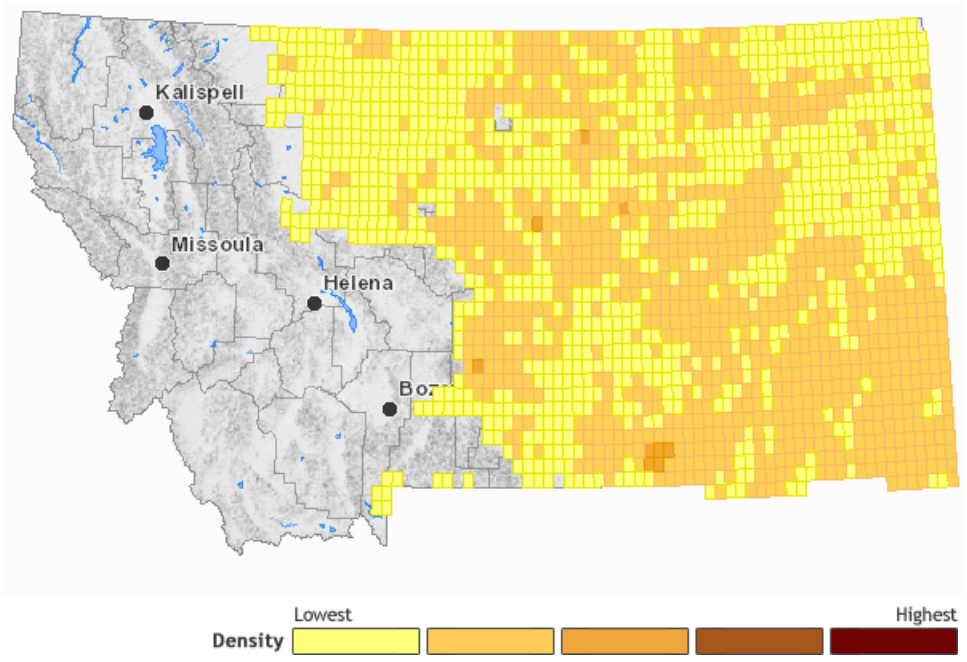
- Great Plains Floodplain
- Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland
- Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland

Range

This system extends north into Alberta, Saskatchewan and Manitoba, east into the Dakotas and Nebraska, and south into Wyoming. In Montana, it occurs in the Yellowstone and Missouri River drainage basins along small rivers and perennial, intermittent and ephemeral streams. In areas adjacent to the mountain ranges of central and southeastern Montana, and near the Rocky Mountain Front, it grades into Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland systems.

Ecological System Distribution

Approximately 5,938 square kilometers are classified as Great Plains Riparian in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fallon, Fergus, Gallatin, Garfield, Glacier, Golden Valley, Hill, Judith Basin, Lewis and Clark, Liberty, Mccone, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Linear

Environment

The primary inputs of water to these systems include groundwater discharge, overland flow, and subsurface interflow from the adjacent upland. Flooding is the key ecosystem process. It creates suitable sites for seed dispersal and seedling establishment, and controls vegetation succession. This system is associated with small rivers and perennial to intermittent or ephemeral streams that flow only during part of the year. In the Great Plains, the water source is primarily local precipitation and groundwater inflow (Decker, 2007); in systems receiving flow from central and southeastern mountain ranges, snowmelt and summer thunderstorms provide a significant portion of flows. The boundaries of these riparian areas extend beyond the limits of flooding into streamside vegetation (Gregory, 1991). They are important links

between terrestrial and aquatic ecosystems, acting as ecotones between upland and wetland, and connecting ecological processes and plant communities.

Vegetation

Like the Western Great Plains Riparian system of Wyoming, Colorado and New Mexico, Montana's Great Plains Riparian systems may include riparian forests or woodlands, as well as shrublands, tallgrass or mixedgrass wet meadows, herbaceous wetlands, and gravel/sand flats (Decker, 2007). Vegetation may be a mosaic of communities that are not always tree- or shrub-dominated. At lower elevations (e.g. along the Little Powder River and Mizpah Creek in southeastern Montana), forested communities may form galleries dominated by Plains cottonwood. Narrowleaf cottonwood occurs at intermediate elevations and black cottonwood tends to be prevalent at higher elevations (Hansen et al., 1996). Willows commonly associated with this system include sandbar willow (*Salix exigua*), yellow willow (*Salix lutea*), peachleaf willow (*Salix amygdaloides*), and diamondleaf willow (*Salix planifolia*). Other shrubs include redosier dogwood, western snowberry (*Symphoricarpos occidentalis*), chokecherry (*Prunus virginiana*), and woods rose (*Rosa woodsii*). In areas where the channel is incised, the understory may be dominated by big sagebrush or silver sagebrush. The herbaceous stratum is variable. Subirrigated areas may support tallgrass meadows dominated by big bluestem (*Andropogon gerardii*) or fresh water cordgrass *(Spartina pectinata*). Other graminoids include wooly sedge (*Carex pellita),* little bluestem (*Schizachyrium scoparium*)*,* western wheatgrass, porcupine needlegrass (*Hesperostipa spartea*)*,* northern dropseed (*Sporobolus heterolepis*), and panic grass (*Panicum virgatum*)*.* American licorice and Canada goldenrod (*Solidago canadensis*) are common understory forbs within all cottonwood riparian systems. These sites are prone to invasion by exotic grasses and forbs, the most widely established being creeping bentgrass (*Agrostis stolonifera*)*,* cheatgrass (*Bromus tectorum*)*,* quackgrass (*Agropyron repens*), Canada thistle (*Cirsium arvense*)*,* clovers *(Melilotus* species*)*, leafy spurge (*Euphorbia esula*) and common dandelion *(Taraxacum officinale*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0636 *Populus deltoides* Floodplain Woodland Alliance
  CEGL000660 *Populus deltoides - Symphoricarpos occidentalis* Floodplain Woodland
A3423 *Populus deltoides* Floodplain Forest Alliance
  CEGL000657 *Populus deltoides - Cornus sericea* Floodplain Forest
  CEGL000658 *Populus deltoides - Fraxinus pennsylvanica* Floodplain Forest
A3492 *Panicum virgatum - Pascopyrum smithii* Wet Meadow Alliance
A3586 *Artemisia cana ssp. Cana* Wet Shrubland Alliance
  CEGL001072 *Artemisia cana - Pascopyrum smithii* Wet Shrubland

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Fluvial processes play a key role in the dynamics of Great Plains streams. The nature of these processes is often indicated by channel morphology. Meandering channels generally have a shallow gradient, low flow variability, and sediment loads dominated by silt and finer particles, while braided channels are characterized by a steep gradient, high flow variability, and a sediment load dominated by sand and coarser particles (Friedman, 2002). Flooding is the key ecosystem process whereby establishment sites for riparian vegetation are created, seeds are dispersed and vegetative succession is controlled. However, since Euro-American settlement, natural fluvial processes have been disrupted in many of these systems by dams and diversions. Fire has been suppressed, agricultural activities have increased siltation rates and introduced both non-native species and chemical changes, and native grazers have been largely replaced by domestic cattle. Consequently, there has been a direct loss of woody plant diversity. Furthermore, both channel incision and channel widening have altered flooding regimes, leading to establishment of flood-intolerant species in many areas.

Management

The quality and quantity of ground and surface water input into riparian areas is almost entirely determined by the condition of the surrounding landscape. Therefore, the integrity of riparian ecological systems is partly determined by processes operating in the surrounding landscape, especially in the local watershed. Different types of land use can alter surface runoff and recharge of local aquifers, and introduce excess nutrients, pollutants, or sediments. Great Plains riparian systems have been substantially impacted by the development of both groundwater and surface water for irrigation. Alteration of natural hydrological processes by dams, diversions, ditches, roads, etc., and abiotic resource consumption through groundwater pumping have considerably altered the presettlement condition of the Great Plains. Vegetation responds to hydrologic changes by shifting from wetland- and riparian-dependent species to more mesic and xeric species typical of adjacent uplands and/or encroaching into the stream channel. When periodic flooding is eliminated by water management, riparian areas may become dominated by late-seral communities due to the inability of pioneer species (e.g., cottonwood and willow) to regenerate (Decker, 2007). Pollution from agricultural runoff can introduce excess nutrients into riparian areas. Increased nutrients can alter species composition by allowing aggressive, invasive species to displace native species. Nutrient cycles may also be disrupted by water management that eliminates normal flooding cycles and prevents deposition of organic material from floodwaters (Decker, 2007). Riparian vegetation is also affected by climatic drought that reduces soil moisture in the unsaturated zone and decreases streamflows, which reduces recharge and lowers the alluvial water table (Friedman et al. 1997). The elimination of beavers from most of the plains watersheds

probably decreased water storage and increased variability in plains streams (Friedman et al. 1997). The replacement of native grazers, especially bison, with fenced cattle has changed the regeneration patterns of cottonwood. In addition, salt cedar and Russian olive can drastically alter ecological processes in these plains riparian areas. Tamarisk is an early successional species with dispersal strategies and habitat requirements similar to native cottonwood and willow (Lesica and Miles, 2004). It can replace the native cottonwood and willow where natural flow regimes have been altered.

Restoration Considerations

Restoration strategies are dependent on the degree and type of disturbance event. Restoration efforts must first concentrate on *restoring* the*stream's hydrology*, so the floods can re-occur. In-stream habitat enhancement (e.g., additions of logs or boulders) should be employed after restoring natural processes or where short-term improvements in habitat are needed (e.g., for species in recovery).

Removingor eliminating grazing from this ecological system will allow the system to recover if hydric soils have not been lost due to extensive soil compaction, pugging, or down cutting of stream channels, and if there are existing populations of herbaceous native species (*Carex*, *Juncus*, and native grasses) that possess rhizomatous root systems capable of re-colonizing bare soils. The presence of rhizomatous, highly adaptable exotic grasses such as Kentucky bluegrass (*Poa pratensis*), common timothy (*Phleum pratense*) and smooth brome (*Bromus inermis*) and pasture forbs such as clovers (*Trifolium* species) and common dandelion (*Taraxacum officinale*) however, will persist on the site and may compete with existing populations of native graminiods and forbs. In these cases, land managers must decide if the exotic density is low enough that an adequate stand of native graminoids and forbs can become established on the site if reseeding efforts are used. In all cases, grazing should be excluded for several years to allow adequate re-growth and recovery of existing shrubs and the herbaceous understory.

Because all major shrub species within this riparian system are capable of re-sprouting and typically possess extensive, spreading root systems, modified land management practices in areas of low to moderate impact can minimize additional restoration needs. Vigor, health and degree of vegetative regeneration of existing trees and shrubs must be evaluated to determine if these components of the community are capable of recovery in an acceptable time frame. Intensive revegetation efforts should be limited to sites where a catastrophic wildfire or prolonged heavy grazing has destroyed existing trees, shrubs and the seedbank.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO:

University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Merriam's Shrew *(Sorex merriami)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Pallid Bat *(Antrozous pallidus)* SOC
Grizzly Bear *(Ursus arctos)* SOC	American Bison *(Bos bison)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC	Arctic Shrew *(Sorex arcticus)* PSOC
Prairie Shrew *(Sorex haydeni)* PSOC	Northern Short-tailed Shrew *(Blarina brevicauda)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Western Spotted Skunk *(Spilogale gracilis)* PSOC
Masked Shrew *(Sorex cinereus)*	Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Eastern Cottontail *(Sylvilagus floridanus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Desert Cottontail *(Sylvilagus audubonii)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*	Eastern Fox Squirrel *(Sciurus niger)*
Northern Pocket Gopher *(Thomomys talpoides)*	Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Ord's Kangaroo Rat *(Dipodomys ordii)*	North American Beaver *(Castor canadensis)*
Western Harvest Mouse *(Reithrodontomys megalotis)*	North American Deermouse *(Peromyscus maniculatus)*
White-footed Deermouse *(Peromyscus leucopus)*	Northern Grasshopper Mouse *(Onychomys leucogaster)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Meadow Vole *(Microtus pennsylvanicus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Common Muskrat *(Ondatra zibethicus)*	Northwestern Jumping Mouse *(Zapus saltator)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	American Black Bear *(Ursus americanus)*
Raccoon *(Procyon lotor)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Mink *(Neogale vison)*
American Badger *(Taxidea taxus)*	Striped Skunk *(Mephitis mephitis)*
Northern River Otter *(Lontra canadensis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Moose *(Alces alces)*	Pronghorn *(Antilocapra americana)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*	American Bittern *(Botaurus lentiginosus)* SOC
Great Blue Heron *(Ardea herodias)* SOC	Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
White-faced Ibis *(Plegadis chihi)* SOC	Ferruginous Hawk *(Buteo regalis)* SOC
Golden Eagle *(Aquila chrysaetos)* SOC	Greater Sage-Grouse *(Centrocercus urophasianus)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC	Whooping Crane *(Grus americana)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC	Common Tern *(Sterna hirundo)* SOC
Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC	Yellow-billed Cuckoo *(Coccyzus americanus)* SOC
Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC	Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Veery *(Catharus fuscescens)* SOC	Loggerhead Shrike *(Lanius ludovicianus)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC	Baird's Sparrow *(Centronyx bairdii)* SOC
LeConte's Sparrow *(Ammospiza leconteii)* SOC	Nelson's Sparrow *(Ammospiza nelsoni)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC	Eastern Screech-Owl *(Megascops asio)* PSOC
Short-eared Owl *(Asio flammeus)* PSOC	Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Chimney Swift *(Chaetura pelagica)* PSOC	Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC	Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Eastern Bluebird *(Sialia sialis)* PSOC	Plumbeous Vireo *(Vireo plumbeus)* PSOC
Black-and-white Warbler *(Mniotilta varia)* PSOC	Ovenbird *(Seiurus aurocapilla)* PSOC
Dickcissel *(Spiza americana)* PSOC	Red-necked Grebe *(Podiceps grisegena)*
Eared Grebe *(Podiceps nigricollis)*	Double-crested Cormorant *(Nannopterum auritum)*
Snowy Egret *(Egretta thula)*	Canada Goose *(Branta canadensis)*
Wood Duck *(Aix sponsa)*	Green-winged Teal *(Anas crecca)*
Northern Pintail *(Anas acuta)*	Blue-winged Teal *(Spatula discors)*

Cinnamon Teal *(Spatula cyanoptera)*
Gadwall *(Mareca strepera)*
Mallard *(Anas platyrhynchos)*
Ring-necked Duck *(Aythya collaris)*
Long-tailed Duck *(Clangula hyemalis)*
Bufflehead *(Bucephala albeola)*
Ruddy Duck *(Oxyura jamaicensis)*
Osprey *(Pandion haliaetus)*
Cooper's Hawk *(Accipiter cooperii)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*
Virginia Rail *(Rallus limicola)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
American Avocet *(Recurvirostra americana)*
Lesser Yellowlegs *(Tringa flavipes)*
Spotted Sandpiper *(Actitis macularius)*
Whimbrel *(Numenius phaeopus)*
Semipalmated Sandpiper *(Calidris pusilla)*
Least Sandpiper *(Calidris minutilla)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Eurasian Collared-Dove *(Streptopelia decaocto)*
American Barn Owl *(Tyto furcata)*
Long-eared Owl *(Asio otus)*
White-throated Swift *(Aeronautes saxatalis)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Belted Kingfisher *(Megaceryle alcyon)*
Downy Woodpecker *(Dryobates pubescens)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*
Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*
Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
White-breasted Nuthatch *(Sitta carolinensis)*
Canyon Wren *(Catherpes mexicanus)*
Marsh Wren *(Cistothorus palustris)*
Mountain Bluebird *(Sialia currucoides)*
Gray Catbird *(Dumetella carolinensis)*
Brown Thrasher *(Toxostoma rufum)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Red-eyed Vireo *(Vireo olivaceus)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Blackpoll Warbler *(Setophaga striata)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Canada Warbler *(Cardellina canadensis)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Blue Grosbeak *(Passerina caerulea)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Field Sparrow *(Spizella pusilla)*
Lark Sparrow *(Chondestes grammacus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Song Sparrow *(Melospiza melodia)*
Harris's Sparrow *(Zonotrichia querula)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*

Northern Shoveler *(Spatula clypeata)*
American Wigeon *(Mareca americana)*
Redhead *(Aythya americana)*
Lesser Scaup *(Aythya affinis)*
Common Goldeneye *(Bucephala clangula)*
Common Merganser *(Mergus merganser)*
Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*
Broad-winged Hawk *(Buteo platypterus)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Peregrine Falcon *(Falco peregrinus)*
Wild Turkey *(Meleagris gallopavo)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Willet *(Tringa semipalmata)*
Upland Sandpiper *(Bartramia longicauda)*
Marbled Godwit *(Limosa fedoa)*
Western Sandpiper *(Calidris mauri)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Rock Pigeon *(Columba livia)*
Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*
Common Nighthawk *(Chordeiles minor)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Calliope Hummingbird *(Selasphorus calliope)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Olive-sided Flycatcher *(Contopus cooperi)*
Willow Flycatcher *(Empidonax traillii)*
Dusky Flycatcher *(Empidonax oberholseri)*
Western Kingbird *(Tyrannus verticalis)*
Horned Lark *(Eremophila alpestris)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Rock Wren *(Salpinctes obsoletus)*
Northern House Wren *(Troglodytes aedon)*
American Dipper *(Cinclus mexicanus)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Palm Warbler *(Setophaga palmarum)*
American Redstart *(Setophaga ruticilla)*
Common Yellowthroat *(Geothlypis trichas)*
Yellow-breasted Chat *(Icteria virens)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Clay-colored Sparrow *(Spizella pallida)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Bunting *(Calamospiza melanocorys)*
Grasshopper Sparrow *(Ammodramus savannarum)*
White-throated Sparrow *(Zonotrichia albicollis)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*

Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*
Orchard Oriole *(Icterus spurius)*
Baltimore Oriole *(Icterus galbula)*
Bullock's Oriole *(Icterus bullockii)*
House Finch *(Haemorhous mexicanus)*
Lesser Goldfinch *(Spinus psaltria)*
American Goldfinch *(Spinus tristis)*

Reptiles

Snapping Turtle *(Chelydra serpentina)* SOC
Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC
Painted Turtle *(Chrysemys picta)*
Common Sagebrush Lizard *(Sceloporus graciosus)*
Northern Rubber Boa *(Charina bottae)*
North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*
Common Gartersnake *(Thamnophis sirtalis)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Great Plains Toad *(Anaxyrus cognatus)* SOC
Northern Leopard Frog *(Lithobates pipiens)* SOC
American Bullfrog *(Lithobates catesbeianus)*
Western Tiger Salamander *(Ambystoma mavortium)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Boreal Chorus Frog *(Pseudacris maculata)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Gray Comma *(Polygonia progne)* SOC
Brimstone Clubtail *(Stylurus intricatus)* SOC
Red-spotted Admiral *(Limenitis arthemis)* PSOC
Eyed Brown *(Lethe eurydice)* PSOC
Plains Clubtail *(Gomphurus externus)* PSOC
Field Crescent *(Phyciodes pulchella)*
Viceroy *(Limenitis archippus)*
Weidemeyer's Admiral *(Limenitis weidemeyerii)*
Lorquin's Admiral *(Limenitis lorquini)*
Common Wood-Nymph *(Cercyonis pegala)*
Plains Emerald *(Somatochlora ensigera)*
Wandering Glider *(Pantala flavescens)*
River Jewelwing *(Calopteryx aequabilis)*
Sweetflag Spreadwing *(Lestes forcipatus)*

Vascular Plants

Swamp Milkweed *(Asclepias incarnata)* SOC
Spotted Joepye-weed *(Eupatorium maculatum)* SOC
Desert Groundsel *(Senecio eremophilus)* SOC
Persistent-sepal Yellow-cress *(Rorippa calycina)* SOC
Bittersweet *(Celastrus scandens)* SOC
Nannyberry *(Viburnum lentago)* SOC
Chaffweed *(Centunculus minimus)* SOC
Heavy Sedge *(Carex gravida)* SOC
Short-pointed Flatsedge *(Cyperus acuminatus)* SOC
Wild Lily-of-the-valley *(Maianthemum canadense)* PSOC
Poison Suckleya *(Suckleya suckleyana)*
Green Ash *(Fraxinus pennsylvanica)*

Native Species Occasionally Associated with this Ecological System

Mammals

Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Swift Fox *(Vulpes velox)* SOC

Birds

Horned Grebe *(Podiceps auritus)* SOC
Black-necked Stilt *(Himantopus mexicanus)* SOC
Long-billed Curlew *(Numenius americanus)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Caspian Tern *(Hydroprogne caspia)* SOC
Forster's Tern *(Sterna forsteri)* SOC
Black Tern *(Chlidonias niger)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC
Sage Thrasher *(Oreoscoptes montanus)* SOC
Sprague's Pipit *(Anthus spragueii)* SOC
Brewer's Sparrow *(Spizella breweri)* SOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Tundra Swan *(Cygnus columbianus)*
Canvasback *(Aythya valisineria)*
Prairie Falcon *(Falco mexicanus)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Red-breasted Nuthatch *(Sitta canadensis)*
Swainson's Thrush *(Catharus ustulatus)*
Yellow-rumped Warbler *(Setophaga coronata)*
Chipping Sparrow *(Spizella passerina)*
Lincoln's Sparrow *(Melospiza lincolnii)*

Reptiles

Spiny Softshell *(Apalone spinifera)* SOC

Amphibians

Columbia Spotted Frog *(Rana luteiventris)*

Invertebrates

Eastern Ringtail *(Erpetogomphus designatus)* SOC
Pronghorn Clubtail *(Phanogomphus graslinellus)* PSOC
California Darner *(Rhionaeschna californica)* PSOC
Blue-eyed Darner *(Rhionaeschna multicolor)* PSOC
Vivid Dancer *(Argia vivida)* PSOC
Prairie Bluet *(Coenagrion angulatum)* PSOC
Familiar Bluet *(Enallagma civile)* PSOC
Alkali Bluet *(Enallagma clausum)* PSOC
Horned Clubtail *(Arigomphus cornutus)* PSOC
Pale Swallowtail *(Pterourus eurymedon)*
One-eyed Sphinx *(Smerinthus astarte)*
Pale Snaketail *(Ophiogomphus severus)*
Variable Darner *(Aeshna interrupta)*
Twelve-spotted Skimmer *(Libellula pulchella)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Common Whitetail *(Plathemis lydia)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Black Meadowhawk *(Sympetrum danae)*
American Rubyspot *(Hetaerina americana)*
Lyre-tipped Spreadwing *(Lestes unguiculatus)*
Variable Dancer *(Argia fumipennis)*
Boreal Bluet *(Enallagma boreale)*
Tule Bluet *(Enallagma carunculatum)*
Northern Bluet *(Enallagma annexum)*
Marsh Bluet *(Enallagma ebrium)*
River Bluet *(Enallagma anna)*
Eastern Forktail *(Ischnura verticalis)*
Western Forktail *(Ischnura perparva)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

L.K. Vance, C. McIntyre, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine, Riverine or Riparian (non-wetland)
Class	Forested, Scrub-Shrub, Emergent, Unconsolidated Shore
Water Regime	Temporarily flooded, seasonally flooded, semipermanently flooded
Geographically Isolated Wetland	No

NatureServe Identifiers:

Element Global ID	28534
System Code	CES303.677, Northwestern Great Plains Riparian

ReGAP:
9326: Northwestern Great Plains Riparian

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Decker, Karin. 2007. *Western Great Plains riparian woodland and shrubland ecological system ecological integrity assessment*. Ft. Collins, Colo: Colorado State University, Colorado Natural Heritage Program.

Covich, A. P., S. C. Fritz, P. J. Lamb, and R. D. Marzolf. 1997. "Potential Effects of Climate Change on Aquatic Ecosystems of the Great Plains of North America". *Hydrological Processes.* 11 (8): 993.

Dodds, W. K., K. Gido, M. R. Whiles, K. M. Fritz, and W. J. Matthews. 2004. Life on the edge: The ecology of Great Plains prairie streams. BioScience 54: 205–216.

Friedman, J. M., and V. J. Lee. 2002. Extreme floods, channel change, and riparian forests along ephemeral streams. Ecological Monographs 72:409-425.

Friedman, J. M., M. L. Scott, and G. T. Auble. 1997. Water management and cottonwood forest dynamics along prairie streams. Pages 49-71 In F. L. Knopf, and F. B. Samson, editors. Ecology and Conservation of Great Plains Vertibrates. Springer-Verlag, New York.

Friedman, J. M., W. R. Osterkamp, M. L. Scott, and G. T. Auble. 1998. Downstream effects of dams on channel geometry and bottomland vegetation: regional patterns in the Great Plains. Wetlands 18:619-633.

Gregory, S. V., F. J. Swanson, W. A. McKee and K. W. Cummins. 1991. An ecosystem perspective of riparian zones. BioScience 41(8):540-551.

Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

Lesica, P., and S. Miles. 2004. "Ecological strategies for managing tamarisk on the C.M. Russell National Wildlife Refuge, Montana, USA". *Biological Conservation.* 119 (4): 535-543.

Reed, P. B. Jr. 1988. National list of plant species that occur in wetlands: Northwest (Region 9). U. S. Fish and Wildlife Service Biological Report 88 (26.9). USDI Fish and Wildlife Service, Research and Development, Washington, DC. 89 pp.

Woods, A. J., J. M. Omernick, J. A. Nesser, J. Shelden, J. A. Comstock, and S. H. Azevedo. 2002. Ecoregions of Montana, 2nd edition (color poster with map, descriptive text, summary tables, and photographs). Environmental Protection Agency, Office of Research and Development, Durham, North Carolina.

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Rocky Mountain Conifer Swamp

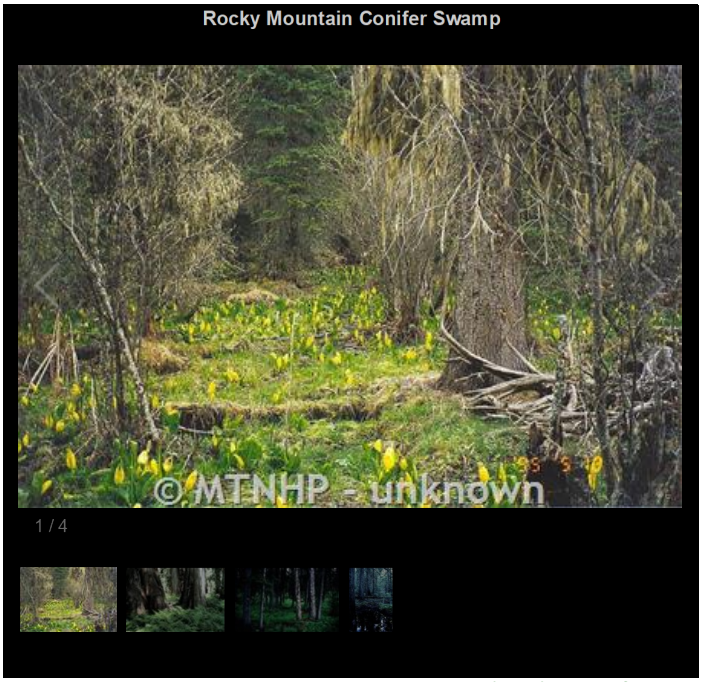


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Provisional State Rank: S1
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State Rank Reason

This is a system with limited occurrence in Montana. Drought and climate change are the major stressors; increased fire frequency or intensity, or loss of overstory vegetation, may also alter dynamics.

General Description

In northwestern Montana, conifer swamps occur from 865 to 1485 meters (2,838-5,200 feet). This is a minor system with infrequent occurrences on valley bottoms, lower benches, toeslopes, stream terraces, and flat sites, often adjacent to lakes, fens or wet meadows with low gradient, meandering streams. Water tables are typically within 50 centimeters (20 inches) of the soil surface throughout the year, with standing water in surface depressions. These swamps are dominated by conifers growing on poorly drained soils that are saturated year-round or have seasonal flooding in the spring. This system is indicative of poorly drained, mucky areas, and areas are often a mosaic of moving water and stagnant water. Soils can be woody peat, muck or mineral but tend toward mineral. Vegetation includes wetland phases of western red cedar (*Thuja plicata),* western hemlock (*Tsuga heterophylla*), subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*) forests. These wetland forests are generally distinguishable from other upland forests and woodlands by shallow water tables and mesic or hydric undergrowth vegetation. Some of the most typical understory species include American ladyfern (*Athyrium filix-femina*), woodfern (*Dryopteris*species), skunk cabbage (*Lysichiton americanus*), field horsetail (*Equisetum arvense*), arrowleaf groundsel (*Senecio triangularis*), and bluejoint reedgrass (*Calamagrostis canadensis*). This system frequently borders fens and wet to mesic coniferous forests.

Diagnostic Characteristics

Woody wetland, Forest and Woodland, saturated soils, depressional, seepage fed slopes, mineral soil w/ A

horizon <10 cm

Similar Systems

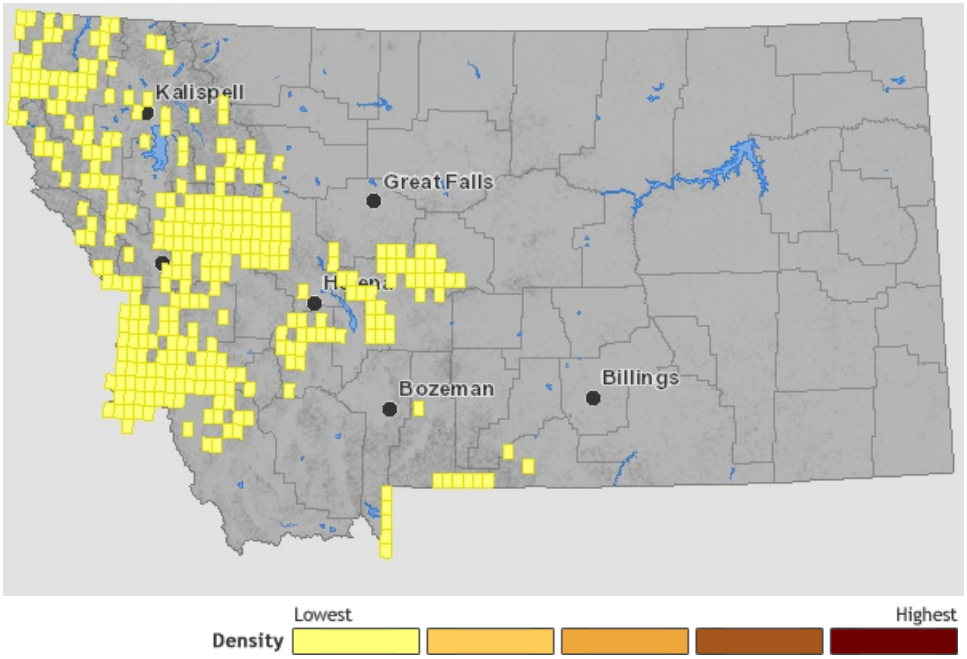
- Rocky Mountain Mesic Montane Mixed Conifer Forest

Range

This system occurs in the northern Rocky Mountains from northwestern Wyoming and central Montana, north into the Canadian Rockies and west into eastern Oregon and Washington. In northwestern Montana, this uncommon system is represented in the Flathead, Kootenai and Yaak river drainages. Montane spruce- and subalpine fir dominated swamps also occur east of the Continental Divide.

Ecological System Distribution

Approximately 6 square kilometers are classified as Rocky Mountain Conifer Swamp in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Teton

Spatial Pattern

Large or Small Patch

Environment

This system is dominated by coniferous trees on poorly drained soils that are saturated year-round or are subjected to seasonal flooding during spring months. These forests are found on flat to gently sloping lowlands, but also occur up to the lower limits of continuous forest. In northwestern Montana, these uncommon wetland forests occur most frequently in depressions on valley bottoms. However, they can occur on steeper slopes where soils are shallow over unfractured bedrock. Soils in these systems are poorly drained and can be organic peat or muck, but are more commonly mineral soils with an A horizon of 10 centimeters (4 inches) or less. Surface horizons usually have high organic matter, and redox depletions are found in moist subsoil. Water tables are typically within 50 centimeters (20 inches) of the soil surface throughout the year, with standing water in surface depressions. Generally, there is both moving and stagnant water within these forests. The system is often seen as an ecotone gradient between fens, wet meadows or marshes and mesic, upland coniferous forests. Some occurrences develop in spring-fed areas adjacent to lakes and ponds, but the system is most often found on benches, toeslopes or valley bottoms along mountain streams. At higher elevations, subalpine fir-bluejoint reedgrass (*Abies lasiocarpa- Calamagrostis canadensis*) forests are found along sub-irrigated stream terraces, pond margins and wet meadows (Pfister et al 1977).

Vegetation

In conifer dominated swamps, the understory vegetation is characterized by high cover of ferns and fern allies such as

American ladyfern (*Athyrium filix-femina*), woodfern *(Dryopteris* species), and horsetail (*Equisetum* species). Common graminoids include bluejoint reedgrass (*Calamagrostis canadensis*), beaked sedge (*Carex utriculata*) and softleaf sedge (*Carex disperma*).

In spruce- (*Picea* species) dominated swamps in the Flathead Valley, skunk cabbage (*Lysichiton americanus*) can form a nearly continuous cover in the understory. American ladyfern is often co-dominant on these sites. In other spruce-dominated occurrences, field horsetail (*Equisetum arvense*) or common horsetail (*Equisetum hyemale*) and American ladyfern are frequently the dominant species in the understory. Other forbs include arrowleaf groundsel (*Senecio triangularis),* Brewer's miterwort (*Mitella breweri*), five stamen miterwort (*Mitella pentandra*)*,* bunchberry dogwood (*Cornus canadensis*), dwarf red blackberry (*Rubus pubescens*), twisted stalk (*Streptopus amplexifolius*), and Canada violet (*Viola canadensis*) (Hansen et al., 1995). Orchids such as one leaf orchid (*Ameorchis rotundifolia*), sparrow's egg ladyslipper (*Cypripedium passerinum*) and small yellow ladyslipper (*Cypripedium parviflorum*) may occur on hummocks formed around base of trees and shrubs, especially in spruce swamps occurring adjacent to extremely rich fens. The shrub canopy may include thinleaf alder (*Alnus incana*), water birch (*Betula occidentalis*), dwarf birch (*Betula nana*) and redoiser dogwood (*Cornus sericea*).

In northwestern Montana, swamps of western redcedar (*Thuja plicata*) and western hemlock (*Tsuga occidentalis*) are largely confined to toeslopes and valley bottoms below 1,280 meters (4,200 feet). In these swamps, devil's club (*Oplopanax horridum*) is the dominant shrub. Pacific yew (*Taxus brevifolia*) is often present. The herbaceous understory includes American skunk cabbage, American ladyfern, oak fern (*Gymnocarpium dryopteris*), wild ginger (*Asarum caudatum*), foam flower (*Tiarella trifoliata*), starry solomon's seal (*Maianthemum stellatum*), and fragrant bedstraw (*Galium triflorum*).

Subalpine fir (*Abies lasiocarpa*) swamps are infrequently represented in Montana, but floristically, they are very similar to western red cedar swamps. This minor type occurs in colder areas between 1,188 to 1,324 meters (3,900 to 5,000 feet) in northwestern Montana (Pfister et al., 1977). However, subalpine fir-bluejoint reedgrass systems are common throughout Montana up to the subalpine elevations. Shrub cover is low and is usually represented by alder (*Alnus* species). Bluejoint reedgrass dominates the understory vegetation. Associated forbs include lanceleaf arnica (*Arnica latifolia*), Canadian horseweed (*Conyza canadensis*), Idaho licorice root (*Ligusticum tenuifolium*), and brook saxifrage (*Saxifraga arguta*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A3613 *Tsuga heterophylla - Thuja plicata* Warm-Mesic Central Rocky Mountain Forest & Woodland Alliance
- **CEGL000473** *Thuja plicata - Athyrium filix-femina* Forest

A3756 *Tsuga heterophylla - Picea sitchensis / Lysichiton americanus* Swamp Forest Alliance
- **CEGL002670** *Thuja plicata / Tsuga heterophylla - Lysichiton americanus* Swamp Forest

A3757 *Abies lasiocarpa - Picea engelmannii* Swamp Forest Alliance
- **CEGL000322** *Abies lasiocarpa / Picea engelmannii - Oplopanax horridus* Swamp Forest
- **CEGL000336** *Abies lasiocarpa / Picea engelmannii - Streptopus amplexifolius* Swamp Forest
- **CEGL000357** *Picea engelmannii - Caltha leptosepala* Swamp Forest
- **CEGL002678** *Picea engelmannii - Calamagrostis canadensis* Swamp Forest
- **CEGL005927** *Picea engelmannii - Equisetum arvense* Swamp Forest

A3770 *Salix wolfii - Salix brachycarpa - Betula glandulosa* Wet Shrubland Alliance
- **CEGL001079** *Betula glandulosa - Carex utriculata* Wet Shrubland
- **CEGL005887** *Betula glandulosa - Carex spp.* Wet Shrubland

A3775 *Picea engelmannii* Swamp Forest Alliance
- **CEGL000405** *Picea (engelmannii x glauca, engelmannii) - Carex disperma* Swamp Forest
- **CEGL000412** *Picea (engelmannii x glauca, engelmannii) - Lysichiton americanus* Swamp Forest

A3776 *Thuja plicata - Tsuga heterophylla* Rocky Mountain Swamp Forest Alliance
- **CEGL000479** *Thuja plicata / Tsuga heterophylla - Oplopanax horridus* Rocky Mountain Swamp Forest
- **CEGL005931** *Thuja plicata - Carex disperma* Swamp Forest

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Due to the high water tables, trees are very susceptible to windthrow. Fire is very infrequent. Mortality from spruce budworm outbreaks in adjacent upland forests may affect this system.

Management

Adjacent roads, trails, logging and other activities present problems due to poor drainage, organic soils, and high water tables. Wet and moist soils are very vulnerable to compaction, even during winter months. All development, travel and equipment use should be diverted away from these forested swamps to suitable, adjacent upland sites. Timber harvesting is very problematic. Increased land use within 100 meters (328 feet) has been correlated with increased nutrient levels in peatlands in Montana, so setbacks should be 100 meters or greater to adequately protect these systems (Jones, 2003).

Restoration Considerations

The prerequisite for restoration of this system is to restore original hydrology on sites where water has been drained or altered. Remedial restoration work may be needed on sites where timber was harvested.

Species Associated with this Ecological System

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Northern Bog Lemming *(Synaptomys borealis)* SOC
Grizzly Bear *(Ursus arctos)* SOC	Fisher *(Pekania pennanti)* SOC
North American Water Vole *(Microtus richardsoni)* PSOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Western Water Shrew *(Sorex navigator)*
Northern Montane Shrew *(Sorex obscurus)*	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
North American Beaver *(Castor canadensis)*	Southern Red-backed Vole *(Clethrionomys gapperi)*
Western Heather Vole *(Phenacomys intermedius)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Common Muskrat *(Ondatra zibethicus)*	Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*	American Black Bear *(Ursus americanus)*
Raccoon *(Procyon lotor)*	Marten *(Martes americana)*
Long-tailed Weasel *(Neogale frenata)*	American Mink *(Neogale vison)*
American Ermine *(Mustela richardsonii)*	Elk *(Cervus canadensis)*

Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*
Moose *(Alces alces)*

Birds

Great Blue Heron *(Ardea herodias)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Northern Hawk Owl *(Surnia ulula)* SOC
Pileated Woodpecker *(Dryocopus pileatus)* SOC
Alder Flycatcher *(Empidonax alnorum)* SOC
Brown Creeper *(Certhia americana)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Red-necked Grebe *(Podiceps grisegena)*
Wood Duck *(Aix sponsa)*
Green-winged Teal *(Anas crecca)*
Blue-winged Teal *(Spatula discors)*
Common Goldeneye *(Bucephala clangula)*
Bufflehead *(Bucephala albeola)*
Common Merganser *(Mergus merganser)*
Sharp-shinned Hawk *(Accipiter striatus)*
Cooper's Hawk *(Accipiter cooperii)*
Spotted Sandpiper *(Actitis macularius)*
Wilson's Snipe *(Gallinago delicata)*
Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Barred Owl *(Strix varia)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Common Nighthawk *(Chordeiles minor)*
Vaux's Swift *(Chaetura vauxi)*
Belted Kingfisher *(Megaceryle alcyon)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Willow Flycatcher *(Empidonax traillii)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Flycatcher *(Empidonax difficilis)*
Tree Swallow *(Tachycineta bicolor)*
Violet-green Swallow *(Tachycineta thalassina)*
Canada Jay *(Perisoreus canadensis)*
American Crow *(Corvus brachyrhynchos)*
Black-capped Chickadee *(Poecile atricapillus)*
Mountain Chickadee *(Poecile gambeli)*
Chestnut-backed Chickadee *(Poecile rufescens)*
Red-breasted Nuthatch *(Sitta canadensis)*
Golden-crowned Kinglet *(Regulus satrapa)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Swainson's Thrush *(Catharus ustulatus)*
Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*
Orange-crowned Warbler *(Leiothlypis celata)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Yellow Warbler *(Setophaga petechia)*
Yellow-rumped Warbler *(Setophaga coronata)*
Townsend's Warbler *(Setophaga townsendi)*
Wilson's Warbler *(Cardellina pusilla)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Song Sparrow *(Melospiza melodia)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Pine Grosbeak *(Pinicola enucleator)*
Purple Finch *(Haemorhous purpureus)*
White-winged Crossbill *(Loxia leucoptera)*
Red Crossbill *(Loxia curvirostra)*
Pine Siskin *(Spinus pinus)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Sierran Treefrog *(Pseudacris sierra)*
Columbia Spotted Frog *(Rana luteiventris)*

Invertebrates

Freija Fritillary *(Boloria freija)* PSOC
Zigzag Darner *(Aeshna sitchensis)* PSOC
Mariposa Copper *(Tharsalea mariposa)*
Taiga Bluet *(Coenagrion resolutum)*

Vascular Plants

Great-spurred Violet *(Viola selkirkii)* SOC
Sparrow's-egg Lady's-slipper *(Cypripedium passerinum)* SOC
Crested Shieldfern *(Dryopteris cristata)* SOC
Northern Twayblade *(Listera borealis)*

Native Species Occasionally Associated with this Ecological System

Mammals

Canada Lynx *(Lynx canadensis)* SOC
Red-tailed Chipmunk *(Neotamias ruficaudus)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC
Ring-necked Duck *(Aythya collaris)*
White-throated Swift *(Aeronautes saxatalis)*
Red-winged Blackbird *(Agelaius phoeniceus)*

Reptiles

Painted Turtle *(Chrysemys picta)*

Invertebrates

Boreal Whiteface *(Leucorrhinia borealis)* SOC
Subarctic Bluet *(Coenagrion interrogatum)* SOC
Lance-tipped Darner *(Aeshna constricta)* PSOC
Lake Darner *(Aeshna eremita)* PSOC
Black-tipped Darner *(Aeshna tuberculifera)* PSOC
Spiny Baskettail *(Epitheca spinigera)* PSOC
Crimson-ringed Whiteface *(Leucorrhinia glacialis)* PSOC
Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Bronze Copper *(Tharsalea hyllus)*
Purplish Copper *(Tharsalea helloides)*
Milbert's Tortoiseshell *(Aglais milberti)*
Common Wood-Nymph *(Cercyonis pegala)*
Canada Darner *(Aeshna canadensis)*
Shadow Darner *(Aeshna umbrosa)*
American Emerald *(Cordulia shurtleffii)*
Whitehouse's Emerald *(Somatochlora whitehousei)*
Hudsonian Whiteface *(Leucorrhinia hudsonica)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Belted Whiteface *(Leucorrhinia proxima)*
Eight-spotted Skimmer *(Libellula forensis)*
Twelve-spotted Skimmer *(Libellula pulchella)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Striped Meadowhawk *(Sympetrum pallipes)*
Band-winged Meadowhawk *(Sympetrum semicinctum)*

Autumn Meadowhawk *(Sympetrum vicinum)*
Sweetflag Spreadwing *(Lestes forcipatus)*
Northern Spreadwing *(Lestes disjunctus)*
Tule Bluet *(Enallagma carunculatum)*
Pacific Forktail *(Ischnura cervula)*
Emerald Spreadwing *(Lestes dryas)*
Spotted Spreadwing *(Lestes congener)*
Boreal Bluet *(Enallagma boreale)*
Northern Bluet *(Enallagma annexum)*
Sedge Sprite *(Nehalennia irene)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

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Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Forested
Water Regime	Saturated or seasonally flooded
Geographically Isolated Wetland	Usually

NatureServe Identifiers:

Element Global ID	28639
System Code	CES306.803, Northern Rocky Mountain Conifer Swamp

National Land Cover Dataset:
90: Woody Wetlands

ReGAP:
9111: Northern Rocky Mountain Conifer Swamp

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.
- Jones, W.M. 2003. Kootenai National Forest peatlands: Description and effects of forest management. Report to the Kootenai National Forest, Montana. Montana Natural Heritage Program, Helena. 14 pp. plus appendices.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service. General Technical Report INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

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Citation for data on this website:
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Emergent Marsh



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Provisional State Rank: S4

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General Description

This widespread wetland system occurs throughout the arid and semi-arid regions of North America. In Montana, this system is typically found in depressions surrounded by an upland matrix of mixed prairie, shrub steppe, or steppe vegetation. Natural marshes occur in and adjacent to ponds and prairie potholes, as fringes around lakes or oxbows, and along slow-flowing streams and rivers as riparian marshes. Marshes are classified as either seasonal or semipermanent based on the dominant vegetation found in the deepest portion of the wetland; vegetation is representative of the hydroperiod. A central shallow marsh zone dominated by graminoids and sedges characterizes seasonal wetlands, while semipermanent wetlands are continually inundated, with water depths up to 2 meters (6.5 feet) and a deeper central marsh zone dominated by cattails (*Typha* species) and bulrushes (*Schoenoplectus* species). Water chemistry may be alkaline or semi-alkaline, but the alkalinity is highly variable even within the same complex of wetlands. Marshes have distinctive soils that are typically mineral, but can also accumulate organic material. Soils characteristics reflect long periods of anaerobic conditions. Dominant vegetation often includes western wheatgrass (*Pascopyrum smithii*), Northwest Territory sedge (*Carex utriculata*), Nebraska sedge (*Carex nebrascensis*), broadleaf cattail (*Typha latifolia*), and hardstem bulrush (*Schoenoplectus acutus*). Alkaline marsh communities include western wheatgrass, fresh water cordgrass (*Spartina pectinata*), and seashore saltgrass (*Distichlis spicata*).

Diagnostic Characteristics

Herbaceous, depressional, mineral with A horizon greater than 10 cm, aquatic herb, deep water greater than 15 cm, saturated soil

Similar Systems

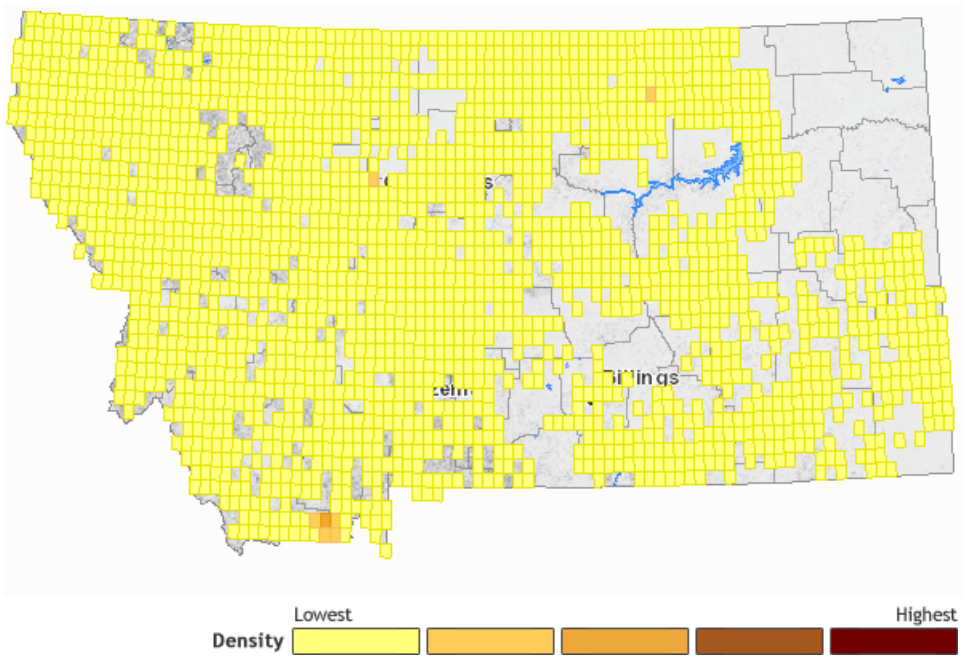
- Great Plains Closed Depressional Wetland
- Great Plains Open Freshwater Depression Wetland
- Great Plains Saline Depression Wetland

Range

This wetland ecological system occurs throughout western North America. In Montana, this system is found throughout the state from foothill to upper montane elevations.

Ecological System Distribution

Approximately 227 square kilometers are classified as Emergent Marsh in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Small patch

Environment

This system is found in environments where precipitation is approximately 25 to 50 centimeters (10 to 20 inches) per year. In Montana, this system is typically found in depressions surrounded by an upland matrix of mixed prairie, shrub steppe, steppe vegetation and forests near the mountains. Natural marshes occur in and adjacent to ponds and prairie potholes, as fringes around lakes or oxbows, and along slow-flowing streams and rivers as riparian marshes. Water chemistry may be alkaline or semi-alkaline, but is highly variable even within the same complex of wetlands. Marshes have distinctive soils that are typically mineral, but can also accumulate organic material. Soils characteristics reflect long periods of anaerobic conditions, with gleying, high organic content, and redoximorphic features. Wetland marshes are classified as either seasonal or semi-permanent based on the dominant vegetation found in the deepest portion of the wetland (Stewart and Kantrud, 1971 and LaBaugh et al., 1996). Vegetation communities occurring in these marsh systems is representative of their hydroperiod; some basins dry to bare soil after seasonal flooding, while others will have a variety of wetland types in a zoned pattern dependent on seasonal water table depths and salt concentrations (Kudray and Cooper, 2006).

Vegetation

Vegetation communities change according to wet-drought cycles. In seasonal ponds that dry out annually, and in semipermanent wetlands during drought years, buried seeds of both annuals and perennials germinate, covering exposed

mud flats (Hansen et al., 1995). In semi-permanent marshes, the drawdown zone is typically dominated by western wheat grass (*Pascopyrum smithii*) near the upland edge, with Northwest Territory sedge (*Carex utriculata*) and Nebraska sedge (*Carex nebrascensis*) as the dominant sedges located down gradient, and broadleaf cattail (*Typha latifolia*) and hardstem bulrush (*Schoenoplectus acutus*) located in the deeper, central portion of the marsh. Water sedge (*Carex aquatilis*) is frequently co-dominant with Northwest Territory sedge. Less commonly, blister sedge (*Carex vesicaria*) and awned sedge (*Carex atherodes*) are intermixed with Northwest Territory sedge or occur as co-dominants on similar sites. Beyond the emergent vegetation, floating-leaved hydrophytes may be present in wetter sites with longer inundation periods, including water lilies (*Nymphaea* species), yellow pondlily (*Nuphar* species), buttercup (*Ranunculus* species) and pondweed (*Potamogeton* species). Other floating species may be present in shallow water, such as duckweed, (*Lemna* species), and submergents such as common hornwort (*Ceratophyllum demersum*), horned pondweed (*Zannichellia palustris*), mare's tail (*Hippuris vulgaris*) and water milfoil (*Myriophyllum* species).

Seasonal marshes are typically dominated by western wheat grass (*Pascopyrum smithii*), beaked sedge (*Carex utriculata*), inflated sedge (*Carex vesicaria*), Nebraska sedge (*Carex nebrascensis*), creeping spikerush (*Eleocharis palustris*), Baltic rush (*Juncus balticus*) and cattail (*Typha latifolia or angustifolia*). During wetter years, annuals disappear and marshes become dominated by emergent perennials. Common perennial forbs include common willow herb (*Epilobium ciliatum*), marsh cinquefoil (*Potentilla palustris*), Gmelin's buttercup (*Ranunculus gmelinii*), greater creeping spearwort (*Ranunculus flammula*), hemlock water parsnip (*Sium suave*), willow dock (*Rumex salicifolius*), field mint (*Mentha arvensis*), leafy aster (*Symphyotrichum foliaceum*) and broadleaf arrowhead (*Sagittaria latifolia*). Fern allies such as water horsetail (*Equisetum fluviatile*) and field horsetail (*Equisetum arvense*) often form significant cover within seasonal marshes. Grasses common to marshes include small floating mannagrass (*Glyceria borealis*), tufted hairgrass (*Deschampsia caespitosa*), and bluejoint reedgrass (*Calamagrostis canadensis*).

Seasonal and semi-permanent marshes with more alkaline water chemistry are commonly found throughout central and eastern Montana. Typical species include hardstem bulrush, cattail, common threesquare (*Schoenoplectus pungens*), alkali bulrush (*Schoenoplectus maritimus*) and inland saltgrass (*Distichlis spicata*), red swampfire (*Salicornia rubra*) and prairie cordgrass (*Spartina pectinata*) in adjacent drawdown zones. These marsh communities are brackish and support species adapted to saline and alkaline water and soil conditions, similar to Western Great Plains Saline Depression systems.

Typically, riverine marshes subjected to unaltered, seasonal water flow and annual flooding are characterized by zonal vegetation determined by water depth with stands of bulrush (*Schoenoplectus* species), softstem bulrush (*Schoenplectus tabernaemontani*), and cattail in deeper water, and manna grass (*Glyceria* species), water sedge, inflated sedge, water horsetail and common spikerush in shallower water zones. Riverine marshes can be influenced by beaver activity and human caused influences that can change the structure and species richness of these plant communities. Beaver activity can increase species richness and diversify community structure by altering water flow, depth, and organic sediment accumulation.

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A1332 *Distichlis spicata* Alkaline Wet Meadow Alliance
A1334 *Sporobolus airoides - Muhlenbergia asperifolia - Spartina gracilis* Alkaline Wet Meadow Alliance
  CEGL001588 *Spartina gracilis* Wet Meadow
A1374 *Juncus balticus - Juncus mexicanus* Wet Meadow Alliance
  CEGL001838 *Juncus balticus* Wet Meadow
A1747 *Lemna minor - Wolffia borealis - Wolffia columbiana* Aquatic Vegetation Alliance
  CEGL005450 *Lemna spp.* Western North American Aquatic Vegetation
A1761 *Myriophyllum sibiricum - Myriophyllum hippuroides* Aquatic Vegetation Alliance
A3435 *Carex limosa - Carex buxbaumii - Triglochin maritima* Alkaline Graminoid Fen Alliance
A3804 *Carex aquatilis - Carex utriculata - Deschampsia caespitosa* Wet meadow Alliance
  CEGL001562 *Carex utriculata* Wet Meadow
A3805 *Carex nebrascensis - Carex vesicaria - Carex pellita* Wet meadow Alliance
  CEGL001813 *Carex nebrascensis* Wet Meadow
  CEGL002661 *Carex vesicaria* Wet Meadow
A3806 *Carex praegracilis - Carex scopulorum - Eleocharis quinqueflora* Wet Meadow Alliance
  CEGL002660 *Carex praegracilis* Wet Meadow
A3807 *Eleocharis palustris - Eleocharis acicularis* Marsh Alliance
  CEGL001833 *Eleocharis palustris* Marsh
A3808 *Glyceria grandis - Glyceria striata - Glyceria borealis* Wet Meadow Alliance
  CEGL001569 *Glyceria borealis* Wet Meadow
A3815 *Calamagrostis canadensis - Calamagrostis stricta - Poa palustris* Wet Meadow Alliance
  CEGL001559 *Calamagrostis canadensis* Western Wet Meadow
A3846 *Phalaris arundinacea* Western Ruderal Marsh Alliance
  CEGL001474 *Phalaris arundinacea* Western Marsh
A3847 *Phragmites australis - Arundo donax - Alopecurus pratensis* Ruderal Marsh Alliance
  CEGL001475 *Phragmites australis* Western Ruderal Wet Meadow
A3891 *Eleocharis palustris - Eleocharis macrostachya* Marsh Alliance
A3892 *Equisetum fluviatile - Equisetum x ferrissii* Marsh Alliance
A3895 *Schoenoplectus americanus - Schoenoplectus acutus - Schoenoplectus californicus* Marsh Alliance
  CEGL001587 *Schoenoplectus pungens* Marsh
  CEGL001840 *Schoenoplectus acutus* Marsh
  CEGL001841 *Schoenoplectus americanus* Western Marsh
  CEGL001843 *Schoenoplectus maritimus* Marsh
  CEGL002623 *Schoenoplectus tabernaemontani* Temperate Marsh
A3896 *Typha domingensis - Typha latifolia - Typha angustifolia* Western Marsh Alliance

CEGL002010 *Typha (latifolia, angustifolia)* Western Marsh
A3926 *Nuphar polysepala* Western Aquatic Vegetation Alliance
CEGL002001 *Nuphar polysepala* Aquatic Vegetation
A3927 *Potamogeton natans - Polygonum amphibium* Aquatic Vegetation Alliance
A4071 *Salicornia rubra* Wet Meadow Alliance
CEGL001999 *Salicornia rubra* Salt Flat

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Wet-drought year climatic cycles in Montana, often in 10 to 20 year cycles, influence the ecological communities in these systems (Hansen et al., 1995). During this climatic cycle, wetlands go through a dry marsh, regenerating marsh, degenerating marsh and a lake phase that is regulated by periodic drought and deluge (Mitsch and Gosselink, 2000). During drought periods, seeds from annuals and perennials germinate and cover exposed mud flats, but when precipitation floods the depressions, the annuals drown and the perennials survive, regenerating the marsh. Over a series of years, perennials dominate and submersed and floating-leaved hydrophytes return. After a few years of the regenerating phase, emergent vegetation begins to decline and eventually the marsh reverts to an open water system. Muskrats may play an important role in the decline of emergent vegetation in some of these systems. During drought, the drawdown to mudflats is necessary so that emergent vegetation can become reestablished. Flooding, drawdown and the eventual exposure of mud flats drive the water-level vegetation cycle. In saline soil marshes, increase in precipitation during exceptionally wet years can dilute the salt concentration in the soils, allowing for less salt-tolerant species to occur.

Species richness can vary considerably among individual examples and is especially influenced by adjacent land use. Agriculture and forestry operations, when adjacent, may cause nutrient and herbicide runoff.

Management

Changes will occur in the plant communities due to climatic conditions and/or management activities. Draining, ditching or conversion to agriculture and pastureland can alter the hydrology of the system. Moderate to heavy grazing practices can greatly decrease cover of beaked sedge, and cause soil compaction. Invasive and exotic species such as reed canarygrass (*Phalaris arundinacea*), common reed (*Phragmites australis*) and Canadian thistle (*Cirsium arvense*) become established in areas of heavy grazing or other disturbances. Diversion or lateration of seasonal flooding in riverine systems can change the species composition and succesional direction of riverine marsh communities.

Restoration Considerations

In marsh systems where water has been drained or altered, the original hydrology of the system must be restored. If water levels are restored, re-growth and re-colonization from dormant rhizomatous root systems of common marsh species can occur within a few years. Cattle grazing must be eliminated or controlled to allow regrowth, recolonization and resprouting from existing root systems. Many of the characteristic species found in marsh systems are rhizomatous, thus exhibit excellent erosion control properties. In some cases, if hydric soils are heavily altered due to pugging or compaction, addition of organic material may be needed to facilitate vegetation recolonization.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's

Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC	Northern Bog Lemming *(Synaptomys borealis)* SOC
Grizzly Bear *(Ursus arctos)* SOC	Prairie Shrew *(Sorex haydeni)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	Meadow Jumping Mouse *(Zapus hudsonius)* PSOC
Masked Shrew *(Sorex cinereus)*	Northern Montane Shrew *(Sorex obscurus)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Northern Pocket Gopher *(Thomomys talpoides)*
Western Harvest Mouse *(Reithrodontomys megalotis)*	North American Deermouse *(Peromyscus maniculatus)*
White-footed Deermouse *(Peromyscus leucopus)*	Northern Grasshopper Mouse *(Onychomys leucogaster)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Common Muskrat *(Ondatra zibethicus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Mink *(Neogale vison)*
Striped Skunk *(Mephitis mephitis)*	Northern River Otter *(Lontra canadensis)*
White-tailed Deer *(Odocoileus virginianus)*	Moose *(Alces alces)*
Pronghorn *(Antilocapra americana)*	

Birds

Bald Eagle *(Haliaeetus leucocephalus)*	Common Loon *(Gavia immer)* SOC
Horned Grebe *(Podiceps auritus)* SOC	Clark's Grebe *(Aechmophorus clarkii)* SOC
American White Pelican *(Pelecanus erythrorhynchos)* SOC	American Bittern *(Botaurus lentiginosus)* SOC
Great Blue Heron *(Ardea herodias)* SOC	Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
White-faced Ibis *(Plegadis chihi)* SOC	Trumpeter Swan *(Cygnus buccinator)* SOC
Yellow Rail *(Coturnicops noveboracensis)* SOC	Whooping Crane *(Grus americana)* SOC
Black-necked Stilt *(Himantopus mexicanus)* SOC	Solitary Sandpiper *(Tringa solitaria)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC	Common Tern *(Sterna hirundo)* SOC
Forster's Tern *(Sterna forsteri)* SOC	Black Tern *(Chlidonias niger)* SOC
LeConte's Sparrow *(Ammospiza leconteii)* SOC	Bobolink *(Dolichonyx oryzivorus)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC	Hooded Merganser *(Lophodytes cucullatus)* PSOC
Short-eared Owl *(Asio flammeus)* PSOC	Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Pied-billed Grebe *(Podilymbus podiceps)*	Red-necked Grebe *(Podiceps grisegena)*
Eared Grebe *(Podiceps nigricollis)*	Western Grebe *(Aechmophorus occidentalis)*
Double-crested Cormorant *(Nannopterum auritum)*	Snowy Egret *(Egretta thula)*
Tundra Swan *(Cygnus columbianus)*	Greater White-fronted Goose *(Anser albifrons)*
Snow Goose *(Anser caerulescens)*	Ross's Goose *(Anser rossii)*
Canada Goose *(Branta canadensis)*	Green-winged Teal *(Anas crecca)*

Northern Pintail *(Anas acuta)*
Cinnamon Teal *(Spatula cyanoptera)*
Gadwall *(Mareca strepera)*
American Wigeon *(Mareca americana)*
Canvasback *(Aythya valisineria)*
Ring-necked Duck *(Aythya collaris)*
Common Goldeneye *(Bucephala clangula)*
Common Merganser *(Mergus merganser)*
Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Virginia Rail *(Rallus limicola)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
American Avocet *(Recurvirostra americana)*
Lesser Yellowlegs *(Tringa flavipes)*
Upland Sandpiper *(Bartramia longicauda)*
Marbled Godwit *(Limosa fedoa)*
Semipalmated Sandpiper *(Calidris pusilla)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Rock Pigeon *(Columba livia)*
Common Nighthawk *(Chordeiles minor)*
Calliope Hummingbird *(Selasphorus calliope)*
Willow Flycatcher *(Empidonax traillii)*
Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
American Crow *(Corvus brachyrhynchos)*
American Robin *(Turdus migratorius)*
European Starling *(Sturnus vulgaris)*
Northern Waterthrush *(Parkesia noveboracensis)*
Common Yellowthroat *(Geothlypis trichas)*
Lazuli Bunting *(Passerina amoena)*
Song Sparrow *(Melospiza melodia)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Rusty Blackbird *(Euphagus carolinus)*
Orchard Oriole *(Icterus spurius)*
American Goldfinch *(Spinus tristis)*

Blue-winged Teal *(Spatula discors)*
Northern Shoveler *(Spatula clypeata)*
Eurasian Wigeon *(Mareca penelope)*
Mallard *(Anas platyrhynchos)*
Redhead *(Aythya americana)*
Lesser Scaup *(Aythya affinis)*
Bufflehead *(Bucephala albeola)*
Ruddy Duck *(Oxyura jamaicensis)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Peregrine Falcon *(Falco peregrinus)*
Sora *(Porzana carolina)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Spotted Sandpiper *(Actitis macularius)*
Whimbrel *(Numenius phaeopus)*
Sanderling *(Calidris alba)*
Western Sandpiper *(Calidris mauri)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Snowy Owl *(Bubo scandiacus)*
Ruby-throated Hummingbird *(Archilochus colubris)*
Belted Kingfisher *(Megaceryle alcyon)*
Eastern Kingbird *(Tyrannus tyrannus)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Common Raven *(Corvus corax)*
Marsh Wren *(Cistothorus palustris)*
Cedar Waxwing *(Bombycilla cedrorum)*
Yellow Warbler *(Setophaga petechia)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*
Savannah Sparrow *(Passerculus sandwichensis)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Baltimore Oriole *(Icterus galbula)*

Reptiles

Snapping Turtle *(Chelydra serpentina)* SOC
Painted Turtle *(Chrysemys picta)*
Plains Gartersnake *(Thamnophis radix)*
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Northern Leopard Frog *(Lithobates pipiens)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Sierran Treefrog *(Pseudacris sierra)*
Columbia Spotted Frog *(Rana luteiventris)*
Great Plains Toad *(Anaxyrus cognatus)* SOC
American Bullfrog *(Lithobates catesbeianus)*
Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Subarctic Darner *(Aeshna subarctica)* SOC
Boreal Whiteface *(Leucorrhinia borealis)* SOC
California Darner *(Rhionaeschna californica)* PSOC
Lake Darner *(Aeshna eremita)* PSOC
Blue-eyed Darner *(Rhionaeschna multicolor)* PSOC
Black-tipped Darner *(Aeshna tuberculifera)* PSOC
Ringed Emerald *(Somatochlora albicincta)* PSOC
Mountain Emerald *(Somatochlora semicircularis)* PSOC
Flame Skimmer *(Libellula saturata)* PSOC
Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Prairie Bluet *(Coenagrion angulatum)* PSOC
Alkali Bluet *(Enallagma clausum)* PSOC
Bronze Copper *(Tharsalea hyllus)*
Mariposa Copper *(Tharsalea mariposa)*
Bog Fritillary *(Boloria eunomia)*
Brush-tipped Emerald *(Somatochlora walshii)* SOC
Eyed Brown *(Lethe eurydice)* PSOC
Lance-tipped Darner *(Aeshna constricta)* PSOC
Sedge Darner *(Aeshna juncea)* PSOC
Zigzag Darner *(Aeshna sitchensis)* PSOC
Spiny Baskettail *(Epitheca spinigera)* PSOC
Hudsonian Emerald *(Somatochlora hudsonica)* PSOC
Crimson-ringed Whiteface *(Leucorrhinia glacialis)* PSOC
Chalk-fronted Corporal *(Ladona julia)* PSOC
Vivid Dancer *(Argia vivida)* PSOC
Familiar Bluet *(Enallagma civile)* PSOC
Arroyo Bluet *(Enallagma praevarum)* PSOC
Purplish Copper *(Tharsalea helloides)*
Greenish Blue *(Icaricia saepiolus)*
Myrina Fritillary *(Boloria myrina)*

Milbert's Tortoiseshell *(Aglais milberti)*
Canada Darner *(Aeshna canadensis)*
Paddle-tailed Darner *(Aeshna palmata)*
Common Green Darner *(Anax junius)*
Whitehouse's Emerald *(Somatochlora whitehousei)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Twelve-spotted Skimmer *(Libellula pulchella)*
Common Whitetail *(Plathemis lydia)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
Saffron-winged Meadowhawk *(Sympetrum costiferum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Band-winged Meadowhawk *(Sympetrum semicinctum)*
Emerald Spreadwing *(Lestes dryas)*
Spotted Spreadwing *(Lestes congener)*
Lyre-tipped Spreadwing *(Lestes unguiculatus)*
Taiga Bluet *(Coenagrion resolutum)*
Tule Bluet *(Enallagma carunculatum)*
Northern Bluet *(Enallagma annexum)*
Hagen's Bluet *(Enallagma hageni)*
Pacific Forktail *(Ischnura cervula)*
Tadpole Physa *(Physella gyrina)*
Common Wood-Nymph *(Cercyonis pegala)*
Variable Darner *(Aeshna interrupta)*
Shadow Darner *(Aeshna umbrosa)*
American Emerald *(Cordulia shurtleffii)*
Hudsonian Whiteface *(Leucorrhinia hudsonica)*
Eight-spotted Skimmer *(Libellula forensis)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Wandering Glider *(Pantala flavescens)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Black Meadowhawk *(Sympetrum danae)*
Striped Meadowhawk *(Sympetrum pallipes)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Sweetflag Spreadwing *(Lestes forcipatus)*
Northern Spreadwing *(Lestes disjunctus)*
Variable Dancer *(Argia fumipennis)*
Boreal Bluet *(Enallagma boreale)*
Rainbow Bluet *(Enallagma antennatum)*
Marsh Bluet *(Enallagma ebrium)*
Eastern Forktail *(Ischnura verticalis)*
Sedge Sprite *(Nehalennia irene)*

Vascular Plants

Swamp Milkweed *(Asclepias incarnata)* SOC
Water Howellia *(Howellia aquatilis)* SOC
Chaffweed *(Centunculus minimus)* SOC
Annual Indian Paintbrush *(Castilleja exilis)* SOC
Short-pointed Flatsedge *(Cyperus acuminatus)* SOC
Slender Bulrush *(Schoenoplectus heterochaetus)* SOC
Tapered Rush *(Juncus acuminatus)* SOC
Spotted Joepye-weed *(Eupatorium maculatum)* SOC
Scarlet Ammannia *(Ammannia robusta)* SOC
Roundleaf Water-hyssop *(Bacopa rotundifolia)* SOC
Bristly Sedge *(Carex comosa)* SOC
Shining Flatsedge *(Cyperus bipartitus)* SOC
Flowering Quillwort *(Lilaea scilloides)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

American Bison *(Bos bison)* SOC
Mountain Lion *(Puma concolor)*
North American Beaver *(Castor canadensis)*

Birds

Baird's Sparrow *(Centronyx bairdii)* SOC
Willet *(Tringa semipalmata)*
Vesper Sparrow *(Pooecetes gramineus)*
Western Meadowlark *(Sturnella neglecta)*
Prairie Falcon *(Falco mexicanus)*
White-throated Swift *(Aeronautes saxatalis)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Brown-headed Cowbird *(Molothrus ater)*

Reptiles

Spiny Softshell *(Apalone spinifera)* SOC
Gophersnake *(Pituophis catenifer)*

Invertebrates

Frigga Fritillary *(Boloria frigga)* SOC
Subarctic Bluet *(Coenagrion interrogatum)* SOC
Horned Clubtail *(Arigomphus cornutus)* PSOC
Pacific Fritillary *(Boloria epithore)*
Western Forktail *(Ischnura perparva)*
Western Pondhawk *(Erythemis collocata)* SOC
Red-disked Alpine *(Erebia discoidalis)* PSOC
Hydaspe Fritillary *(Argynnis hydaspe)*
Viceroy *(Limenitis archippus)*
Western Red Damsel *(Amphiagrion abbreviatum)*

Original Concept Authors

Natureserve Western Ecology Group

Montana Version Authors

T. Luna., C. McIntyre, L. Vance

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Wetland or aquatic bed wetland
Water Regime	Temporarily, seasonally, semi-permanently or permanently flooded
Geographically Isolated Wetland	No

NatureServe Identifiers:

Element Global ID	28571
System Code	CES300.729, North American Arid West Emergent Marsh

ReGAP:
9222: North American Arid West Emergent Marsh

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp. + posters.

Kudray, G.M. and S.V. Cooper. 2006. Montana's Rocky Mountain Front: Vegetation Map and Type Descriptions. Report to the United States Fish and Wildlife Service. Montana Natural Heritage Program, Helena, Montana. 26 pp. plus appendices.

LaBaugh, J. W., T. C. Winter, G. A. Swanson, D. O. Rosenberry, R. D. Nelson, and N. H. Euliss. 1996. "Changes in Atmospheric Circulation Patterns Affect Midcontinent Wetlands Sensitive to Climate". *Limnology and Oceanography*. 41 (5): 864-870.

Mitsch WJ, Gosselink JG. 2000. Freshwater Marshes. In: Wetlands. 3rd Edition. John Wiley and Sons, Inc. 920 p.

- Stewart, R. E. and H. A. Kantrud. 1971. Classification of natural ponds and lakes in the glaciated prairie region. US Department of the Interior, Fish and Wildlife Service, Resource Publication #92, Washington, D.C.

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Citation for data on this website:
Emergent Marsh — North American Arid West Emergent Marsh. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=9222

Geysers and Hot Springs



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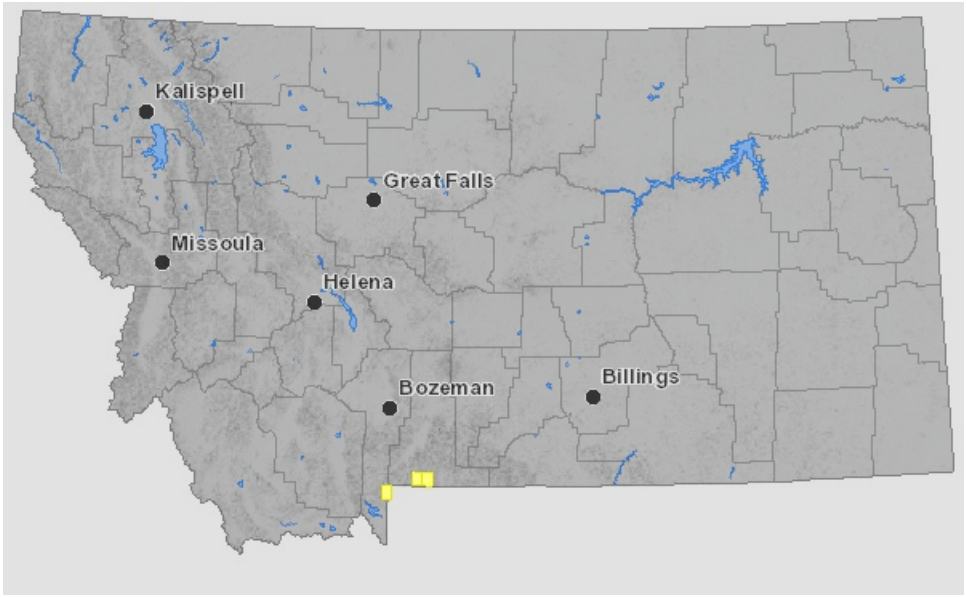
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General Description

Geysers are features resulting from the eruption of steam through a vent on the surface of the earth; hot springs are areas where hot ground water expresses. The land cover class refers to areas where the earth's surface is visibly affected by these features.

Ecological System Distribution

Less than 1 square kilometer is classified as Geysers and Hot Springs in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*





Montana Counties of Occurrence

Gallatin, Park

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Geysers and Hot Springs

ReGAP:
5000: Geysers and Hot Springs

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Citation for data on this website:
Geysers and Hot Springs. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=5000

Open Water



Image Copyright and Usage Information

Provisional State Rank:
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State Rank Reason
Open water state ranks vary by river, stream or water body type.

General Description

Open water systems include lakes, reservoirs, large ponds and the surface areas of rivers. They generally have less than 25% cover of vegetation or bare soil (e.g., point bars or sandbars in rivers).

Diagnostic Characteristics

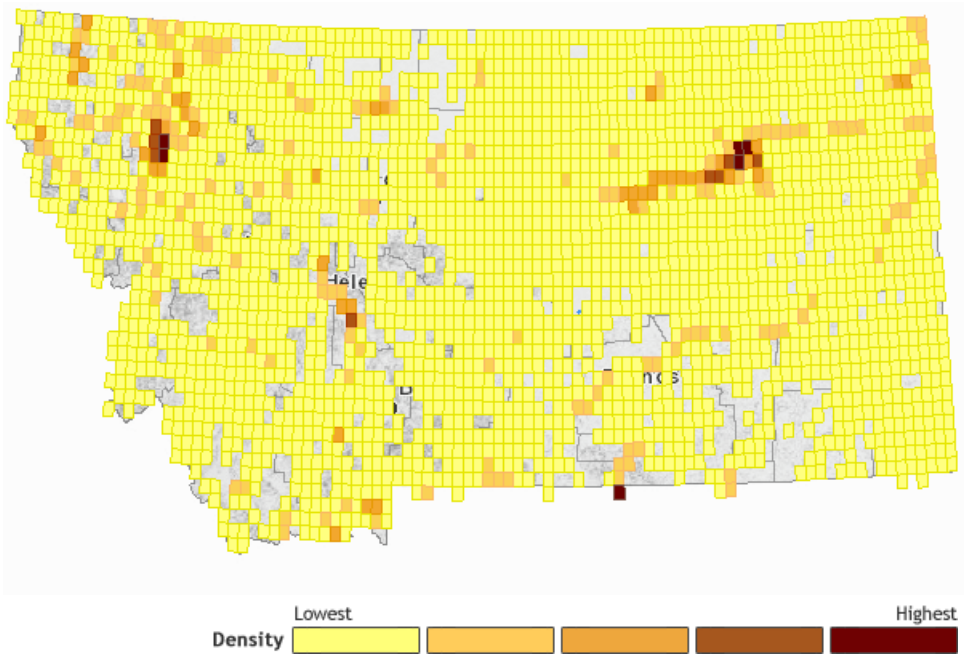
Flowing or still water, absence of emergent vegetation except around margins.

Range

Throughout Montana.

Ecological System Distribution

Approximately 3,712 square kilometers are classified as Open Water in the 2017 Montana Land Cover layers.
Grid on map is based on USGS 7.5 minute quadrangle map boundaries.



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Spatial Pattern

Large patch, linear

Environment

This system includes both natural and manmade water bodies. Although natural lakes and ponds are more common in headwater regions, manmade lakes, reservoirs and ponds are found throughout the state. The medium- to large rivers classified as open water are generally found in low-lying valley bottoms.

Vegetation

Emergent vegetation is not common in open water systems, except around the margins. Species associated with open water systems are those that tolerate permanent or semi-permanent flooding, such as sedges (*Carex spp.*), creeping spikerush (*Eleocharis palustris*), broadleaf cattail (*Typha latifolia*) and bulrush (*Schoenoplectus spp.*). Water sedge (*Carex aquatilis*) is frequently co-dominant with Northwest Territory sedge (*Carex utriculata*). Floating-leaved hydrophytes may be present in shallower areas of lakes, ponds and reservoirs, or in river backwaters. These include water lilies Nymphaea spp.), yellow pondlily (*Nuphar spp.*), buttercup (*Ranunculus spp.*), pondweed (*Potamogeton spp.*) and duckweed (*Lemna species*. Submergents such as common hornwort (*Ceratophyllum demersum*), horned pondweed (*Zannichellia palustris*), mare's tail (*Hippuris vulgaris*) and water milfoil (*Myriophyllum spp.*)are also found in warm, shallow areas of lakes, ponds and reservoirs.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with

the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Northern Myotis *(Myotis septentrionalis)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Eastern Red Bat *(Lasiurus borealis)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	North American Water Vole *(Microtus richardsoni)* PSOC
Western Water Shrew *(Sorex navigator)*	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
North American Beaver *(Castor canadensis)*	Common Muskrat *(Ondatra zibethicus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Raccoon *(Procyon lotor)*
American Mink *(Neogale vison)*	Northern River Otter *(Lontra canadensis)*
Moose *(Alces alces)*	

Birds

Bald Eagle *(Haliaeetus leucocephalus)*	Common Loon *(Gavia immer)* SOC
Horned Grebe *(Podiceps auritus)* SOC	Clark's Grebe *(Aechmophorus clarkii)* SOC
American White Pelican *(Pelecanus erythrorhynchos)* SOC	Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
White-faced Ibis *(Plegadis chihi)* SOC	Trumpeter Swan *(Cygnus buccinator)* SOC
Whooping Crane *(Grus americana)* SOC	Piping Plover *(Charadrius melodus)* SOC
Black-necked Stilt *(Himantopus mexicanus)* SOC	Solitary Sandpiper *(Tringa solitaria)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC	Caspian Tern *(Hydroprogne caspia)* SOC
Common Tern *(Sterna hirundo)* SOC	Forster's Tern *(Sterna forsteri)* SOC
Least Tern *(Sternula antillarum)* SOC	Black Tern *(Chlidonias niger)* SOC
Black Swift *(Cypseloides niger)* SOC	Sedge Wren *(Cistothorus stellaris)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC	Hooded Merganser *(Lophodytes cucullatus)* PSOC
Pacific Loon *(Gavia pacifica)*	Pied-billed Grebe *(Podilymbus podiceps)*
Red-necked Grebe *(Podiceps grisegena)*	Eared Grebe *(Podiceps nigricollis)*
Western Grebe *(Aechmophorus occidentalis)*	Double-crested Cormorant *(Nannopterum auritum)*
Snowy Egret *(Egretta thula)*	Tundra Swan *(Cygnus columbianus)*
Greater White-fronted Goose *(Anser albifrons)*	Snow Goose *(Anser caerulescens)*
Ross's Goose *(Anser rossii)*	Canada Goose *(Branta canadensis)*
Wood Duck *(Aix sponsa)*	Green-winged Teal *(Anas crecca)*
Northern Pintail *(Anas acuta)*	Blue-winged Teal *(Spatula discors)*
Cinnamon Teal *(Spatula cyanoptera)*	Northern Shoveler *(Spatula clypeata)*
Gadwall *(Mareca strepera)*	Eurasian Wigeon *(Mareca penelope)*

American Wigeon *(Mareca americana)*
Canvasback *(Aythya valisineria)*
Ring-necked Duck *(Aythya collaris)*
Lesser Scaup *(Aythya affinis)*
Surf Scoter *(Melanitta perspicillata)*
Common Goldeneye *(Bucephala clangula)*
Common Merganser *(Mergus merganser)*
Ruddy Duck *(Oxyura jamaicensis)*
Northern Harrier *(Circus hudsonius)*
Gyrfalcon *(Falco rusticolus)*
American Coot *(Fulica americana)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
American Avocet *(Recurvirostra americana)*
Lesser Yellowlegs *(Tringa flavipes)*
Whimbrel *(Numenius phaeopus)*
Semipalmated Sandpiper *(Calidris pusilla)*
Least Sandpiper *(Calidris minutilla)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Red-necked Phalarope *(Phalaropus lobatus)*
Ring-billed Gull *(Larus delawarensis)*
Herring Gull *(Larus argentatus)*
Short-billed Gull *(Larus brachyrhynchus)*
Common Nighthawk *(Chordeiles minor)*
Belted Kingfisher *(Megaceryle alcyon)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Marsh Wren *(Cistothorus palustris)*
Northern Waterthrush *(Parkesia noveboracensis)*
Yellow-breasted Chat *(Icteria virens)*
Snow Bunting *(Plectrophenax nivalis)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Bullock's Oriole *(Icterus bullockii)*
Mallard *(Anas platyrhynchos)*
Redhead *(Aythya americana)*
Greater Scaup *(Aythya marila)*
Long-tailed Duck *(Clangula hyemalis)*
White-winged Scoter *(Melanitta deglandi)*
Bufflehead *(Bucephala albeola)*
Red-breasted Merganser *(Mergus serrator)*
Osprey *(Pandion haliaetus)*
Peregrine Falcon *(Falco peregrinus)*
Virginia Rail *(Rallus limicola)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Greater Yellowlegs *(Tringa melanoleuca)*
Spotted Sandpiper *(Actitis macularius)*
Sanderling *(Calidris alba)*
Western Sandpiper *(Calidris mauri)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Snipe *(Gallinago delicata)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
California Gull *(Larus californicus)*
Glaucous Gull *(Larus hyperboreus)*
Snowy Owl *(Bubo scandiacus)*
White-throated Swift *(Aeronautes saxatalis)*
Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
American Dipper *(Cinclus mexicanus)*
Common Yellowthroat *(Geothlypis trichas)*
Song Sparrow *(Melospiza melodia)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Baltimore Oriole *(Icterus galbula)*

Reptiles

Snapping Turtle *(Chelydra serpentina)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*
Spiny Softshell *(Apalone spinifera)* SOC
Painted Turtle *(Chrysemys picta)*
Plains Gartersnake *(Thamnophis radix)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Northern Leopard Frog *(Lithobates pipiens)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Sierran Treefrog *(Pseudacris sierra)*
Columbia Spotted Frog *(Rana luteiventris)*
Great Plains Toad *(Anaxyrus cognatus)* SOC
American Bullfrog *(Lithobates catesbeianus)*
Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Eastern Ringtail *(Erpetogomphus designatus)* SOC
Brimstone Clubtail *(Stylurus intricatus)* SOC
Pronghorn Clubtail *(Phanogomphus graslinellus)* PSOC
Lance-tipped Darner *(Aeshna constricta)* PSOC
Blue-eyed Darner *(Rhionaeschna multicolor)* PSOC
Ringed Emerald *(Somatochlora albicincta)* PSOC
Flame Skimmer *(Libellula saturata)* PSOC
Emma's Dancer *(Argia emma)* PSOC
Familiar Bluet *(Enallagma civile)* PSOC
Horned Clubtail *(Arigomphus cornutus)* PSOC
Pale Snaketail *(Ophiogomphus severus)*
Paddle-tailed Darner *(Aeshna palmata)*
American Emerald *(Cordulia shurtleffii)*
Variegated Meadowhawk *(Sympetrum corruptum)*
River Jewelwing *(Calopteryx aequabilis)*
Northern Spreadwing *(Lestes disjunctus)*
Boreal Bluet *(Enallagma boreale)*
Rainbow Bluet *(Enallagma antennatum)*
Hagen's Bluet *(Enallagma hageni)*
Pacific Forktail *(Ischnura cervula)*
Tadpole Physa *(Physella gyrina)*
Western Pondhawk *(Erythemis collocata)* SOC
Plains Clubtail *(Gomphurus externus)* PSOC
Sinuous Snaketail *(Ophiogomphus occidentis)* PSOC
Lake Darner *(Aeshna eremita)* PSOC
Spiny Baskettail *(Epitheca spinigera)* PSOC
Ocellated Emerald *(Somatochlora minor)* PSOC
Chalk-fronted Corporal *(Ladona julia)* PSOC
Prairie Bluet *(Coenagrion angulatum)* PSOC
Arroyo Bluet *(Enallagma praevarum)* PSOC
Pacific Spiketail *(Zoraena dorsalis)*
Canada Darner *(Aeshna canadensis)*
Common Green Darner *(Anax junius)*
Common Whitetail *(Plathemis lydia)*
Saffron-winged Meadowhawk *(Sympetrum costiferum)*
American Rubyspot *(Hetaerina americana)*
Variable Dancer *(Argia fumipennis)*
Tule Bluet *(Enallagma carunculatum)*
Northern Bluet *(Enallagma annexum)*
River Bluet *(Enallagma anna)*
Western Forktail *(Ischnura perparva)*

Vascular Plants

Beck Water-marigold *(Bidens beckii)* SOC
Watershield *(Brasenia schreberi)* SOC

Pygmy Water-lily *(Nymphaea leibergii)* SOC
Long-sheath Waterweed *(Elodea bifoliata)* SOC
Columbia Water-meal *(Wolffia columbiana)* SOC
Water Star-grass *(Heteranthera dubia)* SOC
American Water-lily *(Nymphaea odorata)*
Water Bulrush *(Schoenoplectus subterminalis)* SOC
Flowering Quillwort *(Lilaea scilloides)* SOC
Guadalupe Water-nymph *(Najas guadalupensis)* SOC
Blunt-leaved Pondweed *(Potamogeton obtusifolius)* SOC

Native Species Occasionally Associated with this Ecological System

Birds

Harlequin Duck *(Histrionicus histrionicus)* SOC
Wilson's Phalarope *(Phalaropus tricolor)*
Chimney Swift *(Chaetura pelagica)* PSOC

Invertebrates

Subarctic Darner *(Aeshna subarctica)* SOC
Boreal Whiteface *(Leucorrhinia borealis)* SOC
Sedge Darner *(Aeshna juncea)* PSOC
Hudsonian Emerald *(Somatochlora hudsonica)* PSOC
Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
Vivid Dancer *(Argia vivida)* PSOC
Variable Darner *(Aeshna interrupta)*
Plains Emerald *(Somatochlora ensigera)*
Hudsonian Whiteface *(Leucorrhinia hudsonica)*
Eight-spotted Skimmer *(Libellula forensis)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Cherry-faced Meadowhawk *(Sympetrum internum)*
White-faced Meadowhawk *(Sympetrum obtrusum)*
Band-winged Meadowhawk *(Sympetrum semicinctum)*
Emerald Spreadwing *(Lestes dryas)*
Spotted Spreadwing *(Lestes congener)*
Marsh Bluet *(Enallagma ebrium)*
Sedge Sprite *(Nehalennia irene)*
Brush-tipped Emerald *(Somatochlora walshii)* SOC
California Darner *(Rhionaeschna californica)* PSOC
Black-tipped Darner *(Aeshna tuberculifera)* PSOC
Crimson-ringed Whiteface *(Leucorrhinia glacialis)* PSOC
Paiute Dancer *(Argia alberta)* PSOC
Alkali Bluet *(Enallagma clausum)* PSOC
Shadow Darner *(Aeshna umbrosa)*
Whitehouse's Emerald *(Somatochlora whitehousei)*
Dot-tailed Whiteface *(Leucorrhinia intacta)*
Twelve-spotted Skimmer *(Libellula pulchella)*
Wandering Glider *(Pantala flavescens)*
Black Meadowhawk *(Sympetrum danae)*
Striped Meadowhawk *(Sympetrum pallipes)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Sweetflag Spreadwing *(Lestes forcipatus)*
Lyre-tipped Spreadwing *(Lestes unguiculatus)*
Eastern Forktail *(Ischnura verticalis)*

Vascular Plants

Roundleaf Water-hyssop *(Bacopa rotundifolia)* SOC

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Open Water

ReGAP:
11: Open Water

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Citation for data on this website:
Open Water. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=11

Alpine-Montane Wet Meadow

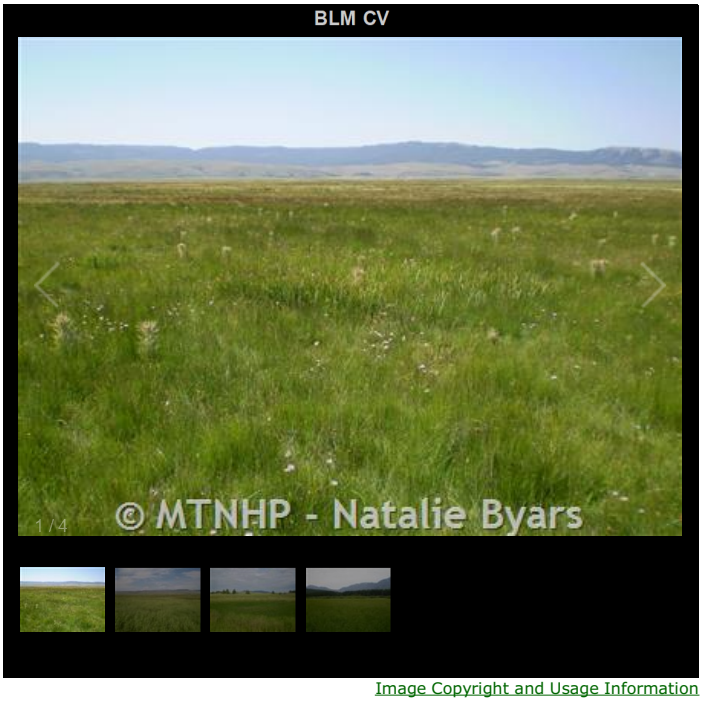


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Provisional State Rank: S4
(see reason below)

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State Rank Reason

This system is widespread from montane to subalpine elevations across Montana, and occurs frequently in protected areas. Climate change threatens the snowmelt-driven hydrology.

General Description

These moderate-to-high-elevation systems are found throughout the Rocky Mountains, dominated by herbaceous species found on wetter sites with very low-velocity surface and subsurface flows. Occurrences range in elevation from montane to alpine at 1,000 to 3,353 meters (3,280-11,000 feet). This system typically occurs in cold, moist basins, seeps and alluvial terraces of headwater streams or as a narrow strip adjacent to alpine lakes (Hansen et al., 1995). Wet meadows are typically found on flat areas or gentle slopes, but may also occur on sub-irrigated sites with slopes up to 10 percent. In alpine regions, sites are typically small depressions located below late-melting snow patches or on snowbeds. The growing season may only last for one to two months. Soils of this system may be mineral or organic. In either case, soils show typical hydric soil characteristics, including high organic content and/or low chroma and redoximorphic features. This system often occurs as a mosaic of several plant associations, often dominated by graminoids such as tufted hairgrass (*Deschampsia caespitosa*), and a diversity of montane or alpine sedges such as small-head sedge (*Carex illota*), small-winged sedge (*Carex microptera*), black alpine sedge (*Carex nigricans*), Holm's Rocky Mountain sedge (*Carex scopulorum*) shortstalk sedge (*Carex podocarpa*) and Payson's sedge (*Carex paysonis*). Drummond's rush (*Juncus drummondii*), Merten's rush (*Juncus mertensianus*), and high elevation bluegrasses (*Poa arctica* and *Poa alpina*) are often present. Forbs such as arrow-leaf groundsel (*Senecio triangularis*), slender-sepal marsh marigold (*Caltha leptosepala*), and spreading globeflower (*Trollius laxus*) often form high cover in higher elevation meadows. Wet meadows are associated with snowmelt and are usually not subjected to high disturbance events such as flooding.

Diagnostic Characteristics

Woody canopy generally less than 10%, total canopy cover more than 10%; subalpine to montane elevations; in snowmelt basins or adjacent to springs, seeps, streams, or lakes, or in areas with high water table; dominated by herbaceous emergent vegetation; organic layer less than 40 cm deep.

Similar Systems

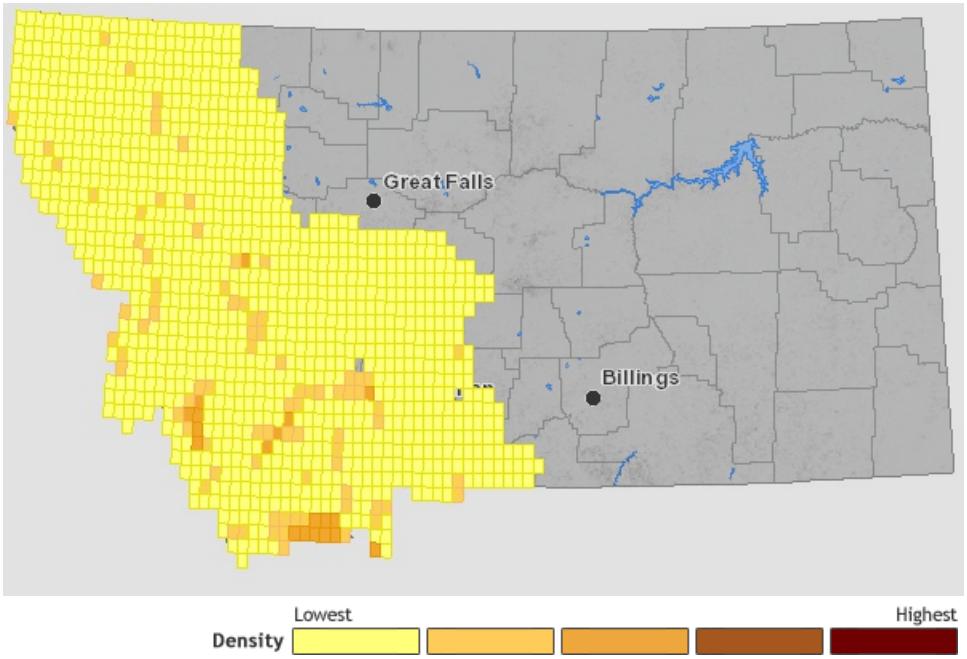
- Alpine Dwarf-Shrubland
- Rocky Mountain Subalpine-Montane Fen
- Rocky Mountain Subalpine-Montane Mesic Meadow

Range

This system is found throughout the Rocky Mountains and Intermountain West regions, ranging in elevation from montane to alpine (1000-3600 m). In Montana, they are most common as high-elevation wetlands in the colder and wetter mountains of the Beartooth-Absaroka range and in northwestern Montana.

Ecological System Distribution

Approximately 1,249 square kilometers are classified as Alpine-Montane Wet Meadow in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Spatial Pattern

Small patch

Environment

Moisture for these wet meadow community types comes from groundwater, stream discharge, overland flow, overbank flow, and precipitation. Salinity and alkalinity are generally low due to the frequent flushing of moisture through the meadow. Depending on the slope, topography, hydrology, soils and substrate, intermittent, ephemeral, or permanent pools may be present. Standing water may be present during some or all of the growing season, with water tables typically remaining at or near the soil surface. Fluctuations of the water table throughout the growing season are not uncommon, however. On drier sites supporting the less mesic types, the late-season water table may be one meter or more below the surface. Soils typically possess a high proportion of organic matter, but this may vary considerably depending on the frequency and magnitude of alluvial deposition. Organic composition of the soil may include a thin layer near the soil surface. Soils may exhibit gleying and/or mottling throughout the profile.

Vegetation

A variety of plant communities are found within this system in Montana. Composition and zonation of wet meadow plant communities represent the competitive abilities, moisture and nutrient requirements, and stress tolerance of anoxic conditions of individual plant species. Variability of water-table depth and reduced soil conditions, soil pH, and saturation duration, strongly influences the distribution and assemblage of species within a wet meadow. Obligate wetland species occur within a fairly restricted range of water-table depth, whereas many common species such as tufted hairgrass, Baltic rush (*Juncus balticus*) and Kentucky bluegrass (*Poa pratensis*) occur over wide ranges. Overlap in ranges of water-table depth for individual species suggests that small changes in hydrology could potentially result in shifts in dominance by different species, and ultimately replacement or loss of certain species.

Many alpine wet meadows throughout the state are dominated by tufted hairgrass, forming a dense stand of tussocks. The tufted hairgrass Temporarily Flooded Herbaceous Alliance has been found at elevations as high as 10,100 feet, but is much more common at lower elevations where it often occupies low gradient areas and slopes less than 15 percent, facing north to northeast (Cooper et al., 1997). This alliance is thought to be found in relatively undisturbed sites (Hansen et al., 1995), while more disturbed sites are dominated by Kentucky bluegrass (*Poa pratensis*), fowl bluegrass (*Poa palustris*), redtop (*Agrostis stolonifera*) and Baltic rush.

In southwestern Montana, wet meadow communities are dominated by species more characteristic of the Middle Rocky Mountains ecoregion, such as Holm's Rocky Mountain sedge (Cooper et al, 1999). Drier sites, especially those where soils and/or hydrology have been disturbed, may be characterized by Baltic rush and clustered field sedge (*Carex praegracilis*) communities. In the Northern Rocky Mountains, shortstalk sedge or Payson's sedge are dominant (Lesica, 2002), often found on slopes that range from zero to eight percent where the growing season lasts only for one to two months. In these northern occurrences, other common graminoids include small-head sedge, lens sedge (*Carex lenticularis*), smallwing sedge, black alpine sedge, beaked sedge (*Carex utriculata*), Drummond's rush, Merten's rush, arctic bluegrass, and alpine bluegrass. Common forbs include woolly pussytoes (*Antennaria lanata*), spreading globeflower, slender-sepal marsh marigold, arrow-leaf groundsel, elephant's head (*Pedicularis groenlandica*), small flowered anemone (*Anemone parviflora*), alpine bistort (*Polygonum viviparum*), Buek's groundsel (*Packera subnuda*), and Rocky Mountain goldenrod *(Solidago multiradiata*). Sibbaldia (*Sibbaldia procumbens*) often occurs in open areas within the turf or open peat. At more montane elevations, extensive shrubby cinquefoil (*Dasiphora fruticosa*) shrublands are frequently found adjacent to this system.

At montane elevations, zonation of wet meadow complexes is evident with sedges such as inflated sedges (*Carex utriculata* and *C. vescicaria*), wooly sedge (*Carex pellita*), Nebraska sedge (*Carex nebrascensis*) and water sedge (*Carex aquatilis*) occupying the wettest zone of the meadow complex. These sedge-dominated communities are typically surrounded by spikerushes (*Eleocharis spp.),* followed by a zone of grasses and forbs such as Baltic rush, bluejoint reedgrass (*Calamagrostis canadensis*), slimstem reedgrass (*Calamagrostis stricta*), pink elephant's head and water ragwort (*Senecio hydrophilus*).

National Vegetation Classification

Switch to Full NVC View

Adapted from US National Vegetation Classification

A0958 *Dasiphora fruticosa ssp. Floribunda* Wet Shrubland Alliance
- **CEGL001106** *Dasiphora fruticosa ssp. floribunda - Carex spp.* Wet Shrubland

A1300 *Carex spectabilis* Subalpine Meadow Alliance
- **CEGL005867** *Carex spectabilis / Arnica x diversifolia* Alpine Meadow

A1361 *Poa glauca* Wet Meadow Alliance

A1374 *Juncus balticus - Juncus mexicanus* Wet Meadow Alliance
- **CEGL001838** *Juncus balticus* Wet Meadow

A1468 *Carex aperta - Carex exsiccata* Wet Meadow Alliance
- **CEGL001801** *Carex aperta* Lowland Wet Meadow

A1698 *Caltha leptosepala - Rhodiola rhodantha* Wet Meadow Alliance
- **CEGL001954** *Caltha leptosepala* Wet Meadow

A3155 *Carex elynoides - Carex rupestris - Kobresia myosuroides* Rocky Mountain Alpine Turf Alliance

A3172 *Juncus drummondii - Juncus parryi - Sibbaldia procumbens* Rocky Mountain Alpine Snowbed Alliance
- **CEGL001904** *Juncus drummondii / Antennaria lanata* Alpine Snowbed
- **CEGL001906** *Juncus parryi - Erigeron ursinus* Alpine Snowbed
- **CEGL005871** *Juncus parryi - Sibbaldia procumbens* Alpine Snowbed

A3435 *Carex limosa - Carex buxbaumii - Triglochin maritima* Alkaline Graminoid Fen Alliance
- **CEGL001769** *Carex saxatilis* Fen

A3437 *Carex lasiocarpa - Carex livida - Dulichium arundinaceum* Acidic Graminoid Fen Alliance

A3770 *Salix wolfii - Salix brachycarpa - Betula glandulosa* Wet Shrubland Alliance
- **CEGL001079** *Betula glandulosa - Carex utriculata* Wet Shrubland
- **CEGL005887** *Betula glandulosa - Carex spp.* Wet Shrubland

A3773 *Cornus sericea - Dasiphora fruticosa ssp. floribunda - Ribes spp.* Wet Shrubland Alliance
- **CEGL001107** *Dasiphora fruticosa ssp. floribunda - Deschampsia caespitosa* Wet Shrubland

A3804 *Carex aquatilis - Carex utriculata - Deschampsia caespitosa* Wet meadow Alliance
- **CEGL001562** *Carex utriculata* Wet Meadow
- **CEGL001599** *Deschampsia caespitosa* Wet Meadow
- **CEGL001601** *Deschampsia caespitosa / Carex nebrascensis* Wet Meadow
- **CEGL001603** *Deschampsia caespitosa / Carex spp.* Wet Meadow
- **CEGL001792** *Carex microptera* Wet Meadow
- **CEGL001802** *Carex aquatilis* Wet Meadow
- **CEGL001803** *Carex aquatilis / Carex utriculata* Wet Meadow
- **CEGL001882** *Deschampsia caespitosa / Caltha leptosepala* Wet Meadow
- **CEGL001889** *Deschampsia caespitosa / Potentilla diversifolia* Wet Meadow

A3805 *Carex nebrascensis - Carex vesicaria - Carex pellita* Wet meadow Alliance

CEGL001809 *Carex pellita* Wet Meadow
CEGL001813 *Carex nebrascensis* Wet Meadow
CEGL002661 *Carex vesicaria* Wet Meadow
A3806 *Carex praegracilis - Carex scopulorum - Eleocharis quinqueflora* Wet Meadow Alliance
CEGL001822 *Carex scopulorum* Wet Meadow
CEGL001823 *Carex scopulorum / Caltha leptosepala* Wet Meadow
CEGL001825 *Carex simulata* Fen
CEGL001836 *Eleocharis quinqueflora* Fen
CEGL002660 *Carex praegracilis* Wet Meadow
A3807 *Eleocharis palustris - Eleocharis acicularis* Marsh Alliance
CEGL001833 *Eleocharis palustris* Marsh
A3808 *Glyceria grandis - Glyceria striata - Glyceria borealis* Wet Meadow Alliance
CEGL001569 *Glyceria borealis* Wet Meadow
CEGL003429 *Glyceria grandis* Wet Meadow
A3809 *Heracleum maximum - Veratrum californicum - Rorippa spp.* Wet Meadow Alliance
CEGL001940 *Heracleum maximum / Rudbeckia occidentalis* Wet Meadow
CEGL005857 *Heracleum maximum* Wet Meadow
A3810 *Saxifraga odontoloma - Senecio triangularis - Mertensia ciliata* Wet Meadow Alliance
CEGL001987 *Senecio triangularis* Wet Meadow
A3812 *Mimulus spp. - Primula parryi - Dodecatheon redolens* Wet Meadow Alliance
A3815 *Calamagrostis canadensis - Calamagrostis stricta - Poa palustris* Wet Meadow Alliance
CEGL001559 *Calamagrostis canadensis* Western Wet Meadow
CEGL001659 *Poa palustris* Wet Meadow
A3832 *Carex nigricans - Sibbaldia procumbens - Trollius laxus* Wet Meadow Alliance
CEGL001816 *Carex nigricans* Wet Meadow
CEGL005824 *Carex nigricans / Sibbaldia procumbens* Wet Meadow
CEGL005858 *Trollius laxus / Parnassia fimbriata* Wet Meadow
A3892 *Equisetum fluviatile - Equisetum x ferrissii* Marsh Alliance
CEGL002746 *Equisetum fluviatile* Marsh
A3930 *Eleocharis palustris - Eleocharis rostellata* Alkaline-Saline Marsh Alliance
CEGL003428 *Eleocharis rostellata* Marsh
A3948 *Valeriana sitchensis - Luzula glabrata var. hitchcockii - Xerophyllum tenax* Subalpine Mesic Meadow Alliance
CEGL001998 *Valeriana sitchensis / Veratrum viride* Meadow
A3953 *Festuca arizonica - Muhlenbergia montana - Poa fendleriana* Southern Rocky Mountain Montane Grassland Alliance
A4165 *Poa secunda - Muhlenbergia richardsonis - Carex douglasii* Moist Meadow Alliance

*Disclaimer: Alliances and Associations have not yet been finalized in the National Vegetation Classification (NVC) standard. A complete version of the NVC for Montana can be found here.

Dynamic Processes

Communities associated with this ecological system are adapted to soils that may be flooded or saturated throughout the growing season. They may also occur on areas with soils that are only saturated early in the growing season, or intermittently during heavy convective storms in summer. Most appear to be relatively stable types, although in some areas these may be impacted by intensive livestock grazing.

Management

Herbaceous wet meadows that have experienced disturbance like excessive grazing or heavy recreational pressure are often invaded by non-native vegetation and are difficult to restore. Typical successional plants to invade disturbed areas include Nebraska sedge (*Carex nebrascensis*), Baltic rush (*Juncus balticus*), and Kentucky bluegrass (*Poa pratensis*). To minimize disturbance, light to moderate grazing can be restricted to periods when the soil is completely dry and can be timed to occur after the maturation of native seedheads (Hansen et al., 1995). Recreational use should be diverted away from these meadows, and pack stock should be fed certified weed-free or pelletized feed.

Restoration Considerations

Large scale restoration projects within this system are usually mine lands reclamation projects in non-protected areas. Small scale projects may occur in areas of heavy recreational use or areas of past intensive grazing.

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana

covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Yuma Myotis *(Myotis yumanensis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Bog Lemming *(Synaptomys borealis)* SOC
Wolverine *(Gulo gulo)* SOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC
Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC
Masked Shrew *(Sorex cinereus)*
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*
Western Heather Vole *(Phenacomys intermedius)*
Montane Vole *(Microtus montanus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*
Least Weasel *(Mustela nivalis)*
American Mink *(Neogale vison)*
American Badger *(Taxidea taxus)*
Elk *(Cervus canadensis)*
Pronghorn *(Antilocapra americana)*
Bighorn Sheep *(Ovis canadensis)*
Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Hoary Marmot *(Marmota caligata)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
North American Water Vole *(Microtus richardsoni)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
American Pika *(Ochotona princeps)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
North American Beaver *(Castor canadensis)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
Marten *(Martes americana)*
Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*
Northern River Otter *(Lontra canadensis)*
Moose *(Alces alces)*
Mountain Goat *(Oreamnos americanus)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
American Bittern *(Botaurus lentiginosus)* SOC
Great Blue Heron *(Ardea herodias)* SOC
Black-crowned Night Heron *(Nycticorax nycticorax)* SOC
White-faced Ibis *(Plegadis chihi)* SOC
Trumpeter Swan *(Cygnus buccinator)* SOC
Ferruginous Hawk *(Buteo regalis)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
LeConte's Sparrow *(Ammospiza leconteii)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC
Black Rosy-Finch *(Leucosticte atrata)* SOC
Gray-crowned Rosy-Finch *(Leucosticte tephrocotis)* SOC
Barrow's Goldeneye *(Bucephala islandica)* PSOC
Hooded Merganser *(Lophodytes cucullatus)* PSOC
Western Screech-Owl *(Megascops kennicottii)* PSOC
Great Gray Owl *(Strix nebulosa)* PSOC
Boreal Owl *(Aegolius funereus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Eared Grebe *(Podiceps nigricollis)*
Western Grebe *(Aechmophorus occidentalis)*
Double-crested Cormorant *(Nannopterum auritum)*
Canada Goose *(Branta canadensis)*
Green-winged Teal *(Anas crecca)*
Northern Pintail *(Anas acuta)*
Cinnamon Teal *(Spatula cyanoptera)*
Northern Shoveler *(Spatula clypeata)*
Gadwall *(Mareca strepera)*
American Wigeon *(Mareca americana)*
Mallard *(Anas platyrhynchos)*
Canvasback *(Aythya valisineria)*
Redhead *(Aythya americana)*
Ring-necked Duck *(Aythya collaris)*
Lesser Scaup *(Aythya affinis)*
Common Goldeneye *(Bucephala clangula)*
Bufflehead *(Bucephala albeola)*
Common Merganser *(Mergus merganser)*
Ruddy Duck *(Oxyura jamaicensis)*
Northern Harrier *(Circus hudsonius)*
Cooper's Hawk *(Accipiter cooperii)*
Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*
Peregrine Falcon *(Falco peregrinus)*
Gyrfalcon *(Falco rusticolus)*
Prairie Falcon *(Falco mexicanus)*
Spruce Grouse *(Canachites canadensis)*
Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*
Virginia Rail *(Rallus limicola)*
Sora *(Porzana carolina)*
American Coot *(Fulica americana)*
Sandhill Crane *(Antigone canadensis)*
Black-bellied Plover *(Pluvialis squatarola)*
American Golden-Plover *(Pluvialis dominica)*
Semipalmated Plover *(Charadrius semipalmatus)*
Killdeer *(Charadrius vociferus)*
American Avocet *(Recurvirostra americana)*
Greater Yellowlegs *(Tringa melanoleuca)*
Lesser Yellowlegs *(Tringa flavipes)*
Spotted Sandpiper *(Actitis macularius)*
Semipalmated Sandpiper *(Calidris pusilla)*
Western Sandpiper *(Calidris mauri)*
Baird's Sandpiper *(Calidris bairdii)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Snipe *(Gallinago delicata)*
Wilson's Phalarope *(Phalaropus tricolor)*
Red-necked Phalarope *(Phalaropus lobatus)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
Ring-billed Gull *(Larus delawarensis)*
Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Common Nighthawk *(Chordeiles minor)*
White-throated Swift *(Aeronautes saxatalis)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Calliope Hummingbird *(Selasphorus calliope)*
Belted Kingfisher *(Megaceryle alcyon)*
Northern Flicker *(Colaptes auratus)*
Olive-sided Flycatcher *(Contopus cooperi)*
Willow Flycatcher *(Empidonax traillii)*
Dusky Flycatcher *(Empidonax oberholseri)*
Tree Swallow *(Tachycineta bicolor)*
Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Bank Swallow *(Riparia riparia)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*
Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*
Northern House Wren *(Troglodytes aedon)*
Marsh Wren *(Cistothorus palustris)*
Western Bluebird *(Sialia mexicana)*
Mountain Bluebird *(Sialia currucoides)*
American Robin *(Turdus migratorius)*
American Pipit *(Anthus rubescens)*
Cedar Waxwing *(Bombycilla cedrorum)*
Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Orange-crowned Warbler *(Leiothlypis celata)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Yellow Warbler *(Setophaga petechia)*
Yellow-rumped Warbler *(Setophaga coronata)*
American Redstart *(Setophaga ruticilla)*
Northern Waterthrush *(Parkesia noveboracensis)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Common Yellowthroat *(Geothlypis trichas)*
Wilson's Warbler *(Cardellina pusilla)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
Clay-colored Sparrow *(Spizella pallida)*
Vesper Sparrow *(Pooecetes gramineus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Fox Sparrow *(Passerella iliaca)*
Song Sparrow *(Melospiza melodia)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Harris's Sparrow *(Zonotrichia querula)*
Dark-eyed Junco *(Junco hyemalis)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Rusty Blackbird *(Euphagus carolinus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Bullock's Oriole *(Icterus bullockii)*
House Finch *(Haemorhous mexicanus)*
White-winged Crossbill *(Loxia leucoptera)*
American Goldfinch *(Spinus tristis)*
Redpoll *(Acanthis flammea)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

- Western Toad *(Anaxyrus boreas)* SOC
- Long-toed Salamander *(Ambystoma macrodactylum)*
- Western Tiger Salamander *(Ambystoma mavortium)*
- Boreal Chorus Frog *(Pseudacris maculata)*
- Sierran Treefrog *(Pseudacris sierra)*
- Columbia Spotted Frog *(Rana luteiventris)*

Invertebrates

- Frigga Fritillary *(Boloria frigga)* SOC
- Gillette's Checkerspot *(Euphydryas gillettii)* SOC
- Brush-tipped Emerald *(Somatochlora walshii)* SOC
- Boreal Whiteface *(Leucorrhinia borealis)* SOC
- Subarctic Bluet *(Coenagrion interrogatum)* SOC
- Giant Sulphur *(Colias gigantea)* PSOC
- Freija Fritillary *(Boloria freija)* PSOC
- Red-spotted Admiral *(Limenitis arthemis)* PSOC
- Red-disked Alpine *(Erebia discoidalis)* PSOC
- Colorado Alpine *(Erebia callias)* PSOC
- White-veined Arctic *(Oeneis bore)* PSOC
- Melissa Arctic *(Oeneis melissa)* PSOC
- Lance-tipped Darner *(Aeshna constricta)* PSOC
- Lake Darner *(Aeshna eremita)* PSOC
- Sedge Darner *(Aeshna juncea)* PSOC
- Zigzag Darner *(Aeshna sitchensis)* PSOC
- Mountain Emerald *(Somatochlora semicircularis)* PSOC
- Red-veined Meadowhawk *(Sympetrum madidum)* PSOC
- Vivid Dancer *(Argia vivida)* PSOC
- Bronze Copper *(Tharsalea hyllus)*
- Purplish Copper *(Tharsalea helloides)*
- Mariposa Copper *(Tharsalea mariposa)*
- Greenish Blue *(Icaricia saepiolus)*
- Hydaspe Fritillary *(Argynnis hydaspe)*
- Bog Fritillary *(Boloria eunomia)*
- Relict Fritillary *(Boloria kriemhild)*
- Pacific Fritillary *(Boloria epithore)*
- Myrina Fritillary *(Boloria myrina)*
- Field Crescent *(Phyciodes pulchella)*
- Common Wood-Nymph *(Cercyonis pegala)*
- Magdalena Alpine *(Erebia magdalena)*
- Canada Darner *(Aeshna canadensis)*
- Variable Darner *(Aeshna interrupta)*
- Paddle-tailed Darner *(Aeshna palmata)*
- American Emerald *(Cordulia shurtleffii)*
- Whitehouse's Emerald *(Somatochlora whitehousei)*
- Hudsonian Whiteface *(Leucorrhinia hudsonica)*
- Belted Whiteface *(Leucorrhinia proxima)*
- Cherry-faced Meadowhawk *(Sympetrum internum)*
- White-faced Meadowhawk *(Sympetrum obtrusum)*
- Striped Meadowhawk *(Sympetrum pallipes)*
- Emerald Spreadwing *(Lestes dryas)*
- Sweetflag Spreadwing *(Lestes forcipatus)*
- Spotted Spreadwing *(Lestes congener)*
- Northern Spreadwing *(Lestes disjunctus)*
- Lyre-tipped Spreadwing *(Lestes unguiculatus)*
- Boreal Bluet *(Enallagma boreale)*
- Northern Bluet *(Enallagma annexum)*
- Sedge Sprite *(Nehalennia irene)*

Vascular Plants

- Low Braya *(Braya humilis)* SOC
- Northwestern Thelypody *(Thelypodium paniculatum)* SOC
- Slender Thelypody *(Thelypodium sagittatum)* SOC
- Small-flowered Pennycress *(Noccaea parviflora)* SOC
- Hutchinsia *(Hornungia procumbens)* SOC
- Water Howellia *(Howellia aquatilis)* SOC
- Glaucous Gentian *(Gentiana glauca)* SOC
- Hiker's Gentian *(Gentianopsis simplex)* SOC
- Marsh Felwort *(Lomatogonium rotatum)* SOC
- Island Koenigia *(Koenigia islandica)* SOC
- Mealy Primrose *(Primula incana)* SOC
- Alkali Primrose *(Primula alcalina)* SOC
- Straightbeak Buttercup *(Ranunculus orthorhynchus)* SOC
- Northern Buttercup *(Ranunculus pedatifidus)* SOC
- Alpine Meadowrue *(Thalictrum alpinum)* SOC
- Platte Cinquefoil *(Potentilla plattensis)* SOC
- Barratt's Willow *(Salix barrattiana)* SOC
- Yellow Marsh Saxifrage *(Saxifraga hirculus)* SOC
- Primrose Monkeyflower *(Mimulus primuloides)* SOC
- Hudson's Bay Bulrush *(Trichophorum alpinum)* SOC
- Sheathed Cotton-grass *(Eriophorum callitrix)* SOC
- Large-fruited Kobresia *(Kobresia sibirica)* SOC
- Simple Kobresia *(Kobresia simpliciuscula)* SOC
- Tufted Club-rush *(Trichophorum cespitosum)* SOC
- Three-flowered Rush *(Juncus triglumis var. albescens)* SOC
- Coville's Rush *(Juncus covillei)* SOC
- Small Tofieldia *(Tofieldia pusilla)* SOC
- California False-hellebore *(Veratrum californicum)* SOC
- Adder's Tongue *(Ophioglossum pusillum)* SOC
- High Northern Buttercup *(Ranunculus hyperboreus)* PSOC

Native Species Occasionally Associated with this Ecological System

Mammals

- Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
- Columbia Plateau Pocket Mouse *(Perognathus parvus)* SOC
- Fisher *(Pekania pennanti)* SOC
- Spotted Bat *(Euderma maculatum)* PSOC
- Snowshoe Hare *(Lepus americanus)*
- Mountain Lion *(Puma concolor)*
- Mule Deer *(Odocoileus hemionus)*
- White-tailed Deer *(Odocoileus virginianus)*

Birds

- Black-necked Stilt *(Himantopus mexicanus)* SOC
- Black Tern *(Chlidonias niger)* SOC
- Tundra Swan *(Cygnus columbianus)*
- Blue-winged Teal *(Spatula discors)*
- Willet *(Tringa semipalmata)*
- Western Wood-Pewee *(Contopus sordidulus)*
- Hammond's Flycatcher *(Empidonax hammondii)*
- Black-billed Magpie *(Pica hudsonia)*
- Mountain Chickadee *(Poecile gambeli)*
- Red-eyed Vireo *(Vireo olivaceus)*
- Chipping Sparrow *(Spizella passerina)*
- Western Meadowlark *(Sturnella neglecta)*
- Common Grackle *(Quiscalus quiscula)*
- Red Crossbill *(Loxia curvirostra)*
- Pine Siskin *(Spinus pinus)*

Reptiles

- Painted Turtle *(Chrysemys picta)*

Amphibians

- Northern Leopard Frog *(Lithobates pipiens)* SOC
- American Bullfrog *(Lithobates catesbeianus)*

Invertebrates

- Subarctic Darner *(Aeshna subarctica)* SOC
- Spiny Baskettail *(Epitheca spinigera)* PSOC
- Ringed Emerald *(Somatochlora albicincta)* PSOC
- Hudsonian Emerald *(Somatochlora hudsonica)* PSOC
- Ocellated Emerald *(Somatochlora minor)* PSOC
- Viceroy *(Limenitis archippus)*
- Dot-tailed Whiteface *(Leucorrhinia intacta)*
- Eight-spotted Skimmer *(Libellula forensis)*

Twelve-spotted Skimmer *(Libellula pulchella)*
Four-spotted Skimmer *(Libellula quadrimaculata)*
Variegated Meadowhawk *(Sympetrum corruptum)*
Saffron-winged Meadowhawk *(Sympetrum costiferum)*
Black Meadowhawk *(Sympetrum danae)*
Band-winged Meadowhawk *(Sympetrum semicinctum)*
Autumn Meadowhawk *(Sympetrum vicinum)*
Taiga Bluet *(Coenagrion resolutum)*
Tule Bluet *(Enallagma carunculatum)*
Pacific Forktail *(Ischnura cervula)*
Western Forktail *(Ischnura perparva)*
Tadpole Physa *(Physella gyrina)*

Vascular Plants

Slender Indian Paintbrush *(Castilleja gracillima)* SOC

Original Concept Authors

NatureServe Western Ecology Group

Montana Version Authors

L. Vance, C. McIntyre, T. Luna

Version Date

1/1/2017

References

Classification and Map Identifiers

Cowardin Wetland Classification:

System	Palustrine
Class	Emergent
Water Regime	Seasonally Flooded/Saturated
Geographically Isolated Wetland	Sometimes

NatureServe Identifiers:

Element Global ID	28648
System Code	CES306.812, Rocky Mountain Alpine-Montane Wet Meadow

National Land Cover Dataset:
95: Emergent Herbaceous Wetland

ReGAP:
9217: Rocky Mountain Alpine-Montane Wet Meadow

Additional References Legend: View Online Publication

Do you know of a citation we're missing?

Brown RW, Chambers JC, Wheeler RM. 1988. Adaptations of Deschampsia cespitosa (tufted hairgrass) for revegetation of high elevation disturbances: some selection criteria. High altitude revegetation workshop no. 8: Proceedings; 1988 March 3-4; Fort Collins, CO. Information Series No. 59. Fort Collins, CO: Colorado Water Resources Research Institute; p 147-72.

- Brown RW, Chambers JC. 1990. Reclamation practices in high-mountain ecosystems. In: Schmidt WC, McDonald KJ, editors. Proceedings--symposium on whitebark pine ecosystems: ecology and management of a high-mountain resource; 1989 March 29-31; Bozeman, MT. General Technical Report. INT-270. Ogden, UT: U.S. Department of Agriculture. Forest Service. Intermountain Research Station; p 329-34.
- Brown RW, Johnston RS. 1978. Rehabilitation of a high elevation mine disturbance. In: Kenney ST, editor. Proceedings: High altitude workshop no. 3. Environmental Res. Cent. Inf. Series No. 28. Fort Collins, CO: Colorado State University; p 116-30.
- Buckner D.L. and J.W. Marr. 1990. Use of sodding in alpine vegetation. Pp 501-508 in: Society for Ecological Restoration, H. Glenn Hughes, and Thomas M. Bonnicksen. 1990. Restoration ''89: the new management challenge : first annual meeting of the Society for Ecological Restoration, January 16-20, 1989, Oakland, California. Madison, Wis: Society for Ecological Restoration, The University of Wisconsin Arboretum.
- Chambers JC, MacMahon JA, Brown RW. 1987. Germination characteristics of alpine grasses and forbs: a comparison of early and late seral dominants with reclamation potential. Reclamation and Revegetation Research(6):235-49.

Chambers, Jeanne C., James A. MacMahon, and Ray W. Brown. 1990. "Alpine Seedling Establishment: The Influence of Disturbance Type". *Ecology.* 71 (4): 1323-1341.

- Cooper, D. J. 1986b. Community structure and classification of Rocky Mountain wetland ecosystems. Pages 66-147 in: J. T. Windell, et al. An ecological characterization of Rocky Mountain montane and subalpine wetlands. USDI Fish & Wildlife Service Biological Report 86(11). 298 pp.

Cooper, S.V., C. Jean, and B.L. Heidel. 1999. Plant associations and related botanical inventory of the Beaverhead Mountains Section, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena. 235 pp.

Cooper, Stephen V., Peter Lesica, and Deborah S. Page-Dumroese. 1995. Plant community classification for alpine vegetation on the Beaverhead National Forest, Montana. Ogden, UT (324 25th Street, Ogden 84401): U.S. Dept. of Agriculture, Forest Service, Intermountain Research Station.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Washington, D.C.: U.S. Fish and Wildlife Service. 103pp.

Jonas, R. 1962. Population dynamics and ecology of Merriam's turkey. Mont. Dept. Fish & Game, Final Rep. Proj. No. W-91-R-4 Job No. II-B.

Kittel, G., E. Van Wie, M. Damm, R. Rondeau, S. Kettler, A. McMullen, and J. Sanderson. 1999. A classification of riparian and wetland plant associations of Colorado: A user's guide to the classification project. Colorado Natural Heritage Program, Colorado State University, Fort Collins CO. 70 pp. plus appendices.

Lesica, P. 2002. A flora of Glacier National Park, Montana. Oregon State Univeristy Press, Corvallis. 512 pp.

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Citation for data on this website:
Alpine-Montane Wet Meadow — Rocky Mountain Alpine-Montane Wet Meadow. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=9217

Steep Alpine Stream

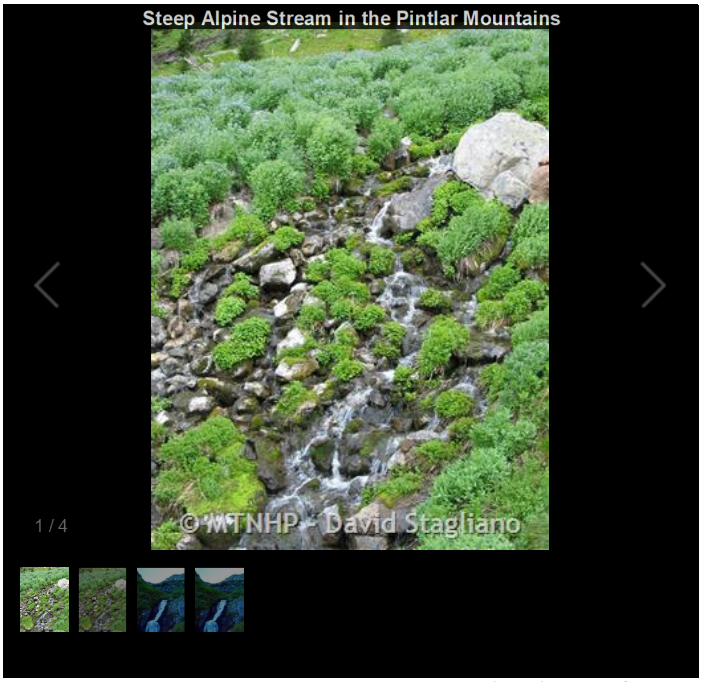


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State Rank Reason

The number of viable occurrences is unknown, but abundant. These stream ecosystems are found across the mountain ranges of Western North America and are usually on protected lands managed by the National Park Service or the United States Forest Service. The state's concern over this ecosystem has increased recently because they may contain Species of Concern or candidate species for the Endangered Species Act, like the Lednian Meltwater stonefly (G1S1) and the western glacier stonefly (G2S1) from the glacier-fed streams of Glacier Park. Loss of glaciers may put this system at higher risk.

General Description

This system is found in the high elevation (usually >2000m) mountainous streams of the Northern and Middle Rockies Ecoregions, including the isolated moutain ranges. Elevation ranges from as low as 6,600 ft in northwestern Montana to 10,500 feet in southwestern Montana. Streams are steep, small and >50% open canopied (1st, 2nd order, avg. wetted width <3m, avg. summer temp <10°C). The sub class E001L are reaches connected to alpine cirque lakes and may have salmonids present if the lake has been stocked. These will generally be Yellowstone or westslope Cutthroat trout, but sometimes brook trout, golden trout or rainbows.

Diagnostic Characteristics

The smallest E001 alpine creeks are steep, shallow and fishless, containing Rocky Mountain Tailed Frogs as the only vertebrate species. The E002 alpine creeks are more gradual gradient, shallow and fishless. If fish are present in the drainage or have access to the streams from a lake outlet, they will typically be members of a single species assemblage dominated by westslope or Yellowstone cutthroat trout depending on the drainage, or by the introduced golden or brook trout. This assemblage is dictated by the fish stocking history

of the high mountain lakes in the area. Native species management plans have been developed by management agencies, but high mountain lakes are often still stocked with introduced species. Sufficient downstream barriers (waterfalls, boulder step-drops) usually exist to prevent the dispersal of mottled sculpin into this system and impede the colonization of introduced species (brook trout) into the pure cutthroat trout areas. The (L) subclass of this ecological system denotes up or downstream connectors to alpine lakes. These can have very different habitat within 100m of the lake. The diverse Macroinvertebrate community of coldwater stenotherms consists primarily of the Mountain Stream and Medium Mountain Stream Assemblages. The community indicator species are characterized by intolerant, shredder, and scraper mayfly, stonefly and caddisfly species (*Drunella spinifera, Epeorus grandis, Yoraperla, Soliperla, Zapada frigida,* many *Leuctridae* and *Capniidae* species, *Oligophlebodes,* and numerous predatory *Rhyacophila spp.* and the cold-water dipterans (*Thaumalidae, Bibiocephela,* and *Glutops*). At more downstream occurrences, where the alpine mountain streams begin to lose elevation/gradient and warm (>10 °C), a dominance shift occurs to the Medium Mountain Stream Assemblage.

Range

This system occurs at or above treeline throughout the Rocky Mountain ranges, and east into the mountain island ranges of central and south-central Montana. In Montana, the Alpine Stream community is described from ~30 sites within the Northern and Middle Rockies, including the isolated ranges. These include streams in the Beartooths, Absorokas, Elkhorns, Big Belts, Little Belts, Crazys, Gallatin-Madison-Bridgers, Anaconda-Pintlers, Pioneers and in Glacier National Park. These ecosystems typically fall within the boundaries of US Forest Service, National Park lands and are often within wilderness areas.

Spatial Pattern

Linear

Dynamic Processes

Alpine ecosystems are tied to snowpack, climate, groundwater discharge, and water quality. Impacts to these parameters, as well as their natural variability, will have a corresponding effect on alpine biological and ecological systems. Long-term drought, warming temperatures and recreational disturbances in fragile alpine ecosystems are the common impacts on water quantity at alpine stream sites in the northwestern United States.

Management

Due to the high altitude nature of these streams anthropogenic disturbances are usually minimal, but may include high impact recreational use (e.g. stock use, campsites, stream crossings). This stream type may be most threatened by climate change. The communities inhabiting these streams are glacial relicts taking refuge from the last ice age and are confined to these high elevations due to temperature requirements. If these cold-water dependent communities experience increased unsuitable temperatures from snow pack and glacier reductions they have nowhere to go. Due to the inherent inaccessibility of these systems few have been inventoried, but some may contain Species of Concern, like the Lednian Meltwater stonefly (G1S1) and the western glacier stonefly (G2S1) from the glacier-fed streams of Glacier Park. The fish assemblage is dictated by the fish stocking history of the high mountain lakes in the adjacent area. Native species management plans are in place by management agencies, but high mountain lakes are often still stocked with introduced species. Sufficient downstream barriers (waterfalls, boulder step-drops) usually exist to prevent the dispersal of mottled sculpin into this system and impede the colonization of introduced species (brook trout) into the pure cutthroat trout areas.

References

Classification and Map Identifiers

ReGAP:
1510: Steep Alpine Stream

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Citation for data on this website:
Steep Alpine Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1510

Low Alpine Stream



Image Copyright and Usage Information

Provisional State Rank: S5
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State Rank Reason

The number of viable occurrences is unknown, but abundant. These stream ecosystems are found across the mountain ranges of Western North America, often on lands managed by the National Park Service or United States Forest Service.

General Description

This system is found in the high elevation (usually >2000m) mountainous streams of the Northern and Middle Rockies Ecoregions, including the isolated moutain ranges. Elevation ranges from as low as 6,600 ft in northwestern Montana to 10,500 feet in southwestern Montana. Streams are small, gradual gradients and >50% open canopied (1st, 2nd order, avg. wetted width <2m, avg. summer temp <10°C). The (L) subclass of this ecological system denotes up or downstream connections to natural lakes which can have very different habitat for the first 100 m; lake outlets can hold some unique assemblages of aquatic insects (Newell, pers. comm. 2009). The sub class E002L are reaches connected to alpine cirque lakes and may have salmonids present if the lake has been stocked. These will usually be Yellowstone or westslope Cutthroat trout, but sometimes brook trout, golden trout or rainbows.

Diagnostic Characteristics

Many of the smallest alpine creeks are steep, shallow and fishless, containing Rocky Mountain Tailed Frogs as the only vertebrate species. The low gradient (E002) alpine streams are more gradual gradient, shallow and fishless. If fish are present in the drainage or have access to the streams from a lake outlet, they will typically be members of a single species assemblage dominated by westslope or Yellowstone cutthroat trout depending on the drainage, or by the introduced golden or brook trout. This assemblage is dictated by the fish stocking history of the high mountain lakes in the area. Native species management plans have been

developed by state agencies, but high mountain lakes are often still stocked with introduced salmonid species. Sufficient downstream barriers (waterfalls, boulder step-drops) usually exist to prevent the dispersal of mottled sculpin into this system and impede the colonization of introduced species (brook trout) into the pure cutthroat trout areas. The (L) subclass of this ecological system denotes up or downstream connectors to alpine lakes. These can have very different habitat within 100m of the lake. The diverse Macroinvertebrate community of coldwater stenotherms consists primarily of the Mountain Stream and Medium Mountain Stream Assemblages. The community indicator species are characterized by intolerant, shredder, and scraper mayfly, stonefly and caddisfly species (*Drunella spinifera, Epeorus grandis, Yoraperla, Soliperla, Zapada frigida,* many *Leuctridae* and *Capniidae* species, *Oligophlebodes,* and numerous predatory *Rhyacophila spp.* and the cold-water dipterans (*Thaumalidae, Bibiocephela,* and *Glutops*). At more downstream occurrences, where the alpine mountain streams begin to lose elevation/gradient and warm (>10 °C), a dominance shift occurs to the Medium Mountain Stream Assemblage.

Range

This system occurs at or above treeline throughout the Rocky Mountain ranges, and east into the mountain island ranges of central and south-central Montana. In Montana, the Alpine Stream community is described from ~30 sites within the Northern and Middle Rockies, including the isolated ranges. These include streams in the Beartooths, Absorokas, Elkhorns, Big Belts, Little Belts, Crazys, Gallatin-Madison-Bridgers, Anaconda-Pintlers, Pioneers and in Glacier National Park. These ecosystems typically fall within the boundaries of US Forest Service and National Park lands, often in wilderness areas.

Spatial Pattern

Linear

Dynamic Processes

Alpine ecosystems are tied to snowpack, climate, groundwater discharge, and water quality. Impacts to these parameters as well as their natural variability will have a corresponding effect on alpine biological ecological systems. Long-term drought, warming temperatures and heavy recreation in fragile alpine ecosystems are the common impacts on water quantity at alpine stream sites in the north western United States.

Management

Due to the high altitude nature of these streams anthropogenic disturbances are usually minimal, but may include high impact recreational use (e.g. stock use, campsites, stream crossings). This ecological type may also be threatened by global warming. The communities inhabiting these streams are often glacial relicts taking refuge from the last ice age and are confined to these high elevations due to temperature requirements. If these cold-water dependent communities experience increased temperatures from diminished snow pack and glaciers, they have nowhere to go. Due to the inherent inaccessibility of these systems few have been inventoried, but some may contain Species of Concern, like the Lednian Meltwater stonefly (G1S1) and the western glacier stonefly (G2S1) from the glacier-fed streams of Glacier Park. The biological assemblage is dictated by the fish stocking history of the high mountain lakes in the area. Native species management plans are in place by management agencies, but high mountain lakes are often still stocked with introduced species. Sufficient downstream barriers (waterfalls, boulder step-drops) usually exist to prevent the dispersal of mottled sculpin into this system and impede the colonization of introduced species (brook trout) into the pure cutthroat trout areas.

References

Classification and Map Identifiers

ReGAP:
1511: Low Alpine Stream

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Citation for data on this website:
Low Alpine Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1511

Northwestern Great Plains Intermittent Stream

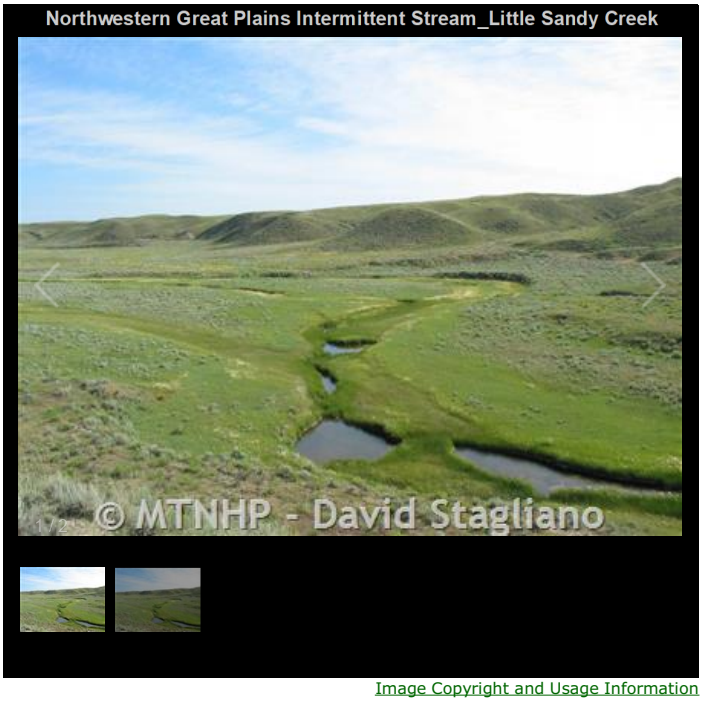


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State Rank Reason

The number of quality occurrences in the state is unknown, but probably fairly common. This is a difficult community type to quantify given the past years of drought in the state and the tenuous nature of this aquatic system. Intermittent pools containing the Ostracoda group should be inventoried for unique crustaceans, such as fairy or tadpole shrimp.

General Description

This ecological system is widely distributed throughout the coulees, small streams (1st to 3rd order) and headwaters of Medium Prairie Rivers (B005) and Great Plains Prairie Streams (C005) within the Northwestern Great Plains Ecoregion. These are small, warm-water, low to moderate gradient and elevation (900-1200m) intermittent streams. Stream sections in the moderate gradient reaches (riffles/runs) are the first to lose flowing water connections and become interrupted pools (D005). Once these systems lose their connectivity to fish recruitment pools of downstream reaches (this may be due to climatic factors such as prolongued drought) they become fishless isolated pools (E005). Throughout their range, these clear to turbid streams are characterized by short to long (~2-25m) pools that are sometimes vegetated with silted gravel to cobble substrates. The fishless pool community type provides substantial amphibian breeding and rearing habitat in otherwise harsh, dry upland conditions, so *Bufo spp.* (toads), Boreal Chorus Frogs (*Pseudacris spp.*), Tiger Salamanders (*Ambystoma tigrinum), and Rana pipiens (*northern leopard frog) tadpoles and adults are usually present. The E005c is a prairie stream reach within 1 river mile of a confluence with a larger river (at least 2 stream orders larger) and contains a biological fish community that is significantly effected by the large river connectivity.

Diagnostic Characteristics

The E005 ecological system type will be fishless. Intermittent stream pool indicator species rely on seasonal pools as essential habitat. These species, sometimes also referred to as obligate species, are dependent upon these unique pools for their continued existence. One of the defining characteristics of the seasonal pool biotic community is a lack of permanent populations of predatory fish. Isolation and periodic drying keep predatory fish from colonizing and occupying the pool. This reduced-predator environment allows amphibian larvae and invertebrate larvae to thrive. Different species of amphibian and invertebrate seasonal pool indicator species occur across the Northern Great Plains Steppe of the United States. In Montana and northwestern North and South Dakota, amphibian indicators include Woodhouse's toad (*Bufo Woodhousii*), boreal chorus frogs, spadefoots (*Spea bombifrons*) and tiger salamanders (*Ambystoma tigrinum*). These amphibians depend upon seasonal pools for optimal breeding. Additionally, a crustacean group, the fairy shrimp, *Branchinecta* and *Eubranchipus*, the clam shrimp *Caenestheriella*, and the tadpole shrimp *Lepidurus* rely on these pools for their entire life cycle. The diagnostic community of intermittent prairie stream invertebrates consists of the Prairie Pool assemblage (#12, Stagliano 2005). The community indicator species are characterized by tolerant, damselfly taxa (*Coenagrion/Enallagma, Lestes* and *Ishnura*), the crustaceans (*Hyalella* and *Gammarus*), many genera and species of the water boatman (*Corixidae: Sigara alternate, Trichocorixa nais,* and *Corisella*), the snails (*Physella, Gyraulus,* and *Stagnicola*), mayflies (*Caenis* and *Callibaetis*), and beetles (*Oreodytes, Laccophilus, Hydroporus* and *Hygrotus*). As the complexity of the pool habitat decreases the clinger habitat species are lost, such as the damselflies and many of the water boatman taxa.

Range

In Montana, the Northwestern Great Plains Intermittent Stream Ecosystem occurs throughout the non-glaciated Great Plains regions of northern North America within the Missouri and Mississippi River Drainages. Within Montana, this community exists in a multitude of streams and coulees mostly situated south of the Missouri River and within the Yellowstone River basin. Some of the many examples include Upper Otter, Bear, Hanging Woman, Trail, East Fork Trail, East Fork Hanging Woman, and Little Pumpkin Creek.

Spatial Pattern

4

Dynamic Processes

Intermittent stream pool indicator species rely on seasonal pools as essential habitat. These species, sometimes also referred to as obligate species, are dependent upon these unique pools for their continued existence. One of the defining characteristics of the seasonal (intermittent) pool biotic community is a lack of permanent populations of predatory fish. Isolation and periodic drying keep predatory fish from colonizing and occupying the pool.

Management

Small stock ponds, dams, and cattle intrusions have had the most significant negative impact on this community. Anywhere stock ponds and dams occur the downstream reaches are affected by altered water temperatures and flow, and changes in sediment and nutrient transport (Winston et al. 1991). The spring flows backed up behind stock pond dams could have potentially filled numerous E005 pools, and possibly connected these pools for a brief period to downstream fish populations for recolonization. Therefore, unless there is sufficient outflow, streams and coulees below stock ponds usually do not develop this community type. Another threat to this community is cattle intrusions, which cause trampling of stream banks with the subsequent siltation and nutrient inputs into the pools. This siltation and nutrient loading may eliminate aquatic macrophytes and cause blue-green algae blooms.

References

Classification and Map Identifiers

ReGAP:
1450: Northwestern Great Plains Intermittent Stream

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Citation for data on this website:
Northwestern Great Plains Intermittent Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1450

Northwestern Glaciated Plains Intermittent Stream



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State Rank Reason

The number of quality occurrences in the state is unknown, but probably fairly common. This is a difficult community type to quantify given the past years of drought in the state and the tenuous nature of this aquatic system. Intermittent pools containing the Ostracoda group should be inventoried for unique crustaceans, such as fairy or tadpole shrimp.

General Description

This ecosystem is found widely throughout the coulees, small streams (1st to 3rd order, average wetted width=3m) and headwaters of Medium Prairie Rivers (B006) and Northern Glaciated Prairie Streams (C006, C008) within the Northern Glaciated Plains Ecoregion. These small, cool to warm-water, low gradient and elevation (900-1200m) streams have origins in the alluvium and sedimentary geology of this region. Throughout their range these clear (typical) to turbid streams are usually characterized by vegetated long pools separated from each other by narrowed riffle areas, which are usually dry by early summer, forming isolated pools or a "string of pearls." Once these systems lose their connectivity to the fish recruitment pools of downstream reaches (sometimes due to climatic factors such as drought), or if they never had fish potential, they become the Fishless Isolated Pool ecosystem type (E006). The substrate can be gravel to cobbles in the shallow pools, to silted gravel deeper pools with rooted vegetation. These pools, on average, remain filled longer and are cooler and wider than their Great Plains counterparts. The D006c is a prairie stream reach within 1 river mile of a confluence with a larger river (at least 2 stream orders larger) and contains a biological fish community that is significantly affected by the large river connectivity.

Diagnostic Characteristics

Intermittent stream indicator species rely on the seasonal to permanent channel pools as essential habitat.

These resident and pioneering fish species, sometimes also referred to as obligate species, are dependent upon these unique pools for their continued existence. One of the defining characteristics of the seasonal pool biotic community is a lack of permanent populations of predatory fish. In the largest clear, non-degraded pools, members of the Northern Redbelly Dace Assemblage may occur. A reference condition Northern Glaciated Intermittent Stream type will have fathead minnow, brook stickleback, lake chub (not as common), brassy minnow and northern redbelly dace in order of dominance. If connectivity to downstream reaches exists on an annual basis, the pioneering white sucker may occur. Without aquatic macrophytes in the pools, brook stickleback or northern redbelly dace will be rare. Typically this community will be co-dominated by fathead minnow and brook stickleback only, and just fathead minnow in truly degraded or non-vegetated systems. The E006 type will be fishless. If there is aquatic vegetation in the pools, brook stickleback may be present, but often it is just a single fish species in the pool. The only introduced fish species reported from a D005 stream was black bullhead. Isolation and periodic drying keep predatory fish from colonizing and occupying the string of pools. The macroinvertebrate community consists of members of the Prairie Stream and Pool Assemblages, occurring in the cobbles and in the vegetated pool areas respectively. The reference community indicator species are characterized by the crustaceans, *Hyalella* and *Gammarus;* damselfly genera, *Coenagrion/Enallagma sp. Enallagma civile, Ishnura;* many genera and species of the water boatman (*Corixidae), Sigara alternate, Sigara grosslineata, Trichocorixa, Trichocorixa nais,* and *Corisella;* the snails, *Physella, Gyraulus,* and *Stagnicola*; the mayflies, *Caenis* and *Callibaetis;* and beetles *Haliplus, Oreodytes, Laccophilus, Hydroporus* and *Hygrotus*. As the complexity of the pool habitat decreases, the system loses clinger habitat species such as the damselflies and many of the water boatman taxa. The truly intermittent fishless pool ecosystems (E005) may only exist for a few months. If these pools are dry for more than a year and then rehydrate, many invertebrates with resting egg stages dominate the pools, including the crustaceans *Ostracoda, Cladocera, Copepoda;* the fairy shrimp, *Branchinecta, Eubranchipus;* the clam shrimp, *Caenestheriella;* and the tadpole shrimp, *Lepidurus.*

Range

The Northern Glaciated Intermittent Stream Ecosystem occurs throughout the glaciated Great Plains regions of northern North America. Within Montana, this community exists in a multitude of streams and coulees mostly situated north of the Missouri River, including Murray Coulee, Cowen Coulee, Hell Coulee, and Rattlesnake, Little Sage, Coberg, E. Fork Battle, Black, Little Sandy, Snow, Bitter, Buggy, Plentywood, Boxelder and E. Fork Porcupine Creeks.

Spatial Pattern

4

Dynamic Processes

Intermittent stream pool indicator species rely on seasonal pools as essential habitat. These species, sometimes also referred to as obligate species, are dependent upon these unique pools for their continued existence. One of the defining characteristics of the seasonal pool biotic community is a lack of permanent populations of predatory fish. Isolation and periodic drying keep predatory fish from colonizing and occupying the pool.

Management

Small dams, water diversions, stock ponds and introduced gamefish species have had the most significant negative impact on this community (Winston et al. 1991). Other threats include heavy cattle intrusions to the riparian areas, which causes bank erosion and subsequent sedimentation and siltation. Anywhere dams occur, even small stock pond earthen dams, the downstream reaches are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport. The spring flows backed up behind stock pond dams could have potentially filled numerous E005 pools, and possibly connected these pools for a brief period to downstream fish populations for recolonization. Therefore, unless there is sufficient outflow, streams and coulees below stock ponds usually do not develop this community type. Another threat to this community includes cattle intrusions, which cause trampling of stream banks with the subsequent siltation and nutrient inputs (cow pies) into the pools. This siltation and nutrient loading may eliminate aquatic macrophytes and cause blue-green algae blooms. This native community, as well as others downstream, suffers from cattle damage to the riparian areas of these pools. Therefore, riparian areas adjacent to streams should be given priority management attention.

References

Classification and Map Identifiers

ReGAP:
1451: Northwestern Glaciated Plains Intermittent Stream

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Citation for data on this website:
Northwestern Glaciated Plains Intermittent Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1451

Northwestern Great Plains Perennial Spring

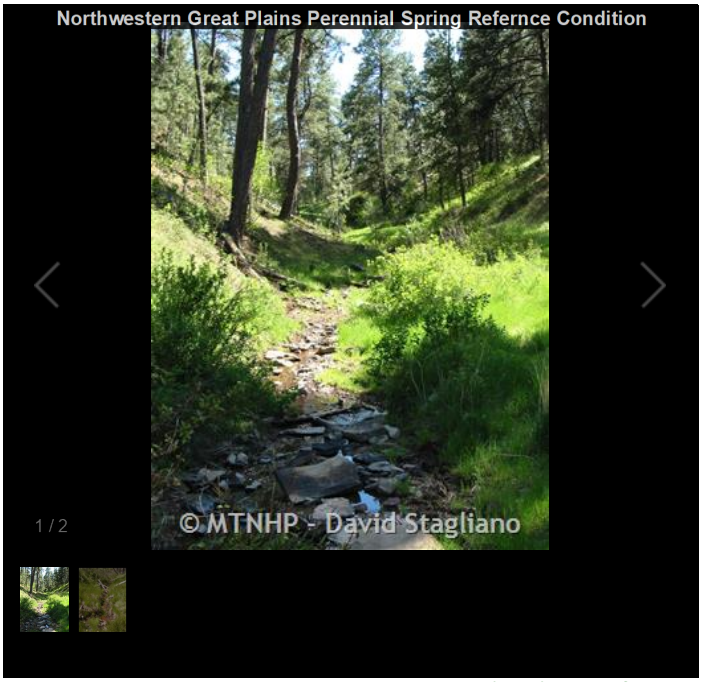


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Provisional State Rank: S3
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State Rank Reason

The number of occurrences is unknown because of the potential occurrence on reservations or private lands. In an inital evaluation of USFS springs in Montana, this ecosystem was evaluated at 30 sites within the Custer National Forest Ashland District, but only five of these contained a high-quality, fully functional S005 community (Stagliano 2004). On subsequent surveys in the Custer Forest (Ashlands & Sioux Districts) numerous perennial spring sites were visited, but very few had intact aquatic communities present (Stagliano 2010, unpublished data 2011). In a similar ecological type, the caddisfly *Hesperophylax designatus* was also found to be an indicator species of perennial springs in the Glass Mountains of the Great Basin (UT) in a 1994 survey (Myers 1995). Therefore, this ecosystem may be widespread, but because of the limited occurrence of high integrity sites in Montana, long-term monitoring and restoration of degraded sites may be recommended.

General Description

This groundwater dependent ecosystem (GDE) is found in the low-moderate elevation (1000-1600 m), upland hill areas of the Northwestern Great Plains (43) or Northern Glaciated Plains Ecoregion (42). It occurs as small (0.2-2m in width) perennial fishless headwater spring channels with low-moderate gradient geomorphology flowing (<1 L/sec) from sedimentary geology. Benthic invertebrate habitats are typically long riffle/run reaches dominated by shale cobbles and gravel with some woody debris. Surface topography of these springs can range from moderate gradient to undulating or hummocky. Disturbance by cattle is widespread, as these springs often represent the only water source in the uplands.

Diagnostic Characteristics

The S005 ecological system will be fishless. Diagnostic indicator macroinvertebrates of a reference condition

spring ecological system (S005) include the midges (Chironomidae) - *Odontomesa*, *Radotanypus*, *Heleniella*, *Pseudodiamesa*, diptera - *Tipula*, *Dicranota*, *Ormosia*, *Pedicia*, the snails – Hydrobiidae and *Physa*; the Mayfly - *Baetis tricaudatus*, the caddisfly - *Hesperophylax designatus*, the water mite and leech - *Hydrachna* and *Glossophona complanata*, the Beetles - *Oreodytes*, *Optioservus* and *Hydroporus*, and the damselfly larva - *Argia*. Sediment impaired and cattle degraded springs will quickly lose the mayfly, caddisfly, and dipteran species (above), and form a community dominated by tolerant midges, biting dipterans, and air breathing beetles.

Range

Throughout its Montana range, this seep and springs system occurs within the Custer National Forest, Wolf Mountains, and the higher elevation ponderosa pine forests of the Powder River Basin.

Spatial Pattern

Linear

Environment

Surface topography usually has a moderate gradient but can be undulating or hummocky. Disturbance by cattle is widespread, as these springs often represent the only water source in the uplands.

Dynamic Processes

Spring water ecosystems are tied to climate, groundwater discharge, and water quality. Impacts to these parameters, as well as their natural variability, will have a corresponding effect on spring biological ecological systems. Long-term drought, groundwater withdrawal at local and regional levels, and local diversions at or near the orifice are common impacts on water quantity at spring sites throughout the Western United States.

Management

Grazing and livestock use around these springs should be limited to a stock tank; immediate spring areas should be fenced to avoid cattle intrusions. Soils adjacent to the springs are often waterlogged and are easily trampled and hummocked by livestock, causing severe streambed degradation, sedimentation, and siltation downstream.

References

Classification and Map Identifiers

ReGAP:
1650: Northwestern Great Plains Perennial Spring

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Citation for data on this website:
Northwestern Great Plains Perennial Spring. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1650

Headwater Foothills and Valley Stream



Image Copyright and Usage Information

Provisional State Rank: S5
(see reason below)

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State Rank Reason

The number of viable stream mile occurrences is unknown, but these stream ecosystems are abundant across the mountain ranges of Western North America, often in protected lands managed by the BLM or US Forest Service.

General Description

This ecosystem is found in the mountainous, moderate-to-high elevation (1600-2500m), forested, moderately confined-channel streams of the Middle Rockies Ecoregion, including the isolated mountain ranges. These small-to-medium (1st-2nd order, average wetted width =3m, average summer temperature <15°C) moderately flowing streams have permanent flow with strong seasonal variability due to melting snowpack from higher elevation mountainous areas. These streams represent the transition from forested stream communities to foothills and intermontane rivers, and provide substantial habitat for Montana's native cutthroat trout populations, which thrive in the cold water temperatures and complex in-stream habitats. The geomorphology of these streams is usually a step-pool configuration with a substrate dominated by boulders, cobbles, and gravel in the short pools. Large woody debris from the surrounding hillslopes can provide significant channel material and additional substrate to these streams. The (y) descriptor on this AES code depicts the stream is in the Yellowstone River Basin and the (e) descriptor indicates the system along Rocky Mountain Front streams which have retained a slightly different fish community.

Diagnostic Characteristics

The fish community is the Traditional Trout Stream Assemblage with indicator species of the Headwaters Foothills and Small Foothills Rivers characterized by the native Westslope or Yellowstone Cutthroat trout (AES D001y), mountain whitefish and Rocky Mountain sculpin. However, the introduced species of the

Stocked Trout Assemblage, the brook trout and rainbow trout, tend to dominate and become the focal species of these systems. Steep fishless areas provide habitat for the Rocky Mountain Tailed Frog. As s these streams proceed down gradient, inclusions of the longnose sucker, longnose dace and the mountain sucker (D001y Yellowstone drainages) into the community become apparent. The shallow riffle areas of the larger foothills rivers entering Intermountain Rivers may provide spawning habitat for downstream populations of brown trout during their fall migration, and suckers, dace and rainbow trout in the spring. The reference condition Macroinvertebrate Community Indicators include the Traditional Trout Stream assemblage, with some members of the Medium Cool-Water Transitional Assemblage and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast-current mayfly, stonefly and caddis species, *Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Rhithrogena, Arctopsyche grandis, Lepidostoma spp.,* and the tipulid, *Antocha*. As the foothills streams near the valleys and begin to warm (>17 C) or become sediment impaired, degraded or dewatered, they will quickly lose the Traditional Trout Stream community (#4) and shift to the mayfly, caddisfly, beetle and dipteran species that form communities Medium Cool-Water Transitional Assemblage (#1) and #105 with indicator species *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Constempellina, Prosimulium, Amiocentrus aspilis, Lara, Phaenopsectra, Plauditus,* and *Narpus*. Populations of the western pearlshell mussel have been reported from this river ecosystem, although the populations may be in decline.

Range

In Montana, the Headwater Foothills and Valley Stream type is reported from over 150 sites within the Middle Rockies, including the isolated ranges. These include streams in many of Montana's mountain ranges, including the Beartooths, Absorokas, Elkhorns, Big Belts, Little Belts, Crazys, Gallatin-Madison-Bridgers, Anaconda-Pintlers, Pioneers and the Big Snowy Mountains. These ecosystems typically fall within the boundaries of National Forest Service lands and wilderness areas.

Spatial Pattern

Linear

Dynamic Processes

Beaver played a large role in the ecological processes of this ecological system in the past, providing mediating flood control with numerous beaver ponds in the watershed. Large riparian willow complexes are indicative of proper functioning condition.

Management

Small dams, water diversions, stock ponds and introduced gamefish species have had the most significant negative impact on this community (Winston et al. 1991). Other threats include heavy cattle intrusions to the riparian areas, which cause bank erosion and subsequent sedimentation and siltation. Anywhere dams occur, even small stock pond earthen dams, the downstream reaches are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1410: Headwater Foothills and Valley Stream

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Citation for data on this website:
Headwater Foothills and Valley Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1410

Headwater Forested Source Streams

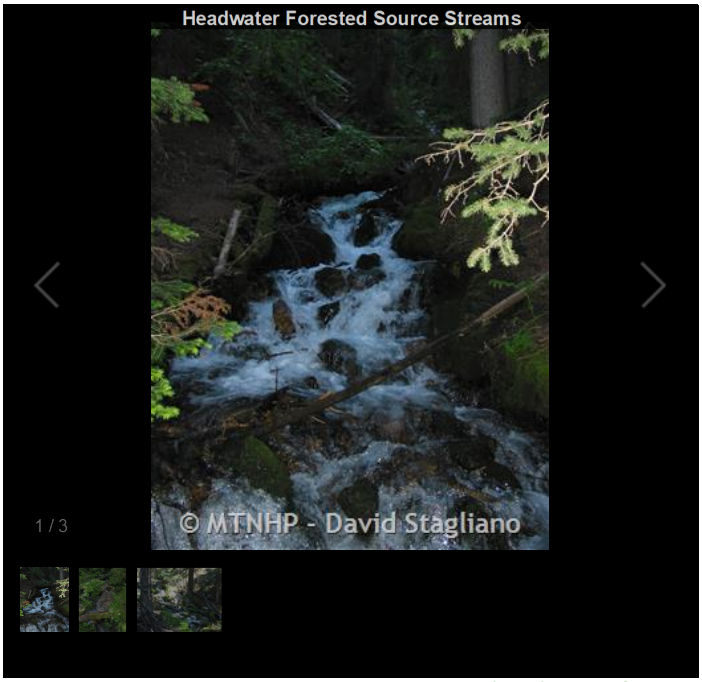


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State Rank Reason

The number of viable stream mile occurrences is unknown, but these stream ecosystems are abundant across the mountain ranges of Western North America, often in protected lands managed by the BLM or US Forest Service.

General Description

This ecosystem is found in the mountainous, moderate-to-high elevation (1600-2500m), forested, moderately confined-channel streams of the Middle Rockies Ecoregion, including the isolated mountain ranges. These small-to-medium medium (2nd-3rd order, average wetted width less than 4m, average summer temperature <15°C) moderately flowing streams have permanent flow with strong seasonal variability due to melting snowpack from higher elevation mountainous areas. These streams represent the transition from alpine stream communities to foothills and intermontane rivers, and provide substantial habitat for Montana's native cutthroat trout populations, which thrive in the cold water temperatures and complex in-stream habitats. The geomorphology of these streams is usually a step-pool configuration with a substrate dominated by boulders, cobbles, and gravel in the short pools. Large woody debris from the surrounding hillslopes can provide significant channel material and additional substrate to these streams.

Diagnostic Characteristics

The typical headwater source stream is steep, shallow and fishless with significant barriers to fish colonization (natural waterfalls or impassable culverts); dominant bioloigical communities are amphibians and macroinvertebrates. However, pioneering members of the Headwater Trout Stream Assemblage, specifically Westslope Cutthroat Trout, may migrate up these small tributaries if barriers are permeable. Unfortunately, the introduced brook trout may also migrate up and aggressively compete with the native

cutthroats in this limited habitat. The Macroinvertebrate Community consists of coldwater stenotherms characteristic of the shredder and predator functional groups of the Mountain Stream Assemblage. The community indicator species include intolerant, moderate current mayflies (*Baetis bicaudatus, Ameletus, Caudetella spp.,* and *Drunella spinifera*), stoneflies (*Yoraperla, Zapada colombiana, Despaxia augusta, Leuctridae,* and *Megarcys*), caddisflies (*Neothremma alicia, Parapsyche, Cryptochia, Lepidostoma,* and *Neophylax splendans*), cold-water dipterans (*Bibiocephela* and *Glutops*), and the non-insect turbellarian *Polycelis coronata*. The (L) subclass of this ecological system denotes up- or downstream connections to natural lakes which can have very different habitat for the first 100 meters; lake outlets can hold some unique assemblages of aquatic insects (Newell, pers. comm. 2009).

Range

In Montana, this Headwater Source Stream type is reported from over 100 sites within the Northern and Middle Rockies Ecoregions and particularly the Bitterroot Ecological Section. The D009 system includes headwater streams in many of Montana's western mountain ranges, including the Bitterroots, Beaverheads, Garnets, Anaconda-Pintlers, Pioneers and the Sapphire Mountains. The D010 system includes streams particularly within the Flathead Ecological Section. The D011 AES includes the glaciated Northern Rockies Valley Ecological Section. These ecosystems typically fall within the boundaries of National Forest Service lands and wilderness areas.

Spatial Pattern

Linear

Management

Due to the confined valley nature of these streams, the largest management issue involves keeping the riparian zone intact. Disturbances in the riparian zone (e.g., timber harvest, roads) can have severe water quality impacts, such as bank erosion, sedimentation, increased stream temperatures, silt deposits and loss of large woody debris. Livestock use around the riparian areas can have strong local effects resulting in sedimentation and stream widening at cattle crossings.

References

Classification and Map Identifiers

ReGAP:
1401: Headwater Forested Source Streams

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Citation for data on this website:
Headwater Forested Source Streams. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1401

Western Foothills and Valley Stream

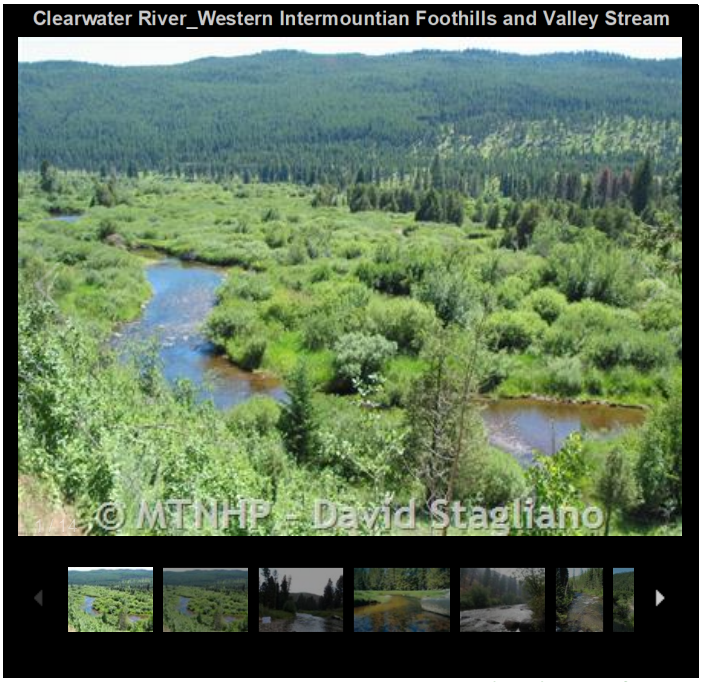


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State Rank Reason

The number of viable stream mile occurrences is unknown, but these stream ecosystems are abundant across the mountain ranges of Western North America, often in protected lands managed by the BLM or US Forest Service.

General Description

This ecosystem is found in the moderate elevation (1200-2000m), upland foothill streams of the Northern Rockies, Canadian Rockies or Middle Rockies Ecoregions. These moderately confined-channel streams are usually small- to medium-sized (2nd-3rd order, average wetted width=5m), with average summer temperature <15°C). Moderately flowing streams have permanent flow with strong seasonal variability due to melting snowpack from higher elevation mountainous areas. They are often within BLM or National Forest Service boundaries. These streams represent the transitional areas from the headwater or forested stream communities to lower foothills and intermontane rivers, and provide substantial habitat for Montana's native cutthroat trout populations, which thrive in the cold water temperatures and complex in-stream habitats. The geomorphology of these streams is usually a riffle/run/pool configuration with substrate dominated by boulders and cobbles, and gravel in the short pools. Large woody debris from the surrounding hillslopes can provide significant channel material and additional substrate to these streams. The (L) descriptor on this AES code depicts proximity to a lake outlet or large beaver complex which can have significant effect on the biological community.

Diagnostic Characteristics

The fish community is the Coldwater Transitional Community and the Traditional Trout Stream Assemblage with indicator species of the Intermountian Foothill Stream and Rivers characterized by the native species,

Westslope Cutthroat trout, mountain whitefish and Rocky Mountain sculpin, with corridor use by the Bull Trout. However, the introduced species of the Stocked Trout Assemblage, the brook trout and rainbow trout, tend to dominate and become the focal species of these systems. As Intermountain Foothills Streams and Rivers proceed down gradient, inclusions of the bull trout, longnose sucker, and large scale sucker into the community become apparent if stream quality and connectiveness remain intact. Intermountain Streams and Rivers provide spawning habitat for downstream populations of bull trout during their summer/fall migration and cutthroat trout and suckers in the spring. Macroinvertebrate Community of the Intermountain foothills rivers are dominated by the Traditional Trout Stream Assemblage, with some members of the Medium Mountain Stream Assemblages. The community indicator species are characterized by main channel, fast current mayfly, stonefly and caddisfly species (*Caudatella, Epeorus, Drunella spp., Rhithrogena, Pteronarcys californica, Classenia sabulosa, Hesperoperla pacifica, Perlodids, Brachycentrus americanus, Arctopsyche grandis,* and *Lepidostoma spp.*), and the tipulid, *Antocha*. As Foothills Rivers proceed downstream and begin to warm (>17 °C) or are sediment impaired, degraded or dewatered, they will quickly lose the Traditional Trout Stream Assemblage and shift to the mayfly, stonefly and caddisfly species that form the Medium Montain Assemblage, with its indicator species *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Constempellina, Prosimulium, Amiocentrus aspilis, Lara, Plauditus,* and *Narpus*. Populations of the western pearlshell mussel have been documented in the Intermountain Foothills Transitional river ecosystem, although these populations may be in decline when they lose their cutthroat trout host fish.

Range

This AES within the westside river drainages of the state contains 2718.4 miles of stream. C007 classified streams encompass low to moderate gradient intermountain streams from the Glaciated Columbia Region of the Northern Rockies to the Idaho Batholith in the Bitterroot Basin. Representative streams include the Little Blackfoot River, West Fork Rock Creek, Ninemile Creek, the upper Swan River and Thompson Rivers. C009 AES is the Intermontane Moderate Gradient Stream across the Bitterroot Valley Ecological Section. C010 AES is the Intermontane Moderate Gradient Stream across the Flathead Valley Ecological Section. C011 is the Intermontane Moderate Gradient Streams across the glaciated Northern Rockies Valley Ecological Section.

Spatial Pattern

4

Dynamic Processes

Beaver played a large role in the ecological processes of this ecological system in the past and provided mediating flood control with their numerous beaver ponds in the watershed. Large riparian willow complexes were indicative of a proper functioning small mountain to foothill transitional stream.

Management

Small dams, water diversions, stock ponds and introduced gamefish species have had the most significant negative impact on this community (Winston et al. 1991). Other threats include heavy cattle intrusions to the riparian areas, which causes bank erosion and subsequent sedimentation and siltation. Anywhere dams occur, even small stock pond earthen dams, the downstream reaches are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1370: Western Foothills and Valley Stream

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Citation for data on this website:
Western Foothills and Valley Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1370

Missouri Mainstem Intermountain Transitional River



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Provisional State Rank: S4
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State Rank Reason

A viable, fully functioning Mainstem Intermountain Transitional River is uncommon in the state. Diversion, flood control, and hydroelectric dams have significantly altered large portions of this Large River Ecosystem in Montana. Many of the native fish species that inhabited this river reach have been replaced by introduced salmonids (Rainbow and Brown Trout) and other predator fish (northern pike, walleye and smallmouth bass).

General Description

This cool to cold-water transisitonal ecosystem occurs throughout the upper Missouri and Yellowstone River Drainages and includes some of the most famous trout fishing river sections in the state. Stream habitat occurs at moderate elevation (1200-1600m), medium-large sized streams (6th & 7th order, wetted width from 25 to 50m), average summer temperature ~20°C) with low to moderate gradient and a permanent flow. There is strong seasonal variability due to melting snow pack from higher elevation mountainous areas. These rivers represent the ecotonal area from mid-elevation and moderate gradient intermountain streams to the eastern prairie rivers. There are reaches of the Missouri and Yellowstone Rivers that are marginal freestone trout rivers with boulder/cobble riffles, cobble/gravel runs and pools, and silt on the stream margins or in the deepest pools. Deep runs and pools with undercut banks and large woody debris provide the best fish habitats, while the riffles harbor the most diverse macroinvertebrate communities. These are clear running rivers reaches, except during spring run-off or where cattle intrusions, bank erosion or stream incisement has occurred in the watersheds.

Diagnostic Characteristics

The members of the fish community are dominated by the Coolwater Transitional and the Traditional Trout Stream Assemblages. The fish community indicator species would have typically been dominated by native

species: the Westslope cutthroat, mountain whitefish, mottled sculpin, longnose sucker, longnose dace, with the Yellowstone cutthroat trout & mountain sucker in the Yellowstone drainages. However, the introduced species of the stocked trout assemblage, the brown and rainbow trout, tend to dominate and become the focal species of these systems. One member of the Large Mainstem Warmwater River Assemblage (#5) that occurs frequently in deeper, coldwater habitats of this system is the burbot, a potential SOC in the state. Additionally, the white sucker, walleye, northern pike and the exotic carp may be found at the warmer, lower end of this transitional gradient. The shallow gravel runs of these rivers provide spawning habitat for downstream populations of brown trout during their fall migration, and rainbow trout and sucker species in the spring. The diverse macroinvertebrate community consists of members of the Medium Cool-Water Transitional Assemblage, the Traditional Trout Stream assemblage, Medium Mountain Stream Community and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast current stonefly and caddisfly species: *Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma, Lepidostoma* and the tipulids: *Hexatoma and Antocha* . Mayflies are diverse in this system and contain many genera, including: *Baetis, Ephemerella, Serratella, Rhithrogena, Drunella and Epeorus* . As these transitional rivers proceed downstream and begin to warm (>17 C) or are sediment-impaired, degraded, or dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with indicator species: *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Prosimulium, Amiocentrus aspilis, Lara, Plauditus, Narpus*. Populations of the western pearlshell mussel have been reported from this river ecosystem, although the many of these populations may be in decline.

Range

The Large Intermountain Transitional River type occurs in the Missouri River upstream of Great Falls to the Three Forks area, including the Blue Ribbon Missouri River section between Holter and Cascade. It also occurs in the Yellowstone River upstream of Billings to the Livingston area. This system also includes medium-sized, transitional rivers flowing through Central Montana Broad Valleys including the Upper Missouri River, Lower Gallatin, Jefferson, and Madison Rivers.

Spatial Pattern

Linear

Environment

The environment within which this ecological system is found is typically the broad sage/grassland valleys with cottonwood riparian areas characteristic of the Central Broad Montana Valleys Ecoregion.

Vegetation

Riparian cottonwood stands as well as the flood plain dynamics that enhance recruitment of willows and cottonwood saplings must be maintained. Russian olive and salt cedar are widespread introduced species that have reached nuisance levels along some stretches of the Yellowstone, mostly from Laurel downstream.

Management

Large dams and reservoirs have had the most significant negative impact on this community. Dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches (below Great Falls to Fort Peck Reservoir and between Fort Peck Reservoir and Lake Sacagawea, ND) maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1111: Missouri Mainstem Intermountain Transitional River

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Citation for data on this website:
Missouri Mainstem Intermountain Transitional River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1111

Yellowstone Mainstem Intermountain Transitional River



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Provisional State Rank: S4
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State Rank Reason

A viable, fully functioning Mainstem Intermountain Transitional River is uncommon in the state. Diversion, flood control, and hydroelectric dams have significantly altered large portions of this Large River Ecosystem in Montana. Many of the native fish species that inhabited this river reach have been replaced by introduced salmonids (Rainbow and Brown Trout) and other predator fish (northern pike, walleye and smallmouth bass).

General Description

This cool to cold-water transitional ecosystem occurs within the Yellowstone River Drainage. Stream habitat occurs at moderate elevation (1200-1600m), medium-large sized streams (6th & 7th order, wetted width from 25 to 50m), average summer temperature ~20°C) with low to moderate gradient and a permanent flow. There is strong seasonal variability due to melting snow pack from higher elevation mountainous areas. These rivers represent the ecotonal area from mid-elevation and moderate gradient intermountain streams to the eastern prairie rivers. There are reaches of the Missouri and Yellowstone Rivers that are marginal freestone trout rivers with boulder/cobble riffles, cobble/gravel runs and pools, and silt on the stream margins or in the deepest pools. Deep runs and pools with undercut banks and large woody debris provide the best fish habitats, while the riffles harbor the most diverse macroinvertebrate communities. These are clear running rivers reaches, except during spring run-off or where cattle intrusions, bank erosion, or stream incisement has occurred in the watersheds.

Diagnostic Characteristics

The members of the fish community are dominated by the Coolwater Transitional and the Traditional Trout Stream Assemblages. The fish community indicator species would have typically been dominated by native species: the Westslope cutthroat trout, mountain whitefish, mottled sculpin, longnose sucker, longnose dace,

with the Yellowstone cutthroat trout & mountain sucker in the Yellowstone drainages. However, the introduced species of the stocked trout assemblage, the brown and rainbow trout, tend to dominate and become the focal species of these systems. One member of the Large Mainstem Warmwater River Assemblage (#5) that occurs frequently in deeper, coldwater habitats of this system is the burbot, a potential SOC in the state. Additionally, the white sucker, walleye, northern pike and the exotic carp may be found at the warmer, lower end of this transitional gradient. The shallow gravel runs of these rivers provide spawning habitat for downstream populations of brown trout during their fall migration, and rainbow trout and sucker species in the spring. The diverse macroinvertebrate community consists of members of the Medium Cool-Water Transitional Assemblage, the Traditional Trout Stream assemblage, Medium Mountain Stream Community and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast current stonefly and caddisfly species: *Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma, Lepidostoma* and the tipulids: *Hexatoma and Antocha* . Mayflies are diverse in this system and contain many genera, including: *Baetis, Ephemerella, Serratella, Rhithrogena, Drunella and Epeorus* . As these transitional rivers proceed downstream and begin to warm (>17 C) or are sediment-impaired, degraded, or dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with indicator species: *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Prosimulium, Amiocentrus aspilis, Lara, Plauditus, Narpus*.

Range

The Large Intermountain Transitional River type occurs in the Missouri River upstream of Great Falls to the Three Forks area as well as in the Yellowstone River upstream of Billings to the Livingston Area. This system also includes medium-sized, transitional rivers flowing through Central Montana Broad Valleys, including the Upper Missouri, Lower Gallatin, Jefferson, and Madison Rivers.

Spatial Pattern

Linear

Vegetation

Riparian cottonwood stands as well as the flood plain dynamics that enhance recruitment of willows and cottonwood saplings must be maintained. Russian olive and salt cedar are widespread introduced species that have reached nuisance levels along some stretches of the Yellowstone River, largely from Laurel downstream.

Management

Large dams and reservoirs have had the most significant negative impact on this community. Dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches (below Great Falls to Fort Peck Reservoir and between Fort Peck Reservoir and Lake Sacagawea, ND) maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1112: Yellowstone Mainstem Intermountain Transitional River

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Citation for data on this website:
Yellowstone Mainstem Intermountain Transitional River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1112

Upper Yellowstone Intermountain Transitional River

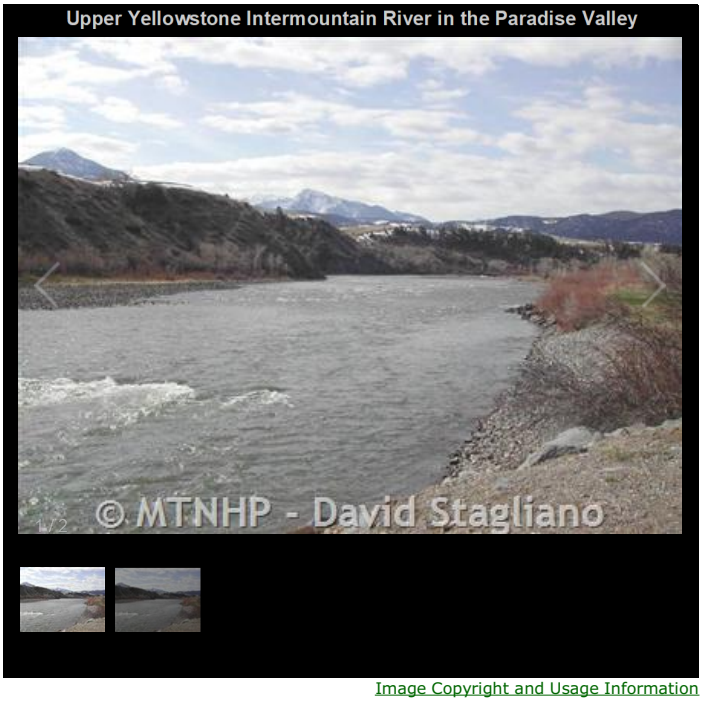


Image Copyright and Usage Information

Provisional State Rank: S4
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State Rank Reason

A viable, fully functioning Mainstem Intermountain Transitional River is uncommon in the state. Diversion, flood control, and hydroelectric dams have significantly altered large portions of this Large River Ecosystem in Montana. Many of the native fish species that inhabited this river reach have been replaced by introduced salmonids (Rainbow and Brown Trout) and other predator fish (northern pike, walleye and smallmouth bass.

General Description

This cool to cold-water transitional ecosystem occurs throughout the upper Missouri and Yellowstone River Drainages and includes some of the most famous trout rivers in the country. Stream habitat occurs at moderate elevation (1200-1600m), medium-large sized streams (6th & 7th order, wetted width from 25 to 50m), average summer temperature ~20°C) with low to moderate gradient and a permanent flow. There is strong seasonal variability due to melting snow pack from higher elevation mountainous areas. These rivers represent the ecotonal area from mid-elevation and moderate gradient intermountain streams to the eastern prairie rivers. There are reaches of the Missouri and Yellowstone Rivers that are marginal freestone trout rivers with boulder/cobble riffles, cobble/gravel runs and pools, and silt on the stream margins or in the deepest pools. Deep runs and pools with undercut banks and large woody debris provide the best fish habitats, while the riffles harbor the most diverse macroinvertebrate communities. These are clear running rivers reaches, except during spring run-off or where cattle intrusions, bank erosion, or stream incisement has occurred in the watersheds.

Diagnostic Characteristics

The members of the fish community are dominated by the Coolwater Transitional and the Traditional Trout Stream Assemblages. The fish community indicator species were historically dominated by native species:

the Westslope cutthroat trout, mountain whitefish, mottled sculpin, longnose sucker, longnose dace, with the Yellowstone cutthroat trout & mountain sucker in the Yellowstone drainages. However, the introduced species of the stocked trout assemblage, the brown and rainbow trout, tend to dominate and become the focal species of these systems. One member of the Large Mainstem Warmwater River Assemblage (#5) that occurs frequently in deeper, coldwater habitats of this system is the burbot, a potential SOC in the state. Additionally, the white sucker, walleye, northern pike, and the exotic carp may be found at the warmer, lower end of this transitional gradient. The shallow gravel runs of these rivers provide spawning habitat for downstream populations of brown trout during their fall migration, and rainbow trout and sucker species in the spring. The diverse macroinvertebrate community consists of members of the Medium Cool-Water Transitional Assemblage, the Traditional Trout Stream assemblage, Medium Mountain Stream Community and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast current stonefly and caddisfly species: *Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma, Lepidostoma* and the tipulids: *Hexatoma and Antocha* . Mayflies are diverse in this system and contain many genera, including: *Baetis, Ephemerella, Serratella, Rhithrogena, Drunella and Epeorus* . As these transitional rivers proceed downstream and begin to warm (>17 C) or are sediment-impaired, degraded, or dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with indicator species: *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Prosimulium, Amiocentrus aspilis, Lara, Plauditus, Narpus*.

Range

The Large Intermountain Transitional River type occurs in the Missouri River upstream of Great Falls to the Three Forks area as well as in the Yellowstone River upstream of Billings to the Livingston Area. Medium-sized, transitional rivers, flowing through Central Montana Broad Valleys including the Upper Missouri, Lower Gallatin, Jefferson, and Madison Rivers.

Spatial Pattern

Linear

Vegetation

Riparian cottonwood stands as well as the flood plain dynamics that enhance recruitment of willows and cottonwood saplings must be maintained. Russian olive and salt cedar are widespread introduced species that have reached nuisance levels along some stretches of the Yellowstone, mostly from Laurel downstream.

Management

Large dams and reservoirs have had the most significant negative impact on this community. Dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches (below Great Falls to Fort Peck Reservoir and between Fort Peck Reservoir and Lake Sacagawea, ND) maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1114: Upper Yellowstone Intermountain Transitional River

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Citation for data on this website:
Upper Yellowstone Intermountain Transitional River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1114

Northwestern Great Plains Large Prairie River

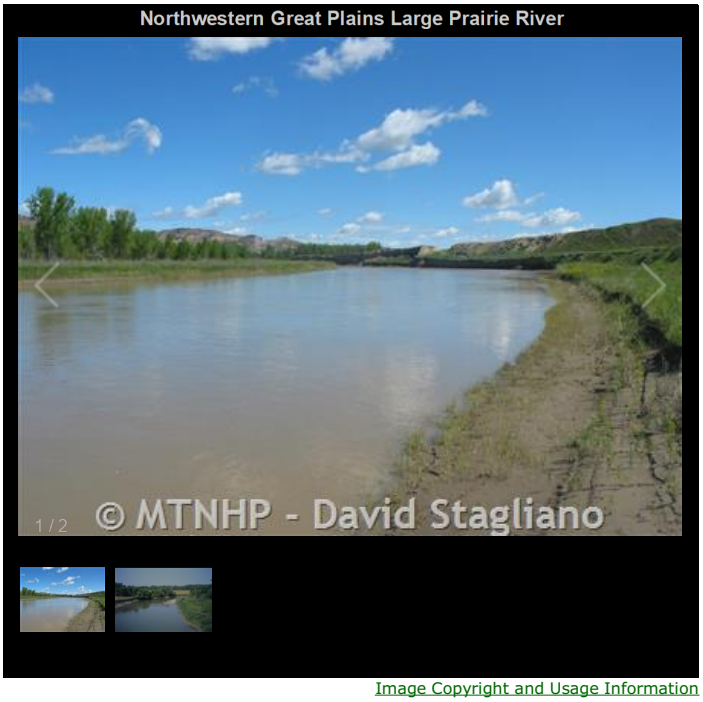


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Provisional State Rank: S3
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State Rank Reason

Diversion, flood control, and hydroelectric dams have significantly altered large portions of the Large Prairie River Ecological systems in MT. The Powder River is the only undammed large prairie river left in the state. Many of the characteristic invertebrates of a properly functioning large prairie system are Globally Rare and only occur in a few river reaches in the state. At least one fish in this community is a Montana Species of Concern, the sturgeon chub (S2). It also contains the globally rare sand-dwelling mayfly group, whose members are currently ranked S1-S3 in Montana. The occurrence of numerous threatened, rare and declining species, and consistent ongoing threats of diversions and oil and gas production to the habitats required for spawning and rearing warrant a state rank of S3.

General Description

This ecosystem consists of mainstem prairie tributaries to the Missouri and Yellowstone Rivers: the Milk, Marias, Little Missouri, Lower Tongue, Bighorn and Powder Rivers. These large (5th order and larger, >200 river miles long, 35m average wetted width) warm-water rivers have low to moderate gradients. These low elevation (below 1000m) rivers are characterized by long deep runs, pools (1-2m deep) and interspaced riffles. Substrate characteristics are typically cobble riffles (when present) to sand and gravel dominated runs and pools, with variably textured side channels. Large woody debris and undercut banks in the lower parts of these rivers provide substantial fish habitat. During spring and early summer, lower sections of these rivers offer many miles of spawning/ nursery habitat for sauger, walleye, channel catfish, and the characteristic large fishes of the Yellowstone and Missouri: pallid sturgeon, shovelnose sturgeon, and blue sucker. The A003c is a prairie river system within 20 river miles from a confluence with a larger river (at least 2 stream orders) and contains a biological fish community that is significantly affected by a large river connectivity.

Diagnostic Characteristics

Fish Community: The members of this community consist of the Large, Medium Warmwater River and the Creek Chub Assemblage. The indicator species are characterized by the native species: channel catfish, stonecat, mooneye, sauger, flathead chub, plains minnow, sand shiner, white sucker, shorthead redhorse and some introduced species, including the walleye, northern pike, black bullhead and the spottail shiner (Milk & Marias Rivers). The shallow riffle habitats are inhabited by the longnose sucker, longnose dace and flathead chub with the mountain sucker included in the Yellowstone drainages. The state threatened sturgeon chub has good populations in the gravel run habitats of the Powder River, but not in any other A003 or A004 river of Montana. Macroinvertebrate Community: This community consists of members of the Transitional Prairie River, Large Prairie River and Filtering Collector Assemblage in the riffles, with Large River Slow Current and Medium River Side-Channel Assemblages in the slow current areas and side channels, and the uncommon sand-dwelling mayfly community group (SDM) in the vast sandbar areas. The indicator species are characterized by main channel riverine dragonfly species, *Stylurus and Ophiogomphus* , the mayflies- *Neochoroterpes oklahoma, Choroterpes, Camelobatidius, Fallceon quilleri, Acentrella insignificans, Ephoron album, and Travarella albertana*; caddisflies (*Leucotrichia pictipes, Neotrichia, Psychomyia, Hydropsyche morosa* group and *Cheumatopsyche*), and the unionid mussels - fatmucket (*Lampsilus siliquiodea*), black sandshell (*Ligumia recta*) (Missouri main stem only), and the side-channel mussel, giant floater (*Pyganodon grandis*). Although not reported in the classification due to rarity in the samples, the unique sand-dwelling mayfly assemblage includes indicator species: *Analetris eximia, Raptoheptegenia cruentata, Lachlania saskatchewanensis, Anepeorus rusticus, Ametropus neavei* and *Homoeoneuria alleni* , and is most closely associated with the Large Valley and Prairie River Assemblage.

Range

Large Prairie River Ecosystem types occur throughout the Great Plains region of North America within the Missouri River Drainage, with notable rivers such as the Niobrara and Platte (Nebraska), Kansas River (KS), Belle Fourche and James Rivers (ND & SD). The Montana Glaciated Plains subsection has the lower Milk and Marias River watersheds below Fresno and Tiber Dams, respectively, to their confluence with the Missouri River. Within the Northwestern Great Plains subsection, Montana has the Lower Bighorn River from Hardin to the Yellowstone, the Powder River from the Wyoming border to the Yellowstone, and a 100-mile stretch of the Little Missouri from the Wyoming to the ND border. This section of the Little Missouri is more typical of a medium-sized prairie stream, but falls in to the Large Prairie River type further downstream in North Dakota.

Spatial Pattern

Linear

Vegetation

Riparian cottonwood stands as well as the flood plain dynamics that enhance recruitment of willows and cottonwood saplings must be maintained. Russian olive and salt cedar are widespread introduced species that have reached nuisance levels along some stretches of the Yellowstone, mostly from Laurel downstream.

Dynamic Processes

Fluvial processes play a key role in the dynamics of Great Plains rivers and streams. The nature of these processes is often indicated by channel morphology. Meandering channels generally have a shallow gradient, low flow variability, and sediment loads dominated by silt and finer particles, while braided channels are characterized by a moderately steep gradient, high flow variability, and sediment loads dominated by sand and coarser particles (Friedman, 2002). Flooding is the key ecosystem process whereby establishment sites for riparian vegetation are created, seeds are dispersed, and vegetative succession is controlled. However, since Euro-American settlement, natural fluvial processes have been disrupted in many of these systems by dams and diversions. Fire has been suppressed, agricultural activities have decreased flows and increased siltation rates, and introduction of non-native fish species have all had consequences. Native grazers have been largely replaced by domestic cattle. Consequently, there has been a direct loss of woody plant diversity. Furthermore, both channel incision and channel widening have altered flooding regimes, leading to establishment of flood-intolerant species in many areas.

Management

Diversion, flood control, and hydroelectric dams, bank armoring and irrigation withdrawals have had the most significant negative impact on this community. Diversion dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches below Yellowtail, Marias, Tongue River and Tiber Dams maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1130: Northwestern Great Plains Large Prairie River

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Citation for data on this website:

Northwestern Great Plains Large Prairie River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1130

Northwestern Glaciated Large Prairie River



Image Copyright and Usage Information

Provisional State Rank: S3
(see reason below)

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State Rank Reason

Diversion, flood control, and hydroelectric dams have significantly altered large portions of the Large Prairie River Ecological systems in Montana. The Powder River is the only undammed large prairie river remaining in the state. Many of the characteristic invertebrates of a properly functioning large prairie system are Globally Rare and only occur in a few river reaches in the state. At least one fish in this community is a Montana Species of Concern, the sturgeon chub (S2). It also contains the globally rare sand-dwelling mayfly group, whose members are currently ranked S1-S3 in Montana. The occurrence of numerous threatened, rare and declining species, and consistent ongoing threats of diversions and oil and gas production to the habitats required for spawning and rearing warrant a state rank of S3.

General Description

This ecosystem consists of mainstem prairie tributaries to the Missouri and Yellowstone Rivers: the Milk, Marias, Little Missouri, Lower Tongue, Bighorn and Powder Rivers. These large (5th order and larger, >200 river miles long, 35m average wetted width) warm-water rivers have low to moderate gradients. These low elevation (below 1000m) rivers are characterized by long deep runs, pools (1-2m deep), and interspaced riffles. Substrate characteristics are typically cobble riffles (when present) to sand and gravel dominated runs and pools, with variably textured side channels. Large woody debris and undercut banks in the lower parts of these rivers provide substantial fish habitat. During spring and early summer, lower sections of these rivers offer many miles of spawning/nursery habitat for sauger, walleye, channel catfish, and the characteristic large fishes of the Yellowstone and Missouri: pallid sturgeon, shovelnose sturgeon, and blue sucker. The A003c is a prairie river system within 20 river miles from a confluence with a larger river (at least 2 stream orders) and contains a biological fish community that is significantly affected by large river connectivity.

Diagnostic Characteristics

Fish Community: The members of this community consist of the Large, Medium Warmwater River and the Creek Chub Assemblage. The indicator species are characterized by the native species: channel catfish, stonecat, mooneye, sauger, flathead chub, plains minnow, sand shiner, white sucker, shorthead redhorse and some introduced species, including the walleye, northern pike, black bullhead, and the spottail shiner (Milk & Marias Rivers). The shallow riffle habitats are inhabited by the longnose sucker, longnose dace and flathead chub with the mountain sucker included in the Yellowstone drainages. The state threatened sturgeon chub has good populations in the gravel run habitats of the Powder River, but not in any other A003 or A004 river of MT. Macroinvertebrate Community: This community consists of members of the Transitional Prairie River, Large Prairie River and Filtering Collector Assemblage in the riffles, with Large River Slow Current and Medium River Side-Channel Assemblages in the slow current areas and side channels, and the uncommon sand-dwelling mayfly community group (SDM) in the vast sandbar areas. The indicator species are characterized by main channel riverine dragonfly species, *Stylurus and Ophiogomphus* , the mayflies- *Neochoroterpes oklahoma, Choroterpes, Camelobatidius, Fallceon quilleri, Acentrella insignificans, Ephoron album, and Travarella albertana*; caddisflies (*Leucotrichia pictipes, Neotrichia, Psychomyia, Hydropsyche morosa* group and *Cheumatopsyche*), and the unionid mussels - fatmucket (*Lampsilus siliquiodea*), black sandshell (*Ligumia recta*) (Missouri main stem only), and the side-channel mussel, giant floater (*Pyganodon grandis*). Although not reported in the classification due to rarity in the samples, the unique sand-dwelling mayfly assemblage includes indicator species: *Analetris eximia, Raptoheptegenia cruentata, Lachlania saskatchewanensis, Anepeorus rusticus, Ametropus neavei* and *Homoeoneuria alleni* , and is most closely associated with the Large Valley and Prairie River Assemblage.

Range

Large Prairie River Ecosystem types occur throughout the Great Plains region of North America within the Missouri River Drainage, with notable rivers such as the Niobrara and Platte (Nebraska), Kansas River (KS), Belle Fourche and James Rivers (ND & SD). The Montana Glaciated Plains subsection includes the lower Milk and Marias River watersheds below Fresno and Tiber Dams, respectively, to their confluence with the Missouri River. Within the Northwestern Great Plains subsection, Montana has the Lower Bighorn River from Hardin to the Yellowstone, the Powder River from the Wyoming border to the Yellowstone and a 100-mile stretch of the Little Missouri from the Wyoming to the ND border. This section of the Little Missouri is more typical of a medium-sized prairie stream, but falls in to the Large Prairie River type further downstream in ND.

Spatial Pattern

Linear

Vegetation

Riparian cottonwood stands as well as the flood plain dynamics that enhance recruitment of willows and cottonwood saplings must be maintained. Russian olive and salt cedar are widespread introduced species that have reached nuisance levels along some stretches of the Yellowstone, mostly from Laurel downstream.

Dynamic Processes

Fluvial processes play a key role in the dynamics of Great Plains rivers and streams. The nature of these processes is often indicated by channel morphology. Meandering channels generally have a shallow gradient, low flow variability, and sediment loads dominated by silt and finer particles, while braided channels are characterized by a moderately steep gradient, high flow variability, and sediment loads dominated by sand and coarser particles (Friedman, 2002). Flooding is the key ecosystem process whereby establishment sites for riparian vegetation are created, seeds are dispersed and vegetative succession is controlled. However, since Euro-American settlement, natural fluvial processes have been disrupted in many of these systems by dams and diversions. Modifications have included fire suppression, decreased flows and increased siltation rates due to agricultural activities, and the introduction of non-native fish species. Native grazers have been largely replaced by domestic cattle. Consequently, there has been a direct loss of woody plant diversity. Furthermore, both channel incision and channel widening have altered flooding regimes, leading to establishment of flood-intolerant species in many areas.

Management

Diversion, flood control, and hydroelectric dams, bank armoring, and irrigation withdrawals have had the most significant negative impact on this community. Diversion dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches below Yellowtail, Marias, Tongue River, and Tiber Dams maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:

1131: Northwestern Glaciated Large Prairie River

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Citation for data on this website:
Northwestern Glaciated Large Prairie River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1131

Large Volume Spring Stream

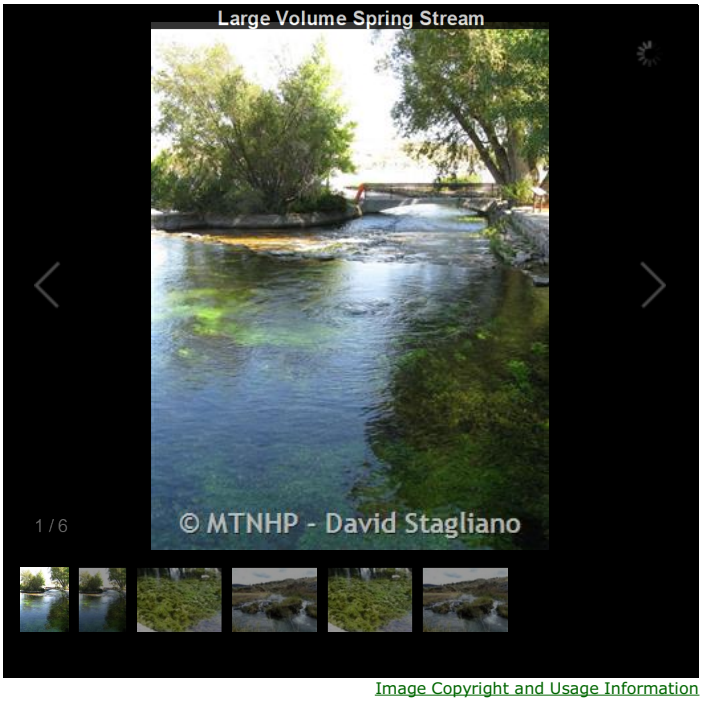


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Provisional State Rank: S4
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State Rank Reason

The number of occurrences is fairly well known and many spring creeks fall within private property. Very few spring creeks have had extensive biological inventories due to private land issues, but the potential of discovering new snail species is high (D. Gustafson, pers. comm.). Due to the constant temperatures, these streams can act as fish refuges during the summer and winter months with trout spawning areas on the gravel bottoms.

General Description

This ecosystem is found in the foothills and valleys of the Middle Rockies Ecoregion east of the Continental Divide. Elevation is 1200-2000m. These medium to large (average wetted width from 2-15m, average summer temperature <15°C) rivers have moderated permanent groundwater flow with strong seasonal variability. Waters are mineral-rich and circumneutral to alkaline with pH of 7.0-8.2; clarity is often high. These factors contribute to lush growth of submerged aquatic vegetation, which may include watercress (*Nasturtium officinale), Potamogeton spp.,* and *Myriophyllum spp.*. These streams represent groundwater discharge input; therefore they do not experience severe flooding or drastic temperature shifts and have more constant flow. The substrate of these streams is usually cobble riffles and gravel/sand runs and pools, with extensive beds of aquatic vegetation and and, unless they are degraded by cattle, flow silt-free and clear.

Diagnostic Characteristics

Fish are from the Traditional Trout Stream Assemblage. The spring creek community historically had native species including westslope cutthroat, mottled sculpin, longnose dace, mountain whitefish, with Yellowstone cutthroat trout and mountain sucker in the Yellowstone drainages. However, the introduced brook, brown,

and rainbow trout tend to dominate and become the focal species of these systems. Abundant populations of spring creek macroinvertebrate communities are diagnostic of this system, but diversity is relatively limited. This unique low-diversity community consists of a combination of members from the Medium Coolwater Transitional, the Traditional Trout Stream, and the Foothills Transitional Assemblages. The community is dominated by the mayflies [*Tricorythodes* and *Ephemerella* spp. (usually *Ephemerella inermis* and *E. infrequens*)], the amphipod crustacean (*Gammarus*), and many Chironomidae. Other community indicator species include *Baetis tricaudatus*, caddisfly species (*Hydropsyche*, *Amiocentrus aspilis*, *Cheumatopsyche*, and *Brachycentrus occidentalis*), beetles (*Optioservus* spp.), and snails (*Gyraulus*, *Physella*).

Range

The Spring Creek type has been identified in the foothill and valleys of many Montana drainages, particularly some of the more famous trout fishing springs: Armstrong's, Depuy's, Nelson's Spring Creeks of the Yellowstone and Thompson, Ben Hart (tributary to the E. Gallatin), O'Dell, Warm Spring and Big Spring Creeks of the Missouri drainage. Additionally, Layout Creek, Bridger and Piney Springs in the foothills of the Bighorns and Wyoming Basin are medium to large volume spring streams.

Spatial Pattern

4

Environment

Surface topography usually has a moderate gradient but can be undulating or hummocky. Disturbance by cattle is widespread, as these springs often represent the only water source in the uplands.

Dynamic Processes

Spring water ecosystems are tied to climate, groundwater discharge, and water quality. Impacts to these parameters, as well as their natural variability, will have a corresponding effect on spring biological and ecological systems. Long-term drought, groundwater withdrawal at local and regional levels, and local diversions at or near the orifice are common impacts on water quantity at spring sites throughout the Western United States.

Management

Livestock use around the riparian areas is common and can have strong local effects resulting in sedimentation and streams becoming wider or shallower. High-density cattle usage can cause severe degradation, sedimentation and siltation on the riffle habitats and gravel spawning areas downstream.

References

Classification and Map Identifiers

ReGAP:
1620: Large Volume Spring Stream

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Citation for data on this website:
Large Volume Spring Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1620

Large Valley Intermountain River



Image Copyright and Usage Information

Provisional State Rank: S4
(see reason below)

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State Rank Reason

Diversion, flood control and hydro dams have significantly altered large portions of this Large River Ecosystem in MT.

General Description

This aquatic ecosystem is found widely throughout the mainstem upper Columbia River basin of the Intermountian rockies and Pacific northwest. Abell et al. (2000) delineated two freshwater ecoregions (FWE) for western Montana, the glaciated (FWE 120) and non-glaciated Columbia River basin (FWE 121). The later FWE delineates the unglaciated portion, or lower two-thirds of the Columbia River basin (McPhail and Lindsey 1986). These large (7th stream order and larger), cold-water rivers have low to moderate gradient with elevations below 1000m and are characterized by long deep runs and pools with depths >2m, numerous mid-stream islands, side channels and interspaced riffles. Substrate characteristics are typically cobble in the riffles, sand and gravel in runs and pools, with gravel and/or finer-textured side channels.

Diagnostic Characteristics

These ecological systems are 7th stream order and larger (>200 river miles) cold-water rivers that have low to moderate gradient and elevations below 1000m. Diagnostic fish species include members of the upper Columbia, Large Valley Intermontane River Community. This assemblage is dominated by large bodied sucker, trout and minnow species, in order of occurrence frequencies : Largescale Sucker, Longnose Dace, Mountain Whitefish, Longnose Sucker, Redside Shiner, Northern Pikeminnow Bull Trout, Slimy Sculpin, Westslope Cutthroat Trout, Burbot, Rocky Mountain Sculpin and the Peamouth. Macroinvertebrate Species consist of members of the Medium Cool-Water Transitional Assemblage, the Traditional Trout Stream assemblage, Medium Mountain Stream Community and the Foothills Transitional Assemblage. The

community indicator species are characterized by main channel, fast current stonefly and caddisfly species, Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma, Lepidostoma and the tipulids: Hexatoma and Antocha. Mayflies are diverse and contain many genera, including Baetis, Ephemerella, Serratella, Rhithrogena, Drunella and Epeorus. As these transitional rivers proceed downstream and begin to warm (>17 C) or are sediment impaired, degraded, or dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with the following indicator species: Acentrella, Acerpenna, Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Prosimulium, Amiocentrus aspilis, Lara, Phaenopsectra, Plauditus. Populations of the western pearlshell mussel have been reported from this river ecosystem, although the populations may be in decline due to loss of their native host fish, the Westslope Cutthroat Trout.

Range

The Large Intermountain Valley River type occurs in the Clark Fork River from the Alberton Gorge Area to the confluence with and including the lower Flathed River.

Spatial Pattern

4

Management

Large dams and reservoirs have had the most significant negative impact on this ecological community. Dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches such as below Libby Dam to the Idaho border maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1150: Large Valley Intermountain River

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Citation for data on this website:
Large Valley Intermountain River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1150

Large Glaciated Valley Intermountain River

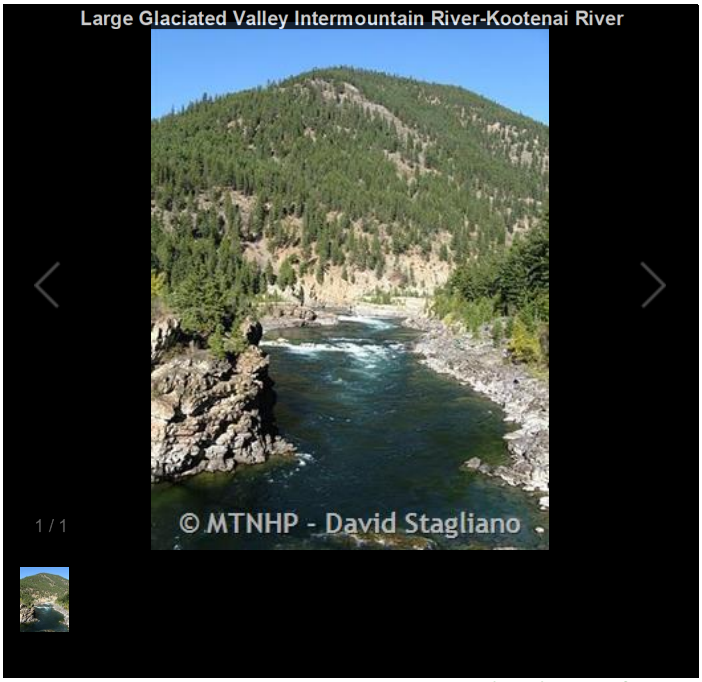


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Provisional State Rank: S4
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State Rank Reason

Diversion, flood control, and hydroelectric dams have significantly altered large portions of this Large River Ecosystem in Montana. Threatened White Sturgeon and Bull Trout populations have been affected by Libby Dam operations for the last 40 years.

General Description

This ecosystem is found widely throughout the glaciated upper Columbia River basin of the Northern Rockies and Pacific Northwest. Abell et al. (2000) delineated two freshwater ecoregions (FWE) for western Montana, the glaciated (FWE 120) and non-glaciated Columbia (FWE 121). The former marks the glaciated portion, or upper third, of the Columbia River basin (McPhail and Lindsey 1986). This part of the Columbia River basin was glaciated, forming valleys filled with glaciofluvial and morainal sediments; it includes most of eastern Washington, the northern portion of Idaho, the northwestern corner of Montana, and southeastern British Columbia. These major rivers originate on the west side of the Continental Divide and flow westward across areas of uplift toward the Pacific Ocean (McPhail & Lindsey 1986). Main rivers are large tributaries to the Columbia: the Yakima, Okanagan, Spokane, and Kootenai rivers. These large (7th stream order and larger), cold-water rivers have low to moderate gradient, elevations below 1000m, and are characterized by long deep runs and pools with depths >2m, numerous mid-stream islands, side channels and interspaced riffles. Substrate characteristics are typically cobble in the riffles and sand and gravel in the runs and pools, with gravel and/or finer-textured side channels.

Diagnostic Characteristics

These ecological systems are 7th stream order and larger (>200 river miles) cold-water rivers that have a low to moderate gradient with elevations below 1000m. Diagnostic fish species include members of the upper

Columbia, Large Valley Intermontane River Community. This assemblage is dominated by large bodied sucker, trout, and minnow species, in order of occurrence frequencies : Largescale Sucker, Longnose Dace, Mountain Whitefish, Longnose Sucker, Redside Shiner, Northern Pikeminnow Bull Trout, Slimy Sculpin, Westslope Cutthroat Trout, Burbot, Mottled Sculpin and the Peamouth. It also includes the Columbia River distributions of the pygmy whitefish (*Prosopium coulteri*) and white sturgeon (Kootenai River populations). Redband rainbow trout (*Oncorynchus mykiss gairdneri*), longnose sucker (*Catostomus catostomus*), burbot (*Lota lota*), and slimy sculpin (*Cottus cognatus*) occur primarily in the glaciated portion of the Columbia River basin. Macroinvertebrate Species consist of members of the Medium Cool-Water Transitional Assemblage, the Traditional Trout Stream assemblage, Medium Mountain Stream Community, and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast current stonefly and caddisfly species: *Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma, Lepidostoma* and the tipulids: *Hexatoma and Antocha* . Mayflies are diverse in this system and contain many genera, including: *Baetis, Ephemerella, Serratella, Rhithrogena, Drunella and Epeorus* . As these transitional rivers proceed downstream and begin to warm (>17 C) or are sediment-impaired, degraded, or dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with indicator species: *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Prosimulium, Amiocentrus aspilis, Lara, Plauditus, Narpus*. Populations of the western pearlshell mussel have been reported from this river ecosystem, although the populations may be in decline due to loss of their native host fish the Westslope Cutthroat Trout.

Range

The Large Intermountain Glaciated Valley River type occurs within the Kootenai River section in Montana from below Libby Dam to the Idaho state line continuing downstream towards Bonners Ferry. This Aquatic Ecological System is found more widespread in other rivers of British Columbia.

Spatial Pattern

Linear

Management

Large dams and reservoirs have had the most significant negative impact on this ecological community. Dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches below Libby and above Bonner's Ferry maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:

1151: Large Glaciated Valley Intermountain River

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Citation for data on this website:
Large Glaciated Valley Intermountain River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1151

Ditch or Canal



Image Copyright and Usage Information

Provisional State Rank: SU

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General Description

This artificial stream channel system is found statewide where diversions and side canals were dug to transfer water from perennially or intermittently natural stream channels. These generally have low to moderate gradient, but some ditches in the transitional area from the mountains to the valleys can have a steep gradient.

Diagnostic Characteristics

Fish Community: The fish species found in these channels can mimic the community found in the adjacent stream or river where the flows are originating, especially where sufficient screening is not in place.

Range

This system is found statewide but is most numerous in the foothills and valleys ecoregion where dryland agricultural areas and irrigated areas are upland of large riparian river bottoms.

Spatial Pattern

Linear

Management

Large ditches and canals can trap and strand thousands of fish of numerous species, especially in the spring high flow and spawning periods. Screening diversions to canals and ditches can reduce the negative impact

on the fish community of the adjacent stream or river.

References

Classification and Map Identifiers

ReGAP:
1000: Manmade Ditch or Canal

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Citation for data on this website:
Ditch or Canal — Manmade Ditch or Canal. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1000

Northwestern Great Plains Valley River

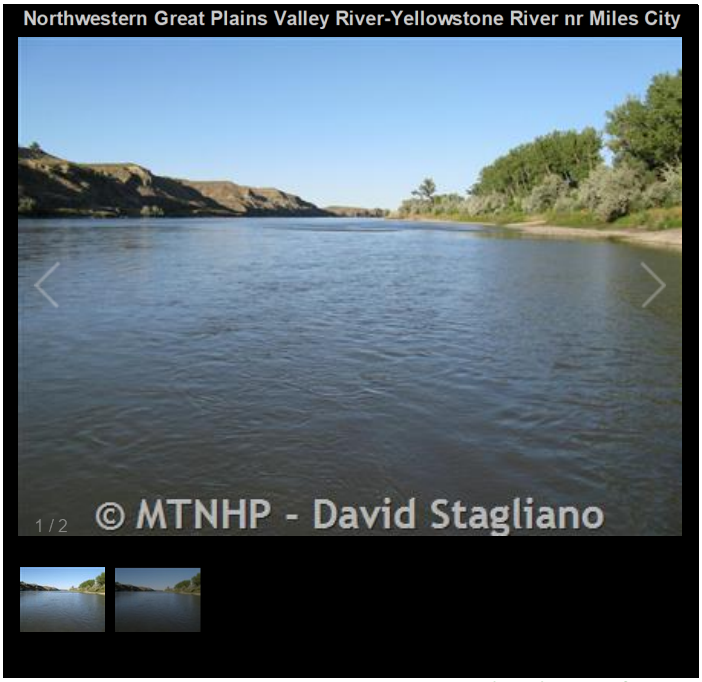


Image Copyright and Usage Information

Provisional State Rank: S3
(see reason below)

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State Rank Reason

The stream river mile occurrence of this system in the state is fairly well known, and angler harvest is regulated for one member of the fish community group, the paddlefish. The Large Valley River type is an at-risk system, containing one of the most endangered fish in the US, the pallid sturgeon (G1S1, USFWS federally endangered). Other fish in this community are Montana Species of Concern: sturgeon chub (S2), sicklefin chub (S1), and blue sucker (S2S3). It also contains the globally rare sand-dwelling mayfly group, which is currently ranked S1-S3 in Montana. The occurrence of numerous threatened, rare and declining species, and consistent threats to the habitats required for spawning and rearing warrants a state rank of S3.

General Description

This ecosystem is found widely throughout the mainstem Missouri River system (7th order and larger) of the midwestern and western United States. These large, warm-water rivers have low to moderate gradient with origins in the intermontane basins of Montana. Throughout the range, river elevation is below 900m and is characterized by long deep runs and pools with depths >2m, numerous mid-stream islands, side channels, and interspaced riffles. Substrate characteristics are typically cobble in the riffles, and sand and gravel in runs and pools, with gravel and/or finer-textured side channels.

Diagnostic Characteristics

Fish Community: The members of this community consist of the Large, Medium, and Large Mainstem Warmwater River Assemblages. The community indicator species are characterized by main channel species including shovelnose sturgeon, pallid sturgeon, freshwater drum, paddlefish, burbot, sturgeon chub, sicklefin chub, and blue sucker. The Missouri mainstem contains an additional species not found in the Yellowstone River, the shortnose gar, which has only been recorded downstream from Fort Peck dam. Large Valley River

fish communities include the side-channel communities occurring at the margins of the main current or in the quiet side-channels; these include emerald shiner, channel catfish, mooneye, sauger, flathead chub, carp, white sucker, shorthead redhorse and sand shiner. The shallow riffle habitat areas are inhabited by longnose sucker, longnose dace, flathead chub with mountain sucker in the Yellowstone River. Macroinvertebrate Community: This community consists of members of the Transitional Prairie River, Large Prairie River, and Filtering Collector Assemblage in the riffles, with Large River Slow Current and Medium River Side-Channel Assemblages in the slow current areas and side channels, and the uncommon sand-dwelling mayfly community group (SDM) in the vast sandbar areas. The indicator species are characterized by main channel riverine dragonfly species, *Stylurus* and *Ophiogomphus*, the mayflies- (*Neochoroterpes oklahoma, Choroterpes, Camelobatidius, Fallceon quilleri, Acentrella insignificans, Ephoron album, and Travarella albertana*), caddisflies (*Leucotrichia pictipes, Neotrichia, Psychomyia, Hydropsyche morosa* group and *Cheumatopsyche*), and the unionid mussels - fatmucket (*Lampsilus siliquiodea*), black sandshell (*Ligumia recta*) (Missouri main stem only), and the side-channel mussel, giant floater (*Pyganodon grandis*). Although not reported in the classification due to rarity in the samples, the unique sand-dwelling mayfly assemblage includes indicator species: *Analetris eximia, Raptoheptegenia cruentata, Lachlania saskatchewanensis, Anepeorus rusticus, Ametropus neavei*, and *Homoeoneuria alleni*, and is most closely associated with the Large Valley and Prairie River Assemblage.

Range

The Large Valley River type occurs in the Missouri River downstream from Great Falls, especially past the confluence with the Marias River, downstream below Fort Peck Reservoir to the North Dakota border and the Yellowstone River downstream from Billings to the Missouri River Confluence. The Yellowstone River transitional area to a characteristic Valley River begins below Billings to around Pompeys Pillar. Additionally, the Lower Powder, Tongue, and Big Horn Rivers have occurrences of the Large Valley River fish assemblage during spring run-off.

Spatial Pattern

Linear

Environment

The Large Valley River type occurs in the Missouri River downstream from Great Falls, especially past the confluence with the Marias River, downstream below Fort Peck Reservoir to the North Dakota border and the Yellowstone River downstream from Billings to the Missouri River Confluence. The Yellowstone River transitional area starts upstream of Billings to around Big Timber. Additionally, the Lower Powder, Tongue, and Big Horn Rivers have occurrences of the Large Valley River fish assemblage during spring run-off.

Vegetation

Riparian cottonwood stands as well as the flood plain dynamics that enhance recruitment of willows and cottonwood saplings must be maintained. Russian olive and salt cedar are widespread introduced species that have reached nuisance levels along some stretches of the Yellowstone, mostly from Laurel downstream.

Dynamic Processes

Fluvial processes play a key role in the dynamics of Great Plains rivers and streams. The nature of these processes is often indicated by channel morphology. Meandering channels generally have a shallow gradient, low flow variability, and sediment loads dominated by silt and finer particles, while braided channels are characterized by a moderately steep gradient, high flow variability, and sediment loads dominated by sand and coarser particles (Friedman, 2002). Flooding is the key ecosystem process whereby establishment sites for riparian vegetation are created, seeds are dispersed and vegetative succession is controlled. However, since Euro-American settlement, natural fluvial processes have been disrupted in many of these systems by dams and diversions. Additional disruptions to the natural dynamics of this system include fire suppression, decreased flows and increased siltation rates due to agricultural activities, and the introduction of non-native fish species. Native grazers have been largely replaced by domestic cattle. Consequently, there has been a direct loss of woody plant diversity. Furthermore, both channel incision and channel widening have altered flooding regimes, leading to establishment of flood-intolerant species in many areas.

Management

Large dams and reservoirs have had the most significant negative impact on this community. Dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches (below Great Falls to Fort Peck Reservoir and between Fort Peck Reservoir and Lake Sacagawea, ND) maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1109: Northwestern Great Plains Valley River

Citation for data on this website:
Northwestern Great Plains Valley River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1109

Northwestern Glaciated Plains Valley River

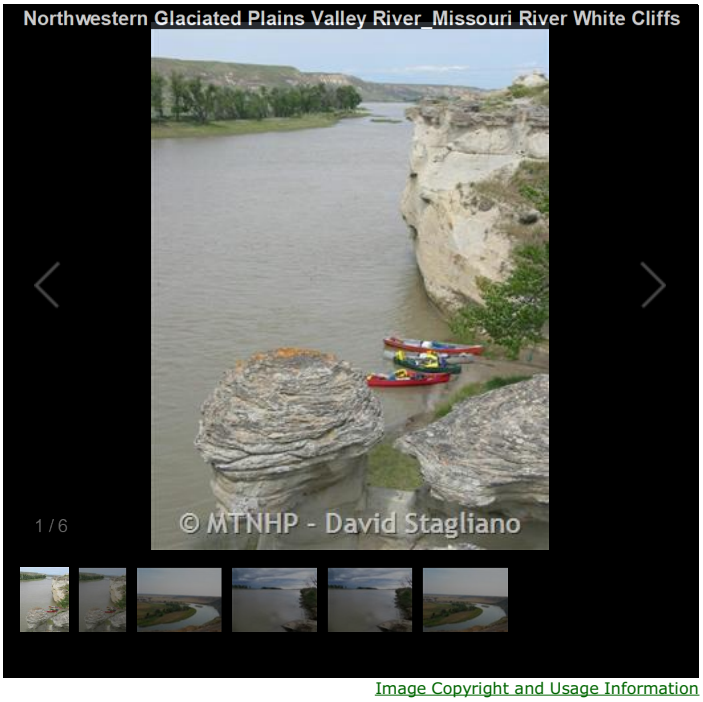


Image Copyright and Usage Information

Provisional State Rank: S3
(see reason below)

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State Rank Reason

The stream river mile occurrence of this system in the state is fairly well known, and angler harvest is regulated for one member of the fish community group, the paddlefish. The Large Valley River type is an at risk system and supports one of the most endangered fish in the US, the pallid sturgeon (G1S1, USFWS federally endangered). Other fish in this community are Montana Species of Concern: sturgeon chub (S2), sicklefin chub (S1), and blue sucker (S2S3). It also contains the globally rare sand-dwelling mayfly group, which is currently ranked S1-S3 in Montana. The occurrence of numerous threatened, rare, and declining species, as well as consistent threats to the habitats required for spawning and rearing warrants a state rank of S3.

General Description

This ecosystem is found widely throughout the mainstem Missouri River system (7th order and larger) of the midwestern and western United States. These large, warm-water rivers have low to moderate gradient with origins in the intermontane basins of Montana. Throughout the range, river elevation is below 900m and is characterized by long deep runs and pools with depths >2m, numerous mid-stream islands, side channels and interspaced riffles. Substrate characteristics are typically cobble in the riffles, whereas sand and gravel dominate runs and pools, with gravel and/or finer-textured side channels.

Diagnostic Characteristics

Fish Community: The members of this community consist of the Large, Medium, and Large Mainstem Warmwater River Assemblages. The community indicator species are characterized by main channel species including shovelnose sturgeon, pallid sturgeon, freshwater drum, paddlefish, burbot, sturgeon chub, sicklefin chub, and blue sucker. The Missouri mainstem contains an additional species not found in the Yellowstone

River, the shortnose gar, which has only been recorded downstream from Fort Peck dam. Large Valley River fish communities also include the side-channel communities occurring at the margins of the main current or in the quiet side-channels; these include emerald shiner, channel catfish, mooneye, sauger, flathead chub, carp, white sucker, shorthead redhorse, and sand shiner. The shallow riffle habitat areas are inhabited by longnose sucker, longnose dace, and flathead chub with mountain sucker in the Yellowstone River. Macroinvertebrate Community: This community consists of members of the Transitional Prairie River, Large Prairie River, and Filtering Collector Assemblage in the riffles, with Large River Slow Current and Medium River Side-Channel Assemblages in the slow current areas and side channels, and the uncommon sand-dwelling mayfly community group (SDM) in the vast sandbar areas. The indicator species are characterized by main channel riverine dragonfly species, *Stylurus* and *Ophiogomphus*, the mayflies- (*Neochoroterpes oklahoma, Choroterpes, Camelobatidius, Fallceon quilleri, Acentrella insignificans, Ephoron album, and Travarella albertana*), caddisflies (*Leucotrichia pictipes, Neotrichia, Psychomyia, Hydropsyche morosa* group and *Cheumatopsyche*), and the unionid mussels - fatmucket (*Lampsilus siliquiodea*), black sandshell (*Ligumia recta*) (Missouri main stem only), and the side-channel mussel, giant floater (*Pyganodon grandis*). Although not reported in the classification due to rarity in the samples, the unique sand-dwelling mayfly assemblage includes indicator species: *Analetris eximia, Raptoheptegenia cruentata, Lachlania saskatchewanensis, Anepeorus rusticus, Ametropus neavei*, and *Homoeoneuria alleni*, and is most closely associated with the Large Valley and Prairie River Assemblage.

Range

In Montana, the Large Valley River type occurs in the Missouri River downstream from Great Falls, especially past the confluence with the Marias River, downstream below Fort Peck Reservoir and on down to the North Dakota border. The Yellowstone River downstream from Billings to the Missouri River Confluence. Additionally, the Lower Powder, Tongue, and Big Horn Rivers have occurrences of the Large Valley River fish assemblage during spring run-off.

Spatial Pattern

Linear

Environment

The Large Valley River type occurs in the Missouri River downstream from Great Falls, especially past the confluence with the Marias River, downstream below Fort Peck Reservoir to the North Dakota border and the Yellowstone River downstream from Billings to the Missouri River Confluence. The Yellowstone River transitional area to a characteristic Valley River begins below Billings to around Pompeys Pillar. Additionally, the Lower Powder, Tongue, and Big Horn Rivers have occurrences of the Large Valley River fish assemblage during spring run-off.

Vegetation

Riparian cottonwood stands as well as the floodplain dynamics that enhance recruitment of willows and cottonwood saplings must be maintained. Russian olive and salt cedar are widespread introduced species that have reached nuisance levels along some stretches of the Yellowstone, mostly from Laurel downstream.

Dynamic Processes

Fluvial processes play a key role in the dynamics of Great Plains rivers and streams. The nature of these processes is often indicated by channel morphology. Meandering channels generally have a shallow gradient, low flow variability, and sediment loads dominated by silt and finer particles, while braided channels are characterized by a moderately steep gradient, high flow variability, and sediment loads dominated by sand and coarser particles (Friedman, 2002). Flooding is the key ecosystem process whereby establishment sites for riparian vegetation are created, seeds are dispersed, and vegetative succession is controlled. However, since Euro-American settlement, natural fluvial processes have been disrupted in many of these systems by dams and diversions. Additional disruptions to the natural dynamics of this system include fire suppression, decreased flows and increased siltation rates due to agricultural activities, and the introduction of non-native fish species. Native grazers have been largely replaced by domestic cattle. Consequently, there has been a direct loss of woody plant diversity. Furthermore, both channel incision and channel widening have altered flooding regimes, leading to establishment of flood-intolerant species in many areas.

Management

Large dams and reservoirs have had the most significant negative impact on this community. Dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches (below Great Falls to Fort Peck Reservoir and between Fort Peck and Lake Sacagawea, ND) maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1110: Northwestern Glaciated Plains Valley River

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Citation for data on this website:
Northwestern Glaciated Plains Valley River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1110

Westslope Intermountain Transitional River

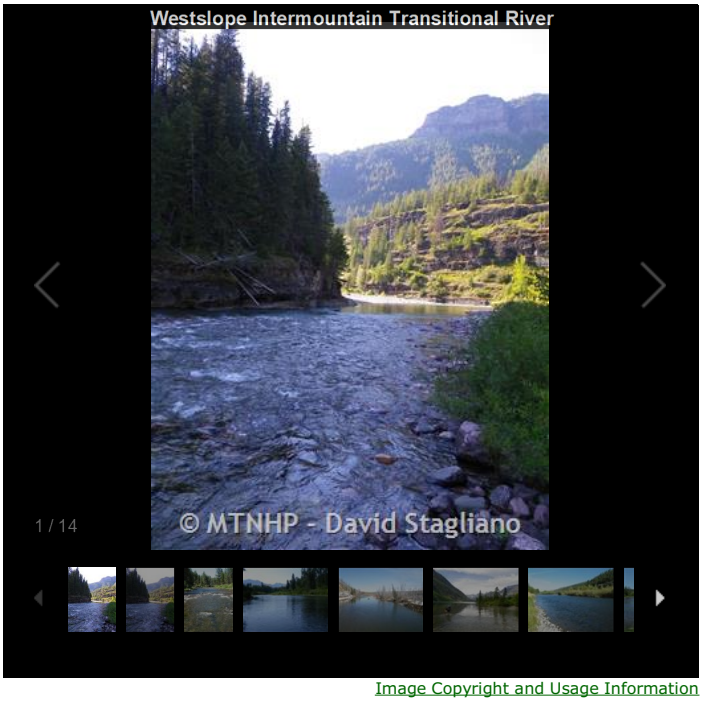


Image Copyright and Usage Information

Provisional State Rank: S4
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State Rank Reason

Widespread and with many representative river reaches in the state, this ecosystem has been affected by small dams, water diversions, stock ponds and introduced gamefish species that have had significantly negative impacts on this community. Thus, outside of wilderness areas such as the Bob Marshall, it is fairly rare to find biologically intact river miles of this ecological system.

General Description

This well-known cool to cold-water ecosystem occurs throughout the upper Columbia River Drainages and includes some of the most famous trout and wilderness rivers on the western side of the state. Habitats occur in moderate elevation (1200-2000m), medium-sized streams (4th-5th order, wetted width from 15 to 30m, average summer temperature <20°C) with moderate gradient and a permanent flow. There is strong seasonal variability due to melting snow pack from higher elevation mountainous areas. These rivers represent the ecotone between high-elevation, moderate gradient mountain streams and intermountain valley rivers. They are generally direct tributaries of the Clark Fork or Flathead Rivers, except for the Mainstem Transitional subtype, which describes portions of the Clark Fork River itself. These are classic freestone trout rivers with boulder/cobble riffles, cobble/gravel runs and pools, and silt on the margins or in the deepest pools. Deep runs and pools with undercut banks and large woody debris provide the best fish habitats, while the riffles harbor the most diverse macroinvertebrate communities. These are clear running rivers, except during spring run-off or where heavy livestock use, bank erosion or stream incisement has occurred in the watersheds. The (L) descriptor on this AES code depicts the effects of proximity to a lake outlet which can have a significant effect on the biological community.

Diagnostic Characteristics

The members of the fish community are dominated by the Coolwater Transitional and the Traditional Trout Stream Assemblages. The westslope fish community indicator species would typically be dominated by native species such as the Westslope cutthroat, mountain whitefish, Rocky Mountain or slimy sculpin, northern pikieminnow, largescale sucker and longnose dace. These rivers also provide strongholds for the Bull Trout in reaches that have not been impaired anthropogenically. However, the introduced species of the Stocked Trout Assemblage, the brown and rainbow trout, tend to dominate and become the focal species of these systems. One member of the Large Mainstem Warmwater River Assemblage (#5) that occurs frequently in deeper, coldwater habitats of this system is the burbot, a potential SOC in the state. Additionally, the white sucker, walleye, northern pike and the exotic carp may be found at the warmer, lower end of this transitional gradient. The shallow gravel runs of these rivers provide spawning habitat for downstream populations of brown trout during their fall migration, and rainbow trout and sucker species in the spring. The diverse macroinvertebrate community consists of members of the Medium Cool-Water Transitional Assemblage; the Traditional Trout Stream assemblage, Medium Mountain Stream Community; and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast current stonefly and caddisfly species such as *Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma* and *Lepidostoma* ; and by the tipulids *Hexatoma* and *Antocha*. Mayflies are diverse and contain many genera, including *Baetis, Ephemerella, Serratella, Rhithrogena, Drunella* and *Epeorus*. As these transitional rivers proceed downstream and begin to warm (>17C) or are sediment impaired, degraded or are dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with indicator species such as *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Prosimulium, Amiocentrus aspilis, Lara, Phaenopsectra, Plauditus,* and *Narpus*. Populations of the western pearlshell mussel have been reported from this river ecosystem, although the populations may be in decline.

Range

AES B009 Medium Intermontane rivers originate in the Bitterroot Valley or Beaverhead Mountains including the Bitterroot, Clark Fork, Rock Creek, Blackfoot and Clearwater Rivers. AES B010 rivers includes those with origins in the Flathead Valley and surrounding mountains including the Yaak, Whitefish, Jocko, Little Bitterroot Rivers. B011 Medium Intermontane rivers begin in the Northern Rockies including North, South & Middle Forks of the Flathead River.

Spatial Pattern

4

Management

Small dams, water diversions, stock ponds and introduced gamefish species have had the most significant negative impact on this community (Winston et al. 1991). Anywhere dams occur, the downstream reaches are affected by altered water temperatures, introduced fish, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1290: Westslope Intermountain Transitional River

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Citation for data on this website:
Westslope Intermountain Transitional River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1290

Medium Southwest Montana Basin Intermountain Transitional River



Image Copyright and Usage Information

Provisional State Rank: S5
(see reason below)

External Links

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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem is heavily affected by small dams, water diversions, stock ponds, and introduced gamefish species that have had significant negative impacts on this community. Therefore, biologically intact river miles of this ecological system are rare.

General Description

This well-known cool to cold-water ecosystem occurs throughout the upper Missouri and Yellowstone River Drainages and includes some of the most famous trout rivers in the country. Habitats occur in moderate elevation (1200-2000m), medium-sized streams (4th-5th order, wetted width from 15 to 30m, average summer temperature <20°C) with moderate gradient and a permanent flow. There is strong seasonal variability due to melting snow pack from higher elevation mountainous areas. These rivers represent the ecotonal area from high-elevation steep-gradient mountain streams to the eastern prairie rivers. They are typically direct tributaries of the Missouri and Yellowstone Rivers except the Mainstem Transitional subtype, which describes portions of the Yellowstone and Missouri River. These are classic freestone trout rivers with boulder/cobble riffles, cobble/gravel runs and pools, and silt on the stream margins or in the deepest pools. Deep runs and pools with undercut banks and large woody debris provide the best fish habitats, while the riffles harbor the most diverse macroinvertebrate communities. These are clear running rivers, except during spring run-off or where cattle intrusions, bank erosion, or stream incisement has occurred in the watershed.

Diagnostic Characteristics

The members of the fish community are dominated by the Coolwater Transitional and the Traditional Trout

Stream Assemblages. The fish community indicator species were historically dominated by native species, including the Westslope cutthroat trout, mountain whitefish, mottled sculpin, longnose sucker, longnose dace, with the Yellowstone cutthroat trout & mountain sucker occurring in the Yellowstone drainages. However, the introduced species of the stocked trout assemblage, the brown and rainbow trout, tend to dominate and become the focal species of these systems. One member of the Large Mainstem Warmwater River Assemblage (#5) that occurs frequently in deeper, coldwater habitats of this system is the burbot, a potential SOC in the state. Additionally, the white sucker, walleye, northern pike, and the exotic carp may be found at the warmer, lower end of this transitional gradient. The shallow gravel runs of these rivers provide spawning habitat for downstream populations of brown trout during their fall migration, and rainbow trout and sucker species in the spring. The Big Hole Assemblage (SPA #6) is a unique assemblage found only in the B001- Big Hole River drainages and includes the indicator species, fluvial arctic grayling (candidate for federal threatened status), and the redside shiner. The diverse macroinvertebrate community consists of members of the Medium Cool-Water Transitional Assemblage, the Traditional Trout Stream assemblage, Medium Mountain Stream Community and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast current stonefly and caddisfly species: *Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma, Lepidostoma* and the tipulids: *Hexatoma and Antocha* . Mayflies are diverse in this system and contain many genera, including: *Baetis, Ephemerella, Serratella, Rhithrogena, Drunella and Epeorus* . As these transitional rivers proceed downstream and begin to warm (>17 C) or are sediment-impaired, degraded, or dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with indicator species: *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Prosimulium, Amiocentrus aspilis, Lara, Plauditus, Narpus*. Populations of the western pearlshell mussel have been reported from this river ecosystem, although the populations may be in decline due to loss of their native host fish the Westslope Cutthroat Trout.

Range

The Intermountain Transitional River Ecosystem has been identified in the rivers that dominate the trout fishing scene throughout central and southwest Montana; B001-Medium Intermontane rivers, origins in Intermontane basins within the Southwest Montana Basin and Valley including the Big Hole, Beaverhead, Madison, Jefferson, Red Rock Rivers. Additional Intermountain Transitional Rivers include the Smith, Gallatin, Dearborn, Sun and the mainstem Missouri from Three Forks to Cascade. In the Yellowstone drainage, the mainstem Yellowstone River from Gardiner to Big Timber, Clarks Fork of the Yellowstone, the lower Boulder, Stillwater, and Shields Rivers. The Middle Missouri/Musselshell Drainages contain the representatives: Judith and Musselshell Rivers.

Spatial Pattern

Linear

Management

Large dams and reservoirs have had the most significant negative impact on this ecological community. Dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches below Milltown and above Noxon Reservior maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1210: Medium Southwest Montana Basin Intermountain Transitional River

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Citation for data on this website:
Medium Southwest Montana Basin Intermountain Transitional River. Montana Field Guide. Montana Natural Heritage Program
Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1210

Medium Intermountain Transitional River



Image Copyright and Usage Information

Provisional State Rank: S5
(see reason below)

External Links

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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem is heavily effected by small dams, water diversions, stock ponds and introduced gamefish species that have had significant negative impacts on this community. Therefore, it is fairly rare to find biologically intact river miles of this ecological system.

General Description

This well-known cool to cold-water ecosystem occurs throughout the upper Missouri and Yellowstone River Drainages and includes some of the most famous trout rivers in the country. Habitats occur in moderate elevation (1200-2000m), medium-sized streams (4th-5th order, wetted width from 15 to 30m, average summer temperature <20°C) with moderate gradient and a permanent flow. There is strong seasonal variability due to melting snow pack from higher elevation mountainous areas. These rivers represent the ecotonal area from high-elevation steep-gradient mountain streams to the eastern prairie rivers. They are typically direct tributaries of the Missouri and Yellowstone Rivers except the Mainstem Transitional subtype, which describes portions of the Yellowstone and Missouri River. These are classic freestone trout rivers with boulder/cobble riffles, cobble/gravel runs and pools, and silt on the margins or in the deepest pools. Deep runs and pools with undercut banks and large woody debris provide the best fish habitats, while the riffles harbor the most diverse macroinvertebrate communities. These are clear running rivers, except during spring run-off or where cattle intrusions, bank erosion or stream incisement has occurred in the watersheds.

Diagnostic Characteristics

The members of the fish community are dominated by the Coolwater Transitional and the Traditional Trout Stream Assemblages. The fish community indicator species would typically be dominated by the native

species: the Westslope cutthroat, mountain whitefish, mottled sculpin, longnose sucker, longnose dace, with the Yellowstone cutthroat trout & mountain sucker in the Yellowstone drainages. However, the introduced species of the stocked trout assemblage, the brown and rainbow trout, tend to dominate and become the focal species of these systems. One member of the Large Mainstem Warmwater River Assemblage (#5) that occurs frequently in deeper, coldwater habitats of this system is the burbot, a potential SOC in the state. Additionally, the white sucker, walleye, northern pike and the exotic carp may be found at the warmer, lower end of this transitional gradient. The shallow gravel runs of these rivers provide spawning habitat for downstream populations of brown trout during their fall migration, and rainbow trout and sucker species in the spring. The Big Hole Assemblage (SPA #6) is a unique assemblage found only in the B001- Big Hole River drainages and includes the indicator species, fluvial arctic grayling (candidate for federal threatened status) and the redside shiner. The diverse macroinvertebrate community consists of members of the Medium Cool-Water Transitional Assemblage, the Traditional Trout Stream assemblage, Medium Mountain Stream Community and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast current stonefly and caddisfly species: *Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma, Lepidostoma* and the tipulids: *Hexatoma and Antocha* . Mayflies are diverse in this system and contain many genera, including: *Baetis, Ephemerella, Serratella, Rhithrogena, Drunella and Epeorus* . As these transitional rivers proceed downstream and begin to warm (>17 C) or are sediment-impaired, degraded, or dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with indicator species: *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Prosimulium, Amiocentrus aspilis, Lara, Plauditus, Narpus*. Populations of the western pearlshell mussel have been reported from this river ecosystem, although the populations may be in decline due to loss of their native host fish the Westslope Cutthroat Trout.

Range

The Intermountain Transitional River Ecosystem has been identified in the rivers that support high trout densities throughout central and southwest Montana; these include the Smith, Jefferson, Madison, Gallatin, Beaverhead, Big Hole, Dearborn, Sun, and the mainstem Missouri from Three Forks to Cascade. In the Yellowstone drainage, these include the mainstem Yellowstone River from Gardiner to Big Timber, Clarks Fork of the Yellowstone, the lower Boulder, Stillwater, and Shields Rivers. Representatives in the Middle Missouri/Musselshell Drainages include the Judith and Musselshell Rivers. B001-Medium Intermontane rivers with origins in the Intermontane basins within the Southwest Montana Basin and Valley including the Big Hole, Beaverhead, Madison, Jefferson, Red Rock Rivers are included here.

Spatial Pattern

Linear

Management

Large dams and reservoirs have had the most significant negative impact on this ecological community. Dams create barriers to the long distance spawning runs many fish in this community need, and reservoirs have submerged considerable spawning habitat. Inter-dam reaches below Milltown and above Noxon Reservior maintain some of their pre-development channel morphology, but they are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1211: Medium Intermountain Transitional River

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Citation for data on this website:
Medium Intermountain Transitional River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1211

Isolated Range Intermountain Transitional River

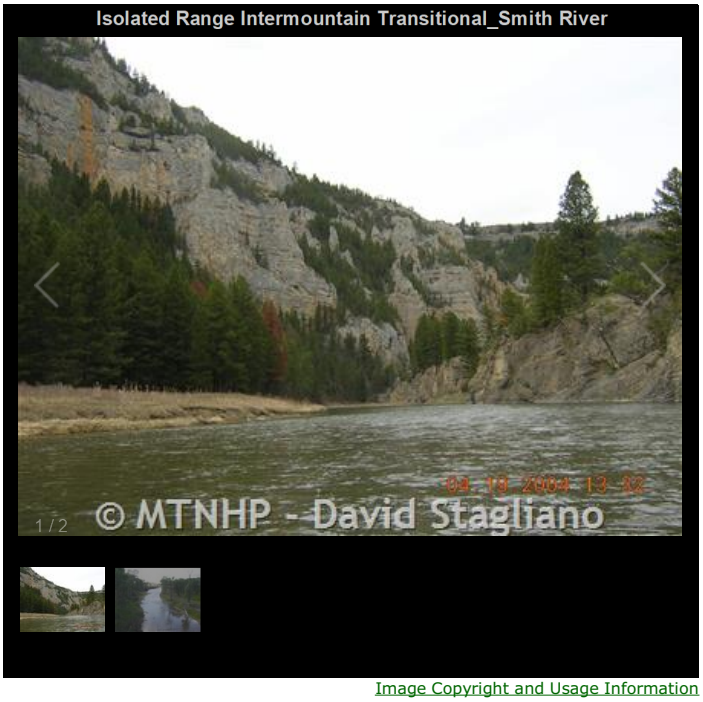


Image Copyright and Usage Information

Provisional State Rank: S5
(see reason below)

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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem is heavily affected by small dams, water diversions, stock ponds and introduced gamefish species that have had significant negative impacts on this community. Therefore, biologically intact river miles of this ecological system are rare.

General Description

This well-known cool to cold-water ecosystem occurs throughout the upper Missouri and Yellowstone River Drainages and includes some of the most famous trout rivers in the country. Habitats occur in moderate elevation (1200-2000m), medium-sized streams (4th-5th order, wetted width from 15 to 30m, average summer temperature <20°C) with moderate gradient and a permanent flow. There is strong seasonal variability due to melting snow pack from higher elevation mountainous areas. These rivers represent the ecotonal area from high-elevation steep-gradient mountain streams to the eastern prairie rivers. They are typically direct tributaries of the Missouri and Yellowstone Rivers except the Mainstem Transitional subtype, which describes portions of the Yellowstone and Missouri River. These are classic freestone trout rivers with boulder/cobble riffles, cobble/gravel runs and pools, and silt on the stream margins or in the deepest pools. Deep runs and pools with undercut banks and large woody debris provide the best fish habitats, while the riffles harbor the most diverse macroinvertebrate communities. These are clear running rivers, except during spring run-off or where cattle intrusions, bank erosion, or stream incisement has occurred in the watershed.

Diagnostic Characteristics

The members of the fish community are dominated by the Coolwater Transitional and the Traditional Trout Stream Assemblages. The fish community indicator species would typically be dominated by the native

species: the Westslope cutthroat, mountain whitefish, mottled sculpin, longnose sucker, longnose dace, with the Yellowstone cutthroat trout & mountain sucker in the Yellowstone drainages. However, the introduced species of the stocked trout assemblage, the brown and rainbow trout, tend to dominate and become the focal species of these systems. One member of the Large Mainstem Warmwater River Assemblage (#5) that occurs frequently in deeper, coldwater habitats of this system is the burbot, a potential SOC in the state. Additionally, the white sucker, walleye, northern pike, and the exotic carp may be found at the warmer, lower end of this transitional gradient. The shallow gravel runs of these rivers provide spawning habitat for downstream populations of brown trout during their fall migration, and rainbow trout and sucker species in the spring. The Big Hole Assemblage (SPA #6) is a unique assemblage found only in the Big Hole River drainages and includes the indicator species, fluvial arctic grayling (candidate for federal threatened status) and the redside shiner. The diverse macroinvertebrate community consists of members of the Medium Cool-Water Transitional Assemblage, the Traditional Trout Stream assemblage, Medium Mountain Stream Community and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast current stonefly and caddisfly species, Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma, Lepidostoma and the tipulids: Hexatoma and Antocha. Mayflies are diverse and contain many genera, including Baetis, Ephemerella, Serratella, Rhithrogena, Drunella and Epeorus. As these transitional rivers proceed downstream and begin to warm (>17 ?C) or are sediment impaired, degraded, or dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with the following indicator species: Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Prosimulium, Amiocentrus aspilis, Lara, Phaenopsectra, Plauditus, Narpus. Populations of the western pearlshell mussel have been reported from this river ecosystem, although the populations may be in decline.

Range

The Intermountain Transitional River Ecosystem has been identified in the rivers that support high trout densities throughout central and southwest Montana; these include the Smith, Jefferson, Madison, Gallatin, Beaverhead, Big Hole, Dearborn, Sun, and the mainstem Missouri from Three Forks to Cascade. In the Yellowstone drainage, these include the mainstem Yellowstone River from Gardiner to Big Timber, Clarks Fork of the Yellowstone, the lower Boulder, Stillwater, and Shields Rivers. The Middle Missouri/Musselshell Drainages contain the following representative streams: Judith and Musselshell Rivers. B003- Medium Transitional/Foothill Rivers, with origins in Isolated Mountain Ranges including the Judith, Stillwater, Musselshell and Smith Rivers and B004-Medium Transitional/Foothills Rivers, with origins in the Yellowstone Highlands, including the Gallatin, Clarks Fork of the Yellowstone, Boulder and Stillwater Rivers are also included here.

Spatial Pattern

4

Management

Small dams, water diversions for agriculture, stock ponds, and introduced gamefish species have had the most significant negative impact on this community. Anywhere dams occur, the downstream reaches are affected by altered water temperatures, introduced fish, unnatural water level fluctuations, and changes in sediment and nutrient transport. This system contains many rivers listed on the 303(d) impaired list due to dewatering.

References

Classification and Map Identifiers

ReGAP:
1212: Isolated Range Intermountain Transitional River

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Citation for data on this website:
Isolated Range Intermountain Transitional River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1212

Yellowstone Highland Intermountain Transitional River

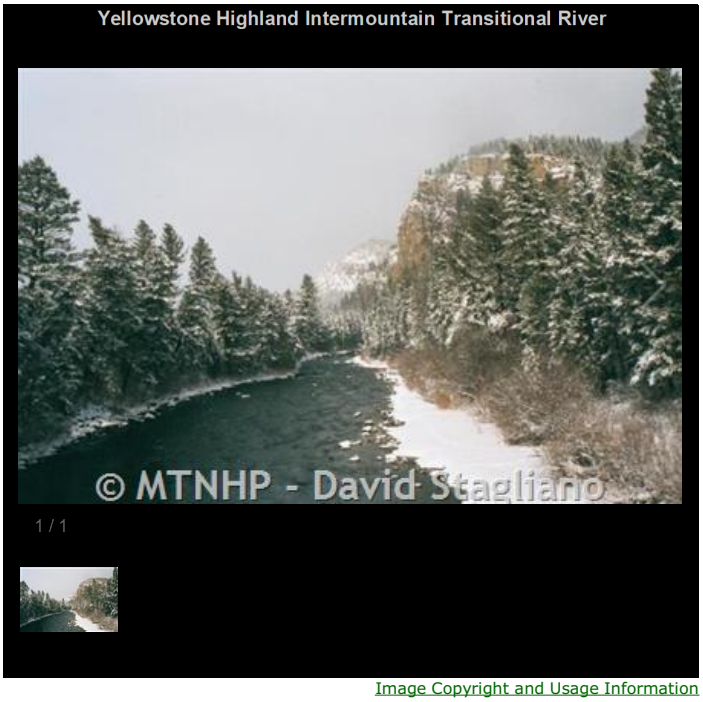


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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem is heavily affected by small dams, water diversions, stock ponds, and introduced gamefish species that have had significant negative impacts on this community. Therefore, examples of biologically intact river miles of this ecological system are rare.

General Description

This well-known cool to cold-water ecosystem occurs throughout the upper Missouri and Yellowstone River Drainages and includes some of the most famous trout rivers in the country. Habitats occur in moderate elevation (1200-2000m), medium-sized streams (4th-5th order, wetted width from 15 to 30m, average summer temperature <20°C) with moderate gradient, and a permanent flow. Seasonal variability is strong due to melting snow pack from higher elevation mountainous areas. These rivers represent the ecotonal area from high-elevation, steep-gradient mountain streams to the eastern prairie rivers. They are typically direct tributaries of the Missouri and Yellowstone Rivers except the Mainstem Transitional subtype, which describes portions of the Yellowstone and Missouri Rivers. These are classic freestone trout rivers with boulder/cobble riffles, cobble/gravel runs and pools, and silt on the stream margins or in the deepest pools. Deep runs and pools with undercut banks and large woody debris provide the best fish habitats, while the riffles harbor the most diverse macroinvertebrate communities. These are clear running rivers, except during spring run-off or where cattle intrusions, bank erosion, or stream incisement has occurred in the watershed.

Diagnostic Characteristics

The members of the fish community are dominated by the Coolwater Transitional and the Traditional Trout Stream Assemblages. The fish community indicator species were historically dominated by the native

species: the Westslope cutthroat trout, mountain whitefish, mottled sculpin, longnose sucker, longnose dace, with the Yellowstone cutthroat trout & mountain sucker occurring in the Yellowstone drainages. However, the introduced species of the stocked trout assemblage, the brown and rainbow trout, tend to dominate and become the focal species of these systems. One member of the Large Mainstem Warmwater River Assemblage (#5) that occurs frequently in deeper, coldwater habitats of this system is the burbot, a potential SOC in the state. Additionally, the white sucker, walleye, northern pike, and the exotic carp may be found at the warmer, lower end of this transitional gradient. The shallow gravel runs of these rivers provide spawning habitat for downstream populations of brown trout during their fall migration, and rainbow trout and sucker species in the spring. The Big Hole Assemblage (SPA #6) is a unique assemblage found only in the Big Hole River drainages and includes the indicator species, fluvial arctic grayling (candidate for federal threatened status), and the redside shiner. The diverse macroinvertebrate community consists of members of the Medium Cool-Water Transitional Assemblage, the Traditional Trout Stream assemblage, Medium Mountain Stream Community, and the Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast current stonefly and caddisfly species, Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Arctopsyche grandis, Hydropsyche, Glossosoma, Lepidostoma and the tipulids: Hexatoma and Antocha. Mayflies are diverse and contain many genera, including Baetis, Ephemerella, Serratella, Rhithrogena, Drunella and Epeorus. As these transitional rivers proceed downstream and begin to warm (>17 ?C) or are sediment impaired, degraded, or dewatered, they will quickly lose the Traditional Trout Stream and Medium Mountain Stream Community (#4 and 90), and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Cool-Water Transitional Assemblage (#1) and the Foothills Transitional Assemblage (#105), with indicator species: Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Prosimulium, Amiocentrus aspilis, Lara, Phaenopsectra, Plauditus, Narpus. Populations of the western pearlshell mussel have been reported from this river ecosystem, although the populations may be in decline.

Range

The Intermountain Transitional River Ecosystem has been identified in the rivers that support high trout densities throughout central and southwest Montana; these include, the Smith, Jefferson, Madison, Gallatin, Beaverhead, Big Hole, Dearborn, Sun, and the mainstem Missouri from Three Forks to Cascade. In the Yellowstone drainage, these include the mainstem Yellowstone River from Gardiner to Big Timber, Clarks Fork of the Yellowstone, the lower Boulder, Stillwater, and Shields Rivers. Representatives of the system in the Middle Missouri/Musselshell Drainages are the Judith and Musselshell Rivers. B003- Medium Transitional/Foothill rivers, with origins in Isolated Mountain Ranges including the Judith, Stillwater, Musselshell and Smith Rivers, and B004-Medium Transitional/Foothils rivers, with origins in the Yellowstone Highlands, including the Gallatin, Clarks Fork of the Yellowstone, Boulder and Stillwater Rivers are included here.

Spatial Pattern

4

Management

Small dams, water diversions for agriculture, stock ponds, and introduced gamefish species have had the most significant negative impact on this community. Anywhere dams occur, the downstream reaches are affected by altered water temperatures, introduced fish, unnatural water level fluctuations, and changes in sediment and nutrient transport. This system contains many rivers listed on the 303(d) list as impaired due to dewatering.

References

Classification and Map Identifiers

ReGAP:
1213: Yellowstone Highland Intermountain Transitional River

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Citation for data on this website:
Yellowstone Highland Intermountain Transitional River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1213

Northwestern Great Plains Medium Prairie River



Image Copyright and Usage Information

Provisional State Rank: S4
(see reason below)

External Links

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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem is heavily affected by small dams, water diversions, stock ponds, and introduced gamefish species that have had significant negative impacts on this community. Therefore, examples of biologically intact river miles of this ecological system are rare.

General Description

This ecosystem is found widely throughout the broad Great Plains region of Montana, including many occurrences in the Northern Glaciated and the Northwestern Great Plains Ecoregions. Representative rivers of this ecosystem are usually direct tributaries to the Missouri and Yellowstone rivers, but can have primary connectivity to other Large Prairie Rivers, such as the Little Powder River to the Powder River or Battle Creek to the Milk River. These are larger (4th and 5th order rivers, >100 river miles long, average wetted width of 15m), perennial, warmwater streams with unconfined valley bottom rivers, but are considered "wadeable" in most reaches by the summer months. In the low to mid-elevation (750-1200m) channels, low gradient streams contain long runs and continuous pools (1-1.5 m in depth), whereas moderate gradient sections contain frequently interspaced riffles that maintain connectivity throughout the year, although riffles may be absent in incised and degraded channel sections. Substrate characteristics are typically cobble/pebble riffles (when present) to gravel dominated runs and silt dominated pools. Large woody debris, deep pools, and undercut banks in the lower reaches of these rivers provide substantial fish habitat. During spring and early summer, lower sections of these rivers (B005c-confluence areas) offer spawning and nursery habitat for sauger, walleye, channel catfish, and other Large Warmwater Assemblage fishes.

Diagnostic Characteristics

The members of the resident fish community consist of species from the Large, Medium Warmwater, Sunfish, Creek Chub, and Core Prairie Stream Assemblages. The diagnostic community species include fewer species of the Large River assemblage, except at confluence areas (B005c & B006c), and are characterized predominately by the native minnow and sucker species of the Medium Warmwater Assemblage: fathead minnows, lake chub, flathead chub, plains silvery minnow, western silvery minnow, white sucker, and shorthead redhorse. In the deeper runs and pools, river carpsucker and channel catfish occur, as well as the introduced species, walleye, northern pike, black bullhead, carp, and green sunfish. The riffle areas are inhabited by longnose dace, flathead chub and, where large cobbles occur, stonecat. The medium prairie rivers of the Northern Glaciated ecoregion (B006) are more likely to contain introduced northern pike, black bullhead and yellow perch, while the Northwestern Great Plains rivers (B005) will more likely have introduced green sunfish, crappie, yellow bullhead and rarely, smallmouth and rock bass. Macroinvertebrate Community consists of members of the Large Prairie River, Prairie Stream, and Filtering Collector Assemblages in the riffles, as well as Prairie Stream, Large Prairie River Slow Current and Medium Prairie River Side-Channel Assemblages in run and pool habitats. Community indicator species are characterized by main channel riverine dragonfly species (Ophiogomphus), damselfly genera (Calopteryx and Hetaerina), mayflies (Leucrocuta, Stenonema terminatum, Isonychia, Fallceon quilleri, Ephoron album, Tricorythodes and Caenis latipennis), caddisflies (Hydropsyche morosa group, Cheumatopsyche and Polycentropus), numerous Corixidae, and mussels - fatmucket (Lampsilus siliquiodea) and the side-channel mussel, giant floater (Pyganodon grandis).

Range

The Medium Prairie River type occurs throughout the Great Plains region of North America within the Missouri River Drainages. In the Montana Glaciated Plains Ecoregion (AES B006), examples include Redwater River, Frenchman, Rock, Battle, Lodge, Poplar, Wolf, Big Muddy, and Beaver Creeks. In the Northwestern Great Plains (AES B005), examples include the lower reaches of the Little Powder, O' Fallon, Mizpah, Pumpkin, Rosebud, Little Beaver, and Beaver Creeks.

Spatial Pattern

4

Dynamic Processes

Fluvial processes play a key role in the dynamics of Great Plains rivers and streams. The nature of these processes is often indicated by channel morphology. Meandering channels generally have a shallow gradient, low flow variability, and sediment loads dominated by silt and finer particles, while braided channels are characterized by a moderately steep gradient, high flow variability, and sediment loads dominated by sand and coarser particles (Friedman, 2002). Flooding is the key ecosystem process whereby establishment sites for riparian vegetation are created, seeds are dispersed, and vegetative succession is controlled. However, since Euro-American settlement, natural fluvial processes have been disrupted in many of these systems by dams and diversions. Disruptions include fire suppression, decreased flows and increased siltation rates due to agricultural activities, and introduction of non-native fish species. Native grazers have been largely replaced by domestic cattle. Consequently, there has been a direct loss of woody plant diversity. Furthermore, both channel incision and channel widening have altered flooding regimes, leading to establishment of flood-intolerant species in many areas.

Management

Small dams, water diversions, stock ponds, and introduced gamefish species have had the most significant negative impact on this community (Winston et al. 1991). Anywhere dams occur, the downstream reaches are affected by altered water temperatures, introduced fish, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1250: Northwestern Great Plains Meduim Prairie River

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Citation for data on this website:
Northwestern Great Plains Medium Prairie River — Northwestern Great Plains Meduim Prairie River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1250

Northwestern Glaciated Plains Medium Prairie River

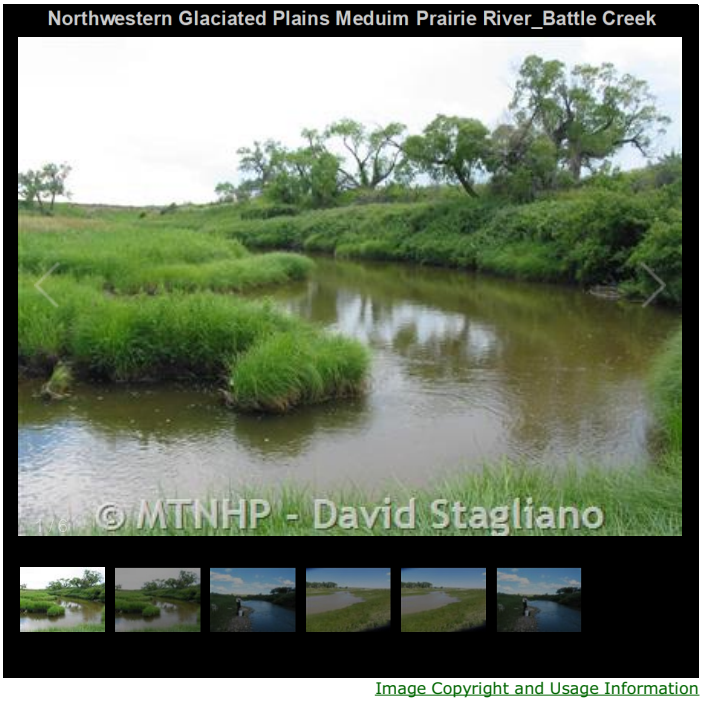


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Provisional State Rank: S4
(see reason below)

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State Rank Reason

Although this ecosystem is widespread and has many representative river reaches in the state, it is heavily affected by small dams, water diversions, stock ponds, and introduced gamefish species that have had significant negative impacts on this community. Therefore, examples of biologically intact river miles of this ecological system are rare.

General Description

This ecosystem is found widely throughout the broader Great Plains region of Montana, including many occurrences in the Northern Glaciated and the Northwestern Great Plains Ecoregions. Representative rivers of this ecosystem are usually direct tributaries to the Missouri and Yellowstone rivers, but they can have primary connectivity to other Large Prairie Rivers, such as the Little Powder River to the Powder River or Battle Creek to the Milk River. These are larger (4th and 5th order rivers, >100 river miles long, average wetted width of 15m), perennial warmwater, unconfined valley bottom rivers, but are considered "wadeable" in most reaches by the summer months. In the low to mid-elevation (750-1200m) examples, channels with a low gradient contain long runs and continuous pools (1-1.5 m in depth), whereas the moderate gradient sections contain frequently interspaced riffles maintaining connectivity throughout the year, although riffles may be absent in incised and degraded channel sections. Substrate characteristics are typically cobble/pebble riffles (when present) to gravel dominated runs and silt dominated pools. Large woody debris, deep pools, and undercut banks in the lower reaches of these rivers provide substantial fish habitat. During spring and early summer, lower sections of these rivers (B006c-confluence areas) offer spawning and nursery habitat for sauger, walleye, channel catfish and other Large Warmwater Assemblage fishes.

Diagnostic Characteristics

The members of the resident fish community consist of species from the Large, Medium Warmwater, Sunfish, Creek Chub, and Core Prairie Stream Assemblages. The diagnostic community species include fewer species of the Large River assemblage, except at confluence areas (B005c & B006c), and are characterized predominately by the native minnow and sucker species of the Medium Warmwater Assemblage: fathead minnows, lake chub, flathead chub, plains silvery minnow, western silvery minnow, white sucker, and shorthead redhorse. In the deeper runs and pools, river carpsucker and channel catfish occur, as well as the introduced species, walleye, northern pike, black bullhead, carp, and green sunfish. The riffle areas are inhabited by longnose dace, flathead chub, and where large cobbles are present, stonecat. The medium prairie rivers of the Northern Glaciated ecoregion (B006) are more likely to contain introduced northern pike, black bullhead, and yellow perch, while the Northwestern Great Plains rivers (B005) will more likely have introduced green sunfish, crappie, yellow bullhead and rarely, smallmouth and rock bass. The Macroinvertebrate Community consists of members of the Large Prairie River, Prairie Stream, and Filtering Collector Assemblages in the riffles, as well as Prairie Stream, Large Prairie River Slow Current and Medium Prairie River Side-Channel Assemblages in run and pool habitats. Community indicator species are characterized by main channel riverine dragonfly species (*Ophiogomphus*), damselfly genera (*Calopteryx and Hetaerina*), mayflies (*Leucrocuta, Stenonema terminatum, Isonychia, Fallceon quilleri, Ephoron album, Tricorythodes and Caenis latipennis*), caddisflies (*Hydropsyche morosa* group, *Cheumatopsyche and Polycentropus*), numerous Corixidae, and mussels - fatmucket (*Lampsilus siliquiodea*) and the side-channel mussel, giant floater (*Pyganodon grandis*).

Range

The Medium Prairie River type occurs throughout the Great Plains region of North America within the Missouri River Drainages. In the Montana Glaciated Plains Ecoregion (AES B006), examples include Redwater River, Frenchman, Rock, Battle, Lodge, Poplar, Wolf, Big Muddy and Beaver Creeks. In the Northwestern Great Plains (AES B005), examples include the lower reaches of the Little Powder, O' Fallon, Mizpah, Pumpkin, Rosebud, Little Beaver, and Beaver Creeks.

Spatial Pattern

Linear

Dynamic Processes

Fluvial processes play a key role in the dynamics of Great Plains rivers and streams. The nature of these processes is often indicated by channel morphology. Meandering channels generally have a shallow gradient, low flow variability, and sediment loads dominated by silt and finer particles, while braided channels are characterized by a moderately steep gradient, high flow variability, and sediment loads dominated by sand and coarser particles (Friedman, 2002). Flooding is the key ecosystem process whereby establishment sites for riparian vegetation are created, seeds are dispersed, and vegetative succession is controlled. However, since Euro-American settlement, natural fluvial processes have been disrupted in many of these systems by dams and diversions. Other disturbances include fire suppression, decreased flows and increased siltation rates due to agricultural activities, and the introduction of non-native fish species. Native grazers have been largely replaced by domestic cattle. Consequently, there has been a direct loss of woody plant diversity. Furthermore, both channel incision and channel widening have altered flooding regimes, leading to establishment of flood-intolerant species in many areas.

Management

Small dams, water diversions, stock ponds, and introduced gamefish species have had the most significant negative impact on this community (Winston et al. 1991). Anywhere dams occur, the downstream reaches are affected by altered water temperatures, introduced fish, unnatural water level fluctuations, and changes in sediment and nutrient transport.

Original Concept Authors

Stagliano, D. 2006

Montana Version Authors

Stagliano, D. and Vance, L. 2011

References

Classification and Map Identifiers

ReGAP:
1251: Northwestern Glaciated Plains Meduim Prairie River

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Citation for data on this website:
Northwestern Glaciated Plains Medium Prairie River — Northwestern Glaciated Plains Meduim Prairie River. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1251

Medium Volume Spring Stream

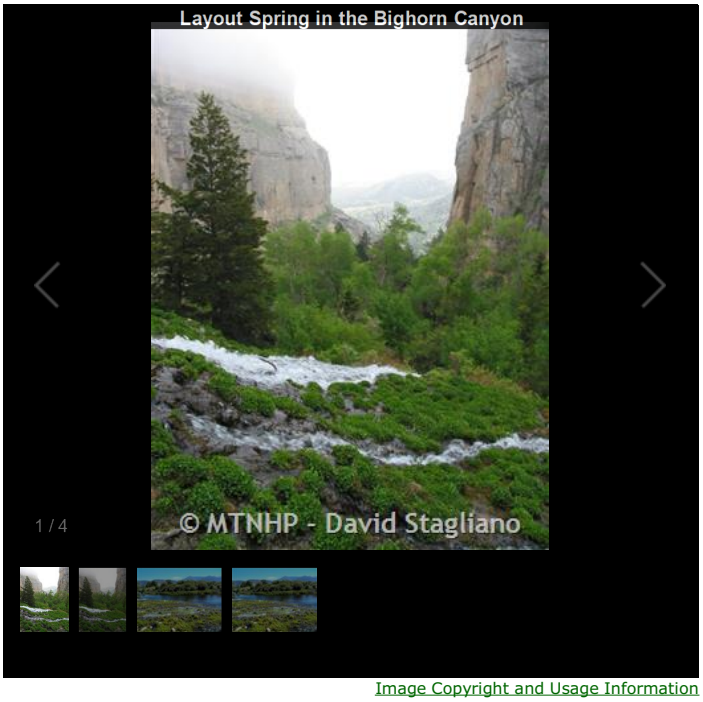


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State Rank Reason

The number of occurrences is fairly well known and many spring creeks fall within private property. Very few spring creeks have had extensive biological inventories due to private land issues, but the potential of discovering new snail species is high (D. Gustafson, pers. comm.). Due to the constant temperatures, these streams can act as fish refuges during the summer and winter months with trout spawning areas on the gravel bottoms.

General Description

This ecosystem is found in the foothills and valleys of the Middle Rockies Ecoregion east of the Continental Divide. Elevation is 1200-2000 m. These small to medium (average wetted width from 2-15m, average summer temperature <15°C) rivers have moderate permanent flow with strong seasonal variability. Waters are mineral-rich and circumneutral to alkaline with pH of 7.0-8.2; clarity is often high. These factors contribute to lush growth of submerged aquatic vegetation, which may include watercress (*Nasturtium officinale*), *Potamogeton* spp., and *Myriophyllum* spp. These streams represent groundwater discharge input, therefore they do not experience severe flooding or drastic temperature shifts and have more constant flow. The substrate of these streams is usually cobble riffles, gravel/sand runs and pools, with extensive beds of aquatic vegetation, and, unless they are degraded by cattle, flow silt-free and clear.

Diagnostic Characteristics

Fish are from the Traditional Trout Stream Assemblage. The spring creek community historically had native species including westslope cutthroat, mottled sculpin, longnose dace, mountain whitefish, with Yellowstone cutthroat trout and mountain sucker in the Yellowstone drainages. However, the introduced brook, brown, and rainbow trout tend to dominate and become the focal species of these systems. Abundant populations of

spring creek macroinvertebrate communities are diagnostic of this system, but diversity is relatively limited. This unique low-diversity community consists of a combination of members from the Medium Coolwater Transitional, the Traditional Trout Stream, and the Foothills Transitional Assemblages. The community is dominated by the mayflies [*Tricorythodes* and *Ephemerella* spp. (usually *Ephemerella inermis* and *E. infrequens*)], the amphipod crustacean (*Gammarus*), and many Chironomidae. Other community indicator species include *Baetis tricaudatus*, caddisfly species (*Hydropsyche*, *Amiocentrus aspilis*, *Cheumatopsyche*, and *Brachycentrus occidentalis*), beetles (*Optioservus* spp.), and snails (*Gyraulus*, *Physella*, *Stagnicola* and Hydrobiidae).

Range

The Spring Creek type has been identified in the foothill and valleys of many Montana drainages, particularly some of the more famous trout fishing springs: Armstrong's, Depuy's, Nelson's Spring Creeks of the Yellowstone and Thompson, Ben Hart (tributary to the E. Gallatin), O'Dell, Warm Spring and Big Spring Creeks of the Missouri drainage. Additionally, Layout Creek, Bridger and Piney Springs in the foothills of the Bighorns and Wyoming Basin are medium to large volume spring streams.

Spatial Pattern

Linear

Environment

Surface topography usually has a moderate gradient but can be undulating or hummocky. Disturbance by cattle is widespread, as these springs often represent the only water source in the uplands.

Dynamic Processes

Spring water ecosystems are tied to climate, groundwater discharge, and water quality. Impacts to these parameters, as well as their natural variability, will have a corresponding effect on spring biological ecological systems. Long-term drought, groundwater withdrawal at local and regional levels, and local diversions at or near the orifice are common impacts on water quantity at spring sites throughout the Western United States.

Management

Livestock use around the riparian areas is common and can have strong local effects resulting in sedimentation and streams becoming wider or shallower. High-density cattle usage can cause severe degradation, sedimentation, and siltation on the riffle habitats and gravel spawning areas downstream.

References

Classification and Map Identifiers

ReGAP:
1621: Medium Volume Spring Stream

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Citation for data on this website:
Medium Volume Spring Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1621

Northern Rocky Mountain Refugium Headwater Forested Streams

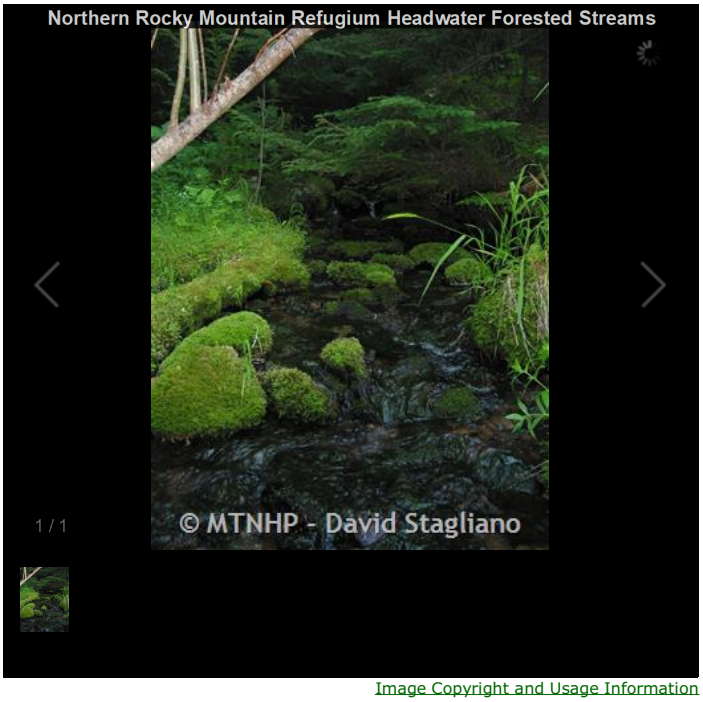


Image Copyright and Usage Information

Provisional State Rank: S2
(see reason below)

External Links

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State Rank Reason
This aquatic ecological system and the adjacent landscape contains more globally rare and endemic aquatic and terrestrial invertebrates than any other ecological system in the state.

General Description

This ecological system classified within the Pacific-influenced Clearwater or Northern Rocky Mountain Refugium is found in the moderate-high elevation (1600-2500m), steep-forested hillslopes of the Bitterroot Mountains. These small, high-gradient streams near their headwaters sources are moderately-confined, single-thread channel streams (1st order spring rivulets, average wetted width-0.5m, average summer temperature: <12oC),and have permanent flow with strong seasonal variability depending on melting snow pack. These systems are often within National Forest Service boundaries and represent groundwater-based streams contributing year-round flow to headwater foothills and mountain streams. The geomorphology of these streams is usually Rosgen A-2 with a step-pool configuration and substrate ranging from boulder/cobbles to gravel in the short pools. Large woody debris from the surrounding hillslopes can provide significant channel material and additional substrate to these streams.

Diagnostic Characteristics

The typical Northern Rocky Mountain Refugium headwater source stream is steep, shallow and fishless with significant barriers to fish colonization; dominant bioloigical communities are amphibians and macroinvertebrates. The macroinvertebrate community consists of coldwater stenotherms of the shredder and predator functional groups (Pristine Mountain Stream #58 assemblage), including disjunct populations and rare endemics: *Caudatella edmundsi, Caurinella idahoensis, Soliperla salish, Sericostriata surdickae,*

Eocosmoecus schmidi, Soyedina potteri, and *Secubelmis (Lumbriculidae).* Surrounding forest communities are dominated by western red cedar and dense deciduous riparian brush including false huckleberry and devil's club. Large amounts of moss or large woody debris covers the stream channel in most areas. The Rocky Mountain tailed frog and Idaho giant salmander are long-lived amphibian indicator species for this ecological system. Adults inhabit the moss-covered or vertically oriented cobble and boulders in areas wet from the splash zone or seeping water, and the larvae occur within the step pools or runs.

Range

This ecological system classified within the Pacific-influenced Clearwater or Northern Rocky Mountain Refugium is found in the moderate-high elevation (1600-2500m), steep-forested hillslopes of the Bitterroot Mountains on the boundary between Montana and Idaho, geographically bounded by Lolo Pass to the south and Lookout Pass or a little further north.

Spatial Pattern

Linear

Management

Due to the confined valley nature of these streams, the largest management issue involves keeping the riparian zone intact. Disturbances in the riparian zone (e.g., timber harvest) can have severe water quality impacts from bank erosion, sedimentation, increased stream temperatures, silt deposits and loss of large woody debris. Livestock use around the riparian areas can have strong local effects resulting in sedimentation and stream widening at cattle crossings.

References

Classification and Map Identifiers

ReGAP:
1492: Northern Rocky Mountain Refugium Headwater Forested Streams

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Citation for data on this website:
Northern Rocky Mountain Refugium Headwater Forested Streams. Montana Field Guide. Montana Natural Heritage Program
Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1492

Northwestern Great Plains Prairie Stream

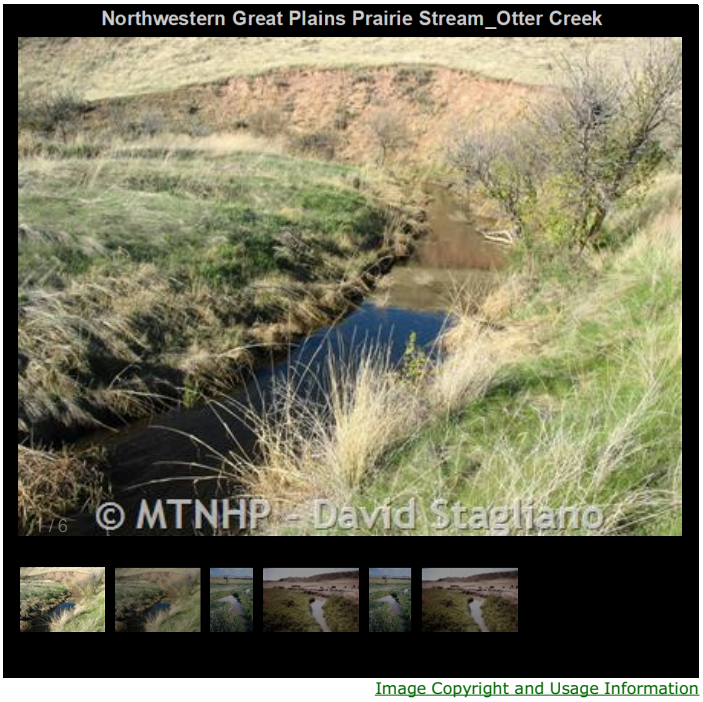


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Provisional State Rank: S4
(see reason below)

External Links

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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem is negatively impacted by small dams, water diversions, stock ponds and introduced gamefish species. The number of quality occurrences in the state is common, but the native community suffers from fish introductions and community homogenization (in the far eastern Montans drainages). Therefore, it is fairly rare to find biologically intact river miles of this ecological system. This community contains creek chub, plains minnow and Iowa darter, which are potential Species of Concern for Montana.

General Description

This ecosystem is found throughout the drainages of the Northwestern Great Plains Ecoregion of Montana. Habitats are small to medium (3rd-4th order, <100 river miles long, average wetted width = 5m) perennial warm-water streams, or upstream reaches above Medium Prairie Rivers. In the low elevation (750-1000m) areas, these are low gradient, meandering streams with a typical stream morphology consisting of long runs and continuous standing pools (1-1.5 m depth. Moderate gradient sections may contain infrequently spaced riffles that sometimes maintain wetted connectivity throughout the year. Riffle habitats may be absent in incised and degraded channel sections. Substrate characteristics are typically cobble/pebble riffles (when present) to silted runs and deeply silted pools. The C005c is a prairie stream system within 5 river miles from a confluence with a larger river (at least 2 stream orders larger) and contains a biological fish community that is significantly affected by the large river connectivity.

Diagnostic Characteristics

The diagnostic resident fish community is dominated by the Core Prairie Stream Assemblage and occasionally members of the Medium Warmwater and Creek Chub Assemblages (especially near the confluence areas with

a medium praire stream, C005c). A fairly clear Great Plains stream in far eastern Montana with weedy pools could contain brook stickleback, northern redbelly dace or brassy minnow, but for the typical turbid Great Plains stream, the community indicator species include fathead minnow, lake chub, flathead chub, white sucker, creek chub, and introduced species like black bullhead, carp and green sunfish. If the stream has gravel substrate in the riffle areas there will likely be longnose dace, and if there are large cobbles or large woody debris, stonecat as well. A severely impaired C005 community will be dominated by green sunfish and other members of the Sunfish Assemblage including plains killifish, black bullhead and fathead minnow. The Macroinvertebrate Community consists of members of the Large Prairie River and Prairie Stream Assemblages in the riffle/run habitats with the Large River Slow Current Assemblage in the slow current areas, side-channels and vegetated pools. The community indicator species are characterized by the crustaceans (*Hyalella* and *Gammarus*), damselfly genera (*Coenagrion/Enallagma spp.* and *Enallagma civile*), many genera and species of the water boatman (*Corixidae: Sigara grosslineata, Trichocorixa* and *Corisella*), snails (*Physella, Gyraulus,* and *Stagnicola*) and mayflies (*Caenis* and *Callibaetis*); and caddisflies (*Hydropsyche morosa* group, and *Cheumatopsyche*), and riffle beetles (*Dubiraphia* and *Microcylloepus*) in the cobble riffles. The giant floater mussel (*Pyganodon grandis*) is common in the small Northern Glaciated Ecoregion streams, but is rarely encountered in the Powder River Basin streams.

Range

The Great Plains Prairie Stream type occurs throughout the Great Plains region of North America within the Missouri River Drainage. In the Northwestern Great Plains of Montana, we have a diversity of this type including the Otter, Sarpy, Armells, Beauvais, Big and Little Porcupine, Pumpkin, Cabin, Cedar, Sweeny, Sandstone, Glendive and Hanging Woman Creeks.

Spatial Pattern

Linear

Management

Small dams, water diversions, stock ponds and introduced gamefish species have had the most significant negative impact on this community (Winston et al. 1991). Other threats include heavy cattle intrusions to the riparian areas, which causes bank erosion and subsequent sedimentation and siltation. Anywhere dams occur, even small stock pond earthen dams, the downstream reaches are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1350: Northwestern Great Plains Prairie Stream

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Citation for data on this website:
Northwestern Great Plains Prairie Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1350

Northern Glaciated Prairie Stream



Image Copyright and Usage Information

Provisional State Rank: S3
(see reason below)

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State Rank Reason

The number of high-quality occurrences in the state is unknown, but it is likely that ~50% of the original stream numbers have suffered from game fish introductions, especially northern pike. The unimpaired stream community contains northern redbelly dace and the Montana Species of Concern northern redbelly/finescale hybrid dace (S3), pearl dace (S2), and the potential Species of Concern, Iowa darter, creek chub, plains minnow and brassy minnow. The occurrence of numerous rare, threatened or declining fish and macroinvertebrate species, and consistent (e.g. water diversions, northern pike populations) or future threats (natural gas wells) warrants a state rank of S3. This ecosystem is also negatively impacted by small dams, water diversions and stock ponds. The native fish community suffers from fish introductions and community homogenization (in the far eastern Montana drainages). Because it is fairly rare to find biologically intact river miles of this ecological system the S-rank denotes this as a potential Ecological System of Concern.

General Description

This ecosystem is distributed widely throughout the Northern Glaciated Plains and Northwestern Great Plains Ecoregions. Habitats are small to medium (3rd-4th order, 30-100 river miles long, average wetted width = 6m), perennial cool/warm-water streams. In low elevation (800-1000m) areas, these are meandering streams with long runs and wide continuous pools (0.5-1.5m in depth), connected by narrow (average wetted width ~2m,) infrequently spaced riffles that may maintain connectivity throughout the year. However, riffles may be absent in incised and degraded channel sections. Substrate characteristics are typically cobble/pebble riffles (when present) to pebble/gravel runs and deeply silted pools. Side channel vegetation, undercut banks and vegetated deep pools provide the most diverse fish habitat. Woody debris is largely absent from the typical C006 and C008 stream. The C006c is a prairie stream system within 5 river miles from a confluence with a larger river (i.e,/ more than 2 stream orders larger) and contains a biological fish community that is significantly affected by its large river connectivity.

Diagnostic Characteristics

The diagnostic resident fish community is dominated by the Core Prairie Stream and the Brook Stickleback Assemblages and, in clear, vegetated, non-degraded streams, the Northern Redbelly Dace Assemblage. Without aquatic macrophytes in the pools or runs, brook stickleback or northern redbelly dace will be rare. The Creek Chub Assemblage may be present, especially near the confluence areas with a medium praire stream, C006c. A typical Northern Glaciated Prairie Stream community will have fathead minnow, lake chub (not as common), brook stickleback, northern redbelly dace, pearl dace, and brassy minnow in the vegetated pools, and white sucker, longnose dace and sometimes plains minnow, stonecat and Iowa darter in the cobble/pebble riffle and gravelly run sections. Unfortunately, northern pike has been widely introduced as a gamefish in the northern regions of Montana, and small prairie streams containing reproducing populations of these predators quickly lose their water column species, such as northern redbelly dace, pearl dace, Iowa darter, plains minnow, and brassy minnow. A fish community with the introduced pike will usually degrade to bullheads and white suckers. The Macroinvertebrate Community consists of the Large Prairie River and Prairie Stream Assemblages in the riffles, and the Medium River Side-Channel and Prairie Pool Assemblages in the slow current areas, side channels and vegetated pools. The community indicator species are characterized by the crustaceans (*Hyalella* and *Gammarus*), damselfly genera (*Coenagrion/Enallagma spp.* and *Enallagma civile*), many genera and species of the water boatman (*Corixidae: Sigara grosslineata, Trichocorixa* and *Corisella*), snails (*Physella, Gyraulus,* and *Stagnicola*) and mayflies (*Caenis* and *Callibaetis*), in the cobble riffles; and caddisflies (*Hydropsyche morosa* group, and *Cheumatopsyche*), and riffle beetles (*Dubiraphia* and *Microcylloepus*). The giant floater mussel (*Pyganodon grandis*) can be found in the gravel to silted side-channels since two of its host fish species are members of the Brook Stickleback Assemblage.

Range

The Northern Glaciated Prairie Stream ecological system occurs throughout the north-central glaciated region of North America within the Missouri and Mississippi River Drainages. Within Montana this community exists in a multitude of streams such as Woody Island Coulee, upper Battle, upper Whitewater, Snake, Smoke, Beaver, People's, Stinky, Big and Little Warm, Assiniboine, Willow, Little Cottonwood, Porcupine and Little Porcupine Creeks and the West Fork Poplar River.

Spatial Pattern

Linear

Management

Small dams, water diversions, stock ponds and introduced gamefish species have had the most significant negative impact on this community (Winston et al. 1991). Other threats include heavy cattle intrusions to the riparian areas, which causes bank erosion and subsequent sedimentation and siltation. Anywhere dams occur, even small stock pond earthen dams, the downstream reaches are affected by altered water temperatures, unnatural water level fluctuations, and changes in sediment and nutrient transport.

References

Classification and Map Identifiers

ReGAP:
1351: Northern Glaciated Prairie Stream

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Citation for data on this website:
Northern Glaciated Prairie Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1351

Small Foothills and Valley Dry Gulch

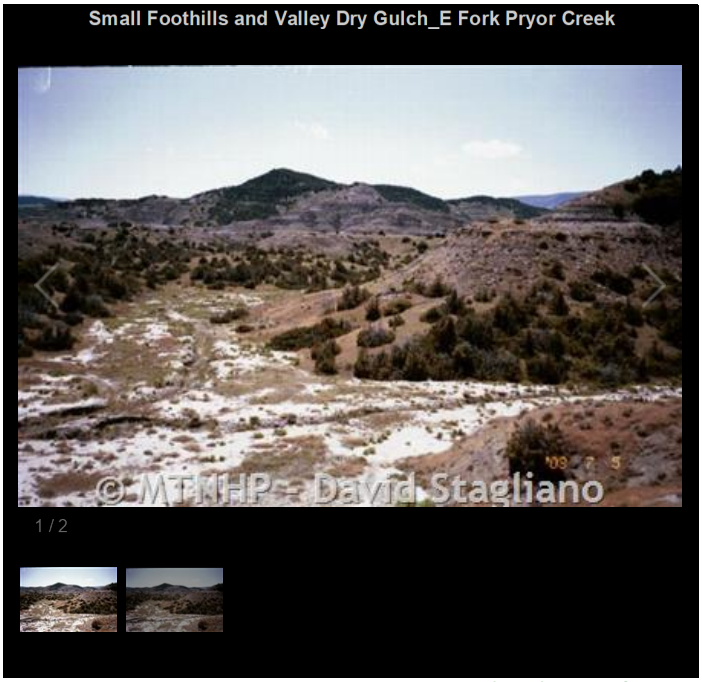


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Provisional State Rank: S5
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State Rank Reason

These "stream" ecosystems are abundant across the dry intermountain ranges of Western North America and are usually under private, BLM or National Forest Service land ownership and management.

General Description

These are short (<5 miles) dry gulchs, coulees or draws appearing on the 1:100K National Hydrography Dataset layer as 1st order tributaries, generally occurring on south facing hillsides, and rarely to never having intermittent or permanent water. Therefore, they do not typically contain an aquatic community, but may have a robust riparian community. These are typically feeder gullies to a C001 or D001 system type.

Diagnostic Characteristics

The characteristics of the dry gulch ecological system is a lack of water and no aquatic biological communities.

Range

In Montana, the dry gulch type is reported from over 100 sites within the foothills and valleys of the Middle Rockies, including the isolated ranges. These include dry microclimate regions in many of Montana's mountain ranges, including the south facing slopes of the Elkhorns, Big Belts, Little Belts, Crazys, Gallatin-Madison-Bridgers, Anaconda-Pintlers, Pioneers, Pryors, Bear Paws, Judiths and the Big Snowy Mountains. These ecosystems often fall within the boundaries of BLM, Forest Service or private lands.

Spatial Pattern

Linear

Dynamic Processes

Heavy rainfall or summer thunderstorm events may cause these gulchs to temporarily contain and channel water downstream, but flow will not persist for long enough to allow an aquatic community to colonize and become established. Severe storms (i.e., "gully washers") may cause significant erosion of channel bed materials sending them downstream to perennial streams.

Management

Cattle intrusions into the riparian areas along these gullies can cause bank erosion, leading to increased sediment and silt loads being delivered downstream during storms.

References

Classification and Map Identifiers

ReGAP:
1412: Small Foothills and Valley Dry Gulch

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Citation for data on this website:
Small Foothills and Valley Dry Gulch. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1412

Transitional Foothills and Valley Rivers

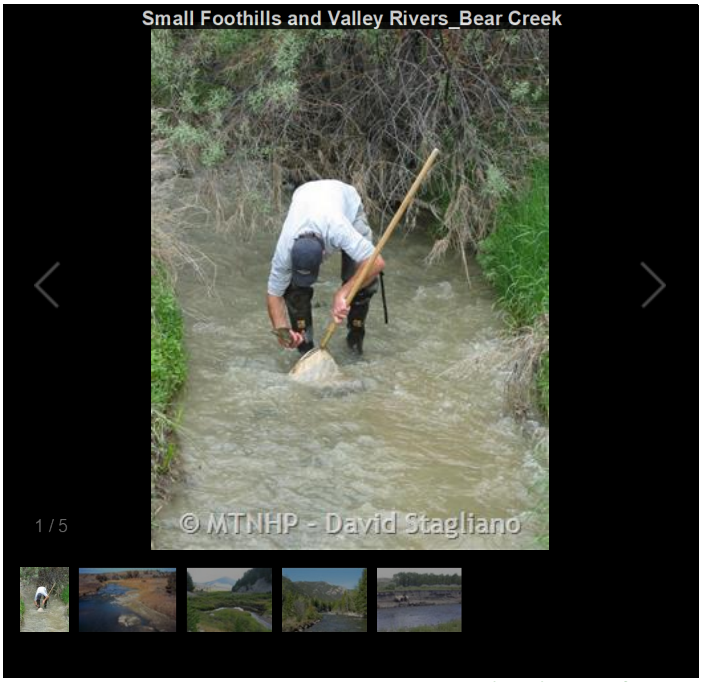


Image Copyright and Usage Information

Provisional State Rank: S4
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External Links

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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem is negatively affected by small dams, water diversions, stock ponds and introduced gamefish species. Therefore, it is fairly rare to find biologically intact river miles of this ecological system.

General Description

This ecosystem is found in the moderate elevation (1200-2000m), upland foothill and valley streams of the Middle Rockies, including the isolated mountain ranges. The smallest sub-type, the Headwaters Foothills River, is a 1st or 2nd order stream tributary to the Small Transitional and Small Foothills River Systems which are small-to-medium sized (2nd-4th order, average wetted width=5m), moderately flowing rivers with permanent flow and strong seasonal variability from melting snowpack. These streams represent the transition from high gradient mountain stream communities to the intermontane or prairie rivers in the east. Small Foothills Rivers are tributaries to Intermountain Rivers and maintain average summer temperatures (<20 degrees C) suitable for cool- to coldwater- fish species. In contrast, Small Transitional Foothill Rivers typically enter Prairie Rivers to the eastern part of the state and lose the ability to maintain cool-water fish species at the lower elevations. The surrounding landscape is transitional as well, with coniferous forests giving way to shrubland and sage steppe. Willows and broad-leaf trees dominate riparian areas. Beaver pond complexes are often found on these streams. Beavers find suitable conditions and dam building materials as the foothills stream gradient decreases. These ponds provide substantial trout habitat, but can warm beyond the tolerance of cutthroat trout, and the native cutthroats will usually be pushed to the upstream reaches by the more aggressive brook trout. The substrate of these streams is usually boulder/cobble riffles, gravel/sand runs and pools, and silted-in beaver ponds with large woody debris.

Diagnostic Characteristics

The fish community is the Coolwater Transitional Community and the Traditional Trout Stream Assemblage with indicator species of the Headwaters Foothills and Small Foothills Rivers characterized by native species, the Westslope or Yellowstone Cutthroat trout, mountain whitefish and mottled sculpin. However, the introduced species of the Stocked Trout Assemblage, the brook trout and rainbow trout, tend to dominate and become the focal species of these systems. As Small Foothills and Transitional Foothills Rivers proceed down gradient, inclusions of the longnose sucker, longnose dace and the mountain sucker (Yellowstone drainages) into the community becomes apparent. Additional fish species (the exotic carp, white sucker, lake chub and fathead minnows of the Core Prairie Stream Assemblage) may be found at the warmer, lower end of the Small Transitional Foothills Rivers in the prairie regions. The shallow riffle areas of the larger foothills rivers entering Intermountain Rivers may provide spawning habitat for downstream populations of brown trout during their fall migration, and suckers, dace and rainbow trout in the spring. Macroinvertebrate Community: Headwaters and Small Foothills Rivers are dominated by the Traditional Trout Stream Assemblage, with some members of the Medium Coolwater Transitional and Foothills Transitional Assemblages. The community indicator species are characterized by main channel, fast current mayfly, stonefly and caddisfly species (*Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Rhithrogena, Arctopsyche grandis,* and *Lepidostoma spp.*), and the tipulid, *Antocha*. As Small Foothills Rivers proceed downstream and begin to warm (>17 °C) or are sediment impaired, degraded or dewatered, they will quickly lose the Traditional Trout Stream Assemblage and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Coolwater Transitional Assemblage with indicator species *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Constempellina, Prosimulium, Amiocentrus aspilis, Lara, Plauditus,* and *Narpus*. Lower, warmer stretches of Small Transitional Foothills Rivers will begin to pick up species of the Transitional Prairie River Assemblage. Populations of the western pearlshell mussel have been documented in the Foothills Transitional river ecosystem, although these populations may be in decline.

Range

This C001 stream type has been identified in the Lewis and Clark National Forest foothills of the Belt, Judith and other isolated mountain ranges. The Middle Missouri, Sun, Teton, Musselshell drainages contain the most representatives of this community type in the database including Arrow, Dog, Newlan Creek, Elk Creek, and Sixteenmile Creek, while the C001y AES sub-class is found within the Yellowstone Foothills.

Spatial Pattern

Linear

Dynamic Processes

Beaver played a large role in the ecological processes of this ecological system in the past and provided mediating flood control with their numerous beaver ponds in the watershed. Large riparian willow complexes were indicative of a proper functioning small mountain to foothill transitional stream.

Management

Livestock use around the riparian areas of this ecosystem is common and can have strong local effects resulting in sedimentation, a shift of the macroinvertebrate communities from a Traditional Trout Stream Assemblage to the Medium Coolwater Transitional Assemblage, and a shift in fish communities from native cutthroat trout to introduced species, such as brook trout. High-density cattle usage can cause severe degradation, bank erosion, sedimentation and siltation on the riffle habitats and gravel spawning areas downstream. Water diversions lower in the foothills for agriculture may be an issue since these streams usually flow onto private lands as foothills grade into the valleys and decrease in elevation and gradient.

References

Classification and Map Identifiers

ReGAP:
1310: Transistional Foothills and Valley Rivers

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Citation for data on this website:
Transitional Foothills and Valley Rivers — Transistional Foothills and Valley Rivers. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1310

Small Foothills and Valley Rivers

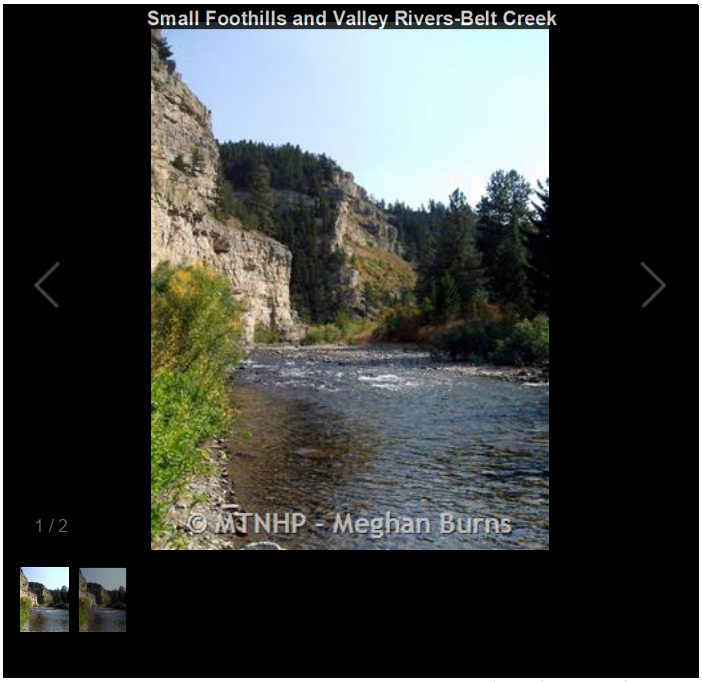


Image Copyright and Usage Information

Provisional State Rank: S4
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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem is negatively affected by small dams, water diversions, stock ponds and introduced gamefish species. Therefore, it is fairly rare to find biologically intact river miles of this ecological system.

General Description

This ecosystem is found in the moderate elevation (1200-2000m), upland foothill and valley streams of the Middle Rockies, including the isolated mountain ranges. The smallest sub-type, the Headwaters Foothills River, is a 1st or 2nd order stream tributary to the Small Transitional and Small Foothills River Systems which are small-medium-sized (2nd-4th order, average wetted width=5m), moderately flowing rivers with permanent flow and strong seasonal variability from melting snowpack. These streams represent transitional from high gradient mountain stream communities to the intermontane or prairie rivers in the east. Small Foothills Rivers are tributaries to Intermountain Rivers and maintain average summer temperatures (<20 degrees C) suitable for cool- to coldwater- fish species. In contrast, Small Transitional Foothill Rivers typically enter Prairie Rivers to the eastern part of the state and lose the ability to maintain cool-water fish species at the lower elevations. The surrounding landscape is transitional as well, with coniferous forests giving way to shrubland and sage steppe. Willow- and broadleafed-dominated complexes are common in riparian areas. Beaver pond complexes are often found on these streams. Beavers find suitable conditions and dam building materials as the foothills stream gradient decreases. These ponds provide substantial trout habitat, but can warm beyond the tolerance of cutthroat trout, and the native cutthroats will usually be pushed to the upstream reaches by the more aggressive brook trout. The substrate of these streams is usually boulder/cobble riffles, gravel/sand runs and pools, and silted-in beaver ponds with large woody debris.

Diagnostic Characteristics

The fish community is the Coolwater Transitional Community and the Traditional Trout Stream Assemblage with indicator species of the Headwaters Foothills and Small Foothills Rivers characterized by the native Westslope or Yellowstone Cutthroat trout, mountain whitefish and mottled sculpin. However, the introduced species of the Stocked Trout Assemblage, the brook trout and rainbow trout, tend to dominate and become the focal species of these systems. As Small Foothills and Transitional Foothills Rivers proceed down gradient, inclusions of the longnose sucker, longnose dace and the mountain sucker (Yellowstone drainages) into the community become apparent. Additional fish species (the exotic carp, white sucker, lake chub and fathead minnows of the Core Prairie Stream Assemblage) may be found at the warmer, lower end of the Small Transitional Foothills Rivers in the prairie regions. The shallow riffle areas of the larger foothills rivers entering Intermountain Rivers may provide spawning habitat for downstream populations of brown trout during their fall migration, and suckers, dace and rainbow trout in the spring. The Macroinvertebrate Community/Headwaters and Small Foothills Rivers are dominated by the Traditional Trout Stream Assemblage, with some members of the Medium Coolwater Transitional and Foothills Transitional Assemblages. The community indicator species are characterized by main channel, fast-current mayfly, stonefly and caddisfly species (*Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Rhithrogena, Arctopsyche grandis,* and *Lepidostoma spp.*), and the tipulid, *Antocha*. As Small Foothills Rivers proceed downstream and begin to warm (>17 °C) or become sediment impaired, degraded or dewatered, they will quickly lose the Traditional Trout Stream Assemblage and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Coolwater Transitional Assemblage, with the indicator species *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Constempellina, Prosimulium, Amiocentrus aspilis, Lara, Plauditus,* and *Narpus.* Lower, warmer stretches of Small Transitional Foothills Rivers will begin to pick up species of the Transitional Prairie River Assemblage. Populations of the western pearlshell mussel have been documented in the Foothills Transitional river ecosystem, although these populations may be in decline.

Range

The stream type C002 has been identified in the Custer National Forest (Beartooth District), Pryor Mountains, and foothills of the Belt, Judith and other isolated mountain ranges. The Middle Missouri/ Musselshell drainages contain the most representatives of this community type in the database. The Stream type C004 has been identified in the Helena and Beaverhead-Deerlodge National Forest, the granitic foothills of the Yellowstone Highlands and in other isolated mountain ranges. The upper Missouri/ Musselshell drainages (including the Whitetail, Little Boulder and Bison Rivers)contain the most representatives of this community type in the database.

Spatial Pattern

Linear

Dynamic Processes

Beaver played a large ecological role in this system in the past, providing mediating flood control through numerous beaver ponds in the watershed. Large riparian willow complexes are indicative of a proper functioning Small Mountain to Foothill Transitional stream.

Management

Livestock use around the riparian areas of this ecosystem can have strong local effects resulting in sedimentation, which causes a shift of the macroinvertebrate communities from a Traditional Trout Stream Assemblage to the Medium Coolwater Transitional Assemblage, and a shift in fish communities from native cutthroat trout to introduced species, such as brook trout. High-density cattle usage can cause severe degradation, bank erosion, sedimentation and siltation in the riffle habitats and gravel spawning areas downstream. Agricultural water diversions lower in the foothills may be an issue because these streams usually flow onto private lands.

References

Classification and Map Identifiers

ReGAP:
1311: Small Foothills and Valley Rivers

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Citation for data on this website:
Small Foothills and Valley Rivers. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1311

Upper Missouri Small Foothills and Valley Rivers

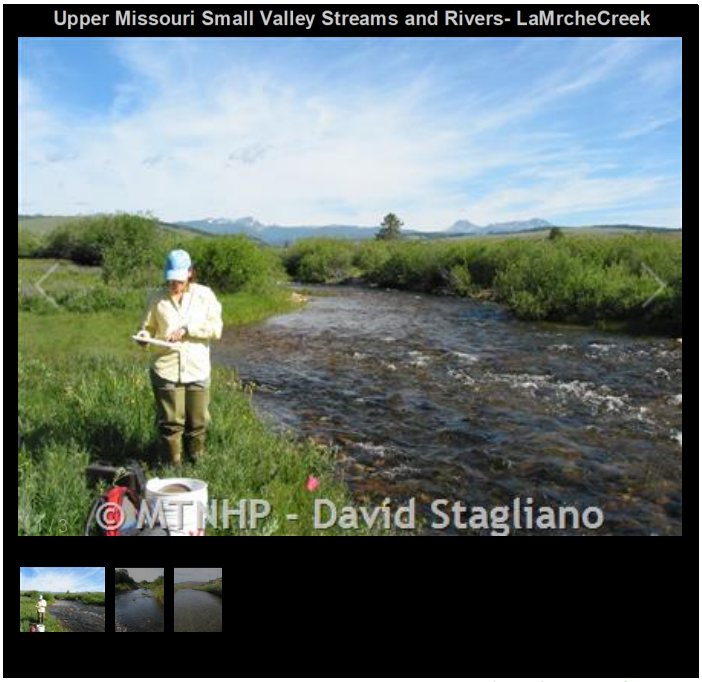


Image Copyright and Usage Information

Provisional State Rank: S4
(see reason below)

External Links

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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem is negatively affected by small dams, water diversions, stock ponds and introduced gamefish species. Therefore, it is fairly uncommon to find biologically intact river reaches of this ecological system.

General Description

This ecosystem is found in the moderate elevation (1200-2000m), upland foothill and valley streams of the Middle Rockies, including the isolated mountain ranges. The smallest sub-type, the Headwaters Foothills River, is a 1st or 2nd order stream tributary to the Small Transitional and Small Foothills River Systems which are small-to-medium sized (2nd-4th order, average wetted width=5m), moderately flowing rivers with permanent flow and strong seasonal variability from melting snowpack. These streams represent the transition from high gradient mountain stream communities to the intermontane or prairie rivers in the east. Small Foothills Rivers are tributaries to Intermountain Rivers and maintain average summer temperatures (<20 degrees C) suitable for cool- to coldwater- fish species. In contrast, Small Transitional Foothill Rivers typically enter Prairie Rivers to the eastern part of the state and lose the ability to maintain cool-water fish species at the lower elevations. The surrounding landscape is transitional as well, with coniferous forests giving way to shrubland and sage steppe. Willows and broad-leaf trees dominate riparian areas. Beaver pond complexes are often found on these streams. Beavers find suitable conditions and dam building materials as the foothills stream gradient decreases. These ponds provide substantial trout habitat, but can warm beyond the tolerance of cutthroat trout, and the native cutthroats will usually be pushed to the upstream reaches by the more aggressive brook trout. The substrate of these streams is usually boulder/cobble riffles, gravel/sand runs and pools, and silted-in beaver ponds with large woody debris.

Diagnostic Characteristics

The fish community is the Coolwater Transitional Community and the Traditional Trout Stream Assemblage with indicator species of the Headwaters Foothills and Small Foothills Rivers characterized by native species, the Westslope or Yellowstone Cutthroat trout, mountain whitefish and mottled sculpin. However, the introduced species of the Stocked Trout Assemblage, the brook trout and rainbow trout, tend to dominate and become the focal species of these systems. As Small Foothills and Transitional Foothills Rivers proceed down gradient, inclusions of the longnose sucker, longnose dace and the mountain sucker (Yellowstone drainages) into the community becomes apparent. Additional fish species (the exotic carp, white sucker, lake chub and fathead minnows of the Core Prairie Stream Assemblage) may be found at the warmer, lower end of the Small Transitional Foothills Rivers in the prairie regions. The shallow riffle areas of the larger foothills rivers entering Intermountain Rivers may provide spawning habitat for downstream populations of brown trout during their fall migration, and suckers, dace and rainbow trout in the spring. Macroinvertebrate Community: Headwaters and Small Foothills Rivers are dominated by the Traditional Trout Stream Assemblage, with some members of the Medium Coolwater Transitional and Foothills Transitional Assemblages. The community indicator species are characterized by main channel, fast current mayfly, stonefly and caddisfly species (*Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Rhithrogena, Arctopsyche grandis,* and *Lepidostoma spp.*), and the tipulid, *Antocha*. As Small Foothills Rivers proceed downstream and begin to warm (>17 °C) or are sediment impaired, degraded or dewatered, they will quickly lose the Traditional Trout Stream Assemblage and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Coolwater Transitional Assemblage with indicator species *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Constempellina, Prosimulium, Amiocentrus aspilis, Lara, Plauditus,* and Narpus. Lower, warmer stretches of Small Transitional Foothills Rivers will begin to pick up species of the Transitional Prairie River Assemblage. Populations of the western pearlshell mussel have been documented in numerous Foothills Transitional rivers, although these populations may be in decline with the loss of the westslope cutthroat trout.

Range

This stream type has been identified in the Beaverhead-Deerlodge National Forest, and the granitic foothills of other isolated mountain ranges. The upper Missouri/Beaverhead drainages (e.g., Bloody Dick Creek, Horse Prairie, Medicine Lodge Creek and Sage Creek) contain the most representatives of this community type in the database, often flowing through the lower end of USFS lands onto BLM and private valley bottoms.

Spatial Pattern

Linear

Dynamic Processes

Beaver played a large role in the ecological processes of this ecological system in the past and provided mediating flood control with their numerous beaver ponds in the watershed. Large riparian willow complexes were indicative of a proper functioning small mountain to foothill transitional stream.

Management

Livestock use around the riparian areas of this ecosystem is common and can have strong local effects resulting in sedimentation, a shift of the macroinvertebrate communities from a Traditional Trout Stream Assemblage to the Medium Coolwater Transitional Assemblage, and a shift in fish communities from native cutthroat trout to introduced species, such as brook trout. High-density cattle usage can cause severe degradation, bank erosion, sedimentation and siltation on the riffle habitats and gravel spawning areas downstream. Water diversions lower in the foothills for agriculture may be an issue since these streams usually flow onto private lands as foothills grade into the valleys and decrease in elevation and gradient.

References

Classification and Map Identifiers

ReGAP:
1312: Upper Missouri Small Foothills and Valley Rivers

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Citation for data on this website:
Upper Missouri Small Foothills and Valley Rivers. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1312

Rocky Mountain Front Foothill and Valley Rivers

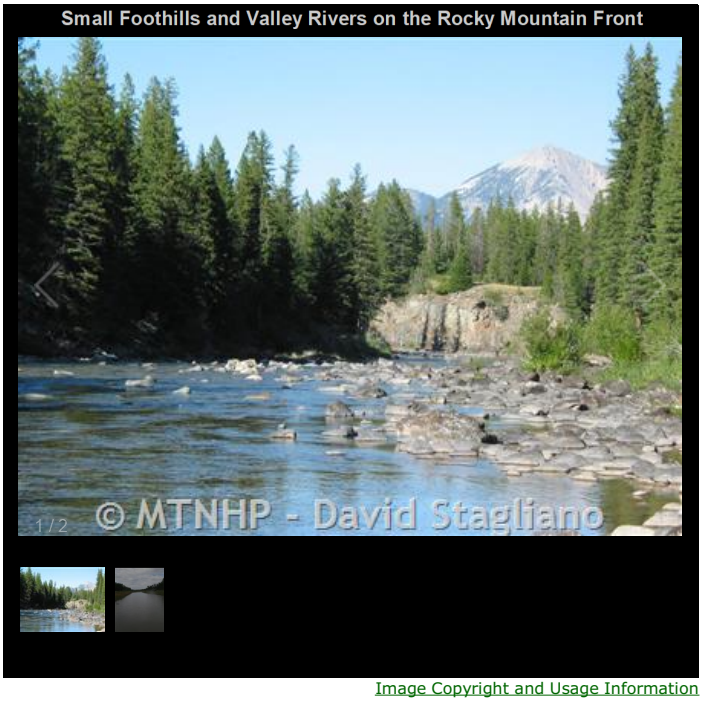


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Provisional State Rank: S4
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External Links

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State Rank Reason

Although widespread and with many representative river reaches in the state, this ecosystem has been negatively affected by small dams, water diversions, stock ponds and introduced gamefish species. Therefore, it is fairly rare to find biologically intact river miles of this ecological system.

General Description

This ecosystem is found in moderate elevation (1200-2000m), upland foothill areas of the Middle Rockies ecoregion, including isolated mountain ranges. The smallest sub-type, the Headwaters Foothills River, is a 1st or 2nd order stream tributary; those feed small- to medium-sized (2nd-4th order, average wetted width = 5m), moderately flowing rivers with permanent flow and strong seasonal variability that depends on melting snowpack from higher elevations. Rocky Mountain Front Foothill and Valley Rivers are transitional between high gradient mountain stream communities and the intermontane or prairie rivers in the east. Small Foothills Rivers are tributaries to Intermountain Rivers and maintain average summer temperatures (<20 degrees C) suitable for cool- to coldwater- fish species. In contrast, Small Transitional Foothills Rivers typically enter Prairie Rivers to the eastern part of the state and lose the ability to maintain cool-water fish species at the lower elevations. The surrounding landscape is transitional as well, with coniferous forests giving way to shrublands and sage steppe, and riparian woodlands and shrublands. Beaver pond complexes are often characteristic habitats on these streams. Beavers find suitable conditions and dam building materials as the foothills stream gradient decreases. These ponds provide substantial trout habitat, but can warm beyond the tolerance of cutthroat trout, and the native cutthroats will usually be pushed to the upstream reaches by the more aggressive brook trout. The substrate of these streams is usually boulder/cobble riffles, gravel/sand runs and pools, or silted-in beaver ponds with large woody debris. The (e) descriptor on this AES code depicts the system along Rocky Mountain Front streams which have retained a slightly different fish community.

Diagnostic Characteristics

The fish community is the Coolwater Transitional Community and the Traditional Trout Stream Assemblage with indicator species of the Headwaters Foothills and Small Foothills Rivers characterized by the native Westslope Cutthroat trout, mountain whitefish and Rocky Mountain sculpin. The AES C002H system that flows from the Rocky Mountain Front to the Hudson River (Belly River Drainages) has a unique assemblage that includes the bull trout and the spoonhead sculpin. However, the introduced species of the Stocked Trout Assemblage, the brook trout and rainbow trout, tend to dominate and become the focal species of these systems. As Small Foothills and Transitional Foothills Rivers proceed down gradient, inclusions of the longnose sucker, longnose dace and mountain whitefish into the community become apparent. Additional fish species (the exotic carp, white sucker, flathead chubs and fathead minnows of the Coolwater Transitional Community) may be found at the warmer, lower end of the Small Transitional Foothills Rivers in the prairie regions. The shallow riffle areas of the larger foothills rivers entering Intermountain Rivers may provide spawning habitat for downstream populations of brown trout during their fall migration, and for suckers, dace and rainbow trout in the spring. The Macroinvertebrate Community/Headwaters and Small Foothills Rivers is dominated by the Traditional Trout Stream Assemblage, with some members of the Medium Coolwater Transitional and Foothills Transitional Assemblage. The community indicator species are characterized by main channel, fast-current mayfly, stonefly and caddisfly species (*Pteronarcys californica, Hesperoperla pacifica, Brachycentrus americanus, Rhithrogena, Arctopsyche grandis,* and *Lepidostoma spp.*), and the tipulid, *Antocha*. As Small Foothills Rivers proceed downstream and begin to warm (>17 °C) or become sediment impaired, degraded or dewatered, they will quickly lose the Traditional Trout Stream Assemblage and shift to the mayfly, caddisfly, beetle and dipteran species that form the Medium Coolwater Transitional Assemblage. This Assemblage is indicated by *Hydropsyche, Optioservus, Baetis tricaudatus, Brachycentrus occidentalis, Helicopsyche borealis, Corynoneura, Constempellina, Prosimulium, Amiocentrus aspilis, Lara, Plauditus,* and *Narpus.* Lower, warmer stretches of Small Transitional Foothills Rivers will begin to pick up species of the Transitional Prairie River Assemblage. Populations of the western pearlshell mussel have been documented in the Foothills Transitional River ecosystem, although these populations may be in decline.

Range

This C001E stream type has been identified in the Rocky Mountain Front portion of the Lewis and Clark National Forest, and in the foothills of the Belt, Judith and other isolated mountain ranges. The upper Sun, Teton, Badger-Two Medicine and Dearborn Rivers contain the most representatives of this community type in the database.

Spatial Pattern

Linear

Dynamic Processes

Beaver once played a large role in the ecological processes of this ecological system in the past and provided mediating flood control with their numerous beaver ponds in the watershed. Large riparian willow complexes were indicative of a proper functioning small mountain to foothill transitional stream, loss of these riparian features represent non-functional or functional-at-risk ecosystems.

Management

Livestock use around the riparian areas of this ecosystem can have strong local effects resulting in sedimentation, a shift of the macroinvertebrate communities from a Traditional Trout Stream Assemblage to the Medium Coolwater Transitional Assemblage, and a shift in fish communities from native cutthroat trout to introduced species, such as brook trout. High-density cattle usage can cause severe degradation, bank erosion, sedimentation and siltation in riffle habitats and gravel spawning areas downstream. Lower in the foothills, agricultural water diversions may be an issue where these streams usually flow onto private lands.

References

Classification and Map Identifiers

ReGAP:
1314: Rocky Mountain Front Foothill and Valley Rivers

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Citation for data on this website:
Rocky Mountain Front Foothill and Valley Rivers. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1314

Small Forested Mountain Streams

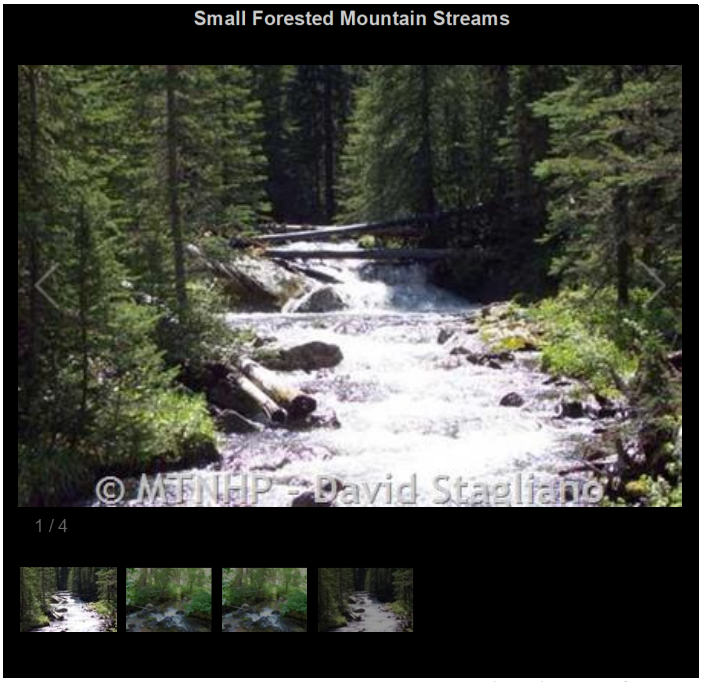


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Provisional State Rank: S5
(see reason below)

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State Rank Reason

The number of viable stream mile occurrences is unknown, but these stream ecosystems are abundant across the mountain ranges of Western North America, often in protected lands managed by the National Park Service or US Forest Service.

General Description

This system is found in the mountainous, moderate-to-high elevation (1600-2500m), forested, moderately confined-channel streams of the Middle Rockies Ecoregion, including the isolated mountain ranges. These small-to-medium (2nd to 3rd order, average wetted width less than 7 meters, average summer temperature <15°C) moderately flowing streams have permanent flow with strong seasonal variability due to melting snowpack from higher elevation mountainous areas. These streams represent the transition from alpine stream communities to foothills and intermontane rivers, and provide substantial habitat for Montana's native cutthroat trout populations, which thrive in the cold water temperatures and complex in-stream habitats. The geomorphology of these streams is usually a step-pool configuration with a substrate dominated by boulders, cobbles, and gravel in the short pools. Large woody debris from the surrounding hillslopes can provide significant channel material and additional substrate to these streams.

Diagnostic Characteristics

The D002 Montane Forested stream type originates in the Rocky Mountain Front Ranges of the upper Missouri River Drainages. The D003 Montane Forested stream type has origins in the isolated mountain ranges of the Missouri River drainages and the D004/D004y Forested stream type begins in the Granitic Mountain Ranges of the upper Missouri Basin and the volcanic yellowstone highlands of the Yellowstone basin. The fish community is the Traditional Trout Stream Assemblage, specifically the Small Trout Stream Assemblage.

There are typically westslope cutthroat trout and Rocky Mountain sculpin in reference quality Missouri and upper Columbia drainage streams, while Yellowstone cutthroat trout and sculpin are found in the Yellowstone Mountain Stream Assemblage (D004y). Unfortunately, the introduced brook and rainbow trout have pushed out many native cutthroat trout populations through aggressive competition (brook trout) and hybridization (rainbow trout). Rocky Mountain sculpin usually persist in all of these types, but single species assemblages of westslope and Yellowstone cutthroat trout occur in many streams that have sufficient downstream barriers to prevent the dispersal of the sculpin upstream. Interestingly, these downstream barriers have allowed the persistence of high quality, intact small mountain stream communities by impeding the colonization of introduced species into the pure cutthroat trout areas. The diverse macroinvertebrate community of coldwater stenotherms makes up the Mountain Stream and Medium Mountain Stream Assemblages. The community indicator species are characterized by intolerant, main channel, fast-current mayfly, stonefly and caddisfly species (*Baetis bicaudatus, Caudetella spp., Drunella spp., Epeorus spp, Cinygmula, Zapada spp., Megarcys, Doroneuria, Sweltsa, Paraperla, Micrasema, Neothremma, Parapsyche, Neophylax spp.,* and numerous *Rhyacophila spp.* groups) and the cold-water dipterans (*Rhabdomastix, Bibiocephela,* and *Glutops*). As mountain streams warm in downstream reaches(>15 °C), a dominance shift occurs to the Medium Mountain Stream Assemblage. Populations of western pearlshell mussel have been reported from this stream type and this ecosystem may be their stronghold in the state east of the Continental Divide.

Range

In Montana, the Mountain Stream type is reported from over 100 sites within the Middle Rockies and Isolated Ranges Ecoregions. These include streams in many of Montana's mountain ranges, including the Beartooths, Absorokas, Elkhorns, Big Belts, Little Belts, Crazys, Gallatin-Madison-Bridgers, Anaconda- Pintlers, Pioneers and the Big Snowy Mountains. These ecosystems typically fall within the boundaries of National Forest Service lands and wilderness areas.

Spatial Pattern

Linear

Dynamic Processes

This diverse community of coldwater stenotherms consists of the Mountain Stream and Medium Mountain Stream Assemblages. The community indicator species are characterized by intolerant, main channel, fast current mayfly, stonefly and caddisfly species (Baetis bicaudatus, Caudetella spp., Drunella spp., Epeorus spp, Cinygmula, Zapada spp. Megarcys, Doroneuria, Sweltsa, Paraperla, Micrasema, Neothremma, Parapsyche, Neophylax spp., and numerous Rhyacophila spp. Groups) and the cold-water dipterans (Rhabdomastix, Bibiocephela, and Glutops). As mountain streams proceed downstream and begin to warm (>15 °C), a dominance shift occurs to the Medium Mountain Stream Assemblage. Populations of western pearlshell mussel have been reported from this stream type and this ecosystem may be their stronghold in the state east of the continental divide.

Management

Due to the confined valley nature of these streams, the largest management issue involves keeping the riparian zone intact. Disturbances in the riparian zone (e.g., logging) can have severe water quality impacts from bank erosion, sedimentation, increased stream temperatures, silt deposits and loss of large woody debris. Livestock use around the riparian areas can have strong local effects resulting in sedimentation and stream widening at cattle crossings.

References

Classification and Map Identifiers

ReGAP:
1420: Small Forested Mountain Streams

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Citation for data on this website:
Small Forested Mountain Streams. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1420

Small Westside Forested Mountain Streams

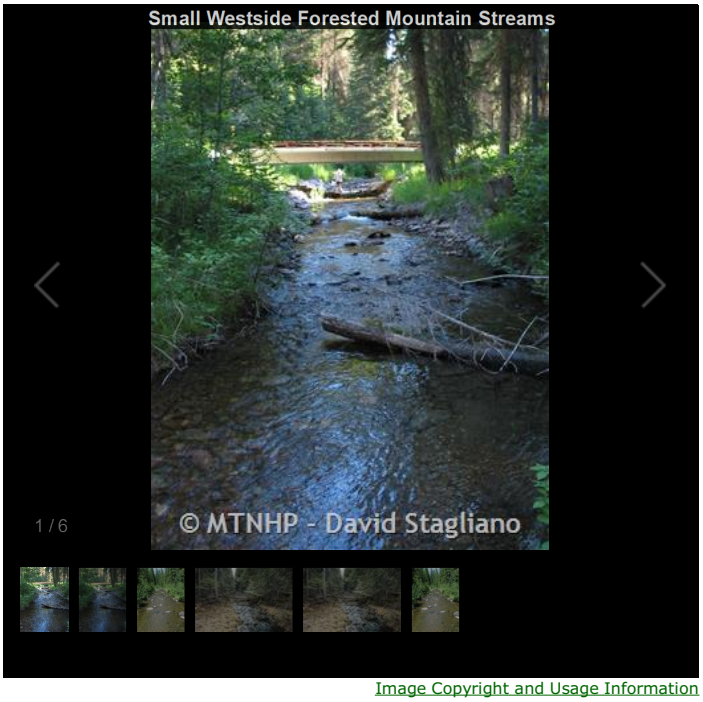


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Provisional State Rank: S5
(see reason below)

External Links

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State Rank Reason

The number of viable stream mile occurrences is unknown, but these stream ecosystems are abundant across the mountain ranges of Western North America, often in protected lands managed by the National Park Service or US Forest Service.

General Description

This ecosystem is found in the mountainous, moderate-to-high elevation (1600-2500m), forested, moderately confined-channel streams of the Middle Rockies Ecoregion, including the isolated mountain ranges. These small-to-medium (2nd to 3rd order, average wetted width =7m, average summer temperature <15°C) moderately flowing streams have permanent flow with strong seasonal variability due to melting snowpack from higher elevation mountainous areas. These streams represent the transition from alpine stream communities to foothills and intermontane rivers, and provide substantial habitat for Montana's native cutthroat trout populations, which thrive in the cold water temperatures and complex in-stream habitats. The geomorphology of these streams is usually a step-pool configuration with a substrate dominated by boulders, cobbles, and gravel in the short pools. Large woody debris from the surrounding hillslopes can provide significant channel material and additional substrate to these streams.

Diagnostic Characteristics

This moderate gradient, Montane Forested stream type originates in the Northern and Middle Rockies of the upper Missouri and Columbia River Basin. The fish community is the Traditional Trout Stream Assemblage, specifically the Small Trout Stream Assemblage, typified by westslope cutthroat trout and Rocky Mountain sculpin in reference quality Missouri and upper Columbia drainage streams. Unfortunately, the introduced brook and rainbow trout have pushed many native cutthroat trout populations to the brink through

aggressive competition (brook trout) and hybridization (rainbow trout). Rocky Mountain sculpin usually persist in all of these types, but single species assemblages of westslope cutthroat trout occur in many streams that have sufficient downstream barriers to prevent the dispersal of the sculpin upstream. Interestingly, these downstream barriers have allowed the persistence of high quality, intact small mountain stream communities by impeding the colonization of introduced species into the pure cutthroat trout areas. A diverse macroinvertebrate community of coldwater stenotherms makes up the Mountain Stream and Medium Mountain Stream Assemblages. The community indicator species are characterized by intolerant, main channel, fast-current mayfly, stonefly and caddisfly species (*Baetis bicaudatus, Caudetella spp., Drunella spp., Epeorus spp, Cinygmula, Zapada spp., Megarcys, Doroneuria, Sweltsa, Paraperla, Micrasema, Neothremma, Parapsyche, Neophylax spp.,* and numerous *Rhyacophila* species Ggroups) and the cold-water dipterans (*Rhabdomastix, Bibiocephela,* and *Glutops*).

Range

In Montana, the Mountain Stream type is reported from over 100 sites within the Northern and Middle Rockies Ecoregions. These include streams in many of Montana's western mountain ranges, including the Bitterroots, Beaverheads, Flint Creeks, Garnets, Anaconda-Pintlers, Pioneers and the Sapphire Mountains. These ecosystems typically fall within the boundaries of National Forest Service lands and wilderness areas.

Spatial Pattern

4

Management

Due to the confined valley nature of these streams, the largest management issue involves keeping the riparian zone intact. Disturbances in the riparian zone (e.g., logging) can have severe water quality impacts from bank erosion, sedimentation, increased stream temperatures, silt deposits and loss of large woody debris. Livestock use around the riparian areas can have strong local effects resulting in sedimentation and stream widening at cattle crossings.

References

Classification and Map Identifiers

ReGAP:
1470: Small Westside Forested Mountain Streams

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Citation for data on this website:
Small Westside Forested Mountain Streams. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1470

Small Perennial Wyoming Basin Springs

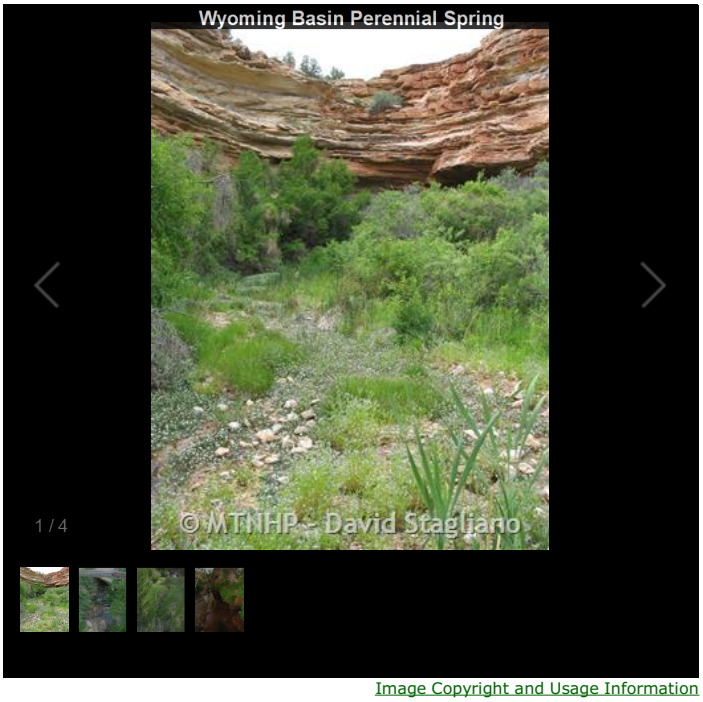


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Provisional State Rank: S3
(see reason below)

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State Rank Reason

This ecological system is a rare system in Montana, which contains only a small portion of the Wyoming Basin Ecoregion.

General Description

This groundwater dependent ecosystem (GDE) is found in the moderate elevation (1000-1600m), upland hill and canyon areas of the Wyoming Basin (18). It occurs as small (0.2-2m in width) perennial fishless headwater spring channels with low-moderate gradient geomorphology flowing from sedimentary geology. We identified 2 types of this ecological system: Limnocrenes — non-linear flowing springs, lentic spring ecosystems that resemble small wetlands (WPSS-Wetland /Ponded Seep Springs), and Rheocrenes – flowing water springs that may flow into perennial or ephemeral streams or may disappear into the ground some distance from their source (Table 2 & 3). Secondarily, Rheocrenes can be separated into dispersed wall spring seeps, a.k.a. hanging gardens (LVWS-Low, MVWS-Med or High Volume Wall Springs & Seeps) or linear flowing channelized springs (STCS-Single Thread Channel Springs). Benthic invertebrate habitats are typically long riffle/run reaches dominated by shale cobbles and gravel with some woody debris. Surface topography of these springs can range from moderate gradient to undulating or hummocky in the ponded wetland areas.

Diagnostic Characteristics

The S006 ecological system will be fishless. Diagnostic indicator macroinvertebrates of a reference condition Wyoming Spring ecological system (S006) include the Caddisflies - *Hesperophylax designatus* and *Lepidostoma unicolor*, Stoneflies: *Amphinemura banksi* and *Hesperoperla pacifica*; the Mayfly - *Baetis tricaudatus*, the aquatic Beetles - *Heterlimnius corpulentus*, *Optioservus* and *Hydroporus*; midges

(Chironomidae) - *Parametriocnemus*, *Brillia*, and *Tvetenia bavarica*. Other Diptera - *Tipula*, *Dicranota*, *Ormosia*, the snails – Hydrobiidae and *Physella*. Sediment impaired and cattle degraded springs will quickly lose the mayfly, stonefly, caddisfly, and dipteran species (above), and form a community dominated by tolerant midges, biting dipteran larvae (Ceratopogonidae), and air breathing beetles.

Range

This seep and spring ecological system occurs within the Wyoming Basin ecoregion in Montana, especially within the Pryor Mountians and Bighorn Canyon National Recreation Area.

Spatial Pattern

Linear

Environment

Surface topography usually has a moderate gradient, but topography can be undulating or hummocky. Disturbance by cattle is widespread, as these springs often represent the only water source in the uplands.

Dynamic Processes

Spring water ecosystems are tied to climate, groundwater discharge, and water quality. Impacts to these parameters, as well as their natural variability, will have a corresponding effect on spring biological ecological systems. Long-term drought, groundwater withdrawal at local and regional levels, and local diversions at or near the orifice are common impacts on water quantity at spring sites throughout the Western United States.

Management

Grazing and livestock use around these springs should be limited to a stock tank; immediate spring areas should be fenced to avoid cattle intrusions. Soils adjacent to the springs are often waterlogged and are easily trampled and hummocked by livestock, causing severe streambed degradation, sedimentation, and siltation downstream.

References

Classification and Map Identifiers

ReGAP:
1660: Small Perennial Wyoming Basin Springs

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Citation for data on this website:
Small Perennial Wyoming Basin Springs. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1660

Small Volume Spring Stream



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Provisional State Rank: S4
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State Rank Reason

The number of occurrences of this system is fairly well known and many spring creeks fall within private property. Very few spring creeks have had extensive biological inventories due to private land issues, but the potential of discovering new snail species is high (D. Gustafson, pers. comm.). Due to the constant temperatures, these streams can act as fish refuges during the summer and winter months, with trout spawning areas on the gravel bottoms.

General Description

This ecosystem is found in the Montana Foothills and Valleys Ecoregion. Elevation is 1200-2000 m. These small volume spring streams (average wetted width 1.3 m, >1 and <5 L/sec, average summer temperature <15°C, S003m-Warm springs - will have water temperatures >25°C) have moderated permanent flow with strong seasonal variability. Waters are mineral-rich and circumneutral to alkaline with pH of 7.0-8.2; clarity is often high. These factors contribute to lush growth of submerged aquatic vegetation, which may include watercress *Nasturtium officinale*, *Potamogeton* spp., and *Myriophyllum* spp. These streams represent groundwater discharge input, therefore they do not experience severe flooding or drastic temperature shifts and have more constant flow. The substrate of these streams is usually cobble riffles, gravel/sand runs and pools, with extensive beds of aquatic vegetation, and, unless they are degraded by cattle, flow silt-free and clear.

Diagnostic Characteristics

The S003 ecological system could be fishless because of its small volume and limited accessibility to a colonization pool of fish, and small warm springs (S003m) may be too warm to allow fish colonization. If present, the spring creek fish community historically had native species including westslope cutthroat,

mottled sculpin, longnose dace, with Yellowstone cutthroat trout in the Yellowstone drainages. However, the introduced brook, brown, and rainbow trout tend to dominate and become the focal species of these systems. Abundant populations of spring creek macroinvertebrate communities are diagnostic because of the stable environment, but display relatively limited diversity. This fairly unique, low-diversity community consists of a combination of members from the Medium Coolwater Transitional, the Traditional Trout Stream, and the Foothills Transitional Assemblages. The community is dominated by the mayflies (*Tricorythodes* and *Ephemerella* spp. [usually *Ephemerella inermis* and *E. infrequens*]), the amphipod crustaceans (*Gammarus* and *Hyalella*), and many genera of Chironomidae. Other community indicator species include *Baetis tricaudatus*, caddisfly species (*Hydropsysche*, *Amiocentrus aspilis*, *Cheumatopsyche*, and *Brachycentrus occidentalis*), beetles (*Optioservus* spp.), and snails (*Gyraulus*, *Physella*, *Stagnicola*, and Hydrobiidae). An S003 spring near Townsend, Montana (Bedford's Spring) is home to an endemic springsnail of the genus, *Pyrgulopsis* , one of the only places this genus is found east of the continental divide.

Range

The Spring Creek type has been identified in the foothill and valley ecoregion of many Montana drainages, particularly some of tributaries to larger valley streams: Bedford Spring Creek, Ben Hart (tributary to the E. Gallatin), O'Dell Creek (tributary to the Madison), Warm Spring Creek of the Missouri drainage.

Spatial Pattern

Linear

Environment

Surface topography usually has a moderate gradient but can be undulating or hummocky. Disturbance by cattle is widespread, as these springs often represent the only water source in the uplands.

Dynamic Processes

Spring water ecosystems are tied to climate, groundwater discharge, and water quality. Impacts to these parameters as well as their natural variability will have a corresponding effect on spring biological ecological systems. Long-term drought, groundwater withdrawal at local and regional levels, and local diversions at or near the orifice are common impacts on water quantity at spring sites throughout the Western United States.

Management

Livestock use around the riparian areas is common and can have strong local effects resulting in sedimentation and streams becoming wider or shallower. High-density cattle usage can cause severe degradation, sedimentation, and siltation on the riffle habitats and gravel spawning areas downstream.

References

Classification and Map Identifiers

ReGAP:
1640: Small Volume Spring Stream

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Citation for data on this website:
Small Volume Spring Stream. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=1640

Pasture/Hay

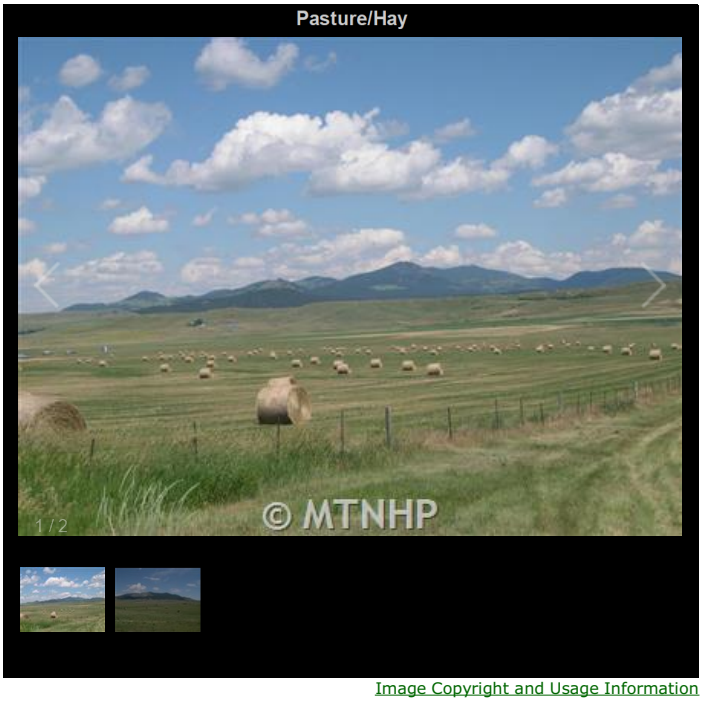


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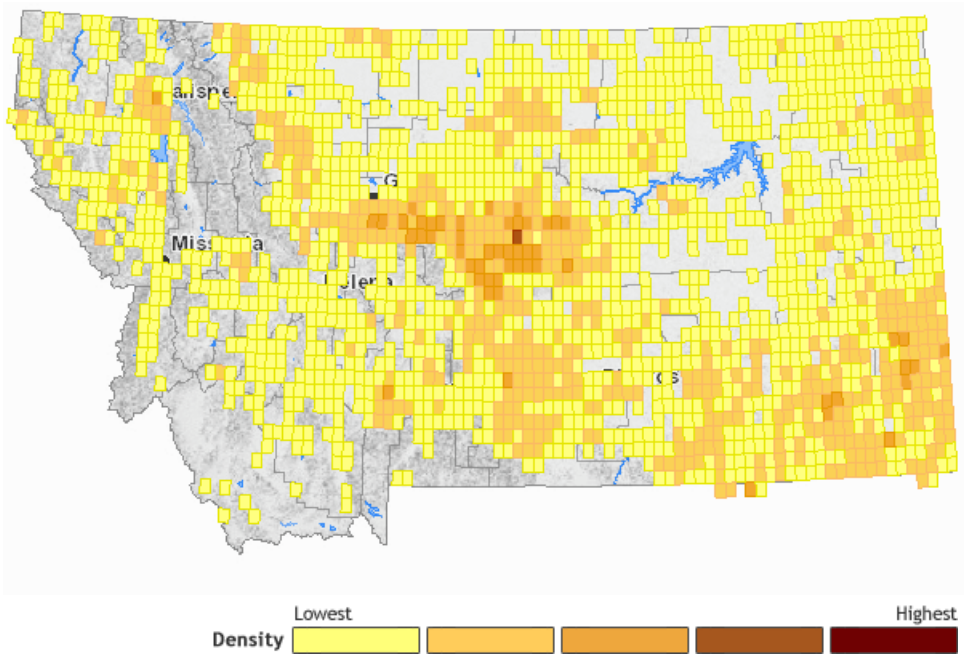
Ecological Systems Map Viewer | Google for more Images | Google for more Web Pages

General Description

These agriculture lands typically have perennial herbaceous cover (e.g. regularly-shaped plantings) used for livestock grazing or the production of hay. There are obvious signs of management such as flood irrigation and haying that distinguish it from natural grasslands. Identified CRP lands are included in this land cover type. Generally speaking, alfalfa grown with center-privot irrigation will be classified as "Cultivated Crops" rather than "Pasture/Hay."

Ecological System Distribution

Approximately 4,900 square kilometers are classified as Pasture/Hay in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC
Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC
Desert Cottontail *(Sylvilagus audubonii)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Common Muskrat *(Ondatra zibethicus)*
Coyote *(Canis latrans)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*
Mule Deer *(Odocoileus hemionus)*
Pronghorn *(Antilocapra americana)*
American Bison *(Bos bison)* SOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
Mountain Cottontail *(Sylvilagus nuttallii)*
White-tailed Jackrabbit *(Lepus townsendii)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Western Harvest Mouse *(Reithrodontomys megalotis)*
White-footed Deermouse *(Peromyscus leucopus)*
Montane Vole *(Microtus montanus)*
Prairie Vole *(Microtus ochrogaster)*
Northwestern Jumping Mouse *(Zapus saltator)*
Red Fox *(Vulpes vulpes)*
Least Weasel *(Mustela nivalis)*
American Ermine *(Mustela richardsonii)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*

Birds

Bobolink *(Dolichonyx oryzivorus)* SOC
Dickcissel *(Spiza americana)* PSOC
Greater White-fronted Goose *(Anser albifrons)*
Ross's Goose *(Anser rossii)*
Blue-winged Teal *(Spatula discors)*
Gadwall *(Mareca strepera)*
American Wigeon *(Mareca americana)*
Osprey *(Pandion haliaetus)*
Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*
Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*
Black-bellied Plover *(Pluvialis squatarola)*
Semipalmated Plover *(Charadrius semipalmatus)*
Upland Sandpiper *(Bartramia longicauda)*
Ring-billed Gull *(Larus delawarensis)*
Herring Gull *(Larus argentatus)*
Short-billed Gull *(Larus brachyrhynchus)*
Eurasian Collared-Dove *(Streptopelia decaocto)*
American Barn Owl *(Tyto furcata)*
Common Nighthawk *(Chordeiles minor)*
Western Kingbird *(Tyrannus verticalis)*
Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Mountain Bluebird *(Sialia currucoides)*
Gray Catbird *(Dumetella carolinensis)*
Northern Shrike *(Lanius borealis)*
Common Yellowthroat *(Geothlypis trichas)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
American Tree Sparrow *(Spizelloides arborea)*
Vesper Sparrow *(Pooecetes gramineus)*
Short-eared Owl *(Asio flammeus)* PSOC
Tundra Swan *(Cygnus columbianus)*
Snow Goose *(Anser caerulescens)*
Canada Goose *(Branta canadensis)*
Cinnamon Teal *(Spatula cyanoptera)*
Eurasian Wigeon *(Mareca penelope)*
Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*
American Kestrel *(Falco sparverius)*
Gyrfalcon *(Falco rusticolus)*
Sandhill Crane *(Antigone canadensis)*
American Golden-Plover *(Pluvialis dominica)*
Killdeer *(Charadrius vociferus)*
Wilson's Snipe *(Gallinago delicata)*
California Gull *(Larus californicus)*
Glaucous Gull *(Larus hyperboreus)*
Rock Pigeon *(Columba livia)*
Mourning Dove *(Zenaida macroura)*
Snowy Owl *(Bubo scandiacus)*
Northern Flicker *(Colaptes auratus)*
Eastern Kingbird *(Tyrannus tyrannus)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Western Bluebird *(Sialia mexicana)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
European Starling *(Sturnus vulgaris)*
Yellow-breasted Chat *(Icteria virens)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Spotted Towhee *(Pipilo maculatus)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*

Savannah Sparrow *(Passerculus sandwichensis)*
White-throated Sparrow *(Zonotrichia albicollis)*
Lapland Longspur *(Calcarius lapponicus)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
House Finch *(Haemorhous mexicanus)*
American Goldfinch *(Spinus tristis)*
House Sparrow *(Passer domesticus)*
Song Sparrow *(Melospiza melodia)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Common Grackle *(Quiscalus quiscula)*
Bullock's Oriole *(Icterus bullockii)*
Lesser Goldfinch *(Spinus psaltria)*
Redpoll *(Acanthis flammea)*

Reptiles

Gophersnake *(Pituophis catenifer)*

Amphibians

Woodhouse's Toad *(Anaxyrus woodhousii)*
Boreal Chorus Frog *(Pseudacris maculata)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
White-tailed Prairie Dog *(Cynomys leucurus)* SOC
Black-tailed Jackrabbit *(Lepus californicus)* PSOC
Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
American Mink *(Neogale vison)*
Northern River Otter *(Lontra canadensis)*
Bighorn Sheep *(Ovis canadensis)*
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Masked Shrew *(Sorex cinereus)*
Western Water Shrew *(Sorex navigator)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
American Badger *(Taxidea taxus)*
Moose *(Alces alces)*

Birds

Bald Eagle *(Haliaeetus leucocephalus)*
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Solitary Sandpiper *(Tringa solitaria)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC
Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Northern Pintail *(Anas acuta)*
Mallard *(Anas platyrhynchos)*
Virginia Rail *(Rallus limicola)*
Greater Yellowlegs *(Tringa melanoleuca)*
Willet *(Tringa semipalmata)*
Whimbrel *(Numenius phaeopus)*
Semipalmated Sandpiper *(Calidris pusilla)*
White-rumped Sandpiper *(Calidris fuscicollis)*
Pectoral Sandpiper *(Calidris melanotos)*
Stilt Sandpiper *(Calidris himantopus)*
Wilson's Phalarope *(Phalaropus tricolor)*
Bonaparte's Gull *(Chroicocephalus philadelphia)*
White-throated Swift *(Aeronautes saxatalis)*
Say's Phoebe *(Sayornis saya)*
Brown Thrasher *(Toxostoma rufum)*
Yellow Warbler *(Setophaga petechia)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Chipping Sparrow *(Spizella passerina)*
Lark Bunting *(Calamospiza melanocorys)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Golden Eagle *(Aquila chrysaetos)* SOC
Whooping Crane *(Grus americana)* SOC
Long-billed Curlew *(Numenius americanus)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Northern Shoveler *(Spatula clypeata)*
Ruffed Grouse *(Bonasa umbellus)*
American Avocet *(Recurvirostra americana)*
Lesser Yellowlegs *(Tringa flavipes)*
Spotted Sandpiper *(Actitis macularius)*
Marbled Godwit *(Limosa fedoa)*
Least Sandpiper *(Calidris minutilla)*
Baird's Sandpiper *(Calidris bairdii)*
Dunlin *(Calidris alpina)*
Long-billed Dowitcher *(Limnodromus scolopaceus)*
Red-necked Phalarope *(Phalaropus lobatus)*
Great Horned Owl *(Bubo virginianus)*
Calliope Hummingbird *(Selasphorus calliope)*
Horned Lark *(Eremophila alpestris)*
Cedar Waxwing *(Bombycilla cedrorum)*
American Redstart *(Setophaga ruticilla)*
Wilson's Warbler *(Cardellina pusilla)*
Field Sparrow *(Spizella pusilla)*
Grasshopper Sparrow *(Ammodramus savannarum)*
White-crowned Sparrow *(Zonotrichia leucophrys)*

Reptiles

North American Racer *(Coluber constrictor)*
Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Northern Leopard Frog *(Lithobates pipiens)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Great Plains Toad *(Anaxyrus cognatus)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Milbert's Tortoiseshell *(Aglais milberti)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Pasture / Hay

ReGAP:
81: Pasture / Hay

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Citation for data on this website:
Pasture/Hay — Pasture / Hay. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=81

Cultivated Crops



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Provisional State Rank:

External Links

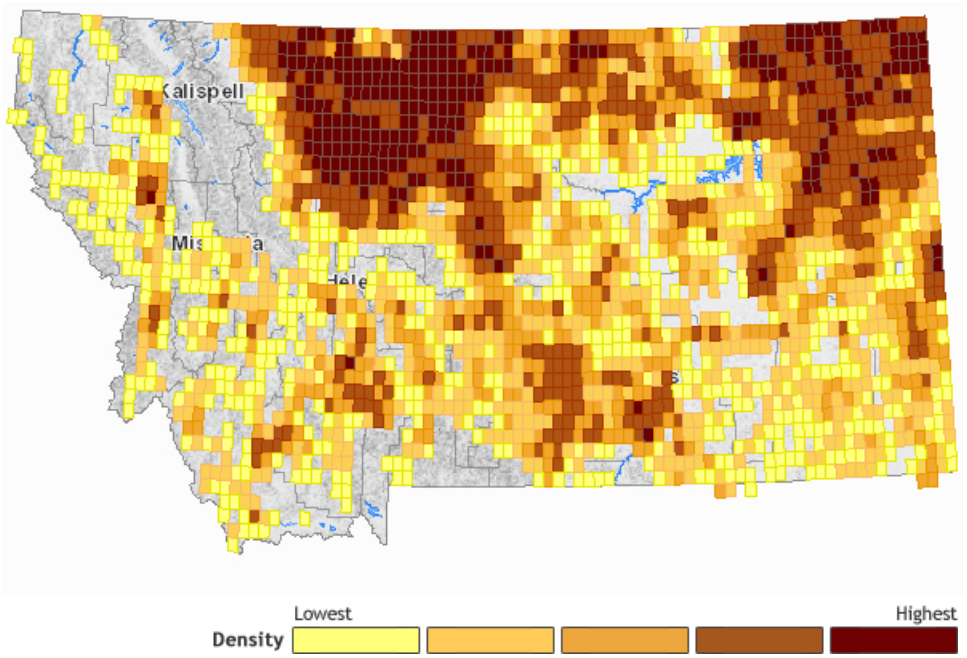
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General Description

These areas used for the production of crops, such as alfalfa, corn, small grains, seed crops, and vegetables, typically on an annual cycle. Agricultural plant cover is variable depending on season and type of farming, and may be dry-farmed or irrigated. This category also includes more stable land cover types, such as orchards.

Ecological System Distribution

Approximately 61,596 square kilometers are classified as Cultivated Crops in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Prairie Shrew *(Sorex haydeni)* PSOC	Eastern Cottontail *(Sylvilagus floridanus)*
White-tailed Jackrabbit *(Lepus townsendii)*	Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Northern Pocket Gopher *(Thomomys talpoides)*	Western Harvest Mouse *(Reithrodontomys megalotis)*
North American Deermouse *(Peromyscus maniculatus)*	White-footed Deermouse *(Peromyscus leucopus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Montane Vole *(Microtus montanus)*
Prairie Vole *(Microtus ochrogaster)*	Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*	Raccoon *(Procyon lotor)*
Least Weasel *(Mustela nivalis)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Pronghorn *(Antilocapra americana)*

Birds

Bobolink *(Dolichonyx oryzivorus)* SOC	Short-eared Owl *(Asio flammeus)* PSOC
Tundra Swan *(Cygnus columbianus)*	Greater White-fronted Goose *(Anser albifrons)*
Snow Goose *(Anser caerulescens)*	Ross's Goose *(Anser rossii)*
Canada Goose *(Branta canadensis)*	Blue-winged Teal *(Spatula discors)*
Cinnamon Teal *(Spatula cyanoptera)*	Gadwall *(Mareca strepera)*
Eurasian Wigeon *(Mareca penelope)*	American Wigeon *(Mareca americana)*
Northern Harrier *(Circus hudsonius)*	Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Merlin *(Falco columbarius)*
Gyrfalcon *(Falco rusticolus)*	Prairie Falcon *(Falco mexicanus)*
Sandhill Crane *(Antigone canadensis)*	Black-bellied Plover *(Pluvialis squatarola)*
American Golden-Plover *(Pluvialis dominica)*	Semipalmated Plover *(Charadrius semipalmatus)*
Killdeer *(Charadrius vociferus)*	Upland Sandpiper *(Bartramia longicauda)*
Ring-billed Gull *(Larus delawarensis)*	California Gull *(Larus californicus)*
Herring Gull *(Larus argentatus)*	Glaucous Gull *(Larus hyperboreus)*
Rock Pigeon *(Columba livia)*	Eurasian Collared-Dove *(Streptopelia decaocto)*
Mourning Dove *(Zenaida macroura)*	American Barn Owl *(Tyto furcata)*
Snowy Owl *(Bubo scandiacus)*	Common Nighthawk *(Chordeiles minor)*
Western Kingbird *(Tyrannus verticalis)*	Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*	Tree Swallow *(Tachycineta bicolor)*
Bank Swallow *(Riparia riparia)*	Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*	Black-billed Magpie *(Pica hudsonia)*
Common Raven *(Corvus corax)*	American Crow *(Corvus brachyrhynchos)*
Mountain Bluebird *(Sialia currucoides)*	European Starling *(Sturnus vulgaris)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*	American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*	Vesper Sparrow *(Pooecetes gramineus)*
Lark Sparrow *(Chondestes grammacus)*	Savannah Sparrow *(Passerculus sandwichensis)*
White-throated Sparrow *(Zonotrichia albicollis)*	Harris's Sparrow *(Zonotrichia querula)*
Lapland Longspur *(Calcarius lapponicus)*	Snow Bunting *(Plectrophenax nivalis)*
Red-winged Blackbird *(Agelaius phoeniceus)*	Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*	Brewer's Blackbird *(Euphagus cyanocephalus)*
Common Grackle *(Quiscalus quiscula)*	Brown-headed Cowbird *(Molothrus ater)*
House Finch *(Haemorhous mexicanus)*	American Goldfinch *(Spinus tristis)*
Redpoll *(Acanthis flammea)*	House Sparrow *(Passer domesticus)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*

Mountain Cottontail *(Sylvilagus nuttallii)*	Desert Cottontail *(Sylvilagus audubonii)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Meadow Vole *(Microtus pennsylvanicus)*	Long-tailed Vole *(Microtus longicaudus)*
Sagebrush Vole *(Lemmiscus curtatus)*	American Badger *(Taxidea taxus)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Whooping Crane *(Grus americana)* SOC	Solitary Sandpiper *(Tringa solitaria)* SOC
Franklin's Gull *(Leucophaeus pipixcan)* SOC	Loggerhead Shrike *(Lanius ludovicianus)* SOC
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC	Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Chimney Swift *(Chaetura pelagica)* PSOC	Dickcissel *(Spiza americana)* PSOC
Northern Pintail *(Anas acuta)*	Northern Shoveler *(Spatula clypeata)*
Mallard *(Anas platyrhynchos)*	Lesser Scaup *(Aythya affinis)*
Osprey *(Pandion haliaetus)*	American Avocet *(Recurvirostra americana)*
Greater Yellowlegs *(Tringa melanoleuca)*	Lesser Yellowlegs *(Tringa flavipes)*
Willet *(Tringa semipalmata)*	Spotted Sandpiper *(Actitis macularius)*
Whimbrel *(Numenius phaeopus)*	Marbled Godwit *(Limosa fedoa)*
Semipalmated Sandpiper *(Calidris pusilla)*	Least Sandpiper *(Calidris minutilla)*
White-rumped Sandpiper *(Calidris fuscicollis)*	Baird's Sandpiper *(Calidris bairdii)*
Pectoral Sandpiper *(Calidris melanotos)*	Dunlin *(Calidris alpina)*
Stilt Sandpiper *(Calidris himantopus)*	Long-billed Dowitcher *(Limnodromus scolopaceus)*
Wilson's Snipe *(Gallinago delicata)*	Wilson's Phalarope *(Phalaropus tricolor)*
Red-necked Phalarope *(Phalaropus lobatus)*	Bonaparte's Gull *(Chroicocephalus philadelphia)*
Great Horned Owl *(Bubo virginianus)*	White-throated Swift *(Aeronautes saxatalis)*
Say's Phoebe *(Sayornis saya)*	Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*	Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Blue Jay *(Cyanocitta cristata)*	American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*	Brown Thrasher *(Toxostoma rufum)*
Cedar Waxwing *(Bombycilla cedrorum)*	Northern Shrike *(Lanius borealis)*
Yellow Warbler *(Setophaga petechia)*	Blackpoll Warbler *(Setophaga striata)*
Common Yellowthroat *(Geothlypis trichas)*	Yellow-breasted Chat *(Icteria virens)*
Spotted Towhee *(Pipilo maculatus)*	Lark Bunting *(Calamospiza melanocorys)*
Song Sparrow *(Melospiza melodia)*	Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Baltimore Oriole *(Icterus galbula)*	Bullock's Oriole *(Icterus bullockii)*

Reptiles

Gophersnake *(Pituophis catenifer)*	Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*	Common Gartersnake *(Thamnophis sirtalis)*
Prairie Rattlesnake *(Crotalus viridis)*	

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Boreal Chorus Frog *(Pseudacris maculata)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Cultivated Crops

ReGAP:
82: Cultivated Crops

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Citation for data on this website:
Cultivated Crops. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=82

Wind Turbine

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

Submit an Image

Provisional State Rank:

External Links

Ecological Systems Map Viewer
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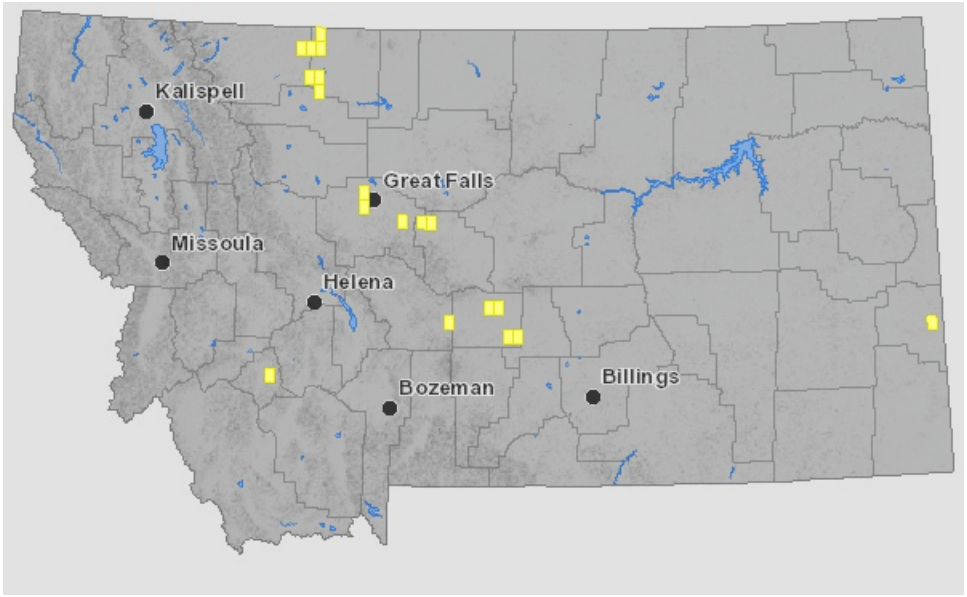
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General Description

Areas of significant wind power generation, usually "wind farms," with significant surface expression. As a rule, residential-sized wind turbines will be too small in their surface coverage to appear on the map.

Ecological System Distribution

Less than 1 square kilometer is classified as Wind Turbine in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*





Montana Counties of Occurrence

Cascade, Fallon, Glacier, Judith Basin, Meagher, Silver Bow, Toole, Wheatland

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.

- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Wind Turbine

ReGAP:
40: Wind Turbine

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Citation for data on this website:
Wind Turbine. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=40

Developed, Open Space



Image Copyright and Usage Information

Provisional State Rank:

External Links

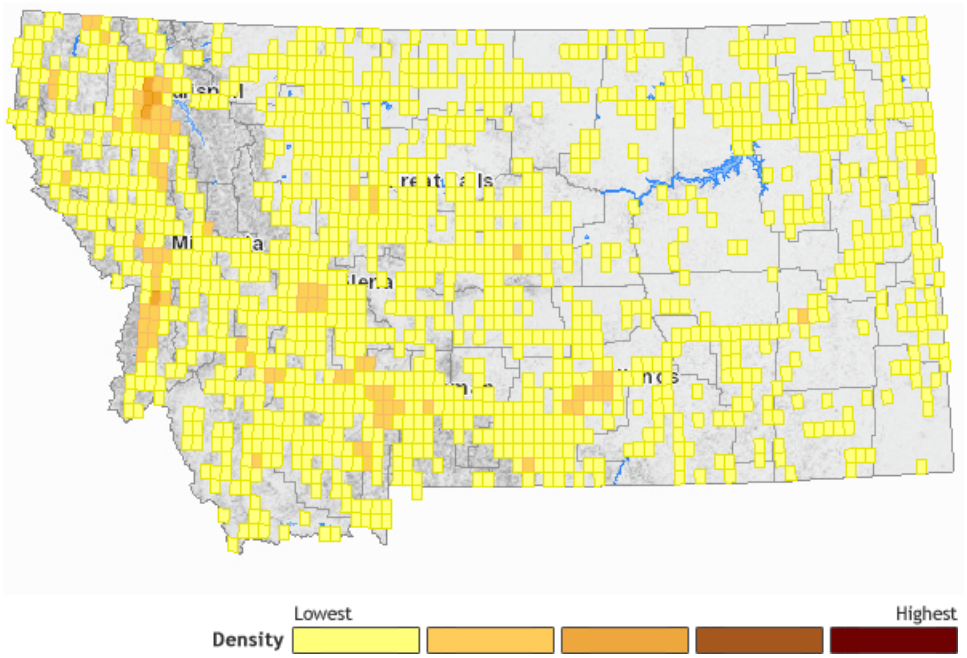
Ecological Systems Map Viewer
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General Description

Vegetation (primarily grasses) planted in developed settings for recreation, erosion control, or aesthetic purposes. Impervious surfaces account for less than 20% of total cover. This category often includes highway and railway rights of way and graveled rural roads.

Ecological System Distribution

Approximately 910 square kilometers are classified as Developed, Open Space in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Merriam's Shrew *(Sorex merriami)* SOC
Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC	Uinta Ground Squirrel *(Urocitellus armatus)* PSOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Masked Shrew *(Sorex cinereus)*	Vagrant Shrew *(Sorex vagrans)*
Northern Montane Shrew *(Sorex obscurus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Eastern Cottontail *(Sylvilagus floridanus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Desert Cottontail *(Sylvilagus audubonii)*
Snowshoe Hare *(Lepus americanus)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	Red-tailed Chipmunk *(Neotamias ruficaudus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Flying Squirrel *(Glaucomys sabrinus)*	Northern Pocket Gopher *(Thomomys talpoides)*
Olive-backed Pocket Mouse *(Perognathus fasciatus)*	Western Harvest Mouse *(Reithrodontomys megalotis)*
North American Deermouse *(Peromyscus maniculatus)*	White-footed Deermouse *(Peromyscus leucopus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*	Raccoon *(Procyon lotor)*
Marten *(Martes americana)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Ermine *(Mustela richardsonii)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	

Birds

Loggerhead Shrike *(Lanius ludovicianus)* SOC	Bobolink *(Dolichonyx oryzivorus)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC	Chimney Swift *(Chaetura pelagica)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC	Rufous Hummingbird *(Selasphorus rufus)* PSOC
Dickcissel *(Spiza americana)* PSOC	Canada Goose *(Branta canadensis)*
Gadwall *(Mareca strepera)*	Turkey Vulture *(Cathartes aura)*
Osprey *(Pandion haliaetus)*	Northern Harrier *(Circus hudsonius)*
Sharp-shinned Hawk *(Accipiter striatus)*	Cooper's Hawk *(Accipiter cooperii)*
Swainson's Hawk *(Buteo swainsoni)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Merlin *(Falco columbarius)*	Gyrfalcon *(Falco rusticolus)*
Prairie Falcon *(Falco mexicanus)*	Ruffed Grouse *(Bonasa umbellus)*
Sandhill Crane *(Antigone canadensis)*	Killdeer *(Charadrius vociferus)*
Upland Sandpiper *(Bartramia longicauda)*	Ring-billed Gull *(Larus delawarensis)*
California Gull *(Larus californicus)*	Herring Gull *(Larus argentatus)*
Glaucous Gull *(Larus hyperboreus)*	Rock Pigeon *(Columba livia)*
Eurasian Collared-Dove *(Streptopelia decaocto)*	Mourning Dove *(Zenaida macroura)*
American Barn Owl *(Tyto furcata)*	Great Horned Owl *(Bubo virginianus)*
Snowy Owl *(Bubo scandiacus)*	Common Nighthawk *(Chordeiles minor)*
Vaux's Swift *(Chaetura vauxi)*	Ruby-throated Hummingbird *(Archilochus colubris)*
Black-chinned Hummingbird *(Archilochus alexandri)*	Calliope Hummingbird *(Selasphorus calliope)*
Downy Woodpecker *(Dryobates pubescens)*	Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*	Olive-sided Flycatcher *(Contopus cooperi)*
Western Wood-Pewee *(Contopus sordidulus)*	Least Flycatcher *(Empidonax minimus)*
Dusky Flycatcher *(Empidonax oberholseri)*	Say's Phoebe *(Sayornis saya)*
Western Kingbird *(Tyrannus verticalis)*	Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*	Purple Martin *(Progne subis)*
Tree Swallow *(Tachycineta bicolor)*	Violet-green Swallow *(Tachycineta thalassina)*

Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Steller's Jay *(Cyanocitta stelleri)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Northern House Wren *(Troglodytes aedon)*
Western Bluebird *(Sialia mexicana)*
American Robin *(Turdus migratorius)*
Brown Thrasher *(Toxostoma rufum)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Common Yellowthroat *(Geothlypis trichas)*
Yellow-breasted Chat *(Icteria virens)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Song Sparrow *(Melospiza melodia)*
Lapland Longspur *(Calcarius lapponicus)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Baltimore Oriole *(Icterus galbula)*
Purple Finch *(Haemorhous purpureus)*
Pine Siskin *(Spinus pinus)*
American Goldfinch *(Spinus tristis)*
House Sparrow *(Passer domesticus)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Bunting *(Calamospiza melanocorys)*
Fox Sparrow *(Passerella iliaca)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Common Grackle *(Quiscalus quiscula)*
Orchard Oriole *(Icterus spurius)*
Bullock's Oriole *(Icterus bullockii)*
House Finch *(Haemorhous mexicanus)*
Lesser Goldfinch *(Spinus psaltria)*
Redpoll *(Acanthis flammea)*

Amphibians

Boreal Chorus Frog *(Pseudacris maculata)*

Native Species Occasionally Associated with this Ecological System

Mammals

Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Dwarf Shrew *(Sorex nanus)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC
California Myotis *(Myotis californicus)*
Eastern Fox Squirrel *(Sciurus niger)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
American Mink *(Neogale vison)*
Northern River Otter *(Lontra canadensis)*
Pronghorn *(Antilocapra americana)*
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Western Water Shrew *(Sorex navigator)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Common Muskrat *(Ondatra zibethicus)*
American Badger *(Taxidea taxus)*
Moose *(Alces alces)*

Birds

Burrowing Owl *(Athene cunicularia)* SOC
Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Eastern Bluebird *(Sialia sialis)* PSOC
Spruce Grouse *(Canachites canadensis)*
Wild Turkey *(Meleagris gallopavo)*
Willet *(Tringa semipalmata)*
Marbled Godwit *(Limosa fedoa)*
Wilson's Phalarope *(Phalaropus tricolor)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Rock Wren *(Salpinctes obsoletus)*
Swainson's Thrush *(Catharus ustulatus)*
Yellow-rumped Warbler *(Setophaga coronata)*
Northern Waterthrush *(Parkesia noveboracensis)*
Wilson's Warbler *(Cardellina pusilla)*
Grasshopper Sparrow *(Ammodramus savannarum)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
White-winged Crossbill *(Loxia leucoptera)*
Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Mallard *(Anas platyrhynchos)*
Dusky Grouse *(Dendragapus obscurus)*
Lesser Yellowlegs *(Tringa flavipes)*
Spotted Sandpiper *(Actitis macularius)*
Wilson's Snipe *(Gallinago delicata)*
White-throated Swift *(Aeronautes saxatalis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Golden-crowned Kinglet *(Regulus satrapa)*
Warbling Vireo *(Vireo gilvus)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Field Sparrow *(Spizella pusilla)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Dark-eyed Junco *(Junco hyemalis)*
Red Crossbill *(Loxia curvirostra)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC	Western Milksnake *(Lampropeltis gentilis)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC	Northern Rubber Boa *(Charina bottae)*
North American Racer *(Coluber constrictor)*	Gophersnake *(Pituophis catenifer)*
Terrestrial Gartersnake *(Thamnophis elegans)*	Plains Gartersnake *(Thamnophis radix)*
Common Gartersnake *(Thamnophis sirtalis)*	Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC	Long-toed Salamander *(Ambystoma macrodactylum)*
Western Tiger Salamander *(Ambystoma mavortium)*	Woodhouse's Toad *(Anaxyrus woodhousii)*
Sierran Treefrog *(Pseudacris sierra)*	Plains Spadefoot *(Spea bombifrons)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Developed, Open Space

ReGAP:
21: Developed, Open Space

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Developed, Open Space. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=21

Low Intensity Residential

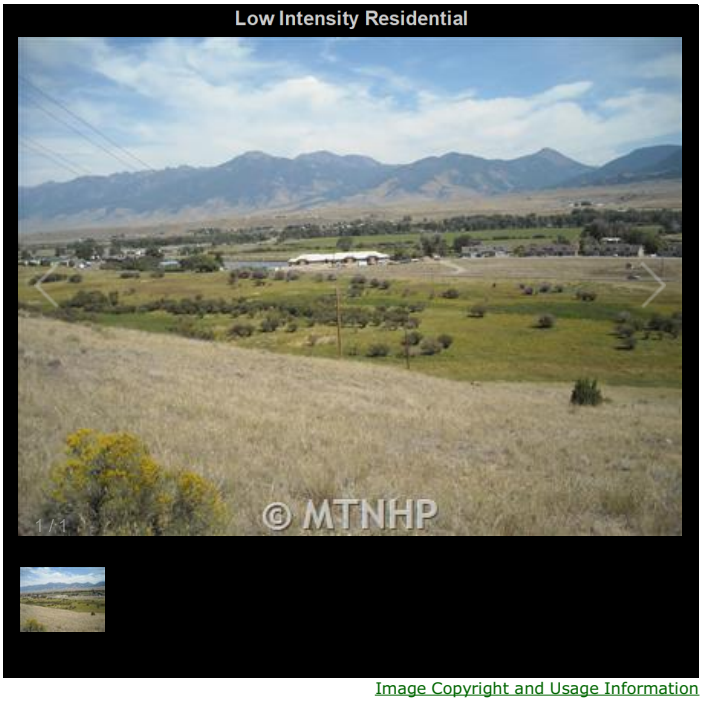


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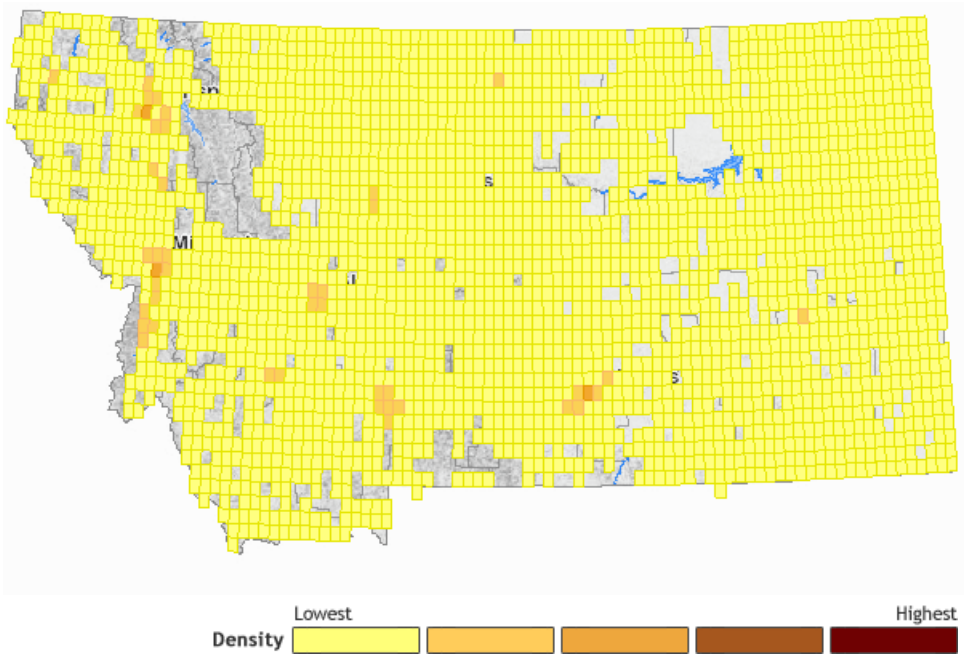
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General Description

Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-50% of total cover. These areas most commonly include single-family housing units in rural and suburban areas. Paved roadways may be classified into this category.

Ecological System Distribution

Approximately 871 square kilometers are classified as Low Intensity Residential in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC	Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
Idaho Pocket Gopher *(Thomomys idahoensis)* PSOC	North American Porcupine *(Erethizon dorsatum)* PSOC
Vagrant Shrew *(Sorex vagrans)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Eastern Cottontail *(Sylvilagus floridanus)*
Mountain Cottontail *(Sylvilagus nuttallii)*	Desert Cottontail *(Sylvilagus audubonii)*
Snowshoe Hare *(Lepus americanus)*	White-tailed Jackrabbit *(Lepus townsendii)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Yellow-bellied Marmot *(Marmota flaviventris)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Red Squirrel *(Tamiasciurus hudsonicus)*	Northern Flying Squirrel *(Glaucomys sabrinus)*
Northern Pocket Gopher *(Thomomys talpoides)*	Western Harvest Mouse *(Reithrodontomys megalotis)*
North American Deermouse *(Peromyscus maniculatus)*	White-footed Deermouse *(Peromyscus leucopus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Meadow Vole *(Microtus pennsylvanicus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*	Raccoon *(Procyon lotor)*
Least Weasel *(Mustela nivalis)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	Striped Skunk *(Mephitis mephitis)*
Mule Deer *(Odocoileus hemionus)*	

Birds

Loggerhead Shrike *(Lanius ludovicianus)* SOC	Bobolink *(Dolichonyx oryzivorus)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC	Chimney Swift *(Chaetura pelagica)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC	Rufous Hummingbird *(Selasphorus rufus)* PSOC
Greater White-fronted Goose *(Anser albifrons)*	Canada Goose *(Branta canadensis)*
Gadwall *(Mareca strepera)*	Osprey *(Pandion haliaetus)*
Northern Harrier *(Circus hudsonius)*	Sharp-shinned Hawk *(Accipiter striatus)*
Cooper's Hawk *(Accipiter cooperii)*	Swainson's Hawk *(Buteo swainsoni)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*	Killdeer *(Charadrius vociferus)*
Upland Sandpiper *(Bartramia longicauda)*	Ring-billed Gull *(Larus delawarensis)*
California Gull *(Larus californicus)*	Herring Gull *(Larus argentatus)*
Glaucous Gull *(Larus hyperboreus)*	Rock Pigeon *(Columba livia)*
Eurasian Collared-Dove *(Streptopelia decaocto)*	Mourning Dove *(Zenaida macroura)*
American Barn Owl *(Tyto furcata)*	Great Horned Owl *(Bubo virginianus)*
Snowy Owl *(Bubo scandiacus)*	Common Nighthawk *(Chordeiles minor)*
Vaux's Swift *(Chaetura vauxi)*	Ruby-throated Hummingbird *(Archilochus colubris)*
Black-chinned Hummingbird *(Archilochus alexandri)*	Calliope Hummingbird *(Selasphorus calliope)*
Downy Woodpecker *(Dryobates pubescens)*	Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*	Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*	Say's Phoebe *(Sayornis saya)*
Western Kingbird *(Tyrannus verticalis)*	Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*	Purple Martin *(Progne subis)*
Tree Swallow *(Tachycineta bicolor)*	Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*	Bank Swallow *(Riparia riparia)*
Cliff Swallow *(Petrochelidon pyrrhonota)*	Barn Swallow *(Hirundo rustica)*
Steller's Jay *(Cyanocitta stelleri)*	Blue Jay *(Cyanocitta cristata)*
Black-billed Magpie *(Pica hudsonia)*	Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*	Black-capped Chickadee *(Poecile atricapillus)*
Mountain Chickadee *(Poecile gambeli)*	Chestnut-backed Chickadee *(Poecile rufescens)*
Red-breasted Nuthatch *(Sitta canadensis)*	White-breasted Nuthatch *(Sitta carolinensis)*

Northern House Wren *(Troglodytes aedon)*
Western Bluebird *(Sialia mexicana)*
American Robin *(Turdus migratorius)*
Northern Mockingbird *(Mimus polyglottos)*
Cedar Waxwing *(Bombycilla cedrorum)*
European Starling *(Sturnus vulgaris)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Blackpoll Warbler *(Setophaga striata)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Lark Sparrow *(Chondestes grammacus)*
Savannah Sparrow *(Passerculus sandwichensis)*
Harris's Sparrow *(Zonotrichia querula)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Baltimore Oriole *(Icterus galbula)*
Purple Finch *(Haemorhous purpureus)*
Pine Siskin *(Spinus pinus)*
American Goldfinch *(Spinus tristis)*
House Sparrow *(Passer domesticus)*

Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*
Northern Shrike *(Lanius borealis)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Chestnut-sided Warbler *(Setophaga pensylvanica)*
Cape May Warbler *(Setophaga tigrina)*
Common Yellowthroat *(Geothlypis trichas)*
Yellow-breasted Chat *(Icteria virens)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Blue Grosbeak *(Passerina caerulea)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Vesper Sparrow *(Pooecetes gramineus)*
Lark Bunting *(Calamospiza melanocorys)*
Song Sparrow *(Melospiza melodia)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*
Common Grackle *(Quiscalus quiscula)*
Orchard Oriole *(Icterus spurius)*
Bullock's Oriole *(Icterus bullockii)*
House Finch *(Haemorhous mexicanus)*
Lesser Goldfinch *(Spinus psaltria)*
Redpoll *(Acanthis flammea)*

Native Species Occasionally Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Black-tailed Jackrabbit *(Lepus californicus)* PSOC
Masked Shrew *(Sorex cinereus)*
California Myotis *(Myotis californicus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
American Mink *(Neogale vison)*
Northern River Otter *(Lontra canadensis)*
White-tailed Deer *(Odocoileus virginianus)*

Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Western Spotted Skunk *(Spilogale gracilis)* PSOC
Western Water Shrew *(Sorex navigator)*
Eastern Fox Squirrel *(Sciurus niger)*
Common Muskrat *(Ondatra zibethicus)*
American Badger *(Taxidea taxus)*
Bobcat *(Lynx rufus)*

Birds

Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Black-and-white Warbler *(Mniotilta varia)* PSOC
Wild Turkey *(Meleagris gallopavo)*
Spotted Sandpiper *(Actitis macularius)*
White-throated Swift *(Aeronautes saxatalis)*
Dusky Flycatcher *(Empidonax oberholseri)*
Rock Wren *(Salpinctes obsoletus)*
Swainson's Thrush *(Catharus ustulatus)*
Warbling Vireo *(Vireo gilvus)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Field Sparrow *(Spizella pusilla)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
White-winged Crossbill *(Loxia leucoptera)*

Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Eastern Bluebird *(Sialia sialis)* PSOC
Ruffed Grouse *(Bonasa umbellus)*
Sandhill Crane *(Antigone canadensis)*
Wilson's Snipe *(Gallinago delicata)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Golden-crowned Kinglet *(Regulus satrapa)*
Brown Thrasher *(Toxostoma rufum)*
Yellow-rumped Warbler *(Setophaga coronata)*
Northern Waterthrush *(Parkesia noveboracensis)*
Wilson's Warbler *(Cardellina pusilla)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Dark-eyed Junco *(Junco hyemalis)*
Red Crossbill *(Loxia curvirostra)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC
North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

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Northern Rubber Boa *(Charina bottae)*
Gophersnake *(Pituophis catenifer)*
Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Sierran Treefrog *(Pseudacris sierra)*

Long-toed Salamander *(Ambystoma macrodactylum)*
Boreal Chorus Frog *(Pseudacris maculata)*
Plains Spadefoot *(Spea bombifrons)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Low Intensity Residential

ReGAP:
22: Low Intensity Residential

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Low Intensity Residential. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=22

High Intensity Residential

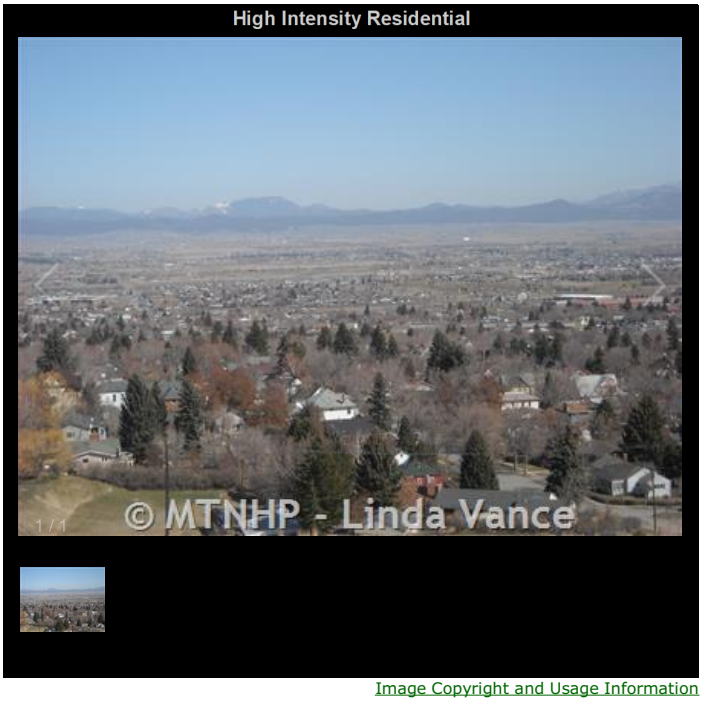


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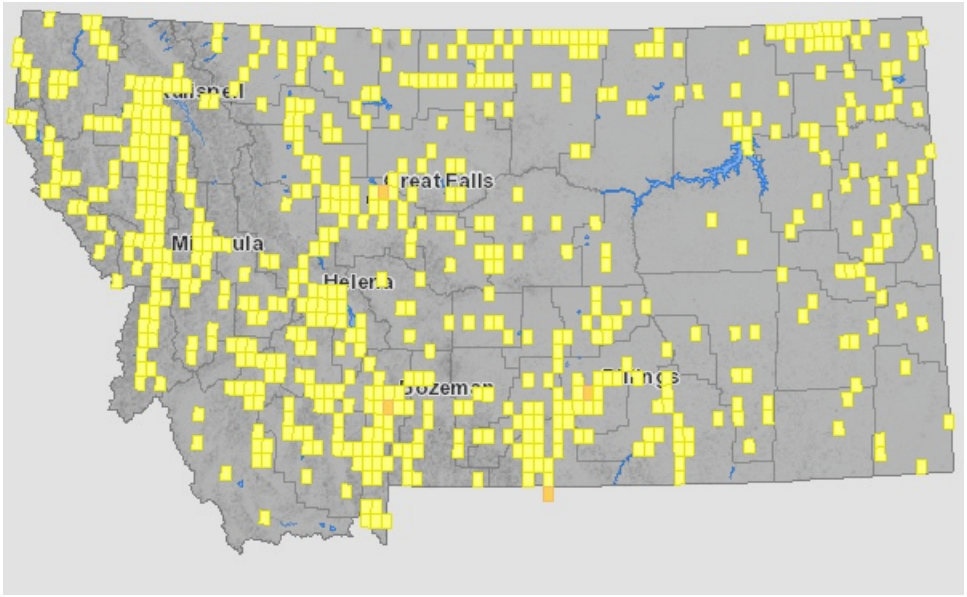
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General Description

Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-80% of the total cover. These areas most commonly include single-family housing units in urban areas. Paved roadways, parking lots, and other large impervious surfaces may be classified into this category.

Ecological System Distribution

Approximately 97 square kilometers are classified as High Intensity Residential in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

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- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
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- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
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Native Species Commonly Associated with this Ecological System

Mammals

Desert Cottontail *(Sylvilagus audubonii)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
Eastern Fox Squirrel *(Sciurus niger)*
North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*
Meadow Vole *(Microtus pennsylvanicus)*
Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Least Weasel *(Mustela nivalis)*
Striped Skunk *(Mephitis mephitis)*
White-tailed Jackrabbit *(Lepus townsendii)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Northern Flying Squirrel *(Glaucomys sabrinus)*
White-footed Deermouse *(Peromyscus leucopus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Montane Vole *(Microtus montanus)*
Prairie Vole *(Microtus ochrogaster)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*

Birds

Green-tailed Towhee *(Pipilo chlorurus)* SOC
Chimney Swift *(Chaetura pelagica)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Cooper's Hawk *(Accipiter cooperii)*
California Gull *(Larus californicus)*
Eurasian Collared-Dove *(Streptopelia decaocto)*
American Barn Owl *(Tyto furcata)*
Vaux's Swift *(Chaetura vauxi)*
Downy Woodpecker *(Dryobates pubescens)*
Northern Flicker *(Colaptes auratus)*
Say's Phoebe *(Sayornis saya)*
Eastern Kingbird *(Tyrannus tyrannus)*
Purple Martin *(Progne subis)*
Violet-green Swallow *(Tachycineta thalassina)*
Cliff Swallow *(Petrochelidon pyrrhonota)*
Steller's Jay *(Cyanocitta stelleri)*
Black-billed Magpie *(Pica hudsonia)*
American Crow *(Corvus brachyrhynchos)*
Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*
Northern House Wren *(Troglodytes aedon)*
Mountain Bluebird *(Sialia currucoides)*
Gray Catbird *(Dumetella carolinensis)*
Cedar Waxwing *(Bombycilla cedrorum)*
Cassin's Vireo *(Vireo cassinii)*
Yellow Warbler *(Setophaga petechia)*
Cape May Warbler *(Setophaga tigrina)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Chipping Sparrow *(Spizella passerina)*
Lark Sparrow *(Chondestes grammacus)*
Song Sparrow *(Melospiza melodia)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Western Meadowlark *(Sturnella neglecta)*
Common Grackle *(Quiscalus quiscula)*
Orchard Oriole *(Icterus spurius)*
Bullock's Oriole *(Icterus bullockii)*
Pine Siskin *(Spinus pinus)*
Redpoll *(Acanthis flammea)*
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Merlin *(Falco columbarius)*
Rock Pigeon *(Columba livia)*
Mourning Dove *(Zenaida macroura)*
Common Nighthawk *(Chordeiles minor)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Hairy Woodpecker *(Dryobates villosus)*
Least Flycatcher *(Empidonax minimus)*
Western Kingbird *(Tyrannus verticalis)*
Horned Lark *(Eremophila alpestris)*
Tree Swallow *(Tachycineta bicolor)*
Bank Swallow *(Riparia riparia)*
Barn Swallow *(Hirundo rustica)*
Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*
Chestnut-backed Chickadee *(Poecile rufescens)*
White-breasted Nuthatch *(Sitta carolinensis)*
Ruby-crowned Kinglet *(Corthylio calendula)*
American Robin *(Turdus migratorius)*
Bohemian Waxwing *(Bombycilla garrulus)*
European Starling *(Sturnus vulgaris)*
Orange-crowned Warbler *(Leiothlypis celata)*
Magnolia Warbler *(Setophaga magnolia)*
Western Tanager *(Piranga ludoviciana)*
Spotted Towhee *(Pipilo maculatus)*
Vesper Sparrow *(Pooecetes gramineus)*
Savannah Sparrow *(Passerculus sandwichensis)*
White-throated Sparrow *(Zonotrichia albicollis)*
Dark-eyed Junco *(Junco hyemalis)*
Red-winged Blackbird *(Agelaius phoeniceus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Brown-headed Cowbird *(Molothrus ater)*
Baltimore Oriole *(Icterus galbula)*
House Finch *(Haemorhous mexicanus)*
American Goldfinch *(Spinus tristis)*
House Sparrow *(Passer domesticus)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Masked Shrew *(Sorex cinereus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*
Northwestern Jumping Mouse *(Zapus saltator)*
Northern River Otter *(Lontra canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
Western Water Shrew *(Sorex navigator)*
Big Brown Bat *(Eptesicus fuscus)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Northern Pocket Gopher *(Thomomys talpoides)*
Red Fox *(Vulpes vulpes)*
Mule Deer *(Odocoileus hemionus)*

Birds

Loggerhead Shrike *(Lanius ludovicianus)* SOC
Cassin's Kingbird *(Tyrannus vociferans)* PSOC
Black-and-white Warbler *(Mniotilta varia)* PSOC
White-throated Swift *(Aeronautes saxatalis)*
Dusky Flycatcher *(Empidonax oberholseri)*
Golden-crowned Kinglet *(Regulus satrapa)*
Swainson's Thrush *(Catharus ustulatus)*
Yellow-rumped Warbler *(Setophaga coronata)*
Yellow-breasted Chat *(Icteria virens)*
Lark Bunting *(Calamospiza melanocorys)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Red Crossbill *(Loxia curvirostra)*
Thick-billed Longspur *(Rhynchophanes mccownii)* SOC
Eastern Bluebird *(Sialia sialis)* PSOC
Great Horned Owl *(Bubo virginianus)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Rock Wren *(Salpinctes obsoletus)*
Western Bluebird *(Sialia mexicana)*
Brown Thrasher *(Toxostoma rufum)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Field Sparrow *(Spizella pusilla)*
Lincoln's Sparrow *(Melospiza lincolnii)*
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*

Amphibians

Boreal Chorus Frog *(Pseudacris maculata)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, High Intensity Residential

ReGAP:
23: High Intensity Residential

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Citation for data on this website:
High Intensity Residential. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=23

Commercial / Industrial

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

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Provisional State Rank:

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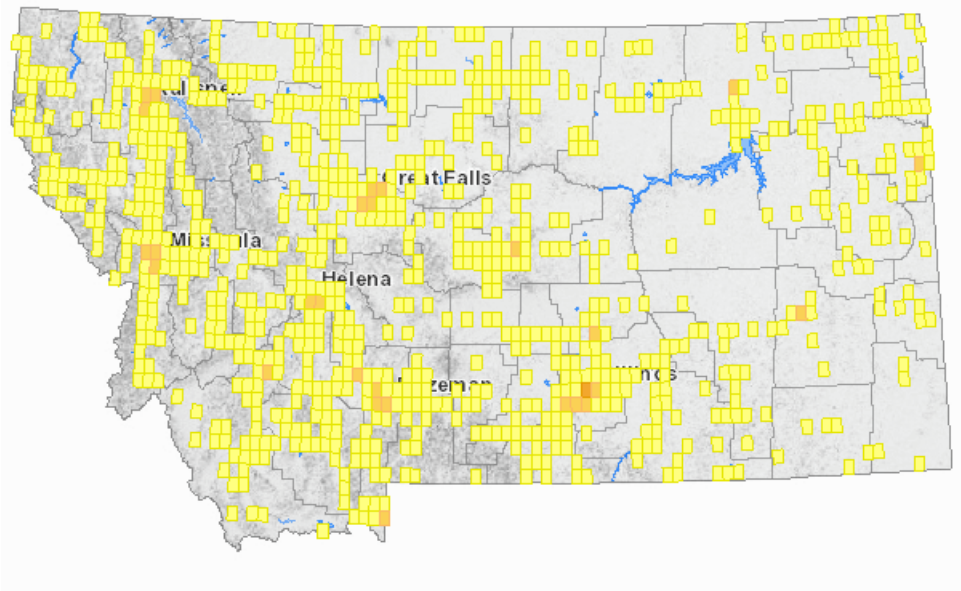
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General Description

Businesses, industrial parks, hospitals, airports; utilities in commercial/industrial areas.

Ecological System Distribution

Approximately 317 square kilometers are classified as Commercial / Industrial in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
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Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

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Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Commercial / Industrial

ReGAP:
24: Commercial / Industrial

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Citation for data on this website:
Commercial / Industrial. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=24

Railroad

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

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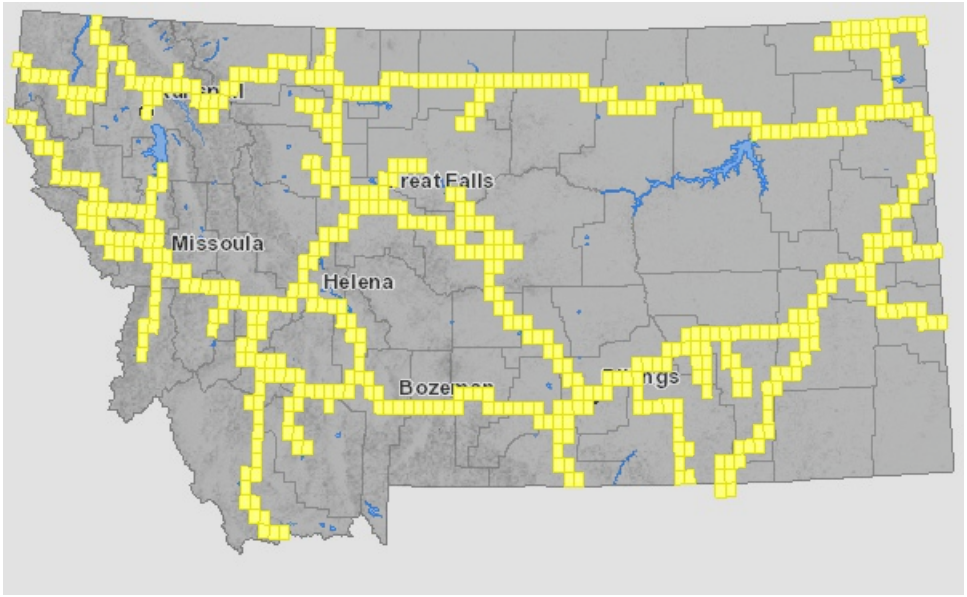
Image Copyright and Usage Information

General Description

Railroad tracks and railroad berms/rights of way, currently in use or capable of use

Ecological System Distribution

Approximately 207 square kilometers are classified as Railroad in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mineral, Missoula, Park, Phillips, Pondera, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

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Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Eastern Red Bat *(Lasiurus borealis)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Railroad

ReGAP:
25: Railroad

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Citation for data on this website:
Railroad. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=25

Interstate

No photos are currently available

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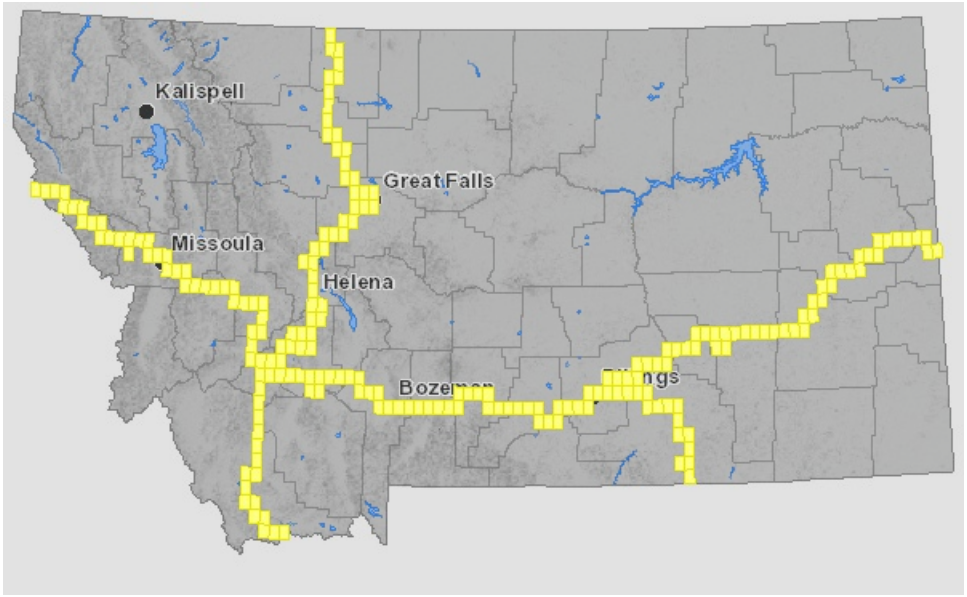
Image Copyright and Usage Information

General Description

National Highway System (NHS) limited access highways and their shoulders and rights of way.

Ecological System Distribution

Approximately 269 square kilometers are classified as Interstate in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Cascade, Custer, Dawson, Deer Lodge, Gallatin, Granite, Jefferson, Lewis and Clark, Madison, Mineral, Missoula, Park, Pondera, Powell, Prairie, Rosebud, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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Suggested Uses and Limitations

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Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
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- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Interstate

ReGAP:
26: Interstate

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Citation for data on this website:
Interstate. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=26

Major Roads

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

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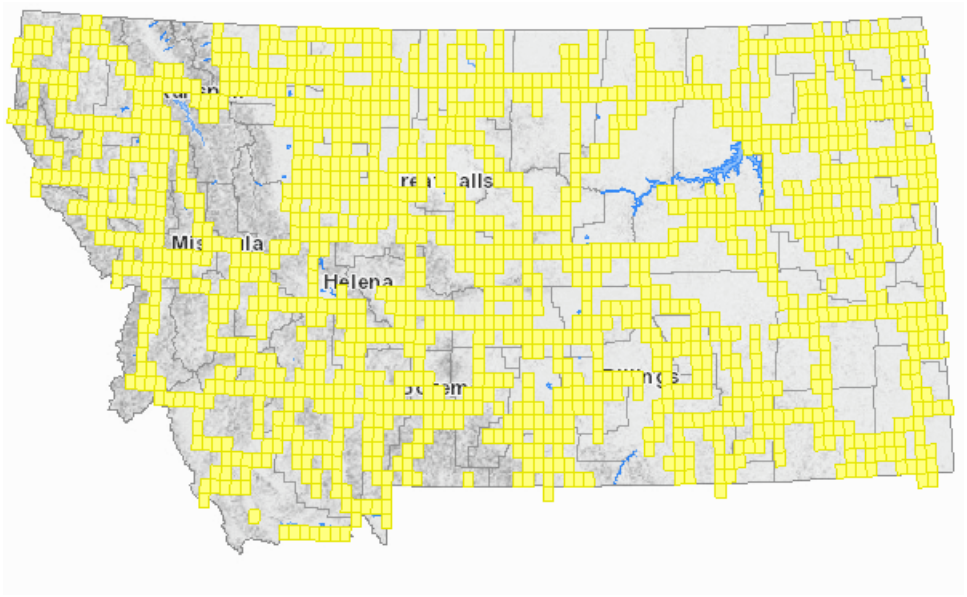
Image Copyright and Usage Information

General Description

U.S. and State Highways that are not part of the National Highway System (NHS) Interstate network. This category includes entrance and exit ramps to NHS Interstate highways.

Ecological System Distribution

Approximately 562 square kilometers are classified as Major Roads in the 2017 Montana Land Cover layers.
Grid on map is based on USGS 7.5 minute quadrangle map boundaries.



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

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Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Major Roads

ReGAP:
27: Major Roads

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Citation for data on this website:
Major Roads. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=27

Other Roads

No photos are currently available

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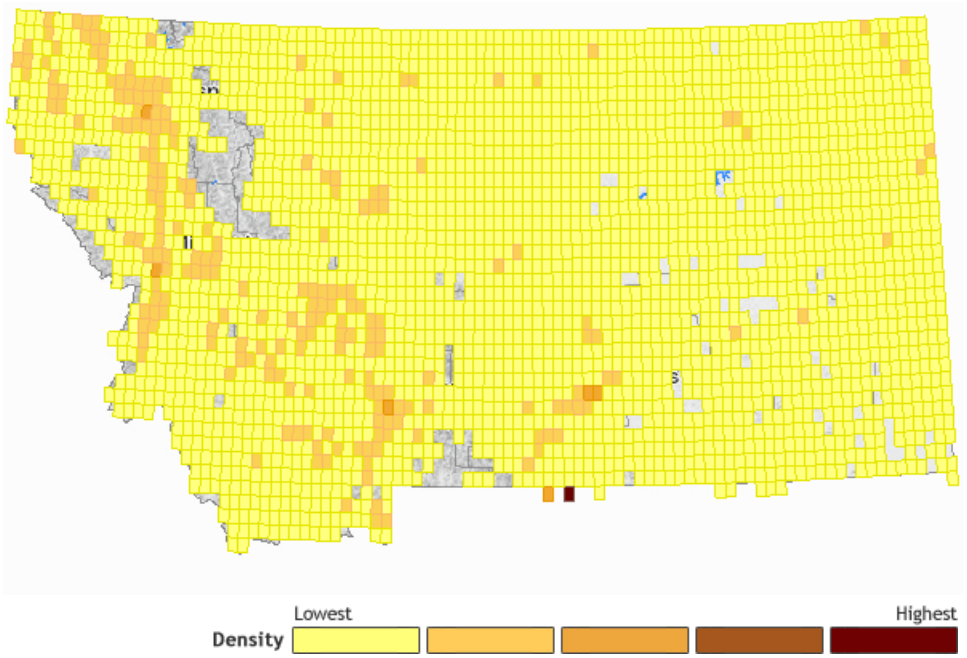
Image Copyright and Usage Information

General Description

County, city and or rural roads generally open to motor vehicles.

Ecological System Distribution

Approximately 3,842 square kilometers are classified as Other Roads in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

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Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*

Reptiles

Western Fence Lizard *(Sceloporus occidentalis)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Other Roads

ReGAP:
28: Other Roads

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Citation for data on this website:
Other Roads. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=28

Quarries, Strip Mines and Gravel Pits



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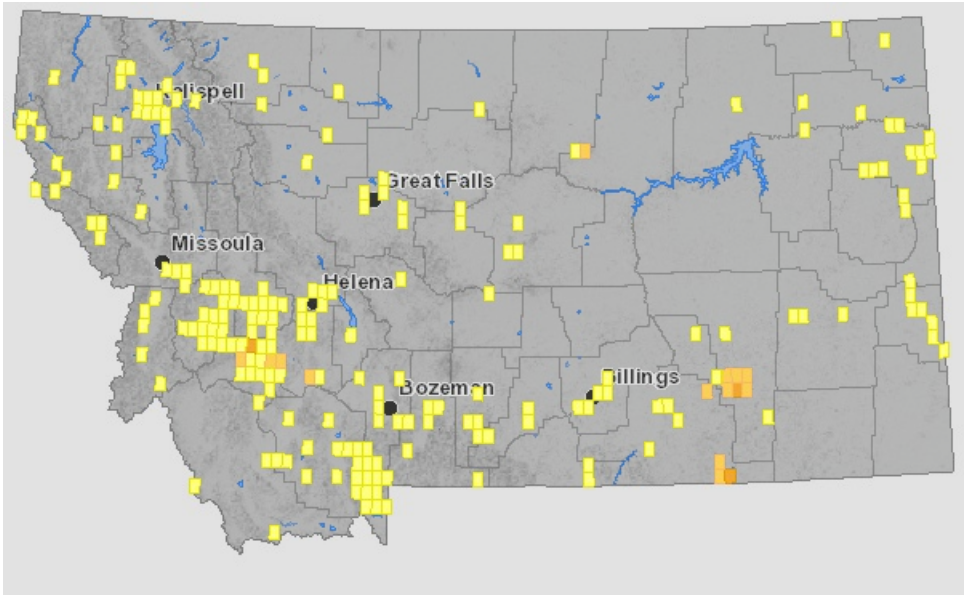
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General Description

Areas of extractive mining activities with significant surface expression in the form of pits, service roads, and permanently installed processing machinery

Ecological System Distribution

Approximately 221 square kilometers are classified as Quarries, Strip Mines and Gravel Pits in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Cascade, Chouteau, Custer, Daniels, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Glacier, Granite, Jefferson, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Phillips, Pondera, Powell, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
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Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

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Native Species Commonly Associated with this Ecological System

Mammals

North American Deermouse *(Peromyscus maniculatus)*

Birds

European Starling *(Sturnus vulgaris)*
House Sparrow *(Passer domesticus)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Sierran Treefrog *(Pseudacris sierra)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Painted Turtle *(Chrysemys picta)*
Common Sagebrush Lizard *(Sceloporus graciosus)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Northern Leopard Frog *(Lithobates pipiens)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Quarries, Strip Mines and Gravel Pits

ReGAP:
31: Quarries, Strip Mines and Gravel Pits

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Citation for data on this website:
Quarries, Strip Mines and Gravel Pits. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=31

Coal Bed Methane

No photos are currently available

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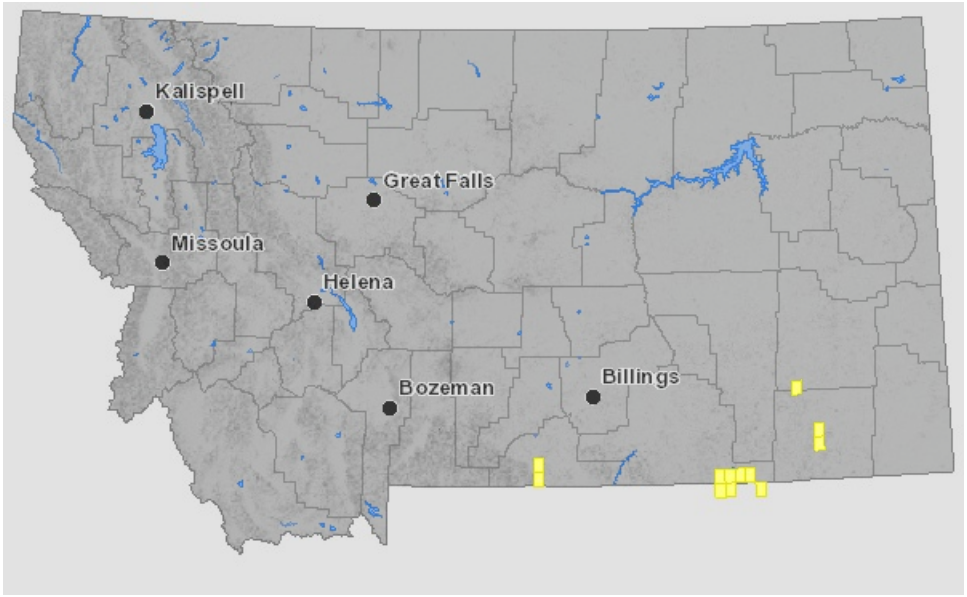
Image Copyright and Usage Information

General Description

Areas of coal bed methane activity with significant surface cover in the form of pads or well sites.

Ecological System Distribution

Less than 1 square kilometer is classified as Coal Bed Methane in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*





Montana Counties of Occurrence

Big Horn, Carbon, Custer, Powder River

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Big Brown Bat *(Eptesicus fuscus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Coal Bed Methane

ReGAP:
32: Coal Bed Methane

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Citation for data on this website:
Coal Bed Methane. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=32

Gas and Gas Storage

No photos are currently available

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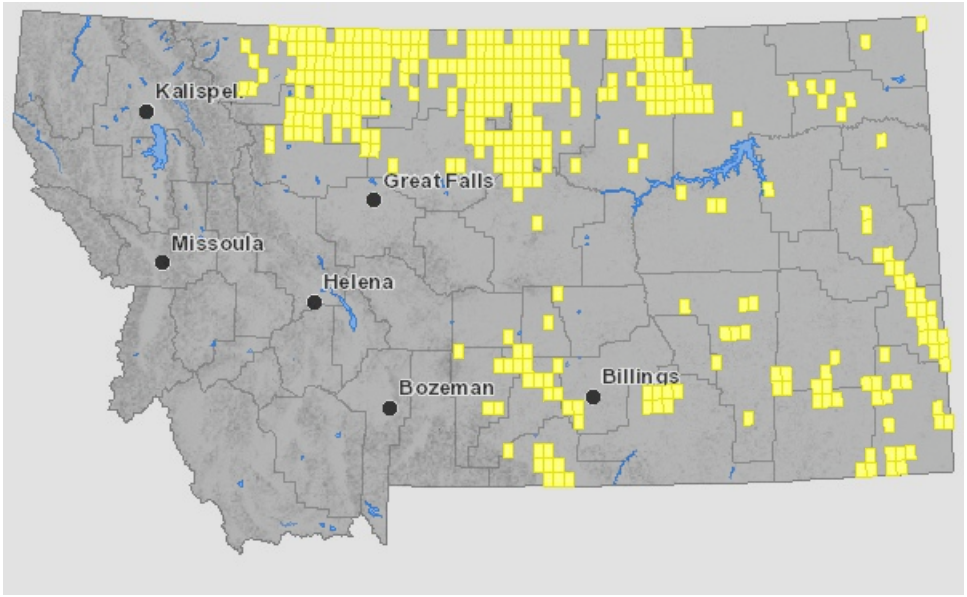
Image Copyright and Usage Information

General Description

Refineries, tanks and other facilities for the purpose of oil and gas storage

Ecological System Distribution

Approximately 7 square kilometers are classified as Gas and Gas Storage in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*





Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Chouteau, Custer, Dawson, Fallon, Fergus, Garfield, Glacier, Golden Valley, Hill, Liberty, Mccone, Musselshell, Phillips, Pondera, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
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Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

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Northern Region. Publication No. R1-93-34. Missoula, MT.
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- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Gas and Gas Storage

ReGAP:
33: Gas and Gas Storage

Login Logout

Citation for data on this website:
Gas and Gas Storage. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=33

Injection

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

Submit an Image

Provisional State Rank:

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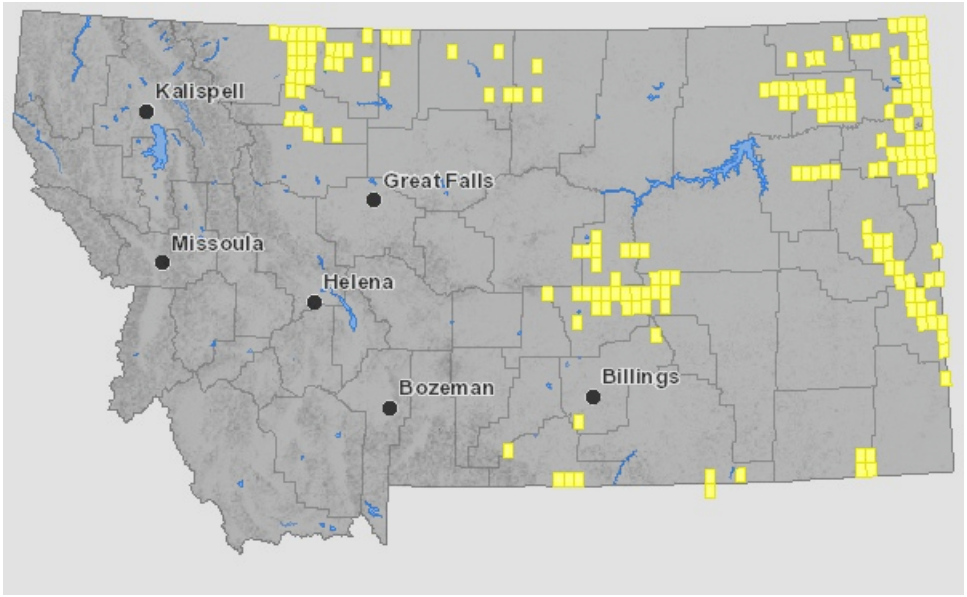
Image Copyright and Usage Information

General Description

Areas of injection mining where there is surface disturbance in the form of drill pads and equipment parking areas.

Ecological System Distribution

Approximately 1 square kilometers are classified as Injection in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*





Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Daniels, Dawson, Fallon, Fergus, Garfield, Glacier, Golden Valley, Hill, Liberty, Mccone, Musselshell, Petroleum, Pondera, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Teton, Toole, Valley, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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Suggested Uses and Limitations

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Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Injection

ReGAP:
34: Injection

Login Logout

Citation for data on this website:
Injection. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=34

Oil and Oil / Gas

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

Submit an Image

Provisional State Rank:

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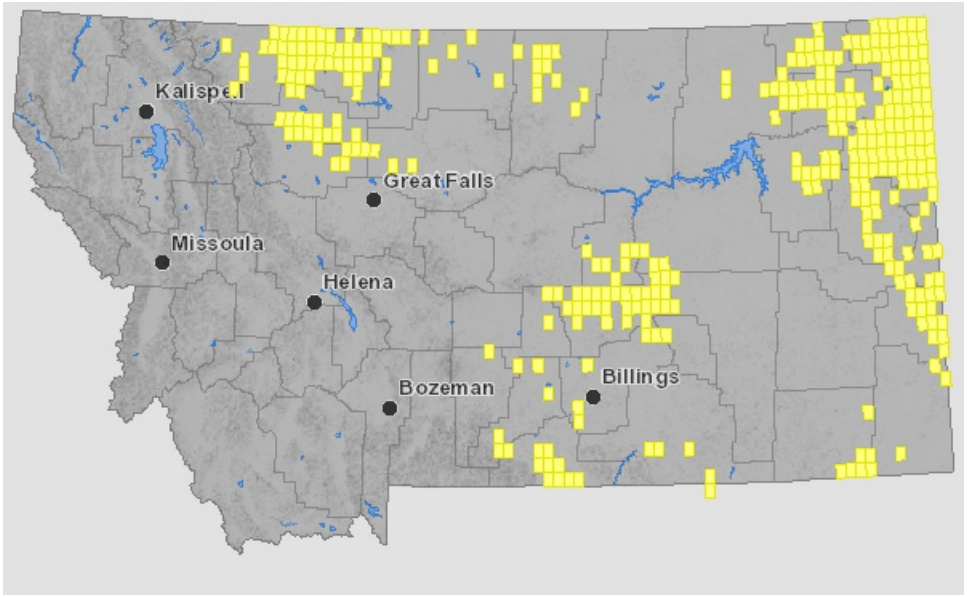
Image Copyright and Usage Information

General Description

Areas of conventional oil and gas extraction with surface cover consisting of structures, pads, pumps and equipment parking areas.

Ecological System Distribution

Approximately 8 square kilometers are classified as Oil and Oil / Gas in the 2017 Montana Land Cover layers.
Grid on map is based on USGS 7.5 minute quadrangle map boundaries.





Montana Counties of Occurrence

Big Horn, Blaine, Carbon, Carter, Chouteau, Daniels, Dawson, Fallon, Garfield, Glacier, Golden Valley, Hill, Liberty, Mccone, Musselshell, Petroleum, Pondera, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Teton, Toole, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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Native Species Occasionally Associated with this Ecological System

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References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Oil and Oil / Gas

ReGAP:
35: Oil and Oil / Gas

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Citation for data on this website:
Oil and Oil / Gas. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=35

Harvested forest-tree regeneration



Image Copyright and Usage Information

Provisional State Rank:

External Links

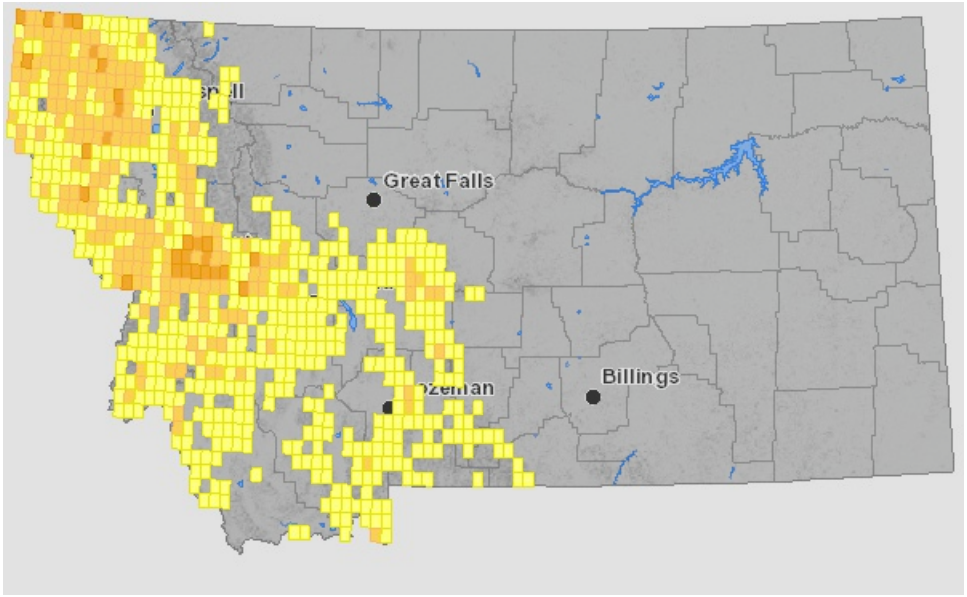
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General Description

Land cover has been modified by logging. New growth is primarily trees.

Ecological System Distribution

Approximately 1,843 square kilometers are classified as Harvested forest-tree regeneration in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Wheatland

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

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Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Canada Lynx *(Lynx canadensis)* SOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Northern Montane Shrew *(Sorex obscurus)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Snowshoe Hare *(Lepus americanus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
White-footed Deermouse *(Peromyscus leucopus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Western Heather Vole *(Phenacomys intermedius)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Northwestern Jumping Mouse *(Zapus saltator)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Raccoon *(Procyon lotor)*
Marten *(Martes americana)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Moose *(Alces alces)*

Birds

Northern Hawk Owl *(Surnia ulula)* SOC	Varied Thrush *(Ixoreus naevius)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC	Western Screech-Owl *(Megascops kennicottii)* PSOC
Boreal Owl *(Aegolius funereus)* PSOC	Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC	Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Cooper's Hawk *(Accipiter cooperii)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	Spruce Grouse *(Canachites canadensis)*
Dusky Grouse *(Dendragapus obscurus)*	Ruffed Grouse *(Bonasa umbellus)*
Mourning Dove *(Zenaida macroura)*	Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*	Long-eared Owl *(Asio otus)*
Northern Saw-whet Owl *(Aegolius acadicus)*	Common Nighthawk *(Chordeiles minor)*
Vaux's Swift *(Chaetura vauxi)*	Calliope Hummingbird *(Selasphorus calliope)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*	Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Downy Woodpecker *(Dryobates pubescens)*	Hairy Woodpecker *(Dryobates villosus)*
American Three-toed Woodpecker *(Picoides dorsalis)*	Northern Flicker *(Colaptes auratus)*
Olive-sided Flycatcher *(Contopus cooperi)*	Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*	Dusky Flycatcher *(Empidonax oberholseri)*
Tree Swallow *(Tachycineta bicolor)*	Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*	Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*	Blue Jay *(Cyanocitta cristata)*
Common Raven *(Corvus corax)*	American Crow *(Corvus brachyrhynchos)*
Black-capped Chickadee *(Poecile atricapillus)*	Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*	White-breasted Nuthatch *(Sitta carolinensis)*
Rock Wren *(Salpinctes obsoletus)*	Northern House Wren *(Troglodytes aedon)*
Golden-crowned Kinglet *(Regulus satrapa)*	Ruby-crowned Kinglet *(Corthylio calendula)*
Western Bluebird *(Sialia mexicana)*	Mountain Bluebird *(Sialia currucoides)*
Townsend's Solitaire *(Myadestes townsendi)*	Swainson's Thrush *(Catharus ustulatus)*
Hermit Thrush *(Catharus guttatus)*	American Robin *(Turdus migratorius)*
Gray Catbird *(Dumetella carolinensis)*	Bohemian Waxwing *(Bombycilla garrulus)*
Cedar Waxwing *(Bombycilla cedrorum)*	Northern Shrike *(Lanius borealis)*
European Starling *(Sturnus vulgaris)*	Warbling Vireo *(Vireo gilvus)*
Red-eyed Vireo *(Vireo olivaceus)*	Cassin's Vireo *(Vireo cassinii)*
Orange-crowned Warbler *(Leiothlypis celata)*	Nashville Warbler *(Leiothlypis ruficapilla)*
Magnolia Warbler *(Setophaga magnolia)*	Cape May Warbler *(Setophaga tigrina)*
Yellow-rumped Warbler *(Setophaga coronata)*	American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*	Wilson's Warbler *(Cardellina pusilla)*
Western Tanager *(Piranga ludoviciana)*	Rose-breasted Grosbeak *(Pheucticus ludovicianus)*

Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Rusty Blackbird *(Euphagus carolinus)*
Pine Grosbeak *(Pinicola enucleator)*
White-winged Crossbill *(Loxia leucoptera)*
Pine Siskin *(Spinus pinus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Lark Sparrow *(Chondestes grammacus)*
Song Sparrow *(Melospiza melodia)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Brown-headed Cowbird *(Molothrus ater)*
Purple Finch *(Haemorhous purpureus)*
Red Crossbill *(Loxia curvirostra)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*
Northern Rubber Boa *(Charina bottae)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Sierran Treefrog *(Pseudacris sierra)*
Long-toed Salamander *(Ambystoma macrodactylum)*

Native Species Occasionally Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Long-legged Myotis *(Myotis volans)* SOC
Wolverine *(Gulo gulo)* SOC
Northern Flying Squirrel *(Glaucomys sabrinus)*
Yuma Myotis *(Myotis yumanensis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC
Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Western Water Shrew *(Sorex navigator)*

Birds

Flammulated Owl *(Psiloscops flammeolus)* SOC
American Kestrel *(Falco sparverius)*
White-throated Swift *(Aeronautes saxatalis)*
Western Flycatcher *(Empidonax difficilis)*
Eastern Kingbird *(Tyrannus tyrannus)*
Barn Swallow *(Hirundo rustica)*
Pygmy Nuthatch *(Sitta pygmaea)*
Townsend's Warbler *(Setophaga townsendi)*
Common Yellowthroat *(Geothlypis trichas)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
House Finch *(Haemorhous mexicanus)*
Pileated Woodpecker *(Dryocopus pileatus)* SOC
Barred Owl *(Strix varia)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Kingbird *(Tyrannus verticalis)*
Bank Swallow *(Riparia riparia)*
Black-billed Magpie *(Pica hudsonia)*
Yellow Warbler *(Setophaga petechia)*
Northern Waterthrush *(Parkesia noveboracensis)*
Western Meadowlark *(Sturnella neglecta)*
Bullock's Oriole *(Icterus bullockii)*
American Goldfinch *(Spinus tristis)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC

Amphibians

Idaho Giant Salamander *(Dicamptodon aterrimus)* SOC

Invertebrates

Zigzag Darner *(Aeshna sitchensis)* PSOC

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Harvested Forest-Tree Regeneration

ReGAP:
8601: Harvested Forest-Tree Regeneration

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Citation for data on this website:
Harvested forest-tree regeneration — Harvested Forest-Tree Regeneration. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8601

Harvested forest-shrub regeneration



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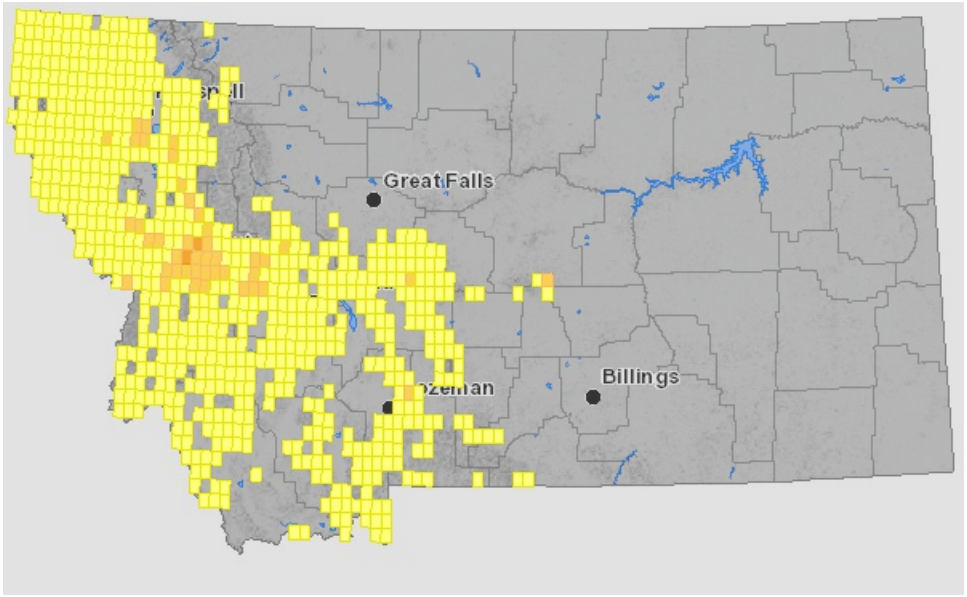
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General Description

Land cover has been modified by logging. New growth is primarily shrubs.

Ecological System Distribution

Approximately 529 square kilometers are classified as Harvested forest-shrub regeneration in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Wheatland

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service,

Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Grizzly Bear *(Ursus arctos)* SOC
Canada Lynx *(Lynx canadensis)* SOC	Masked Shrew *(Sorex cinereus)*
Vagrant Shrew *(Sorex vagrans)*	Northern Montane Shrew *(Sorex obscurus)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Snowshoe Hare *(Lepus americanus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Northern Pocket Gopher *(Thomomys talpoides)*
North American Deermouse *(Peromyscus maniculatus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Northwestern Jumping Mouse *(Zapus saltator)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	American Black Bear *(Ursus americanus)*
Raccoon *(Procyon lotor)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Mountain Lion *(Puma concolor)*
Elk *(Cervus canadensis)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Moose *(Alces alces)*

Birds

Northern Hawk Owl *(Surnia ulula)* SOC	Varied Thrush *(Ixoreus naevius)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC	Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Western Screech-Owl *(Megascops kennicottii)* PSOC	Boreal Owl *(Aegolius funereus)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC	Rufous Hummingbird *(Selasphorus rufus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC	Red-tailed Hawk *(Buteo jamaicensis)*
Spruce Grouse *(Canachites canadensis)*	Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*	Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*	Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*	Northern Saw-whet Owl *(Aegolius acadicus)*
Common Nighthawk *(Chordeiles minor)*	Vaux's Swift *(Chaetura vauxi)*
Black-chinned Hummingbird *(Archilochus alexandri)*	Calliope Hummingbird *(Selasphorus calliope)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*	Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Downy Woodpecker *(Dryobates pubescens)*	Hairy Woodpecker *(Dryobates villosus)*
American Three-toed Woodpecker *(Picoides dorsalis)*	Northern Flicker *(Colaptes auratus)*
Olive-sided Flycatcher *(Contopus cooperi)*	Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*	Dusky Flycatcher *(Empidonax oberholseri)*
Tree Swallow *(Tachycineta bicolor)*	Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*	Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*	Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*	Black-capped Chickadee *(Poecile atricapillus)*
Mountain Chickadee *(Poecile gambeli)*	Red-breasted Nuthatch *(Sitta canadensis)*
Rock Wren *(Salpinctes obsoletus)*	Northern House Wren *(Troglodytes aedon)*
Ruby-crowned Kinglet *(Corthylio calendula)*	Western Bluebird *(Sialia mexicana)*
Mountain Bluebird *(Sialia currucoides)*	Townsend's Solitaire *(Myadestes townsendi)*
Swainson's Thrush *(Catharus ustulatus)*	Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*	Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*	Cedar Waxwing *(Bombycilla cedrorum)*
Northern Shrike *(Lanius borealis)*	European Starling *(Sturnus vulgaris)*
Warbling Vireo *(Vireo gilvus)*	Red-eyed Vireo *(Vireo olivaceus)*
Cassin's Vireo *(Vireo cassinii)*	Orange-crowned Warbler *(Leiothlypis celata)*
Nashville Warbler *(Leiothlypis ruficapilla)*	Magnolia Warbler *(Setophaga magnolia)*
Cape May Warbler *(Setophaga tigrina)*	Yellow-rumped Warbler *(Setophaga coronata)*
American Redstart *(Setophaga ruticilla)*	MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*	Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*	Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*	Lazuli Bunting *(Passerina amoena)*
Indigo Bunting *(Passerina cyanea)*	Spotted Towhee *(Pipilo maculatus)*
American Tree Sparrow *(Spizelloides arborea)*	Chipping Sparrow *(Spizella passerina)*

Lark Sparrow *(Chondestes grammacus)*
Song Sparrow *(Melospiza melodia)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Brown-headed Cowbird *(Molothrus ater)*
Pine Siskin *(Spinus pinus)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Red Crossbill *(Loxia curvirostra)*
Lesser Goldfinch *(Spinus psaltria)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Common Gartersnake *(Thamnophis sirtalis)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Yuma Myotis *(Myotis yumanensis)* SOC
Western Water Shrew *(Sorex navigator)*

Birds

Ovenbird *(Seiurus aurocapilla)* PSOC
Barred Owl *(Strix varia)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Kingbird *(Tyrannus verticalis)*
Bank Swallow *(Riparia riparia)*
Black-billed Magpie *(Pica hudsonia)*
Yellow Warbler *(Setophaga petechia)*
Northern Waterthrush *(Parkesia noveboracensis)*
Vesper Sparrow *(Pooecetes gramineus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
White-winged Crossbill *(Loxia leucoptera)*
American Kestrel *(Falco sparverius)*
White-throated Swift *(Aeronautes saxatalis)*
Western Flycatcher *(Empidonax difficilis)*
Eastern Kingbird *(Tyrannus tyrannus)*
Barn Swallow *(Hirundo rustica)*
Golden-crowned Kinglet *(Regulus satrapa)*
Townsend's Warbler *(Setophaga townsendi)*
Common Yellowthroat *(Geothlypis trichas)*
Western Meadowlark *(Sturnella neglecta)*
Bullock's Oriole *(Icterus bullockii)*
American Goldfinch *(Spinus tristis)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC
Northern Rubber Boa *(Charina bottae)*

Amphibians

Long-toed Salamander *(Ambystoma macrodactylum)*
Sierran Treefrog *(Pseudacris sierra)*

Invertebrates

Zigzag Darner *(Aeshna sitchensis)* PSOC

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Harvested Forest-Shrub Regeneration

ReGAP:
8602: Harvested Forest-Shrub Regeneration

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Citation for data on this website:
Harvested forest-shrub regeneration — Harvested Forest-Shrub Regeneration. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8602

Harvested forest-grass regeneration



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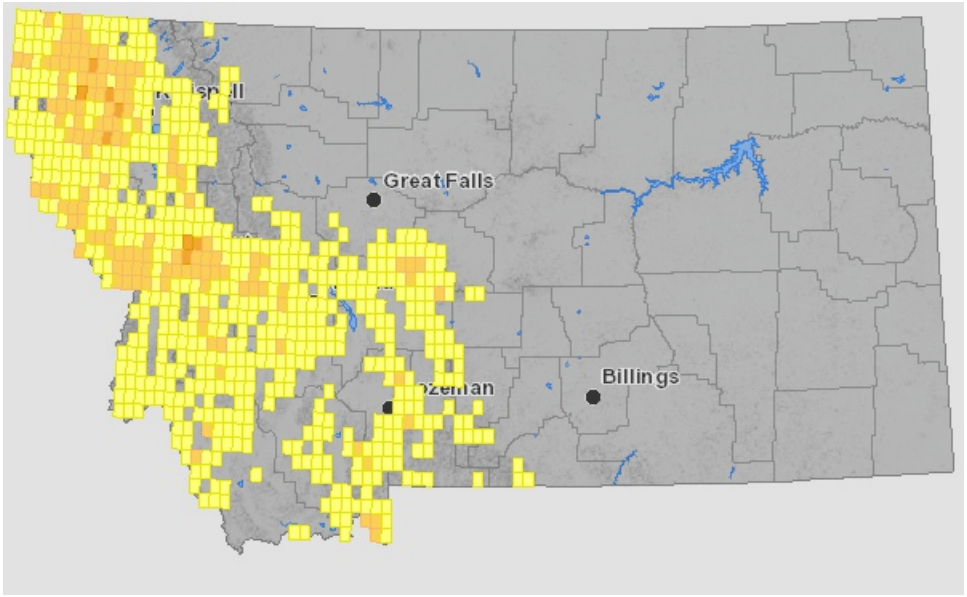
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General Description

Land cover has been modified by logging. New growth is primarily herbaceous species.

Ecological System Distribution

Approximately 1,161 square kilometers are classified as Harvested forest-grass regeneration in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Wheatland

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
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Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

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- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
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- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*
North American Deermouse *(Peromyscus maniculatus)*
Montane Vole *(Microtus montanus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Gray Wolf *(Canis lupus)*
American Black Bear *(Ursus americanus)*
American Ermine *(Mustela richardsonii)*
Bobcat *(Lynx rufus)*
Elk *(Cervus canadensis)*
White-tailed Deer *(Odocoileus virginianus)*
Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Vagrant Shrew *(Sorex vagrans)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Mountain Cottontail *(Sylvilagus nuttallii)*
Northern Pocket Gopher *(Thomomys talpoides)*
Bushy-tailed Woodrat *(Neotoma cinerea)*
Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Red Fox *(Vulpes vulpes)*
Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*
Mountain Lion *(Puma concolor)*
Mule Deer *(Odocoileus hemionus)*

Birds

Northern Hawk Owl *(Surnia ulula)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Boreal Owl *(Aegolius funereus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Red-tailed Hawk *(Buteo jamaicensis)*
Spruce Grouse *(Canachites canadensis)*
Ruffed Grouse *(Bonasa umbellus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*
Northern Saw-whet Owl *(Aegolius acadicus)*
Vaux's Swift *(Chaetura vauxi)*
Calliope Hummingbird *(Selasphorus calliope)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Hairy Woodpecker *(Dryobates villosus)*
Northern Flicker *(Colaptes auratus)*
Western Wood-Pewee *(Contopus sordidulus)*
Dusky Flycatcher *(Empidonax oberholseri)*
Violet-green Swallow *(Tachycineta thalassina)*
Canada Jay *(Perisoreus canadensis)*
Blue Jay *(Cyanocitta cristata)*
American Crow *(Corvus brachyrhynchos)*
Northern House Wren *(Troglodytes aedon)*
Western Bluebird *(Sialia mexicana)*
Townsend's Solitaire *(Myadestes townsendi)*
Hermit Thrush *(Catharus guttatus)*
Northern Shrike *(Lanius borealis)*
Orange-crowned Warbler *(Leiothlypis celata)*
Cape May Warbler *(Setophaga tigrina)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
Chipping Sparrow *(Spizella passerina)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Snow Bunting *(Plectrophenax nivalis)*
House Finch *(Haemorhous mexicanus)*
Pine Siskin *(Spinus pinus)*
Varied Thrush *(Ixoreus naevius)* SOC
Western Screech-Owl *(Megascops kennicottii)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Rough-legged Hawk *(Buteo lagopus)*
Dusky Grouse *(Dendragapus obscurus)*
Great Horned Owl *(Bubo virginianus)*
Long-eared Owl *(Asio otus)*
Common Nighthawk *(Chordeiles minor)*
Black-chinned Hummingbird *(Archilochus alexandri)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*
American Three-toed Woodpecker *(Picoides dorsalis)*
Olive-sided Flycatcher *(Contopus cooperi)*
Least Flycatcher *(Empidonax minimus)*
Tree Swallow *(Tachycineta bicolor)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Steller's Jay *(Cyanocitta stelleri)*
Common Raven *(Corvus corax)*
Rock Wren *(Salpinctes obsoletus)*
Ruby-crowned Kinglet *(Corthylio calendula)*
Mountain Bluebird *(Sialia currucoides)*
Swainson's Thrush *(Catharus ustulatus)*
American Robin *(Turdus migratorius)*
European Starling *(Sturnus vulgaris)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Yellow-rumped Warbler *(Setophaga coronata)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
American Tree Sparrow *(Spizelloides arborea)*
Lark Sparrow *(Chondestes grammacus)*
Song Sparrow *(Melospiza melodia)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Lapland Longspur *(Calcarius lapponicus)*
Brown-headed Cowbird *(Molothrus ater)*
Red Crossbill *(Loxia curvirostra)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC

Amphibians

Western Toad *(Anaxyrus boreas)* SOC

Vascular Plants

Cascade reedgrass *(Calamagrostis tweedyi)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC
Long-eared Myotis *(Myotis evotis)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Yuma Myotis *(Myotis yumanensis)* SOC
Grizzly Bear *(Ursus arctos)* SOC
American Badger *(Taxidea taxus)*

Birds

Great Gray Owl *(Strix nebulosa)* PSOC
Barred Owl *(Strix varia)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Kingbird *(Tyrannus verticalis)*
Bank Swallow *(Riparia riparia)*
Black-billed Magpie *(Pica hudsonia)*
Red-breasted Nuthatch *(Sitta canadensis)*
Yellow Warbler *(Setophaga petechia)*
American Redstart *(Setophaga ruticilla)*
Spotted Towhee *(Pipilo maculatus)*
Western Meadowlark *(Sturnella neglecta)*
Common Grackle *(Quiscalus quiscula)*
American Goldfinch *(Spinus tristis)*
American Kestrel *(Falco sparverius)*
White-throated Swift *(Aeronautes saxatalis)*
Western Flycatcher *(Empidonax difficilis)*
Eastern Kingbird *(Tyrannus tyrannus)*
Barn Swallow *(Hirundo rustica)*
Mountain Chickadee *(Poecile gambeli)*
Golden-crowned Kinglet *(Regulus satrapa)*
Townsend's Warbler *(Setophaga townsendi)*
Common Yellowthroat *(Geothlypis trichas)*
Vesper Sparrow *(Pooecetes gramineus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
White-winged Crossbill *(Loxia leucoptera)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC
Common Gartersnake *(Thamnophis sirtalis)*
Terrestrial Gartersnake *(Thamnophis elegans)*

Amphibians

Long-toed Salamander *(Ambystoma macrodactylum)*

Invertebrates

Zigzag Darner *(Aeshna sitchensis)* PSOC

Vascular Plants

Coville Indian Paintbrush *(Castilleja covilleana)* SOC

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Harvested Forest-Grass Regeneration

ReGAP:
8603: Harvested Forest-Grass Regeneration

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Citation for data on this website:
Harvested forest-grass regeneration — Harvested Forest-Grass Regeneration. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8603

Insect-Killed Forest

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

Submit an Image

Provisional State Rank:

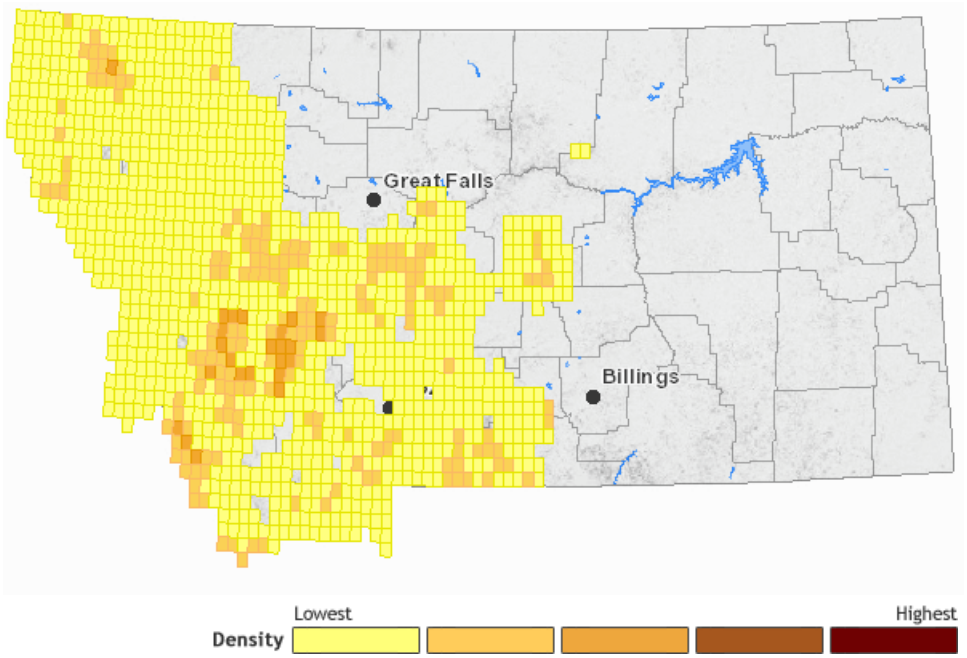
External Links

Ecological Systems Map Viewer
Google for more Images
Google for more Web Pages

Image Copyright and Usage Information

Ecological System Distribution

Approximately 1,965 square kilometers are classified as Insect-Killed Forest in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Phillips, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO:

University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Little Brown Myotis *(Myotis lucifugus)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Grizzly Bear *(Ursus arctos)* SOC	Fisher *(Pekania pennanti)* SOC
Wolverine *(Gulo gulo)* SOC	Canada Lynx *(Lynx canadensis)* SOC
North American Porcupine *(Erethizon dorsatum)* PSOC	Masked Shrew *(Sorex cinereus)*
Northern Montane Shrew *(Sorex obscurus)*	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Snowshoe Hare *(Lepus americanus)*	Red-tailed Chipmunk *(Neotamias ruficaudus)*
Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*	Red Squirrel *(Tamiasciurus hudsonicus)*
Northern Flying Squirrel *(Glaucomys sabrinus)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Southern Red-backed Vole *(Clethrionomys gapperi)*	Western Heather Vole *(Phenacomys intermedius)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
American Black Bear *(Ursus americanus)*	Marten *(Martes americana)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Moose *(Alces alces)*	

Birds

American Goshawk *(Accipiter atricapillus)* SOC	Flammulated Owl *(Psiloscops flammeolus)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC	Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Black-backed Woodpecker *(Picoides arcticus)* SOC	Pileated Woodpecker *(Dryocopus pileatus)* SOC
Clark's Nutcracker *(Nucifraga columbiana)* SOC	Brown Creeper *(Certhia americana)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC	Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Great Gray Owl *(Strix nebulosa)* PSOC	Boreal Owl *(Aegolius funereus)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*	Cooper's Hawk *(Accipiter cooperii)*
Spruce Grouse *(Canachites canadensis)*	Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*	Great Horned Owl *(Bubo virginianus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*	Northern Saw-whet Owl *(Aegolius acadicus)*
Calliope Hummingbird *(Selasphorus calliope)*	Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Downy Woodpecker *(Dryobates pubescens)*	Hairy Woodpecker *(Dryobates villosus)*
American Three-toed Woodpecker *(Picoides dorsalis)*	Northern Flicker *(Colaptes auratus)*
Northern Flicker (Yellow-shafted) *(Colaptes auratus auratus)*	Northern Flicker (Red-shafted) *(Colaptes auratus cafer)*
Hammond's Flycatcher *(Empidonax hammondii)*	Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*	Common Raven *(Corvus corax)*
Black-capped Chickadee *(Poecile atricapillus)*	Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*	Ruby-crowned Kinglet *(Corthylio calendula)*
Townsend's Solitaire *(Myadestes townsendi)*	Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*	Yellow-rumped Warbler *(Setophaga coronata)*
Townsend's Warbler *(Setophaga townsendi)*	Western Tanager *(Piranga ludoviciana)*
Dark-eyed Junco *(Junco hyemalis)*	Pine Grosbeak *(Pinicola enucleator)*
Red Crossbill *(Loxia curvirostra)*	Pine Siskin *(Spinus pinus)*

Reptiles

Terrestrial Gartersnake *(Thamnophis elegans)*	Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC	Long-toed Salamander *(Ambystoma macrodactylum)*

Native Species Occasionally Associated with this Ecological System

Mammals

Preble's Shrew *(Sorex preblei)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
North American Water Vole *(Microtus richardsoni)* PSOC	Vagrant Shrew *(Sorex vagrans)*
Western Water Shrew *(Sorex navigator)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Least Chipmunk *(Neotamias minimus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Meadow Vole *(Microtus pennsylvanicus)*	Montane Vole *(Microtus montanus)*

Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*
Least Weasel *(Mustela nivalis)*
American Ermine *(Mustela richardsonii)*
Bobcat *(Lynx rufus)*
White-tailed Deer *(Odocoileus virginianus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Raccoon *(Procyon lotor)*
Long-tailed Weasel *(Neogale frenata)*
Striped Skunk *(Mephitis mephitis)*
Mule Deer *(Odocoileus hemionus)*
Mountain Goat *(Oreamnos americanus)*

Birds

Northern Hawk Owl *(Surnia ulula)* SOC
Pacific Wren *(Troglodytes pacificus)* SOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Red-tailed Hawk *(Buteo jamaicensis)*
Barred Owl *(Strix varia)*
Vaux's Swift *(Chaetura vauxi)*
Olive-sided Flycatcher *(Contopus cooperi)*
Dusky Flycatcher *(Empidonax oberholseri)*
Tree Swallow *(Tachycineta bicolor)*
Blue Jay *(Cyanocitta cristata)*
American Crow *(Corvus brachyrhynchos)*
White-breasted Nuthatch *(Sitta carolinensis)*
Golden-crowned Kinglet *(Regulus satrapa)*
Swainson's Thrush *(Catharus ustulatus)*
Warbling Vireo *(Vireo gilvus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
American Tree Sparrow *(Spizelloides arborea)*
Fox Sparrow *(Passerella iliaca)*
White-throated Sparrow *(Zonotrichia albicollis)*
Lapland Longspur *(Calcarius lapponicus)*
Purple Finch *(Haemorhous purpureus)*
Redpoll *(Acanthis flammea)*
Boreal Chickadee *(Poecile hudsonicus)* SOC
Varied Thrush *(Ixoreus naevius)* SOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC
Rough-legged Hawk *(Buteo lagopus)*
Common Nighthawk *(Chordeiles minor)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Western Wood-Pewee *(Contopus sordidulus)*
Western Flycatcher *(Empidonax difficilis)*
Violet-green Swallow *(Tachycineta thalassina)*
Black-billed Magpie *(Pica hudsonia)*
Chestnut-backed Chickadee *(Poecile rufescens)*
Pygmy Nuthatch *(Sitta pygmaea)*
Mountain Bluebird *(Sialia currucoides)*
Bohemian Waxwing *(Bombycilla garrulus)*
Cassin's Vireo *(Vireo cassinii)*
Wilson's Warbler *(Cardellina pusilla)*
Indigo Bunting *(Passerina cyanea)*
Chipping Sparrow *(Spizella passerina)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Rusty Blackbird *(Euphagus carolinus)*
White-winged Crossbill *(Loxia leucoptera)*

Reptiles

Northern Rubber Boa *(Charina bottae)*
Gophersnake *(Pituophis catenifer)*

Amphibians

Sierran Treefrog *(Pseudacris sierra)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Insect-Killed Forest

ReGAP:
8700: Insect-Killed Forest

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Citation for data on this website:
Insect-Killed Forest. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8700

Introduced Upland Vegetation - Shrub

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

Submit an Image

Provisional State Rank:

External Links

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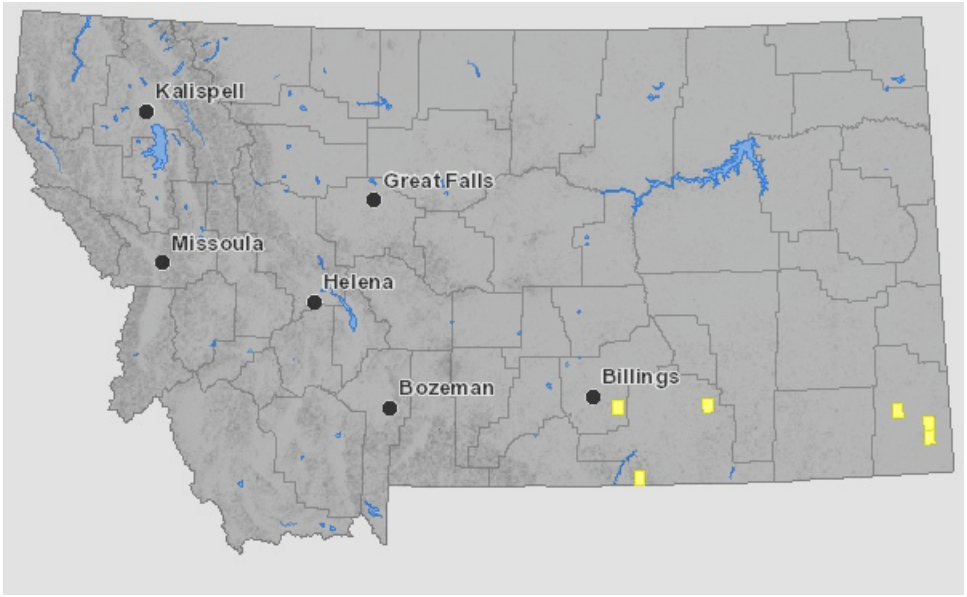
Image Copyright and Usage Information

General Description

Land cover is significantly altered/disturbed by introduced woody and/or herbaceous vegetation.

Ecological System Distribution

Less than 1 square kilometer is classified as Introduced Upland Vegetation - Shrub in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*





Montana Counties of Occurrence

Big Horn, Carter, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO: University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
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- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Mountain Cottontail *(Sylvilagus nuttallii)*	White-tailed Jackrabbit *(Lepus townsendii)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Bushy-tailed Woodrat *(Neotoma cinerea)*	Long-tailed Vole *(Microtus longicaudus)*
Coyote *(Canis latrans)*	Red Fox *(Vulpes vulpes)*
Long-tailed Weasel *(Neogale frenata)*	Striped Skunk *(Mephitis mephitis)*
White-tailed Deer *(Odocoileus virginianus)*	

Birds

Loggerhead Shrike *(Lanius ludovicianus)* SOC	Northern Harrier *(Circus hudsonius)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Rock Pigeon *(Columba livia)*	Eurasian Collared-Dove *(Streptopelia decaocto)*
Mourning Dove *(Zenaida macroura)*	American Barn Owl *(Tyto furcata)*
Common Nighthawk *(Chordeiles minor)*	Purple Martin *(Progne subis)*
Black-billed Magpie *(Pica hudsonia)*	Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*	Black-capped Chickadee *(Poecile atricapillus)*
Gray Catbird *(Dumetella carolinensis)*	Brown Thrasher *(Toxostoma rufum)*
Bohemian Waxwing *(Bombycilla garrulus)*	Northern Shrike *(Lanius borealis)*
European Starling *(Sturnus vulgaris)*	Yellow Warbler *(Setophaga petechia)*
Spotted Towhee *(Pipilo maculatus)*	American Tree Sparrow *(Spizelloides arborea)*
Brewer's Blackbird *(Euphagus cyanocephalus)*	Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*	House Sparrow *(Passer domesticus)*

Reptiles

Gophersnake *(Pituophis catenifer)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Prairie Shrew *(Sorex haydeni)* PSOC	Spotted Bat *(Euderma maculatum)* PSOC
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Bobcat *(Lynx rufus)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Green-tailed Towhee *(Pipilo chlorurus)* SOC	Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Red-tailed Hawk *(Buteo jamaicensis)*	Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*	White-throated Swift *(Aeronautes saxatalis)*

Reptiles

North American Racer *(Coluber constrictor)*	Terrestrial Gartersnake *(Thamnophis elegans)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Introduced Upland Vegetation - Shrub

ReGAP:
8402: Introduced Upland Vegetation - Shrub

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Citation for data on this website:
Introduced Upland Vegetation - Shrub. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025,

from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8402

Introduced Upland Vegetation - Annual and Biennial Forbland



Image Copyright and Usage Information

Provisional State Rank:

External Links

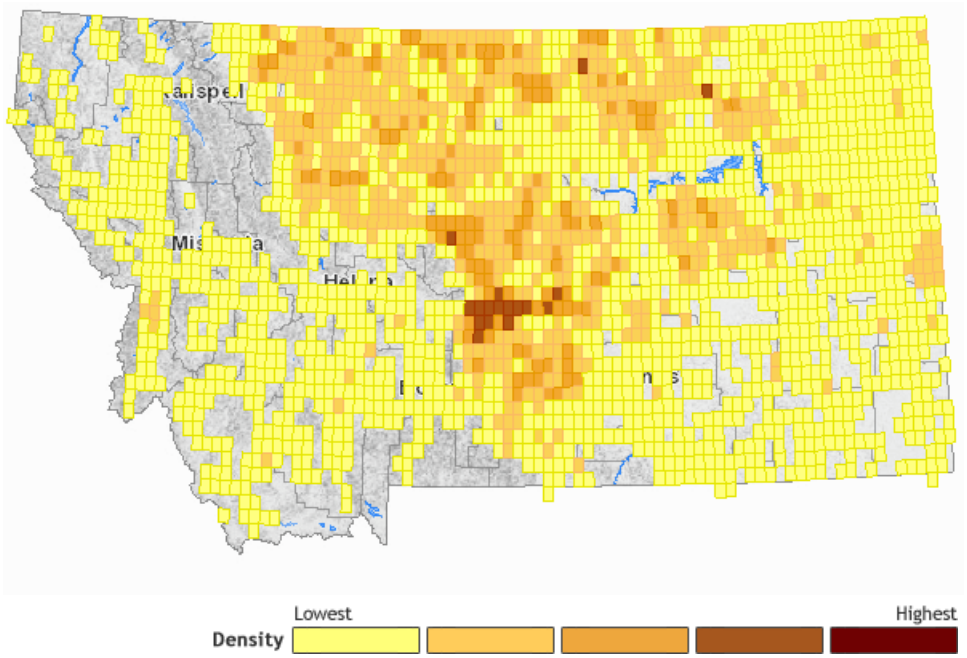
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General Description

Land cover is significantly altered/disturbed by introduced annual and biennial forbs. Natural vegetation types are no longer recognizable. Typical species that dominate these areas are knapweed, oxeye daisy, Canada thistle, leafy spurge, pepperweed, and yellow sweetclover.

Ecological System Distribution

Approximately 7,614 square kilometers are classified as Introduced Upland Vegetation - Annual and Biennial Forbland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

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3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

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Native Species Commonly Associated with this Ecological System

Mammals

Western Pygmy Shrew *(Sorex eximius)* SOC	Prairie Shrew *(Sorex haydeni)* PSOC
Vagrant Shrew *(Sorex vagrans)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Desert Cottontail *(Sylvilagus audubonii)*	White-tailed Jackrabbit *(Lepus townsendii)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*	Northern Pocket Gopher *(Thomomys talpoides)*
Western Harvest Mouse *(Reithrodontomys megalotis)*	North American Deermouse *(Peromyscus maniculatus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	Bushy-tailed Woodrat *(Neotoma cinerea)*
Meadow Vole *(Microtus pennsylvanicus)*	Montane Vole *(Microtus montanus)*
Prairie Vole *(Microtus ochrogaster)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Raccoon *(Procyon lotor)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	

Birds

Eastern Bluebird *(Sialia sialis)* PSOC	Dickcissel *(Spiza americana)* PSOC
Blue-winged Teal *(Spatula discors)*	Cinnamon Teal *(Spatula cyanoptera)*
Gadwall *(Mareca strepera)*	American Wigeon *(Mareca americana)*
Lesser Scaup *(Aythya affinis)*	Northern Harrier *(Circus hudsonius)*
Swainson's Hawk *(Buteo swainsoni)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Gyrfalcon *(Falco rusticolus)*	Prairie Falcon *(Falco mexicanus)*
Sandhill Crane *(Antigone canadensis)*	Black-bellied Plover *(Pluvialis squatarola)*
Killdeer *(Charadrius vociferus)*	Ring-billed Gull *(Larus delawarensis)*
Rock Pigeon *(Columba livia)*	Eurasian Collared-Dove *(Streptopelia decaocto)*
Mourning Dove *(Zenaida macroura)*	American Barn Owl *(Tyto furcata)*
Snowy Owl *(Bubo scandiacus)*	Common Nighthawk *(Chordeiles minor)*
Western Kingbird *(Tyrannus verticalis)*	Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*	Purple Martin *(Progne subis)*
Tree Swallow *(Tachycineta bicolor)*	Cliff Swallow *(Petrochelidon pyrrhonota)*
Barn Swallow *(Hirundo rustica)*	Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*	Western Bluebird *(Sialia mexicana)*
Mountain Bluebird *(Sialia currucoides)*	Northern Shrike *(Lanius borealis)*
European Starling *(Sturnus vulgaris)*	American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*	Vesper Sparrow *(Pooecetes gramineus)*
Lark Sparrow *(Chondestes grammacus)*	Savannah Sparrow *(Passerculus sandwichensis)*
Harris's Sparrow *(Zonotrichia querula)*	Lapland Longspur *(Calcarius lapponicus)*
Snow Bunting *(Plectrophenax nivalis)*	Western Meadowlark *(Sturnella neglecta)*
Rusty Blackbird *(Euphagus carolinus)*	Brewer's Blackbird *(Euphagus cyanocephalus)*
Common Grackle *(Quiscalus quiscula)*	Brown-headed Cowbird *(Molothrus ater)*
American Goldfinch *(Spinus tristis)*	House Sparrow *(Passer domesticus)*

Reptiles

North American Racer *(Coluber constrictor)*	Gophersnake *(Pituophis catenifer)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Boreal Chorus Frog *(Pseudacris maculata)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
Swift Fox *(Vulpes velox)* SOC	American Bison *(Bos bison)* SOC

Spotted Bat *(Euderma maculatum)* PSOC
Western Water Shrew *(Sorex navigator)*
Western Small-footed Myotis *(Myotis ciliolabrum)*
Yellow-pine Chipmunk *(Neotamias amoenus)*
Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Northwestern Jumping Mouse *(Zapus saltator)*
Bighorn Sheep *(Ovis canadensis)*
Masked Shrew *(Sorex cinereus)*
California Myotis *(Myotis californicus)*
Big Brown Bat *(Eptesicus fuscus)*
Yellow-bellied Marmot *(Marmota flaviventris)*
Long-tailed Vole *(Microtus longicaudus)*
Elk *(Cervus canadensis)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC
Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Burrowing Owl *(Athene cunicularia)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC
Bobolink *(Dolichonyx oryzivorus)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC
Northern Shoveler *(Spatula clypeata)*
Ruffed Grouse *(Bonasa umbellus)*
Upland Sandpiper *(Bartramia longicauda)*
Wilson's Snipe *(Gallinago delicata)*
Great Horned Owl *(Bubo virginianus)*
Calliope Hummingbird *(Selasphorus calliope)*
Bank Swallow *(Riparia riparia)*
Common Yellowthroat *(Geothlypis trichas)*
Lark Bunting *(Calamospiza melanocorys)*
Song Sparrow *(Melospiza melodia)*
Red-winged Blackbird *(Agelaius phoeniceus)*
House Finch *(Haemorhous mexicanus)*
Golden Eagle *(Aquila chrysaetos)* SOC
Long-billed Curlew *(Numenius americanus)* SOC
Sprague's Pipit *(Anthus spragueii)* SOC
Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Short-eared Owl *(Asio flammeus)* PSOC
Northern Pintail *(Anas acuta)*
Merlin *(Falco columbarius)*
Willet *(Tringa semipalmata)*
Marbled Godwit *(Limosa fedoa)*
Wilson's Phalarope *(Phalaropus tricolor)*
White-throated Swift *(Aeronautes saxatalis)*
Say's Phoebe *(Sayornis saya)*
American Robin *(Turdus migratorius)*
Spotted Towhee *(Pipilo maculatus)*
Grasshopper Sparrow *(Ammodramus savannarum)*
White-throated Sparrow *(Zonotrichia albicollis)*
Baltimore Oriole *(Icterus galbula)*
Redpoll *(Acanthis flammea)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC
Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Common Wood-Nymph *(Cercyonis pegala)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Introduced Upland Vegetation - Annual and Biennial Forbland

ReGAP:
8403: Introduced Upland Vegetation - Annual and Biennial Forbland

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Citation for data on this website:
Introduced Upland Vegetation - Annual and Biennial Forbland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8403

Introduced Upland Vegetation - Annual Grassland

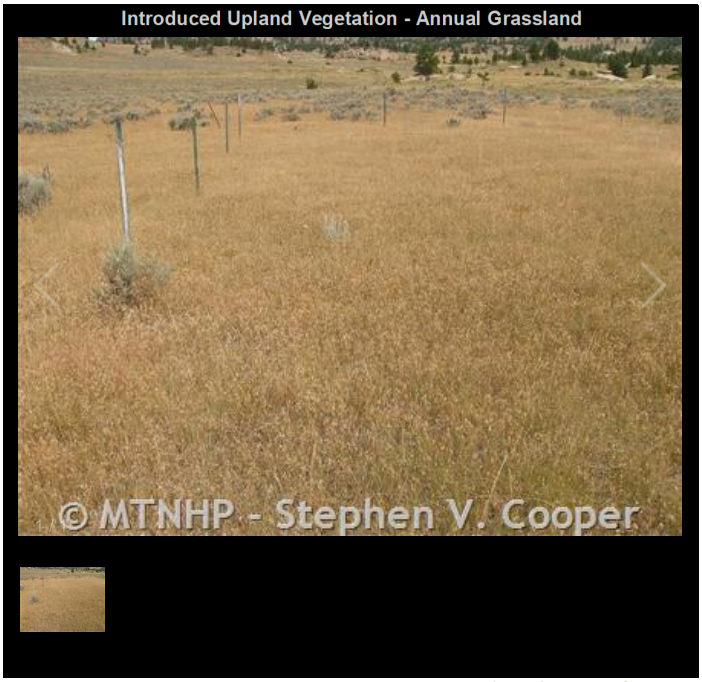


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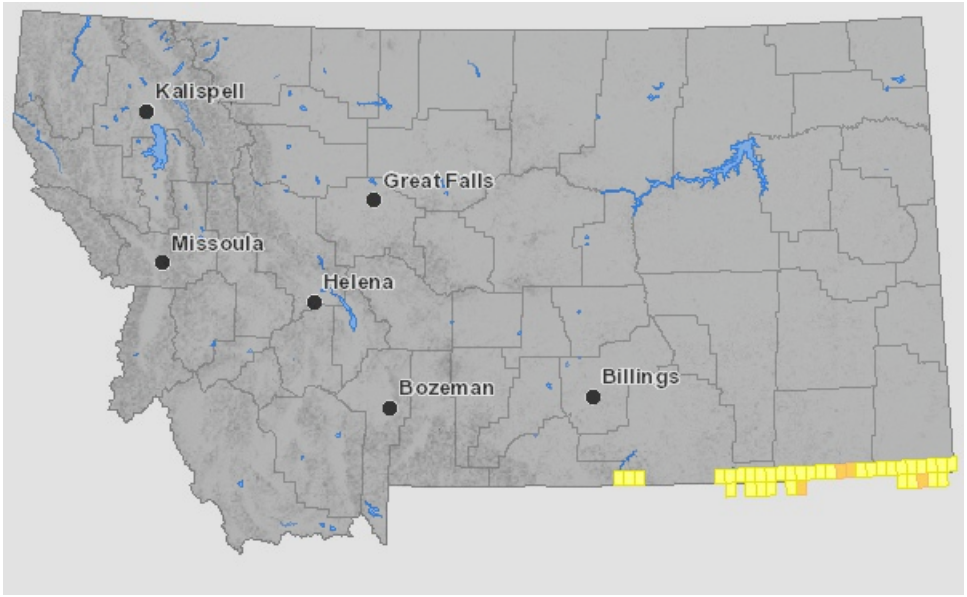
Ecological Systems Map Viewer | Google for more Images | Google for more Web Pages

General Description

Land cover is significantly altered/disturbed by introduced annual grasses. Natural vegetation types are no longer recognizable. Typical species include Japanese brome and cheatgrass.

Ecological System Distribution

Approximately 29 square kilometers are classified as Introduced Upland Vegetation - Annual Grassland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*





Montana Counties of Occurrence

Big Horn, Carter, Powder River

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

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Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

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Native Species Commonly Associated with this Ecological System

Mammals

Mountain Cottontail *(Sylvilagus nuttallii)*	Desert Cottontail *(Sylvilagus audubonii)*
White-tailed Jackrabbit *(Lepus townsendii)*	Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Long-tailed Vole *(Microtus longicaudus)*	Prairie Vole *(Microtus ochrogaster)*
Coyote *(Canis latrans)*	Red Fox *(Vulpes vulpes)*
Long-tailed Weasel *(Neogale frenata)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	

Birds

Dickcissel *(Spiza americana)* PSOC	American Wigeon *(Mareca americana)*
Northern Harrier *(Circus hudsonius)*	Swainson's Hawk *(Buteo swainsoni)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Rock Pigeon *(Columba livia)*	Eurasian Collared-Dove *(Streptopelia decaocto)*
Mourning Dove *(Zenaida macroura)*	American Barn Owl *(Tyto furcata)*
Common Nighthawk *(Chordeiles minor)*	Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*	Purple Martin *(Progne subis)*
Common Raven *(Corvus corax)*	American Crow *(Corvus brachyrhynchos)*
European Starling *(Sturnus vulgaris)*	Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*	Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*	House Sparrow *(Passer domesticus)*

Reptiles

Gophersnake *(Pituophis catenifer)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC	Prairie Shrew *(Sorex haydeni)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Bobcat *(Lynx rufus)*
Bighorn Sheep *(Ovis canadensis)*	

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Burrowing Owl *(Athene cunicularia)* SOC	Sprague's Pipit *(Anthus spragueii)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC	Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Red-tailed Hawk *(Buteo jamaicensis)*
Merlin *(Falco columbarius)*	Prairie Falcon *(Falco mexicanus)*
Upland Sandpiper *(Bartramia longicauda)*	White-throated Swift *(Aeronautes saxatalis)*

Reptiles

North American Racer *(Coluber constrictor)*	Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*	Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Woodhouse's Toad *(Anaxyrus woodhousii)*	Boreal Chorus Frog *(Pseudacris maculata)*

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Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	

System Code	, Introduced Upland Vegetation - Annual Grassland

ReGAP:
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Citation for data on this website:
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Introduced Upland Vegetation - Perennial Grassland and Forbland

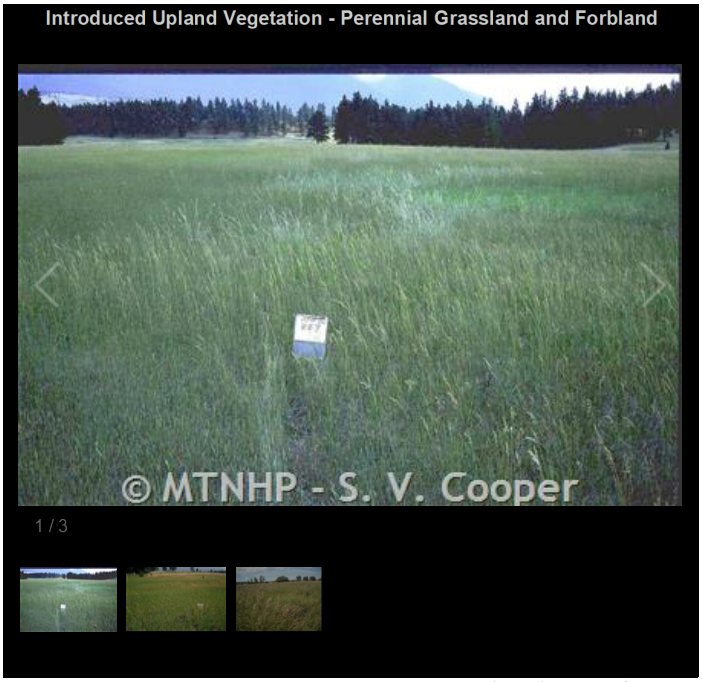


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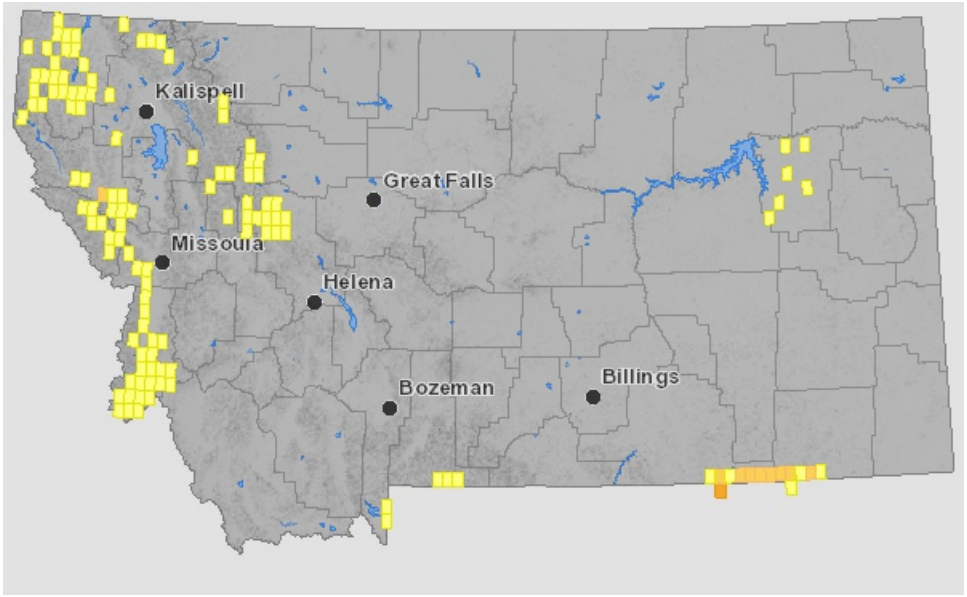
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General Description

Land cover is significantly altered/disturbed by introduced, non-native perennial grasses and forbs. Natural vegetation types are no longer recognizable. Grass species include Crested wheatgrass, Smooth brome, timothy, and Kentucky bluegrass. Forbs may include knapweed, Canada thistle, leafy spurge, pepperweed and sweetclover.

Ecological System Distribution

Approximately 49 square kilometers are classified as Introduced Upland Vegetation - Perennial Grassland and Forbland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*





Montana Counties of Occurrence

Big Horn, Flathead, Gallatin, Garfield, Lake, Lewis and Clark, Lincoln, Mccone, Mineral, Missoula, Park, Powder River, Powell, Ravalli, Sanders, Teton

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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Native Species Commonly Associated with this Ecological System

Mammals

Mountain Cottontail *(Sylvilagus nuttallii)*	Desert Cottontail *(Sylvilagus audubonii)*
White-tailed Jackrabbit *(Lepus townsendii)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*	Northern Pocket Gopher *(Thomomys talpoides)*
Western Harvest Mouse *(Reithrodontomys megalotis)*	North American Deermouse *(Peromyscus maniculatus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Long-tailed Weasel *(Neogale frenata)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	

Birds

Dickcissel *(Spiza americana)* PSOC	Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Rock Pigeon *(Columba livia)*
Eurasian Collared-Dove *(Streptopelia decaocto)*	Mourning Dove *(Zenaida macroura)*
American Barn Owl *(Tyto furcata)*	Common Nighthawk *(Chordeiles minor)*
Western Kingbird *(Tyrannus verticalis)*	Eastern Kingbird *(Tyrannus tyrannus)*
Horned Lark *(Eremophila alpestris)*	Purple Martin *(Progne subis)*
Cliff Swallow *(Petrochelidon pyrrhonota)*	Barn Swallow *(Hirundo rustica)*
Common Raven *(Corvus corax)*	American Crow *(Corvus brachyrhynchos)*
Northern Shrike *(Lanius borealis)*	European Starling *(Sturnus vulgaris)*
Lark Sparrow *(Chondestes grammacus)*	Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*	Common Grackle *(Quiscalus quiscula)*
Brown-headed Cowbird *(Molothrus ater)*	American Goldfinch *(Spinus tristis)*
House Sparrow *(Passer domesticus)*	

Reptiles

Gophersnake *(Pituophis catenifer)*	

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Boreal Chorus Frog *(Pseudacris maculata)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
American Bison *(Bos bison)* SOC	Prairie Shrew *(Sorex haydeni)* PSOC
Spotted Bat *(Euderma maculatum)* PSOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Yellow-bellied Marmot *(Marmota flaviventris)*	Northwestern Jumping Mouse *(Zapus saltator)*
Bobcat *(Lynx rufus)*	Bighorn Sheep *(Ovis canadensis)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC
Burrowing Owl *(Athene cunicularia)* SOC	Sprague's Pipit *(Anthus spragueii)* SOC
Loggerhead Shrike *(Lanius ludovicianus)* SOC	Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Common Poorwill *(Phalaenoptilus nuttallii)* PSOC	Merlin *(Falco columbarius)*
Prairie Falcon *(Falco mexicanus)*	Upland Sandpiper *(Bartramia longicauda)*
White-throated Swift *(Aeronautes saxatalis)*	Lark Bunting *(Calamospiza melanocorys)*
Grasshopper Sparrow *(Ammodramus savannarum)*	

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC	North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*	Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*	

Amphibians

Woodhouse's Toad *(Anaxyrus woodhousii)*	Plains Spadefoot *(Spea bombifrons)*

References

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Introduced Upland Vegetation - Perennial Grassland and Forbland

ReGAP:
8405: Introduced Upland Vegetation - Perennial Grassland and Forbland

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Citation for data on this website:
Introduced Upland Vegetation - Perennial Grassland and Forbland. Montana Field Guide. Montana Natural Heritage Program
Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8405

Introduced Riparian and Wetland Vegetation



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Provisional State Rank:

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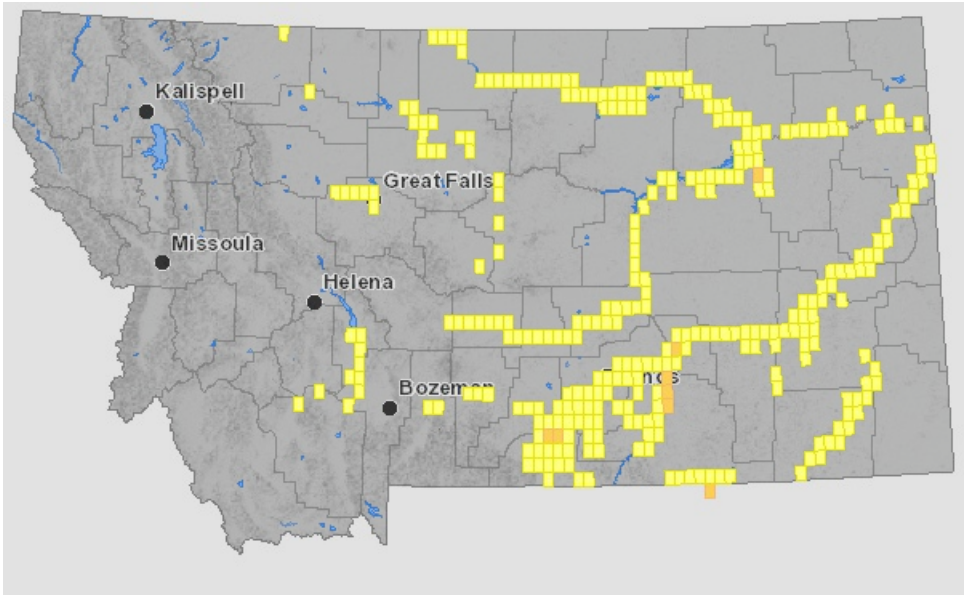
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General Description

Areas where non-native vegetation dominates lands immediately adjacent to rivers and streams (riparian) or occupies 75% of more of a wetland. Typically this class describes Russian Olive along large rivers east of the Rocky Mountains.

Ecological System Distribution

Approximately 143 square kilometers are classified as Introduced Riparian and Wetland Vegetation in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Custer, Dawson, Fergus, Gallatin, Garfield, Glacier, Golden Valley, Hill, Jefferson, Judith Basin, Liberty, Madison, Mccone, Musselshell, Park, Petroleum, Phillips, Powder River, Prairie, Richland, Roosevelt, Rosebud, Stillwater, Sweet Grass, Treasure, Valley, Wheatland, Wibaux, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO:

University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Eastern Red Bat *(Lasiurus borealis)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC

Amphibians

American Bullfrog *(Lithobates catesbeianus)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*

Reptiles

Snapping Turtle *(Chelydra serpentina)* SOC	Spiny Softshell *(Apalone spinifera)* SOC
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC	Smooth Greensnake *(Opheodrys vernalis)* SOC
Gophersnake *(Pituophis catenifer)*	Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*	Common Gartersnake *(Thamnophis sirtalis)*
Prairie Rattlesnake *(Crotalus viridis)*	

Amphibians

Northern Leopard Frog *(Lithobates pipiens)* SOC

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Introduced Riparian and Wetland Vegetation

ReGAP:
8406: Introduced Riparian and Wetland Vegetation

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Citation for data on this website:
Introduced Riparian and Wetland Vegetation. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8406

Recently burned forest

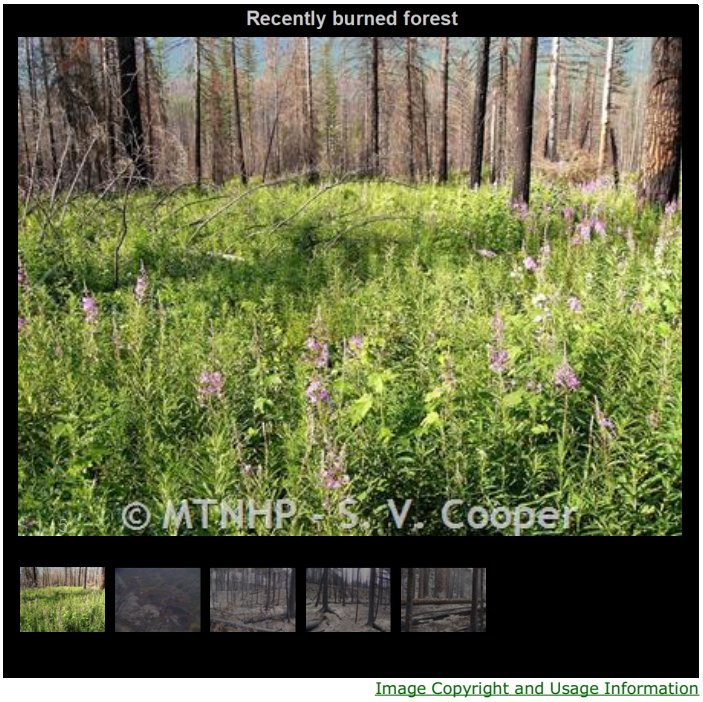


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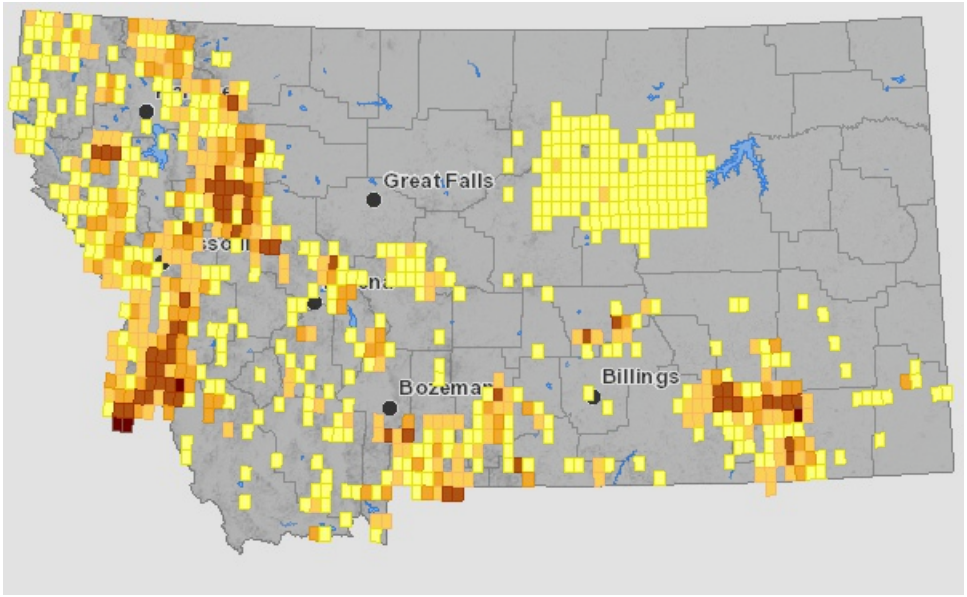
Ecological Systems Map Viewer
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General Description

Land cover is apparently modified by recent fires which have burned forest and woodland vegetation. Vegetation is a mixture of herbaceous, shrub, and tree species.

Ecological System Distribution

Approximately 8,334 square kilometers are classified as Recently burned forest in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Deer Lodge, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Ravalli, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Treasure, Valley, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

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Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

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University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC	Vagrant Shrew *(Sorex vagrans)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Snowshoe Hare *(Lepus americanus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Red Squirrel *(Tamiasciurus hudsonicus)*	Northern Flying Squirrel *(Glaucomys sabrinus)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Western Heather Vole *(Phenacomys intermedius)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Marten *(Martes americana)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*

Birds

Flammulated Owl *(Psiloscops flammeolus)* SOC	Northern Hawk Owl *(Surnia ulula)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC	Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Black-backed Woodpecker *(Picoides arcticus)* SOC	Pileated Woodpecker *(Dryocopus pileatus)* SOC
Varied Thrush *(Ixoreus naevius)* SOC	Green-tailed Towhee *(Pipilo chlorurus)* SOC
Evening Grosbeak *(Coccothraustes vespertinus)* SOC	Western Screech-Owl *(Megascops kennicottii)* PSOC
Great Gray Owl *(Strix nebulosa)* PSOC	Boreal Owl *(Aegolius funereus)* PSOC
Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC	Rufous Hummingbird *(Selasphorus rufus)* PSOC
Eastern Bluebird *(Sialia sialis)* PSOC	Tennessee Warbler *(Leiothlypis peregrina)* PSOC
Turkey Vulture *(Cathartes aura)*	Cooper's Hawk *(Accipiter cooperii)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Spruce Grouse *(Canachites canadensis)*
Dusky Grouse *(Dendragapus obscurus)*	Ruffed Grouse *(Bonasa umbellus)*
Mourning Dove *(Zenaida macroura)*	Great Horned Owl *(Bubo virginianus)*
Snowy Owl *(Bubo scandiacus)*	Northern Pygmy-Owl *(Glaucidium gnoma)*
Long-eared Owl *(Asio otus)*	Northern Saw-whet Owl *(Aegolius acadicus)*
Common Nighthawk *(Chordeiles minor)*	Vaux's Swift *(Chaetura vauxi)*
Calliope Hummingbird *(Selasphorus calliope)*	Williamson's Sapsucker *(Sphyrapicus thyroideus)*
Red-naped Sapsucker *(Sphyrapicus nuchalis)*	Downy Woodpecker *(Dryobates pubescens)*
Hairy Woodpecker *(Dryobates villosus)*	American Three-toed Woodpecker *(Picoides dorsalis)*
Northern Flicker *(Colaptes auratus)*	Olive-sided Flycatcher *(Contopus cooperi)*
Western Wood-Pewee *(Contopus sordidulus)*	Least Flycatcher *(Empidonax minimus)*
Dusky Flycatcher *(Empidonax oberholseri)*	Western Flycatcher *(Empidonax difficilis)*
Eastern Kingbird *(Tyrannus tyrannus)*	Tree Swallow *(Tachycineta bicolor)*
Violet-green Swallow *(Tachycineta thalassina)*	Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*
Bank Swallow *(Riparia riparia)*	Cliff Swallow *(Petrochelidon pyrrhonota)*
Canada Jay *(Perisoreus canadensis)*	Steller's Jay *(Cyanocitta stelleri)*
Black-billed Magpie *(Pica hudsonia)*	Common Raven *(Corvus corax)*
American Crow *(Corvus brachyrhynchos)*	Black-capped Chickadee *(Poecile atricapillus)*
Mountain Chickadee *(Poecile gambeli)*	Red-breasted Nuthatch *(Sitta canadensis)*
White-breasted Nuthatch *(Sitta carolinensis)*	Rock Wren *(Salpinctes obsoletus)*
Northern House Wren *(Troglodytes aedon)*	Ruby-crowned Kinglet *(Corthylio calendula)*
Western Bluebird *(Sialia mexicana)*	Mountain Bluebird *(Sialia currucoides)*
Townsend's Solitaire *(Myadestes townsendi)*	Swainson's Thrush *(Catharus ustulatus)*
Hermit Thrush *(Catharus guttatus)*	American Robin *(Turdus migratorius)*
Gray Catbird *(Dumetella carolinensis)*	Cedar Waxwing *(Bombycilla cedrorum)*
Northern Shrike *(Lanius borealis)*	European Starling *(Sturnus vulgaris)*

Warbling Vireo *(Vireo gilvus)*
Red-eyed Vireo *(Vireo olivaceus)*
Cassin's Vireo *(Vireo cassinii)*
Orange-crowned Warbler *(Leiothlypis celata)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Yellow Warbler *(Setophaga petechia)*
Magnolia Warbler *(Setophaga magnolia)*
Cape May Warbler *(Setophaga tigrina)*
Yellow-rumped Warbler *(Setophaga coronata)*
American Redstart *(Setophaga ruticilla)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Common Yellowthroat *(Geothlypis trichas)*
Wilson's Warbler *(Cardellina pusilla)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Lazuli Bunting *(Passerina amoena)*
Indigo Bunting *(Passerina cyanea)*
Spotted Towhee *(Pipilo maculatus)*
American Tree Sparrow *(Spizelloides arborea)*
Chipping Sparrow *(Spizella passerina)*
Lark Sparrow *(Chondestes grammacus)*
Fox Sparrow *(Passerella iliaca)*
Song Sparrow *(Melospiza melodia)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-throated Sparrow *(Zonotrichia albicollis)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Harris's Sparrow *(Zonotrichia querula)*
Dark-eyed Junco *(Junco hyemalis)*
Snow Bunting *(Plectrophenax nivalis)*
Brown-headed Cowbird *(Molothrus ater)*
Pine Grosbeak *(Pinicola enucleator)*
Purple Finch *(Haemorhous purpureus)*
White-winged Crossbill *(Loxia leucoptera)*
Red Crossbill *(Loxia curvirostra)*
Pine Siskin *(Spinus pinus)*
American Goldfinch *(Spinus tristis)*
Redpoll *(Acanthis flammea)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Northern Rubber Boa *(Charina bottae)*
North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*
Terrestrial Gartersnake *(Thamnophis elegans)*
Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Long-toed Salamander *(Ambystoma macrodactylum)*
Western Tiger Salamander *(Ambystoma mavortium)*
Woodhouse's Toad *(Anaxyrus woodhousii)*
Boreal Chorus Frog *(Pseudacris maculata)*

Invertebrates

Gillette's Checkerspot *(Euphydryas gillettii)* SOC

Vascular Plants

Pale Corydalis *(Corydalis sempervirens)* SOC
Cascade reedgrass *(Calamagrostis tweedyi)* SOC

Native Species Occasionally Associated with this Ecological System

Mammals

Eastern Red Bat *(Lasiurus borealis)* SOC
Pallid Bat *(Antrozous pallidus)* SOC
Grizzly Bear *(Ursus arctos)* SOC
Wolverine *(Gulo gulo)* SOC
Canada Lynx *(Lynx canadensis)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Masked Shrew *(Sorex cinereus)*
Red-tailed Chipmunk *(Neotamias ruficaudus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
American Black Bear *(Ursus americanus)*
Moose *(Alces alces)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC
Golden Eagle *(Aquila chrysaetos)* SOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Sharp-shinned Hawk *(Accipiter striatus)*
Wild Turkey *(Meleagris gallopavo)*
Barred Owl *(Strix varia)*
White-throated Swift *(Aeronautes saxatalis)*
Hammond's Flycatcher *(Empidonax hammondii)*
Western Kingbird *(Tyrannus verticalis)*
Barn Swallow *(Hirundo rustica)*
Pygmy Nuthatch *(Sitta pygmaea)*
Golden-crowned Kinglet *(Regulus satrapa)*
Townsend's Warbler *(Setophaga townsendi)*
Northern Waterthrush *(Parkesia noveboracensis)*
Clay-colored Sparrow *(Spizella pallida)*
Vesper Sparrow *(Pooecetes gramineus)*
Western Meadowlark *(Sturnella neglecta)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Bullock's Oriole *(Icterus bullockii)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*
Plains Gartersnake *(Thamnophis radix)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Sierran Treefrog *(Pseudacris sierra)*
Plains Spadefoot *(Spea bombifrons)*

Invertebrates

Zigzag Darner *(Aeshna sitchensis)* PSOC

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC
Coville Indian Paintbrush *(Castilleja covilleana)* SOC

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Recently Burned Forest

ReGAP:
8501: Recently Burned Forest

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Citation for data on this website:
Recently burned forest — Recently Burned Forest. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8501

Recently burned grassland

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

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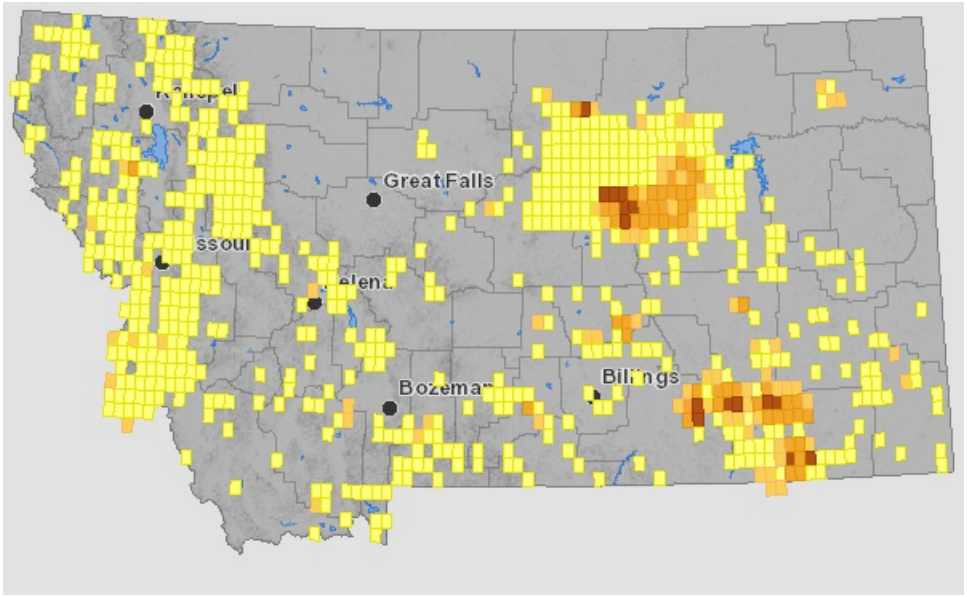
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General Description

Land cover is apparently modified by recent fires which have burned grassland vegetation. Vegetation is a mixture of herbaceous and shrub species.

Ecological System Distribution

Approximately 810 square kilometers are classified as Recently burned grassland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Roosevelt, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Treasure, Valley, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

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Native Species Commonly Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Pallid Bat *(Antrozous pallidus)* SOC	Hispid Pocket Mouse *(Chaetodipus hispidus)* SOC
Swift Fox *(Vulpes velox)* SOC	American Bison *(Bos bison)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	White-tailed Jackrabbit *(Lepus townsendii)*
Richardson's Ground Squirrel *(Urocitellus richardsonii)*	Columbian Ground Squirrel *(Urocitellus columbianus)*
Thirteen-lined Ground Squirrel *(Ictidomys tridecemlineatus)*	Olive-backed Pocket Mouse *(Perognathus fasciatus)*
Ord's Kangaroo Rat *(Dipodomys ordii)*	North American Deermouse *(Peromyscus maniculatus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Prairie Vole *(Microtus ochrogaster)*	Sagebrush Vole *(Lemmiscus curtatus)*
Coyote *(Canis latrans)*	Gray Wolf *(Canis lupus)*
Red Fox *(Vulpes vulpes)*	Least Weasel *(Mustela nivalis)*
Long-tailed Weasel *(Neogale frenata)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*
Pronghorn *(Antilocapra americana)*	

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Chestnut-collared Longspur *(Calcarius ornatus)* SOC
Turkey Vulture *(Cathartes aura)*	Northern Harrier *(Circus hudsonius)*
Red-tailed Hawk *(Buteo jamaicensis)*	Rough-legged Hawk *(Buteo lagopus)*
American Kestrel *(Falco sparverius)*	Upland Sandpiper *(Bartramia longicauda)*
Snowy Owl *(Bubo scandiacus)*	Common Nighthawk *(Chordeiles minor)*
Eastern Kingbird *(Tyrannus tyrannus)*	Horned Lark *(Eremophila alpestris)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*	Bank Swallow *(Riparia riparia)*
American Crow *(Corvus brachyrhynchos)*	Rock Wren *(Salpinctes obsoletus)*
Northern Shrike *(Lanius borealis)*	European Starling *(Sturnus vulgaris)*
Western Meadowlark *(Sturnella neglecta)*	American Goldfinch *(Spinus tristis)*

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC	Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC	North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*	Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*	Common Gartersnake *(Thamnophis sirtalis)*
Prairie Rattlesnake *(Crotalus viridis)*	

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Woodhouse's Toad *(Anaxyrus woodhousii)*
Boreal Chorus Frog *(Pseudacris maculata)*	Plains Spadefoot *(Spea bombifrons)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Fringed Myotis *(Myotis thysanodes)* SOC	Long-legged Myotis *(Myotis volans)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Western Harvest Mouse *(Reithrodontomys megalotis)*	Northern Grasshopper Mouse *(Onychomys leucogaster)*

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	Long-billed Curlew *(Numenius americanus)* SOC
Burrowing Owl *(Athene cunicularia)* SOC	Marbled Godwit *(Limosa fedoa)*
White-throated Swift *(Aeronautes saxatalis)*	

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC	Western Skink *(Plestiodon skiltonianus)* SOC
Smooth Greensnake *(Opheodrys vernalis)* SOC	Common Sagebrush Lizard *(Sceloporus graciosus)*

Vascular Plants

Long-styled Thistle *(Cirsium longistylum)* SOC

Coville Indian Paintbrush *(Castilleja covilleana)* SOC

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Recently Burned Grassland

ReGAP:
8502: Recently Burned Grassland

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Citation for data on this website:
Recently burned grassland — Recently Burned Grassland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8502

Recently burned shrubland

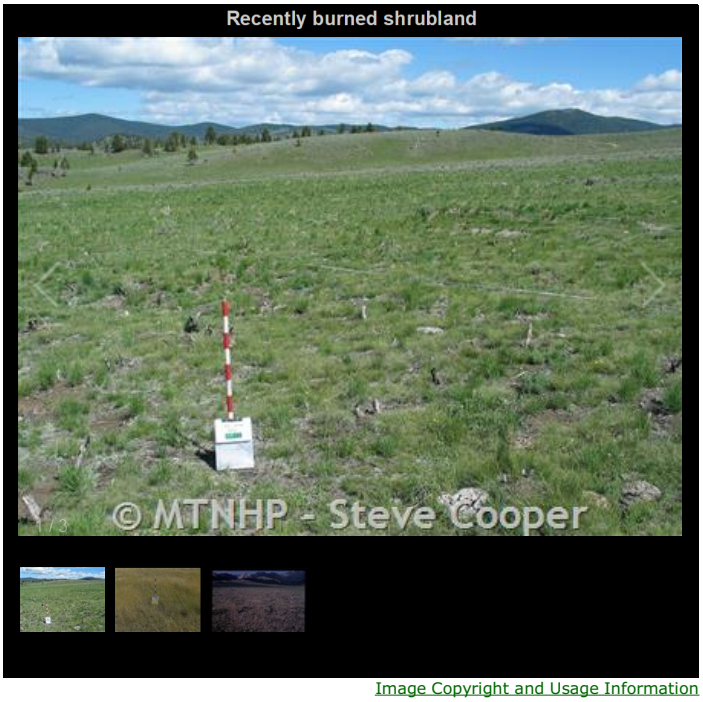


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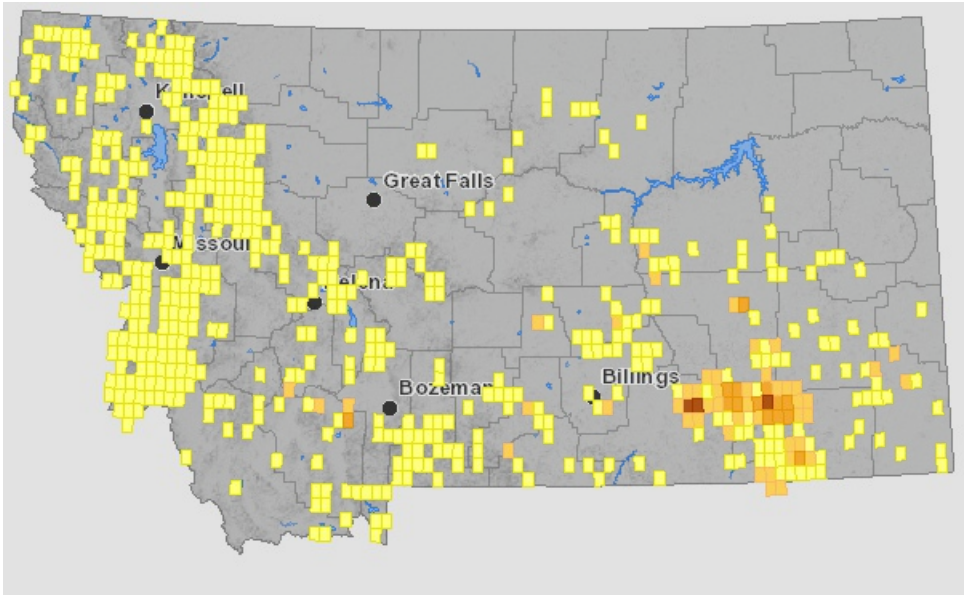
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General Description

Land cover is apparently modified by recent fires which have shrubland vegetation. Vegetation is a mixture of herbaceous and shrub species.

Ecological System Distribution

Approximately 934 square kilometers are classified as Recently burned shrubland in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Fallon, Fergus, Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Treasure, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

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1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
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Suggested Uses and Limitations

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Native Species Commonly Associated with this Ecological System

Mammals

Yuma Myotis *(Myotis yumanensis)* SOC	Northern Hoary Bat *(Lasiurus cinereus)* SOC
Hispid Pocket Mouse *(Chaetodipus hispidus)* SOC	American Bison *(Bos bison)* SOC
Spotted Bat *(Euderma maculatum)* PSOC	Wyoming Ground Squirrel *(Urocitellus elegans)* PSOC
Mountain Cottontail *(Sylvilagus nuttallii)*	White-tailed Jackrabbit *(Lepus townsendii)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Northern Pocket Gopher *(Thomomys talpoides)*
Olive-backed Pocket Mouse *(Perognathus fasciatus)*	North American Deermouse *(Peromyscus maniculatus)*
Montane Vole *(Microtus montanus)*	Long-tailed Vole *(Microtus longicaudus)*
Sagebrush Vole *(Lemmiscus curtatus)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Least Weasel *(Mustela nivalis)*	Long-tailed Weasel *(Neogale frenata)*
American Badger *(Taxidea taxus)*	Striped Skunk *(Mephitis mephitis)*
Bobcat *(Lynx rufus)*	Mule Deer *(Odocoileus hemionus)*
White-tailed Deer *(Odocoileus virginianus)*	Pronghorn *(Antilocapra americana)*

Birds

Ferruginous Hawk *(Buteo regalis)* SOC	Turkey Vulture *(Cathartes aura)*
Northern Harrier *(Circus hudsonius)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Upland Sandpiper *(Bartramia longicauda)*	Mourning Dove *(Zenaida macroura)*
Snowy Owl *(Bubo scandiacus)*	Common Nighthawk *(Chordeiles minor)*
Eastern Kingbird *(Tyrannus tyrannus)*	Horned Lark *(Eremophila alpestris)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*	Bank Swallow *(Riparia riparia)*
American Crow *(Corvus brachyrhynchos)*	Rock Wren *(Salpinctes obsoletus)*
Northern Shrike *(Lanius borealis)*	European Starling *(Sturnus vulgaris)*
Western Meadowlark *(Sturnella neglecta)*	Lesser Goldfinch *(Spinus psaltria)*
American Goldfinch *(Spinus tristis)*	

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC	Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC	North American Racer *(Coluber constrictor)*
Terrestrial Gartersnake *(Thamnophis elegans)*	Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*	

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Woodhouse's Toad *(Anaxyrus woodhousii)*
Plains Spadefoot *(Spea bombifrons)*	

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Pallid Bat *(Antrozous pallidus)* SOC
Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC	California Myotis *(Myotis californicus)*
Western Small-footed Myotis *(Myotis ciliolabrum)*	Big Brown Bat *(Eptesicus fuscus)*
Northern Grasshopper Mouse *(Onychomys leucogaster)*	

Birds

Golden Eagle *(Aquila chrysaetos)* SOC	Burrowing Owl *(Athene cunicularia)* SOC
White-throated Swift *(Aeronautes saxatalis)*	

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC	Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Common Sagebrush Lizard *(Sceloporus graciosus)*	Gophersnake *(Pituophis catenifer)*
Common Gartersnake *(Thamnophis sirtalis)*	

Amphibians

Western Toad *(Anaxyrus boreas)* SOC	Boreal Chorus Frog *(Pseudacris maculata)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Recently Burned Shrubland

ReGAP:
8503: Recently Burned Shrubland

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Citation for data on this website:
Recently burned shrubland — Recently Burned Shrubland. Montana Field Guide. Montana Natural Heritage Program Retrieved on October 9, 2025, from https://FieldGuide.mt.gov/displayES_Detail.aspx?ES=8503

Burned Sagebrush

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

Submit an Image

Provisional State Rank:

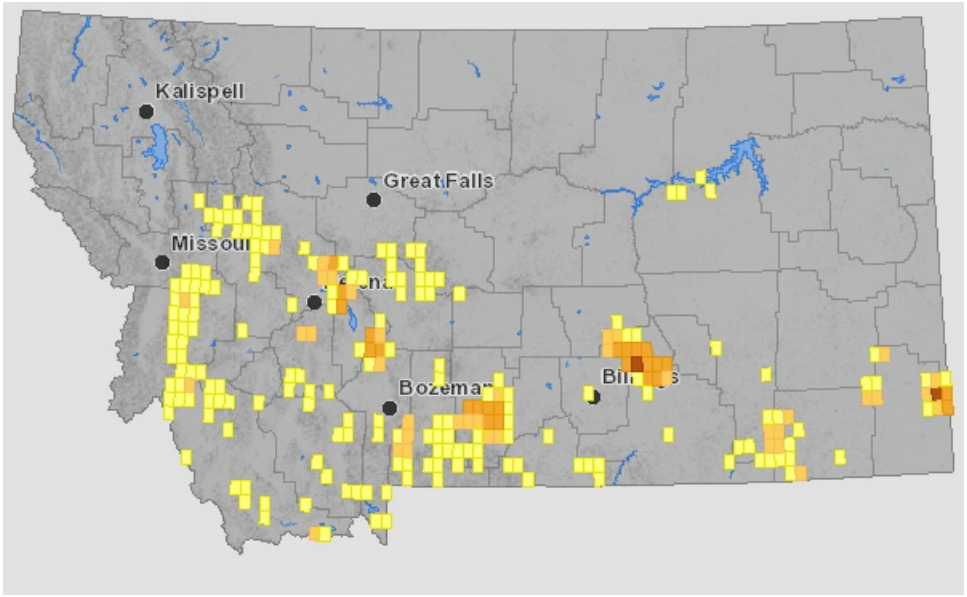
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Ecological System Distribution

Approximately 1,735 square kilometers are classified as Burned Sagebrush in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Carter, Cascade, Custer, Gallatin, Garfield, Granite, Jefferson, Judith Basin, Lewis and Clark, Madison, Meagher, Missoula, Musselshell, Park, Powder River, Powell, Ravalli, Rosebud, Stillwater, Sweet Grass, Valley, Yellowstone

Species Associated with this Ecological System

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Native Species Commonly Associated with this Ecological System

Mammals

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Eastern Kingbird *(Tyrannus tyrannus)*	Horned Lark *(Eremophila alpestris)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*	Bank Swallow *(Riparia riparia)*
American Crow *(Corvus brachyrhynchos)*	Rock Wren *(Salpinctes obsoletus)*
Northern Shrike *(Lanius borealis)*	European Starling *(Sturnus vulgaris)*
Western Meadowlark *(Sturnella neglecta)*	Lesser Goldfinch *(Spinus psaltria)*
American Goldfinch *(Spinus tristis)*	

Reptiles

Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC	North American Racer *(Coluber constrictor)*
Gophersnake *(Pituophis catenifer)*	Terrestrial Gartersnake *(Thamnophis elegans)*
Plains Gartersnake *(Thamnophis radix)*	Prairie Rattlesnake *(Crotalus viridis)*

Amphibians

Western Tiger Salamander *(Ambystoma mavortium)*	Plains Spadefoot *(Spea bombifrons)*

Native Species Occasionally Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Long-eared Myotis *(Myotis evotis)* SOC
Silver-haired Bat *(Lasionycteris noctivagans)* SOC	Pallid Bat *(Antrozous pallidus)* SOC
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	

Reptiles

Plains Hog-nosed Snake *(Heterodon nasicus)* SOC	Western Milksnake *(Lampropeltis gentilis)* SOC
Common Gartersnake *(Thamnophis sirtalis)*	

Amphibians

Western Toad *(Anaxyrus boreas)* SOC

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Burned Sagebrush

ReGAP:
8504: Burned Sagebrush

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Post-Fire Recovery

No photos are currently available

If you have a high quality photo of this Ecological System, are confident in the identification, and would like to submit it for inclusion on the Montana Field Guide, please send it to us using our online photo submission tool.

Submit an Image

Provisional State Rank:

External Links

Ecological Systems Map Viewer

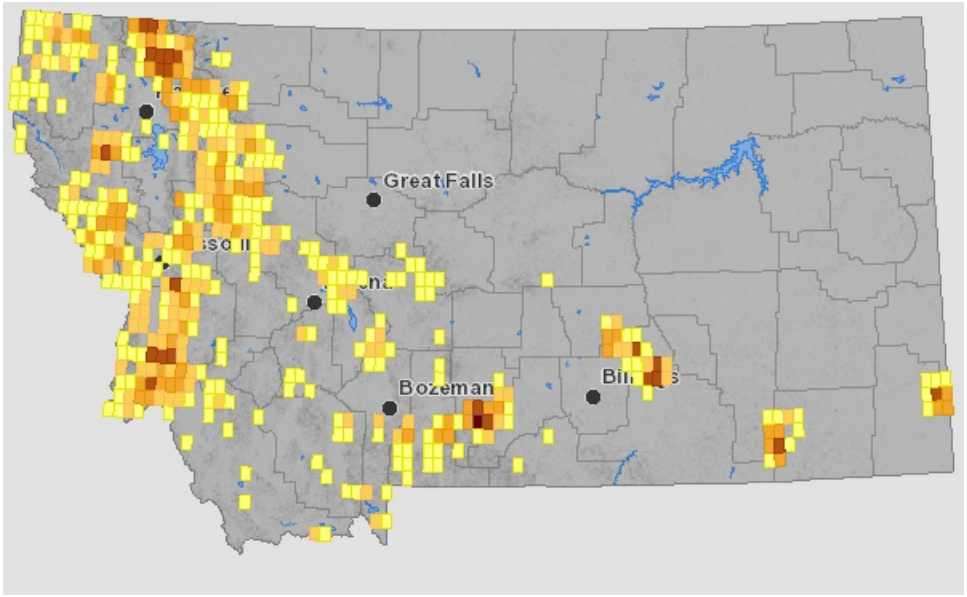
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Ecological System Distribution

Approximately 4,102 square kilometers are classified as Post-Fire Recovery in the 2017 Montana Land Cover layers. *Grid on map is based on USGS 7.5 minute quadrangle map boundaries.*



Montana Counties of Occurrence

Beaverhead, Big Horn, Broadwater, Carbon, Carter, Cascade, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Pondera, Powder River, Powell, Ravalli, Rosebud, Sanders, Stillwater, Sweet Grass, Teton, Yellowstone

Species Associated with this Ecological System

Details on Creation and Suggested Uses and Limitations

How Associations Were Made

We associated the use and habitat quality (common or occasional) of each of the 82 ecological systems mapped in Montana for vertebrate animal species that regularly breed, overwinter, or migrate through the state by:

1. Using personal observations and reviewing literature that summarize the breeding, overwintering, or migratory habitat requirements of each species (Dobkin 1992, Hart et al. 1998, Hutto and Young 1999, Maxell 2000, Foresman 2012, Adams 2003, and Werner et al. 2004);
2. Evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements;
3. Examining the observation records for each species in the state-wide point observation database associated with each ecological system;
4. Calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of "observations versus availability of habitat".

Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association. If you have any questions or comments on species associations with ecological systems, please contact the Montana Natural Heritage Program's Senior Zoologist.

Suggested Uses and Limitations

Species associations with ecological systems should be used to generate potential lists of species that may occupy broader landscapes for the purposes of landscape-level planning. These potential lists of species should not be used in place of documented occurrences of species (this information can be requested at: https://mtnhp.mt.gov/requests/) or systematic surveys for species and evaluations of habitat at a local site level by trained biologists. Users of this information should be aware that the land cover data used to generate species associations is based on imagery from the late 1990s and early 2000s and was only intended to be used at broader landscape scales. Land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections). Finally, although a species may be associated with a particular ecological system within its known geographic range, portions of that ecological system may occur outside of the species' known geographic range.

Literature Cited

- Adams, R.A. 2003. Bats of the Rocky Mountain West; natural history, ecology, and conservation. Boulder, CO:

University Press of Colorado. 289 p.
- Dobkin, D. S. 1992. Neotropical migrant land birds in the Northern Rockies and Great Plains. USDA Forest Service, Northern Region. Publication No. R1-93-34. Missoula, MT.
- Foresman, K.R. 2012. Mammals of Montana. Second edition. Mountain Press Publishing, Missoula, Montana. 429 pp.
- Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT. 1302 p.
- Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service, Rocky Mountain Research Station RMRS-GTR-32. 72 p.
- Maxell, B.A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to U.S. Forest Service Region 1. Missoula, MT: Wildlife Biology Program, University of Montana. 161 p.
- Werner, J.K., B.A. Maxell, P. Hendricks, and D. Flath. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.

Native Species Commonly Associated with this Ecological System

Mammals

Little Brown Myotis *(Myotis lucifugus)* SOC	Yuma Myotis *(Myotis yumanensis)* SOC
Long-eared Myotis *(Myotis evotis)* SOC	Fringed Myotis *(Myotis thysanodes)* SOC
Long-legged Myotis *(Myotis volans)* SOC	Silver-haired Bat *(Lasionycteris noctivagans)* SOC
Northern Hoary Bat *(Lasiurus cinereus)* SOC	Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC
Uinta Ground Squirrel *(Urocitellus armatus)* PSOC	Vagrant Shrew *(Sorex vagrans)*
California Myotis *(Myotis californicus)*	Western Small-footed Myotis *(Myotis ciliolabrum)*
Big Brown Bat *(Eptesicus fuscus)*	Mountain Cottontail *(Sylvilagus nuttallii)*
Snowshoe Hare *(Lepus americanus)*	Yellow-pine Chipmunk *(Neotamias amoenus)*
Columbian Ground Squirrel *(Urocitellus columbianus)*	Golden-mantled Ground Squirrel *(Callospermophilus lateralis)*
Red Squirrel *(Tamiasciurus hudsonicus)*	Northern Flying Squirrel *(Glaucomys sabrinus)*
Northern Pocket Gopher *(Thomomys talpoides)*	North American Deermouse *(Peromyscus maniculatus)*
Western Heather Vole *(Phenacomys intermedius)*	Montane Vole *(Microtus montanus)*
Long-tailed Vole *(Microtus longicaudus)*	Coyote *(Canis latrans)*
Gray Wolf *(Canis lupus)*	Red Fox *(Vulpes vulpes)*
Marten *(Martes americana)*	Long-tailed Weasel *(Neogale frenata)*
American Ermine *(Mustela richardsonii)*	American Badger *(Taxidea taxus)*
Striped Skunk *(Mephitis mephitis)*	Bobcat *(Lynx rufus)*
Mountain Lion *(Puma concolor)*	Elk *(Cervus canadensis)*
Mule Deer *(Odocoileus hemionus)*	White-tailed Deer *(Odocoileus virginianus)*

Birds

Flammulated Owl *(Psiloscops flammeolus)* SOC	Northern Hawk Owl *(Surnia ulula)* SOC
Lewis's Woodpecker *(Melanerpes lewis)* SOC	Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC
Black-backed Woodpecker *(Picoides arcticus)* SOC	Pileated Woodpecker *(Dryocopus pileatus)* SOC
Varied Thrush *(Ixoreus naevius)* SOC	Green-tailed Towhee *(Pipilo chlorurus)* SOC
Cassin's Finch *(Haemorhous cassinii)* SOC	Evening Grosbeak *(Coccothraustes vespertinus)* SOC
Western Screech-Owl *(Megascops kennicottii)* PSOC	Great Gray Owl *(Strix nebulosa)* PSOC
Boreal Owl *(Aegolius funereus)* PSOC	Broad-tailed Hummingbird *(Selasphorus platycercus)* PSOC
Rufous Hummingbird *(Selasphorus rufus)* PSOC	Eastern Bluebird *(Sialia sialis)* PSOC
Tennessee Warbler *(Leiothlypis peregrina)* PSOC	Turkey Vulture *(Cathartes aura)*
Cooper's Hawk *(Accipiter cooperii)*	Red-tailed Hawk *(Buteo jamaicensis)*
Rough-legged Hawk *(Buteo lagopus)*	American Kestrel *(Falco sparverius)*
Spruce Grouse *(Canachites canadensis)*	Dusky Grouse *(Dendragapus obscurus)*
Ruffed Grouse *(Bonasa umbellus)*	Mourning Dove *(Zenaida macroura)*
Great Horned Owl *(Bubo virginianus)*	Snowy Owl *(Bubo scandiacus)*
Northern Pygmy-Owl *(Glaucidium gnoma)*	Long-eared Owl *(Asio otus)*
Northern Saw-whet Owl *(Aegolius acadicus)*	Common Nighthawk *(Chordeiles minor)*
Vaux's Swift *(Chaetura vauxi)*	Calliope Hummingbird *(Selasphorus calliope)*
Williamson's Sapsucker *(Sphyrapicus thyroideus)*	Red-naped Sapsucker *(Sphyrapicus nuchalis)*
Downy Woodpecker *(Dryobates pubescens)*	Hairy Woodpecker *(Dryobates villosus)*
American Three-toed Woodpecker *(Picoides dorsalis)*	Northern Flicker *(Colaptes auratus)*
Olive-sided Flycatcher *(Contopus cooperi)*	Western Wood-Pewee *(Contopus sordidulus)*
Least Flycatcher *(Empidonax minimus)*	Dusky Flycatcher *(Empidonax oberholseri)*
Western Flycatcher *(Empidonax difficilis)*	Eastern Kingbird *(Tyrannus tyrannus)*
Tree Swallow *(Tachycineta bicolor)*	Violet-green Swallow *(Tachycineta thalassina)*
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*	Bank Swallow *(Riparia riparia)*
Cliff Swallow *(Petrochelidon pyrrhonota)*	Canada Jay *(Perisoreus canadensis)*
Steller's Jay *(Cyanocitta stelleri)*	Black-billed Magpie *(Pica hudsonia)*
Common Raven *(Corvus corax)*	American Crow *(Corvus brachyrhynchos)*
Black-capped Chickadee *(Poecile atricapillus)*	Mountain Chickadee *(Poecile gambeli)*
Red-breasted Nuthatch *(Sitta canadensis)*	White-breasted Nuthatch *(Sitta carolinensis)*
Rock Wren *(Salpinctes obsoletus)*	Northern House Wren *(Troglodytes aedon)*
Ruby-crowned Kinglet *(Corthylio calendula)*	Western Bluebird *(Sialia mexicana)*
Mountain Bluebird *(Sialia currucoides)*	Townsend's Solitaire *(Myadestes townsendi)*
Swainson's Thrush *(Catharus ustulatus)*	Hermit Thrush *(Catharus guttatus)*
American Robin *(Turdus migratorius)*	Gray Catbird *(Dumetella carolinensis)*
Bohemian Waxwing *(Bombycilla garrulus)*	Cedar Waxwing *(Bombycilla cedrorum)*

Northern Shrike *(Lanius borealis)*
Warbling Vireo *(Vireo gilvus)*
Cassin's Vireo *(Vireo cassinii)*
Nashville Warbler *(Leiothlypis ruficapilla)*
Magnolia Warbler *(Setophaga magnolia)*
Yellow-rumped Warbler *(Setophaga coronata)*
MacGillivray's Warbler *(Geothlypis tolmiei)*
Wilson's Warbler *(Cardellina pusilla)*
Yellow-breasted Chat *(Icteria virens)*
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*
Lazuli Bunting *(Passerina amoena)*
Spotted Towhee *(Pipilo maculatus)*
Chipping Sparrow *(Spizella passerina)*
Lark Sparrow *(Chondestes grammacus)*
Song Sparrow *(Melospiza melodia)*
White-throated Sparrow *(Zonotrichia albicollis)*
Harris's Sparrow *(Zonotrichia querula)*
Snow Bunting *(Plectrophenax nivalis)*
Pine Grosbeak *(Pinicola enucleator)*
White-winged Crossbill *(Loxia leucoptera)*
Pine Siskin *(Spinus pinus)*
Redpoll *(Acanthis flammea)*
European Starling *(Sturnus vulgaris)*
Red-eyed Vireo *(Vireo olivaceus)*
Orange-crowned Warbler *(Leiothlypis celata)*
Yellow Warbler *(Setophaga petechia)*
Cape May Warbler *(Setophaga tigrina)*
American Redstart *(Setophaga ruticilla)*
Common Yellowthroat *(Geothlypis trichas)*
Canada Warbler *(Cardellina canadensis)*
Western Tanager *(Piranga ludoviciana)*
Black-headed Grosbeak *(Pheucticus melanocephalus)*
Indigo Bunting *(Passerina cyanea)*
American Tree Sparrow *(Spizelloides arborea)*
Clay-colored Sparrow *(Spizella pallida)*
Fox Sparrow *(Passerella iliaca)*
Lincoln's Sparrow *(Melospiza lincolnii)*
White-crowned Sparrow *(Zonotrichia leucophrys)*
Dark-eyed Junco *(Junco hyemalis)*
Brown-headed Cowbird *(Molothrus ater)*
Purple Finch *(Haemorhous purpureus)*
Red Crossbill *(Loxia curvirostra)*
American Goldfinch *(Spinus tristis)*

Reptiles

Northern Alligator Lizard *(Elgaria coerulea)* SOC
Plains Hog-nosed Snake *(Heterodon nasicus)* SOC
Gophersnake *(Pituophis catenifer)*
Plains Gartersnake *(Thamnophis radix)*
Prairie Rattlesnake *(Crotalus viridis)*
Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC
Western Milksnake *(Lampropeltis gentilis)* SOC
Terrestrial Gartersnake *(Thamnophis elegans)*
Common Gartersnake *(Thamnophis sirtalis)*

Amphibians

Western Toad *(Anaxyrus boreas)* SOC
Western Tiger Salamander *(Ambystoma mavortium)*
Boreal Chorus Frog *(Pseudacris maculata)*
Long-toed Salamander *(Ambystoma macrodactylum)*
Woodhouse's Toad *(Anaxyrus woodhousii)*

Native Species Occasionally Associated with this Ecological System

Mammals

Pallid Bat *(Antrozous pallidus)* SOC
Wolverine *(Gulo gulo)* SOC
Spotted Bat *(Euderma maculatum)* PSOC
Red-tailed Chipmunk *(Neotamias ruficaudus)*
American Black Bear *(Ursus americanus)*
Grizzly Bear *(Ursus arctos)* SOC
Canada Lynx *(Lynx canadensis)* SOC
Masked Shrew *(Sorex cinereus)*
Southern Red-backed Vole *(Clethrionomys gapperi)*
Moose *(Alces alces)*

Birds

American Goshawk *(Accipiter atricapillus)* SOC
Ovenbird *(Seiurus aurocapilla)* PSOC
Wild Turkey *(Meleagris gallopavo)*
White-throated Swift *(Aeronautes saxatalis)*
Western Kingbird *(Tyrannus verticalis)*
Pygmy Nuthatch *(Sitta pygmaea)*
Townsend's Warbler *(Setophaga townsendi)*
Vesper Sparrow *(Pooecetes gramineus)*
Brewer's Blackbird *(Euphagus cyanocephalus)*
Golden Eagle *(Aquila chrysaetos)* SOC
Sharp-shinned Hawk *(Accipiter striatus)*
Barred Owl *(Strix varia)*
Hammond's Flycatcher *(Empidonax hammondii)*
Barn Swallow *(Hirundo rustica)*
Golden-crowned Kinglet *(Regulus satrapa)*
Northern Waterthrush *(Parkesia noveboracensis)*
Western Meadowlark *(Sturnella neglecta)*
Bullock's Oriole *(Icterus bullockii)*

Reptiles

Western Skink *(Plestiodon skiltonianus)* SOC
Northern Rubber Boa *(Charina bottae)*
Common Sagebrush Lizard *(Sceloporus graciosus)*
North American Racer *(Coluber constrictor)*

Amphibians

Sierran Treefrog *(Pseudacris sierra)*
Plains Spadefoot *(Spea bombifrons)*

References

Classification and Map Identifiers

Cowardin Wetland Classification: *Not applicable*

NatureServe Identifiers:

Element Global ID	
System Code	, Post-Fire Recovery

ReGAP:
8505: Post-Fire Recovery

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