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Russian Olive (*Elaeagnus angustifolia* L.) Distribution Mapping for the Yellowstone River and Tributaries Using Feature Analysis Software, an Extension for ArcMap

By

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Introduction

Russian olive (*Elaeagnus angustifolia* L.) was introduced to the United States in the early 1900's. The tree has been planted in Montana for shelterbelts, windbreaks, wildlife habitat and ornamentals. Russian olives have naturalized and the range is expanding along the Yellowstone River; its tributaries, as well as other watersheds in the state. They can be found along riparian corridors, irrigation delivery systems, pastures, saline affected areas, and some wetland sites. The Natural Resources Conservation Service (NRCS) used remote sensing to examine the extent of Russian olive distribution along the Yellowstone Watershed. The GIS dataset identifies the location of Russian olive populations within the Yellowstone Watershed; Gallatin, Park, Sweet Grass, Stillwater, Carbon, Yellowstone, Big Horn, Treasure, Rosebud, Custer, Powder River, Prairie, Dawson, Wibaux, and Richland Counties.

Method

The unique color, size and growth form of the Russian olive allows for the use of remote sensing techniques to extract Russian olive features from the NAIP imagery. Feature Analyst, an extension for ArcMap, was used to locate and draw polygon features around the tree canopies. This was followed up by a manual editing process to help remove obvious errors. The resulting shapefile provides a fairly accurate representation of Russian olive distribution along the Yellowstone River corridor and its major tributaries (i.e., Shields, Clark's Fork, Big Horn, Little Big Horn, Tongue, and Powder Rivers).

The study area (buffer) varied within the watershed. This was necessary because of the variability in landscape features such as the width of the floodplains, soil types, topography, hydrology, land types/management, and Russian olives identified. Basically, the study area encompasses all of the Russian olives that were identified to the lateral extent of the riverine systems in the study area. Future analysis should consider this and ensure that the lateral extents are examined for Russian olive expansion.

Like all remote sensing projects, there are trade-offs between accuracy and efficiency, as well as limitations of the imagery. Errors of omission, particularly under canopy, are probably more likely than false positives. The probability of false positives may increase in eastern Montana where silverberry (*Eleagnus commutata*) and silver buffaloberry (*Shepherdia agentea*) are more common. Smaller trees were typically missed by the software, and were inserted during the editing process.

Given the stated limitations, it is recommended that the data be field checked for site specific applications. That being said, this dataset should be a very useful tool for analyzing Russian olive location, distribution, and concentration.

Data Results

There are approximately 7,194 canopy acres and over 490,000 polygons for the Yellowstone Watershed. While many polygons represent individual trees, they also represent groups of trees, or even dense groves over 25 acres in size.

Below is a list of the counties within the study area (i.e., Yellowstone Watershed) and the canopy acres identified.

Park – 43 acres
Sweet Grass – 15 acres
Stillwater – 64 acres
Carbon – 644 acres
Yellowstone – 1,073 acres
Big Horn – 1,102 acres
Treasure – 489 acres
Rosebud – 1,043 acres
Custer – 922 acres
Powder River – 797 acres
Prairie – 162 acres
Dawson – 310 acres
Wibaux – 3 acres
Richland – 527 acres

The dataset can be found at f:\geodata\land_use_land_cover\Russian_Olive\. It can be brought right into ArcMap or used through Toolkit as a resource layer.

Russian Olive Map/GIS Data Applications

1. Location, distribution, and concentration of Russian olive trees within the watersheds and/or landscape;
2. Area of canopy cover in square feet or acres;
3. Establishing priority areas and target funding opportunities;
4. Number of land owners with Russian olive trees on their property;
5. Develop conservation plan maps;
6. Information for contracting purposes;
7. Outreach and education with land owners, conservation districts, weed districts, county extension offices, and others.

Reference Material

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