

# Montana Lidar Inventory

## Help Document

Through the Montana Lidar Inventory, users can view, download, and request lidar data throughout Montana.

### Use the Viewer to:

- Find (filter) lidar projects based on:
  - Downloadable Data v. Request Only v. Not at the Montana State Library
  - Project Status (completed, in-progress, planned), Recent Collections (<5 years), and Quality Level
  - Availability of contours and building footprints
- View lidar-derived products, including bare-earth DEM, surface DEM, intensity, hillshade, slope, aspect
- Download and request lidar data
- Search by Address, Save and print maps, Identify elevations, and Measure distances and areas
- Compare various GIS layers using a Swipe Tool.

*This application was developed by the GIS programmers at the Montana State Library  
with support from the USDA- MT Natural Resources Conservation Service*



<http://msl.mt.gov>

# Introduction to the Montana Lidar Inventory: View, Download, Request

This application was built using Esri's Experience Builder in ArcGIS Online. ArcGIS Online is a cloud-based environment for storing and managing geographic content. It enables users to create and share maps and explore data through a web browser.

Once you have navigated to the Montana Lidar Inventory through a web browser and opened the "View, Download, and Request" page, the application opens to a map of Montana with Lidar Project Area boundaries in the foreground. The currently available lidar is also displayed as a hillshade generated from the 1-meter, bare-earth digital elevation model. As you navigate to projects with lidar data available for download and zoom in, the Quads with Downloadable Lidar layer displays. Lidar-derived raster products may be downloaded for an entire project area or by Quad.

## Help Document Outline

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The screenshot displays the Montana Lidar Inventory web application. At the top, the Montana State Library logo is on the left, and the title "Montana Lidar Inventory" is on the right. Below the title is a navigation bar with links: Introduction, Status Dashboard, View, Download, and Request Data, Collaborate, Data Use Survey, Lidar 101, and Lidar Imagery & Posters. A social media bar with icons for Facebook, Twitter, LinkedIn, YouTube, and Instagram is also present. The main content area features a heading "Discover where lidar has been collected in Montana. View, download, or request data, and collaborate on future acquisitions." followed by a list of instructions on how to use the inventory. To the right of the text is a grid of eight thumbnail images showing various lidar data visualizations, including hillshades, point clouds, and maps. Below the grid is the Montana State Library LIDAR logo and the text "View, Download, and Request Lidar". At the bottom of the page, there is a "CONTACT US:" section with the address "1201 11th Ave, Helena, Montana 59620", phone number "(406) 444-2115", toll-free number "(800) 338-5087", and email "View Directory".

**Montana Lidar Inventory**

Introduction Status Dashboard View, Download, and Request Data Collaborate Data Use Survey Lidar 101 Lidar Imagery & Posters

**Discover where lidar has been collected in Montana. View, download, or request data, and collaborate on future acquisitions.**

Use the Montana Lidar Inventory to:

- Check on the status of lidar for Montana - This page provides a dashboard of completed, in-progress, and planned lidar acquisitions.
- View, download, or request lidar data - Access a web application for viewing, downloading, and requesting lidar data.
- Collaborate and submit areas of interest for future acquisitions - Interact with a map for submitting priority areas of interest for future lidar planning.
- Learn how lidar data is being used in Montana - Explore a map, charts, and table documenting lidar use in Montana and also view lidar images and posters.
- View Lidar Images and Posters

Any organization acquiring lidar data in Montana should:

- Check the inventory to see where data is already available or planned for acquisition.
- Identify potential partners with mutual areas of interest, and identify partner funding.
- Apply for a USGS 3DEP Data Collaboration Announcement. The Montana Elevation Working Group led by the Montana State Library can assist with coordination.

Contact Montana State Library GIS for additional information.

Learn more!

- 2019 Montana Lidar Plan
- Overview of Montana State Library Lidar Resources

**CONTACT US:**

1201 11th Ave  
Helena, Montana 59620  
Hours: Monday-Friday 8AM-5PM  
[Submit a request for Geoinfo Support](#)

Phone: (406) 444-2115  
Toll Free: (800) 338-5087  
Email: [View Directory](#)

## Step 1 – Selecting a Basemap

Click on this icon to open the Basemap Gallery

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**MONTANA STATE LIBRARY**

**Montana Lidar Inventory**

Introduction Status Dashboard **View, Download, and Request Data** Collaborate Data Use Survey Lidar 101 & Imagery Help Videos

Viewable Lidar Projects (in this application) Downloadable lidar projects (MSL or USGS) Lidar projects not yet at the State Library Completed lidar acquisitions In-progress lidar acquisitions Planned lidar acquisitions Completed lidar projects that are less than 5 years old Lidar projects that have contours Lidar projects that have building footprints Quality Level 1 lidar (~8 points per square meter) Quality Level 2 lidar (~2 points per square meter)

Address, Parcel, Quad, Project Name

Enable clicking the map to get the coordinates

**The background map, or Basemap, is a reference image to help provide geographic context.**

**The default Basemap is set to the Map of Montana. If you want to change the Basemap click the Basemap Gallery button located in the top right to open the window.**

**To change the Background Map choose from one of the options available in the Basemap Gallery, such as Montana Air Photos or Topographic.**

**Once you've made a basemap selection, click the x or the Basemap Gallery button to hide the window.**

Status	Collection Dates	ExpectedMont...	Project Descrip...	Square Miles	Project Data D...	Rep
summer 2018			This project contains a co...	2,444.21	<a href="#">View</a>	<a href="#">View</a>
April - June 2019			In February 2019, an ame...	819.13	<a href="#">View</a>	<a href="#">View</a>
June 2019			Base Specification Version...	789.23	<a href="#">View</a>	<a href="#">View</a>
07/29/2019-08/06/2019, ...			Aerial LIDAR data and deri...	1,937.64	<a href="#">View</a>	<a href="#">View</a>



Step 2 – Viewing the Data Layers and Legend

Click on this icon to open the Layer List and Legend

Introduction

Status Dashboard

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Collaborate

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Viewable Lidar Projects (in this application)

Downloadable lidar projects (MSL or USGS)

Lidar projects not yet at the State Library

Completed lidar acquisitions

In-progress lidar acquisitions

Planned lidar acquisitions

Completed lidar projects that are less than 5 years old

+

-

Home

Location

Address, Parcel, Quad, Project Name

Search

Layer List

Layers

Layer

Legend

Reservations

Counties

Lidar Projects

Completed

In Progress

Planned

Proposed

Layers

Layer

Legend

Reservations

Counties

Lidar Projects

2 foot contours (Lidar)

1 foot contours (Lidar)

Lidar Building Footprints

Hillshade - Digital Surface Model (1 meter Lidar)

Hillshade - Bare Earth Digital Elevation Model (1 meter Lidar)

Shaded Relief - Digital Surface Model (1 meter Lidar)

Shaded Relief - Bare Earth Digital Elevation Model (1 meter Lidar)

Canopy Height Model (1 meter lidar)

Intensity (1 meter Lidar)

Aspect (1 meter Lidar)

Slope (1 meter Lidar)

Turn on the **Legend** to see how the features of each visible layer are symbolized.

Turn the data layers on or off within the **Layer List** by clicking the eye to the left of the layer name.

Some layers are only visible when you zoom in and are grayed out in the Layer List if they are not visible at the current extent/scale of your map.

Layers will display in the order shown in the Layer List and may need to be turned off to see the layers underneath (lower in the list), or the layer order can be rearranged by dragging layers up/down.

Map

Enable clicking the map to get the coordinates

### Step 3 – Changing the map extent – Zooming in or out

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Address, Parcel, Quad, Project Name

You can use the roller function on your mouse or the “+” and “-” buttons to zoom in or out on the map. The plus and minus keys on a keyboard will also zoom in/out when your mouse cursor is located on the map.

As you zoom in additional layers will become visible.

100 mi

Enable clicking the map to get the coordinates

UNITED STATES

Esri, USGS, Montana State U, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USEWS, US Bureau of Land Management, Geographic Coordinate Database, US Geological Survey, ... Powered by Esri



Step 4 – Filters

Introduction

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Viewable Lidar Projects (in this application)

☐

Downloadable lidar projects (MSL or USGS)

☐

Lidar projects not yet at the State Library

☐

Completed lidar acquisitions

☐

In-progress lidar acquisitions

☐

Planned lidar acquisitions

☐

Completed lidar projects that are less than 5 years old

☐

Lidar projects that have contours

☐

Lidar projects that have building footprints

☐

Quality Level 1 lidar (~8 points per square meter)

☐

Quality Level 2 lidar (~2 points per square meter)

☒

+

-

Home

Location

Layers

Address, Parcel, Quad, Project Name

Search

Grasslands National Park

Map

Download

Print

Fullscreen

Layers

Help

Help

Click Button Next to Filter to Turn them On/Off . You can Choose Multiple Filters, though keep in mind an “or” statement is used. Selections will display on Map. After setting a filter, click the tab (arrow) to move the window out of the way.

Submit a lidar request, view the lidar project list, and submit a lidar data use survey by clicking any of these links

Request lidar data not available by download |

View lidar projects as a list |

Let us know how you are using the data |

50 mi

Montana Lidar Inventory

Disclaimer

Map of Montana showing lidar data coverage. The map is color-coded by project status: green for viewable, blue for downloadable, and yellow for not yet at the State Library. The map shows various regions including Glacier National Park, Yellowstone National Park, and the Snake River Plain. A search bar is located at the top right of the map area.

Enable clicking the map to get the coordinates

Esri, USGS | Montana State Library, Esri, TomTom, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS, USFWS | US Bureau of ... Powered by Esri

## Step 5 – Navigating to an area of interest, searching, coordinates, and bookmarks

The screenshot shows the Montana Lidar Inventory web application. The interface includes a header with the Montana State Library logo, navigation links (Introduction, Status Dashboard, View, Download, and Request Data, Collaborate, Data Use Survey, Lidar 101 & Imagery, Help Videos), and social media icons. A search bar is located at the top left of the map area. On the left side of the map, there are navigation controls including a crosshair icon and a zoom slider. A 'Bookmark' widget is open on the right side, showing a list of saved locations: Shaw Butte and Lake Como, with a '+' button to add more. A 'Help' button is also visible in the top right corner of the map area.

**After Reloading the Map you can go back to the default map extent**

**Type in an Address, Parcel, Lidar Project, Quad, or County**

**You can navigate to an area of interest by panning and zooming or by using the search tool. Pan by holding down the left mouse button and dragging or by using the arrows keys on your keyboard when the mouse cursor is over the map.**

**Lat/Long coordinates – Toggle the crosshair icon to get the coordinates for a clicked location (place marker).**

**You can add bookmarks by selecting the bookmark widget. Zoom in/out to your area of interest and click the “+” button to save the bookmark. You can then customize the name of your bookmark. These will be saved until you exit the experience, or you may choose to delete them by clicking the black garbage can.**

Enable clicking the map to get the coordinates

50 mi

Esri, USGS | Montana State U... Esri, TomTom, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS, USFWS | US Bureau of Land Management, Geographic Coordin... Powered by Esri



Step 6 – Tools: Measuring

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Viewable Lidar Projects (in this application)

Downloadable lidar projects (MSL or USGS)

Lidar projects not yet at the State Library

Completed lidar acquisitions

In-progress lidar acquisitions

Planned lidar acquisitions

Completed lidar projects that are less than 5 years old

Lidar projects that have contours

Lidar projects that have building footprints

Quality Level 1 lidar (~8 points per square meter)

Quality Level 2 lidar (~2 points per square meter)

Address, Parcel, Quad, Project Name

Search

Map navigation controls

Map

Scale bar: 10 mi

Measure

Unit: Imperial

Distance: 4.50 mi

New measurement

Measurement tool icon

Tool Window

Instructions: To make area or distance, click on the measurement tool to open the Tool Window. Click on the button to choose which type of measurement, area, distance or location. Then left click in the map to start the measurement, and double click on the map to finish. Use the Dropdown Arrow to Change the Unit of Measure

Facebook

Twitter

LinkedIn

YouTube

Instagram

OpenStreetMap

Disclaimer

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## Step 7 – Tools: Swipe

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The screenshot displays the Montana Lidar Inventory web application. The interface includes a top navigation bar with the Montana State Library logo, a search bar, and various navigation links. A yellow circle highlights the 'Swipe' button in the top right corner of the map area. A yellow arrow points from the 'Swipe' button to the 'Swipe' tool panel on the right side of the screen. The 'Swipe' panel shows a list of layers, including '2 foot contours (Lidar)', '1 foot contours (Lidar)', 'Hillshade - Digital Surface Model (1 meter Lidar)', 'Hillshade - Bare Earth Digital Elevation Model (1 meter Lidar)', 'Shaded Relief - Digital Surface Model (1 meter Lidar)', 'Shaded Relief - Bare Earth Digital Elevation Model (1 meter Lidar)', 'Intensity (1 meter Lidar)', 'Aspect (1 meter Lidar)', and 'Slope (1 meter Lidar)'. A yellow arrow points from the 'Swipe' panel to the map area, indicating the tool's function.

**Montana Lidar Inventory**

Introduction Status Dashboard **View, Download, and Request Data** Collaborate Data Use Survey Lidar 101 & Imagery Help Videos

Address, Parcel, Quad, Project Name

3859 ft

Quad: Northwest Great Falls 47111e3

Enable clicking the map to get the coordinates

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**Swipe**

Swipe

**Leading layers**

- ☒ 2 foot contours (Lidar)
- ☒ 1 foot contours (Lidar)
- ☒ Hillshade - Digital Surface Model (1 meter Lidar)
- ☒ Hillshade - Bare Earth Digital Elevation Model (1 meter Lidar)
- ☒ Shaded Relief - Digital Surface Model (1 meter Lidar)
- ☒ Shaded Relief - Bare Earth Digital Elevation Model (1 meter Lidar)

**Trailing layers**

- ☒ Intensity (1 meter Lidar)
- ☒ Aspect (1 meter Lidar)
- ☒ Slope (1 meter Lidar)

Click on the Swipe Button to open the Swipe Tool

Choose your leading layer (left side) followed by your trailing layer (right side). Then click the toggle button to begin swiping.

You can hide/reveal layers and toggle them on and off in the pop-up window

Use the Swipe Slider Bar to reveal/hide the selected layer

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Esri, NASA, NGA, USGS, FEMA, Community Maps Contributors, Montana State University, Montana State Library, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NAS... Powered by Esri

## Step 10 – Tools: Add Data

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The screenshot displays the Montana Lidar Inventory web application interface. At the top, the Montana State Library logo is on the left, and the title 'Montana Lidar Inventory' is centered. Navigation links include 'Introduction', 'Status Dashboard', 'View, Download, and Request Data' (highlighted), 'Collaborate', 'Data Use Survey', 'Lidar 101 & Imagery', and 'Help Videos'. A search bar is located below the navigation bar. In the top right corner, there are social media icons and a 'Disclaimer' link. A yellow arrow points to the 'Add Data' button in the top right corner. A white text box on the left side of the map contains the following text:

You can add your own data to the map by selecting the Add Data widget in the top right corner of the page.

You can search and add data from your ArcGIS Online account, add data via a URL, or insert any of the supported file types.

The 'Add Data' widget is open, showing a 'Search' tab selected. Below the search bar, there are tabs for 'URL' and 'File'. The 'File' tab is selected, and a list of supported file types is displayed: ArcGIS Server Web Service, WMS OGC Web Service, WMTS OGC Web Service, WFS OGC Web Service, KML Layer, CSV Layer, and GeoJSON Layer. A search bar is also present in the 'File' tab. Below the list of file types, there is a section for 'Supported formats: Shapefile, CSV, KML, GeoJSON, GPX.' and a 'Drop or browse to upload' area with an 'Upload' button. The background map shows a topographic view of a region in Montana, including Helena and the Big Horn Mountains. A scale bar at the bottom left indicates 10 miles. The footer contains copyright information for Esri, CGIAR, USGS, Montana State Library, Esri, TomTom, Garmin, SafeGraph, FAQ, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USFWS, and US Bureau of Reclamation, along with the text 'Powered by Esri'.



## Step 11 – Identifying Features and Downloading Data

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The screenshot shows the Montana Lidar Inventory web application. The header includes the Montana State Library logo, navigation links (Introduction, Status Dashboard, View, Download, and Request Data, Collaborate, Data Use Survey, Lidar 101 & Imagery, Help Videos), and social media icons. A search bar at the top left contains the text "Address, Parcel, Quad, Project Name". The main map area displays a topographic view of a forested region with a specific quad highlighted in cyan. A popup window is open on the right side of the map, titled "Quads with downloadable lidar: Belt Park Butte 46110h7". The popup contains a "Zoom to" button and a text block explaining that the link below will provide a .zip file containing the bare-earth DEM, Digital Surface Model, intensity and hillshade for all lidar projects available by download within the selected quad. A yellow circle highlights the "Click here to Download" link. In the top right corner of the popup, a tab indicator shows "1 of 3".

Once you have navigated to an area of interest, click within the map to reveal the **Popup Window** that displays selected attributes of the Data Layers.

Only layers that are checked on in the Layer List and visible in the Legend will have a popup window open when you click in the map.

The topright of the popup window shows how many layers have been opened (3 in this example). If there are several layers visible, then click through the left and right arrows on the popup window (top left) to view information about the other visible layers.

**Click on Links ("View") in the Popup to Download Data or View Reports**

## Step 12 – Viewing Layer Attribute Tables

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Address, Parcel, Quad, Project Name

Clicking the action button and selecting "View in table" will bring up your selected record in the attribute table.

To open/close the Attribute Table(s) for existing layers click on the arrow at the bottom of the map screen.

You can access Lidar Project Quads by clicking on these words.

Enable clicking the map to get the coordinates

**Lidar Projects: Statewide Phase 3 USGS 3DEP FY2021 - CASCADE**

View in table Export

Collection Status Completed

Collection Dates

ExpectedMonthYear

Project Description Available the LidarExplore in Montana through the Working Gro the Montan

Selected (1)

Zoom to

View in table

Pan to

Show on map

Export

All data (207)

Set filter

Zoom to

Pan to

Statistics

Export

**Lidar Projects** Quads with Downloadable Lidar

Project Name	Collection Status	Collection Dates	ExpectedMont...	Project Descrip...	Square Miles			
CARTER_2018_SGrou...	Completed	summer 2018		This project contains a co...	2,444.21			
MISSOULA_2019_ClrkFr...	Completed	April - June 2019		In February 2019, an ame...	819.13			
DEERLODGE_2019_DLcni...	Completed	June 2019		Base Specification Version...	789.23	<a href="#">View</a>	<a href="#">View</a>	<a href="#">View</a>
LINCOLN_2020_LNcntyQ...	Completed	07/29/2019-08/06/2019, ...		Aerial LiDAR data and deri...	1,937.64	<a href="#">View</a>	<a href="#">View</a>	<a href="#">View</a>

Turn column headings on or off by using the show/hide columns button (the button looks like an eye).

Click on the column headings to sort the data.

Attribute table options can be found by clicking the four white dots. Exports, Filters, and Statistics can be found here.



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Clicking the Selection button will bring up the selection popup