

https://www.mtmemory.org

MONTANA STATE LIBRARY  
A GREATER STATE OF KNOWLEDGE

MONTANA HISTORY PORTAL

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Collections | Contributors | Exhibits

The Montana History Portal is a free online hub for Montana cultural institutions to share their collections with the public.

Search Our Database

Search

Item Type

Date

Within Data

**Administrative Boundaries**  
Legally documented and attributed jurisdictional boundaries.

**Cadastral**  
Tax Parcels, Land Ownership, and Conservation Easements.

**Climate**  
Accurate, timely, and relevant climate data.

**Elevation**  
Spatially references vertical positions above or below a datum surface.

**Geographic Names**  
Names and locations for cultural and geographic features.

**Geology**  
Geologic map data collected from field research.

**Hydrography**  
Networked geometry and attributes representing surface water.

**Hydrologic Units**  
The area of land surrounding a hydrologic feature.

**Land Cover**  
Records natural biological communities and disturbances.

**Mapping Control**  
Locations of monumented points.

**Imagery**  
Georeferenced images of the Earth's surface.

**Soils**  
Polygons representing soil map units and attribution.

**Structures and Addresses**  
Spatial database of primary structures, buildings, and their addresses.

**Transportation**  
Transportation features and attribution.

**Wetland & Riparian**  
Extent, type, and approximate location of wetlands, riparian areas, and deepwater habitats.

**MSDI Contacts**  
Contact information for the MSDI Theme Leads and Stewards.

https://msl.mt.gov/research/state\_publications/

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OFFICIAL STATE WEBSITE

SERVICES AGENCIES LOGIN Search MT.gov Sites

MONTANA STATE LIBRARY  
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ABOUT THE LIBRARY - DIGITAL LIBRARY - SERVICES TO LIBRARIES - TALKING BOOKS

Home > Research > State government information. > **State Government Information.**

## State Government Information

The Montana State Library collects and provides permanent public access to state government information produced by state agencies.

- [MTGov Web Archive](#)
- [Digitized Text Archive](#)
- [Montana Depository Library Program](#)
- [Montana state, local government, and association website locator](#) (xls download)
- [Submit State Publications](#)
- [State Publications Management Plan](#)
- [State Agency Databases](#)
- [Key Principles of Government Information](#)
- [Archived campaign websites for 2018 Montana legislature candidates.](#)

MONTANA STATE LIBRARY  
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Government Information - Digitized Government Publications

The Government Information program is made possible by federal funds from the Institute of Museum and Library Services, with additional state and local support. Discover how federal grants enhance Montana's libraries: Federal Library Funds at Work

# Montana State Library - Digital Library Services


2025 Montana Natural Heritage Program Partners Meeting

12/11/2025





# Agenda

- Digital Library Programs
  - GIS Coordination in Montana
  - Geospatial Data Highlights
    - Montana Spatial Data Infrastructure (MSDI)
    - Imagery
    - Lidar
    - Elevation-Derived Hydro
    - Montana State Realtime Network
  - Wrap Up
  - Questions
- 


# Digital Library Programs

- [Montana Natural Heritage Program](#)
- [GIS Coordination](#)
- [Water Information System](#)
- [Land Information](#)
- [Government Information](#)
- [Montana History Portal](#)
- [Montana State Reference Network](#)
- [Research Resources](#)
- [Talking Book Services](#)

← ↻ 🏠 🔒 https://msl.mt.gov/about/mission/page 🔍 ⋮ ☆ ⚙️ 📌 🌐 ⋮

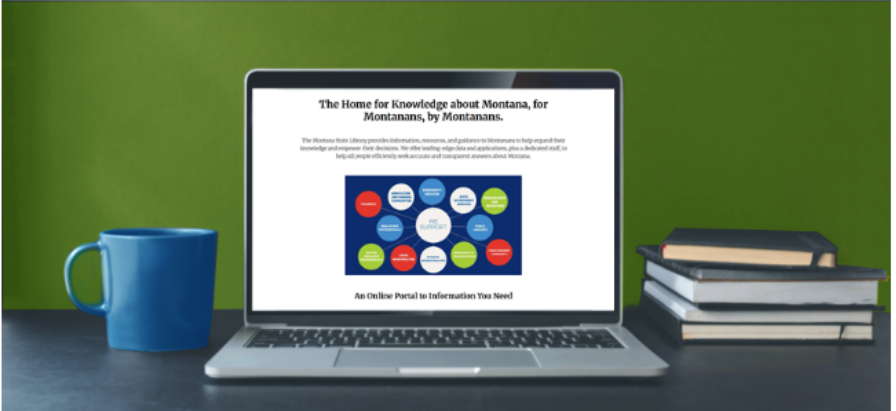
MONTANA.GOV  
OFFICIAL STATE WEBSITE

SERVICES AGENCIES LOGIN Search MT.gov Sites 🔍

 MONTANA STATE LIBRARY  
A GREATER STATE OF KNOWLEDGE

## Using Our Services

### Digital First Reference Services




The Home for Knowledge about Montana, for Montanans, by Montanans.

The Montana State Library provides information, resources, and guidance to Montanans to help expand their knowledge and empower their decisions. We also teaching, organizing and applications, plus a robust staff, to help all people effectively work accurate and transparent answers about Montana.

An Online Portal to Information You Need

Montana State Library is a special government library in which items from our collection are either mailed to patrons or fully accessible online. We follow a digital first reference service model with in-person references services available by appointment.

To make an appointment, please email: [MSLAppointment@mt.gov](mailto:MSLAppointment@mt.gov) or call: (406) 444-3115. If you know the staff member you would like to meet, you can contact them directly. Phone numbers and emails for each staff member can be found at our [Staff Directory](#).

 MONTANA STATE LIBRARY  
A GREATER STATE OF KNOWLEDGE

**CONTACT US:**  
PO Box 201800, Phone: (406)  
or 444-3115  
1201 11th Ave Toll Free: (800)  
Helena, 338-5087  
Montana 59620 TTY: Montana  
Relay 711  
Hours: Monday-  
Friday Accessibility

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# *The State of Montana*

## **GIS Coordination in the State of Montana**



**MONTANA  
STATE LIBRARY**

**GIS COORDINATION**

### Public Land Ownership

- Bureau of Land Management
- US Fish and Wildlife
- National Park Service
- US Forest Service
- US Dept of Agriculture
- Montana State Trust Land
- State of Montana - Miscellaneous



### 2010 Montana Facts

Montana Total Area: 345,860 Sq. Miles | Largest County: Beaverhead, 5,549 Sq. Miles | Smallest County: Silver Bow, 718 Sq. Miles  
Largest City: Billings, Yellowstone County, Population 108,170 | Smallest County Seat: Winnett, Petroleum County, Population 183  
Major Rivers: Yellowstone River, Missouri River, Clark Fork River | High Point: Granite Peak 13,796 ft | Low Point: Kootenai River 1880 ft



# Montana Geospatial Information Act (MGIA)

- State GIS Coordination
- Advisory Council
- **Montana Spatial Data Infrastructure**
- Grant Program
- Geospatial Information Plan
- GIS Coordination Strategic Plan

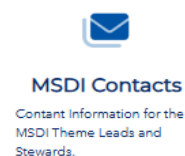
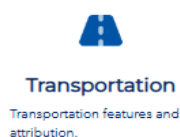
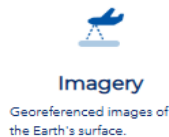
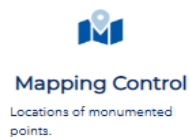
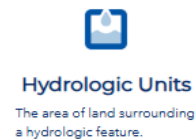
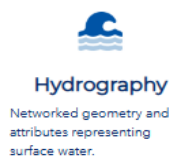
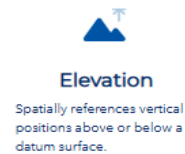
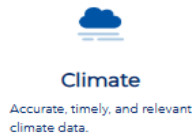
# Montana Geospatial Information Advisory Council

	First	Last	Agency/Organization	Representative Type
1	Allen	Armstrong	Bureau of Land Management	Federal Government Representative
2	Adam	Carpenter*	State Chief Data Officer (Dept. of Admin)	Director of the Dept. of Administration or Designee
3	Maureen	Celander	Custer County	County or Municipal Government Representative
4	Nick	Youngstrom	MT Dept. of Natural Resoures & Conservation	State of Montana Executive Branch Department Director
5	Vacant		tbd	Tribal Government Interests Representative
6	Valentijn	Hoff	University of Montana - Fire Center	Montana University System Representative
7	Joseph	Kauffman	MARLS	Montana Association of Registered Land Surveyors Representative
8	Vacant		tbd	Private Business (Active in GIS) Representative
9	Lee	Macholz	City of Missoula	County or Municipal Government Representative
10	Eric	Spangenberg	MAGIP Rep (City of Helena/LC County)	Montana Association of GIS Professionals Representative
11	Jennie	Stapp*	State Librarian	State Librarian or Designee - Serves as Presiding Officer
*Denotes Permanent Member				

# Montana Spatial Data Infrastructure

## Montana Spatial Data Infrastructure (MSDI)

The Montana Spatial Data Infrastructure (MSDI) is made up of fifteen (15) framework geographic data themes vital to Montanans for viewing, analyzing, exploring, and understanding its expansive and complex geography. Eight (8) themes are federally defined framework themes. Seven (7) additional framework layers were selected by the Montana Geospatial Information Advisory Council (MGIAC).



- Stewarding Agency
- Theme Lead
- Statewide Datasets
  - Downloadable
  - Web Services
  - Metadata
  - Applications
- Working Group – open to all

# Working Groups - Get Involved!

Framework Theme	Steward	Lead
<a href="#">Administrative Boundaries</a>	Montana State Library	<a href="#">Meghan Burns</a>
<a href="#">Cadastral</a>	Montana State Library	<a href="#">Jeff Hedstrom</a>
<a href="#">Climate</a>	<a href="#">University of Montana</a>	<a href="#">Dr. Kelsey Jencso</a>
<a href="#">Elevation</a>	Montana State Library	<a href="#">Troy Blandford</a>
<a href="#">Geographic Names</a>	Montana State Library	<a href="#">geoinfo@mt.gov</a>
<a href="#">Geology</a>	<a href="#">Montana Bureau of Mines &amp; Geology</a>	<a href="#">John Sanford</a>
<a href="#">Hydrography</a>	Montana State Library	<a href="#">Troy Blandford</a>
<a href="#">Hydrologic Units</a>	<a href="#">Natural Resources Conservation Service</a>	<a href="#">Nathan Parry</a>
<a href="#">Land Cover</a>	<a href="#">Montana Natural Heritage Program</a>	<a href="#">Jessica Mitchell</a>
<a href="#">Mapping Control</a>	Montana State Library	<a href="#">Bob Holliday</a>
<a href="#">Imagery</a>	Montana State Library	<a href="#">Erin Fashoway</a>
<a href="#">Soils</a>	<a href="#">Natural Resources Conservation Service</a>	<a href="#">Nathan Parry</a>
<a href="#">Structures &amp; Addresses</a>	Montana State Library	<a href="#">Michael Fashoway</a>
<a href="#">Transportation</a>	Montana State Library	<a href="#">Michael Fashoway</a>
<a href="#">Wetlands &amp; Riparian</a>	Montana Natural Heritage Program   Montana Department of Environmental Quality	<a href="#">Bryce Maxell</a>   <a href="#">Steve Carpenedo</a>

<https://msl.mt.gov/geoinfo/data/msdi/> - Contact Theme Lead today!

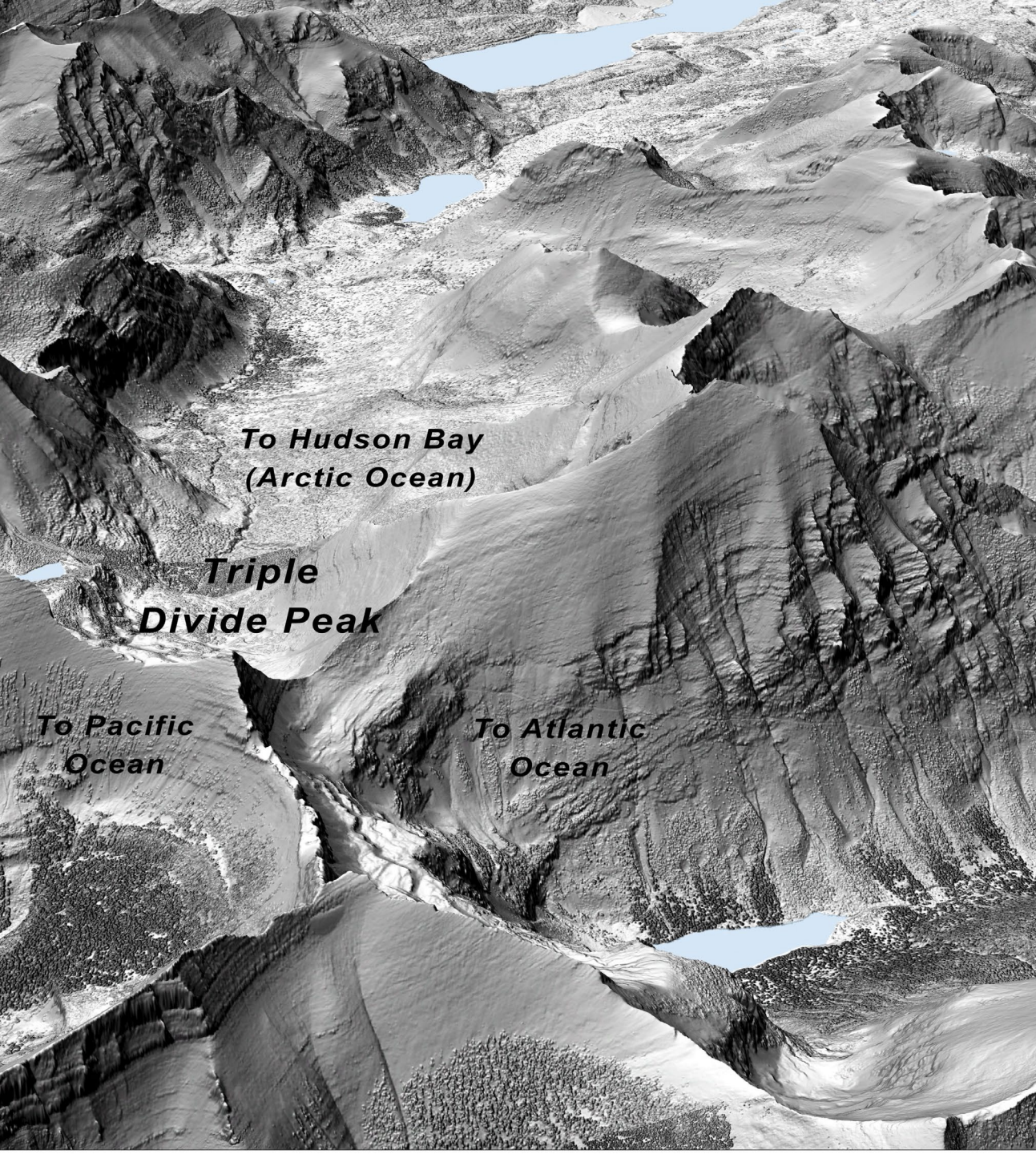


# ***Collaboration: MSDI Working Groups***

- Develop Standards for Imagery Data
- Create an Inventory of Existing Data
- Understand Business Uses and Critical Activities
- Explore Cost Efficiencies of Shared Resources
- Develop MSDI Imagery Plan







# Montana Geospatial Information Act Grant Program

- Cancelled State Fiscal Years 2025-2026 – due to funding downturn
- Reopening for State Fiscal Year 2027.
- Grant program priorities are set through the Geospatial Information Plan
- Two Year Program
- Eligible Recipients
  - local, state, & tribal government entities & Montana universities

## 4 MONTANA GEOSPATIAL INFORMATION ACT GRANT PROGRAM

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### 4.1 Prioritize Grant Awards that directly impact the improvement of the MSDI Framework Thems & Data Initiatives in *Figure 4.1*:

MSDI Framework Theme Grant Priorities	
Administrative Boundaries	Hydrography
Cadastral	Transportation
Elevation	Structures & Addresses

Key Geospatial Data Initiatives:
NG9-1-1 Data Development
Geo-Enabling Montana's Elections
3DHP/Elevation Derived Hydrography

*Figure 4.1*

### 4.2 Conduct an internal review of the MGIA Grant Program

- Present internal review findings to the Council.
- Act on findings, recommendations, and advice from the Council.

### 4.3 Improve Communication for the MGIA Grant Program's Grant Criteria

- Conduct outreach, create/record webinars, oversee in-person trainings, etc.



# Imagery





# Imagery

- MT statewide imagery is **NAIP**
  - Nine NAIP collections since 2005 (approx. every 2 years)
- NAIP **2025** collected
  - at 30 cm resolution in MT!
  - County mosaics **now available**
  - Web services TBD
- Other ad hoc collections

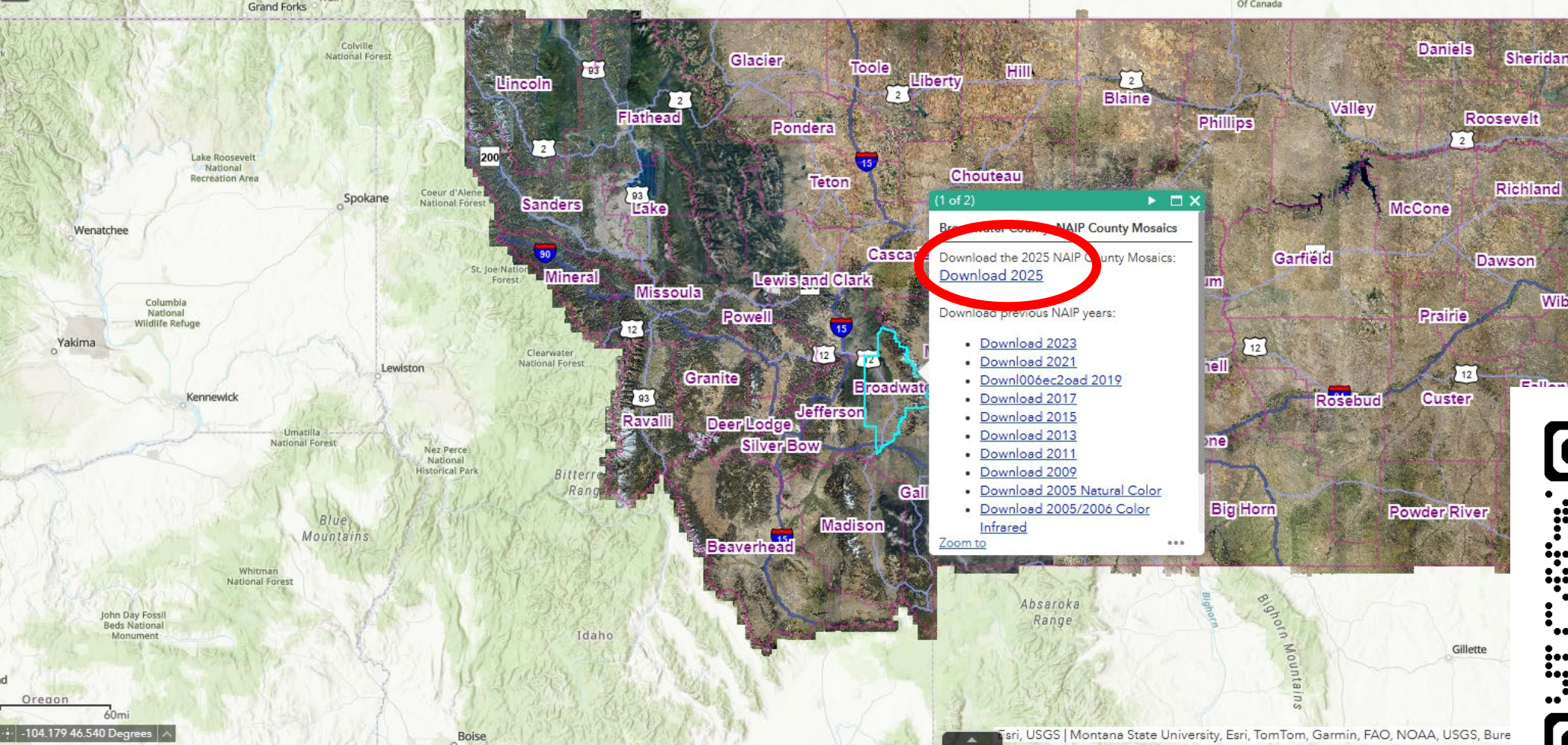
2021 (60 cm)



2025 (30 cm)



Address, Parcel, & Quad St



(1 of 2)

Download the 2025 NAIP County Mosaics:

[Download 2025](#)

Download previous NAIP years:

- [Download 2023](#)
- [Download 2021](#)
- [Download 2019](#)
- [Download 2017](#)
- [Download 2015](#)
- [Download 2013](#)
- [Download 2011](#)
- [Download 2009](#)
- [Download 2005 Natural Color](#)
- [Download 2005/2006 Color Infrared](#)

[Zoom to](#)

Layer List

Layers

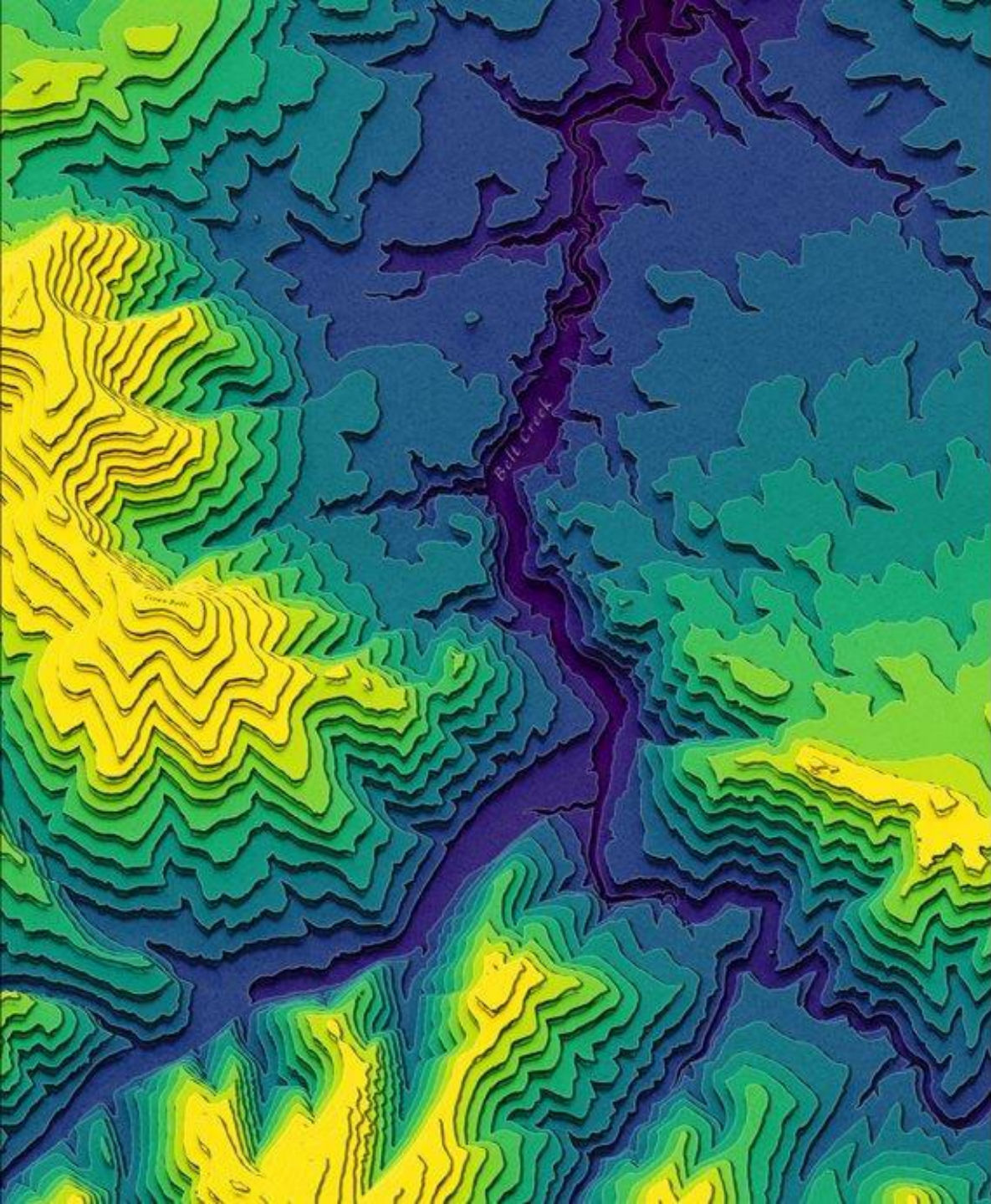
- ☒ Download NAIP County Mosaics (2005-2025) ...
- ☒ NAIP Photo Dates ...
- ☒ Download DOQQ Tiles ...
- ☒ Montana DOQQ Photo Dates ...
- ☒ Montana Historic Imagery Mid 20th Century Photo Dates ...
- ☒ Flathead 2009 Ortho Mosaic Index ...
- ☒ Parcels ...
- ☒ StateBaseMap ...
- ☒ NAIP\_2023 ...
- ☐ NAIP 2023 Infrared ...
- ☐ NAIP 2023 NDVI ...



# Elevation - Lidar







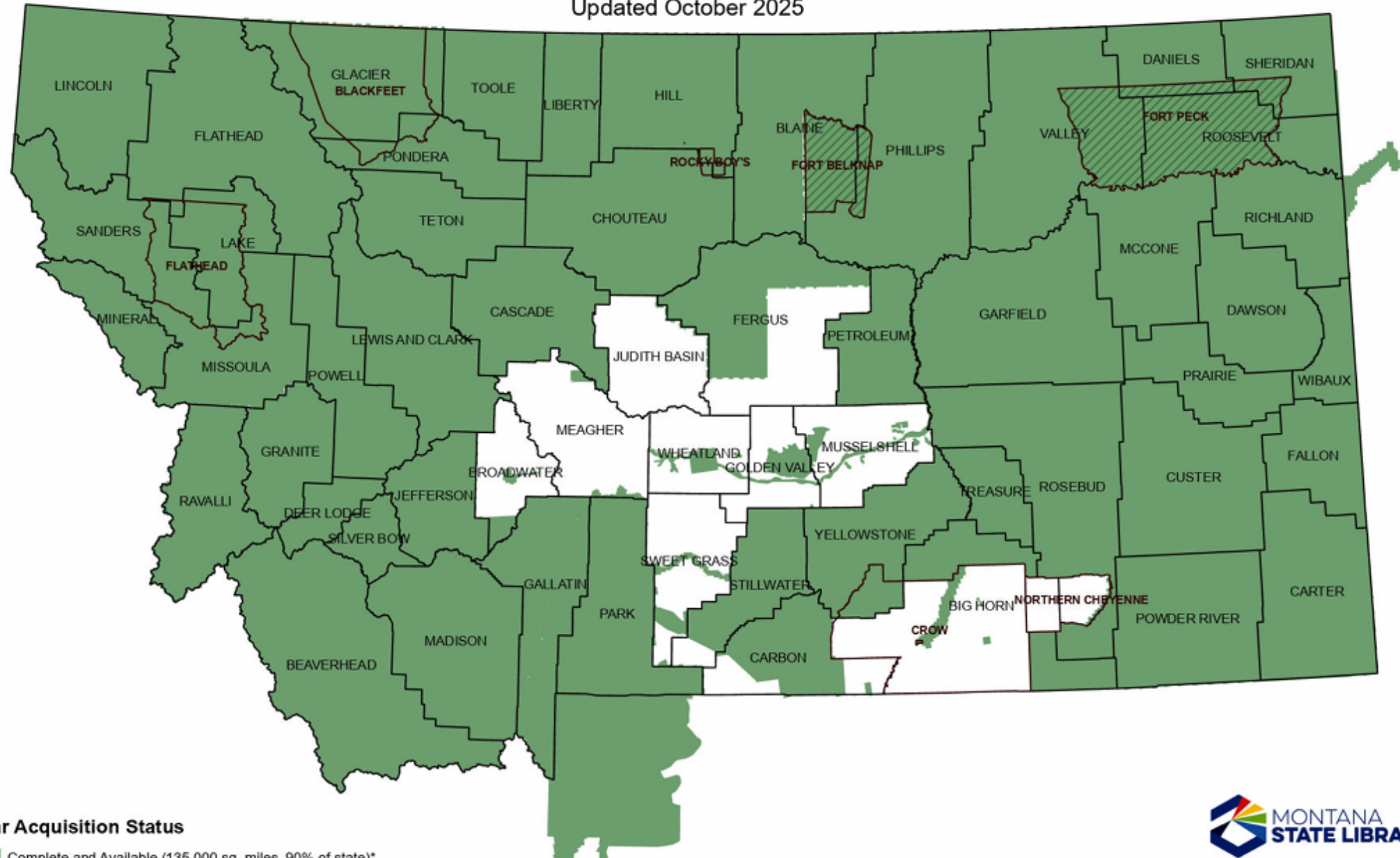
## LiDAR (Elevation Data)

- MSL serves in a coordination role finding partners to acquire lidar through the **USGS 3D Elevation Program (3DEP)**.
- Kicked off in 2019
- From meters (current) to centimeters (future) accuracy
- Ubiquitous access



# Montana Lidar Inventory

Updated October 2025



## Lidar Acquisition Status

Complete and Available (135,000 sq. miles, 90% of state)\*

Complete (not available at MSL)

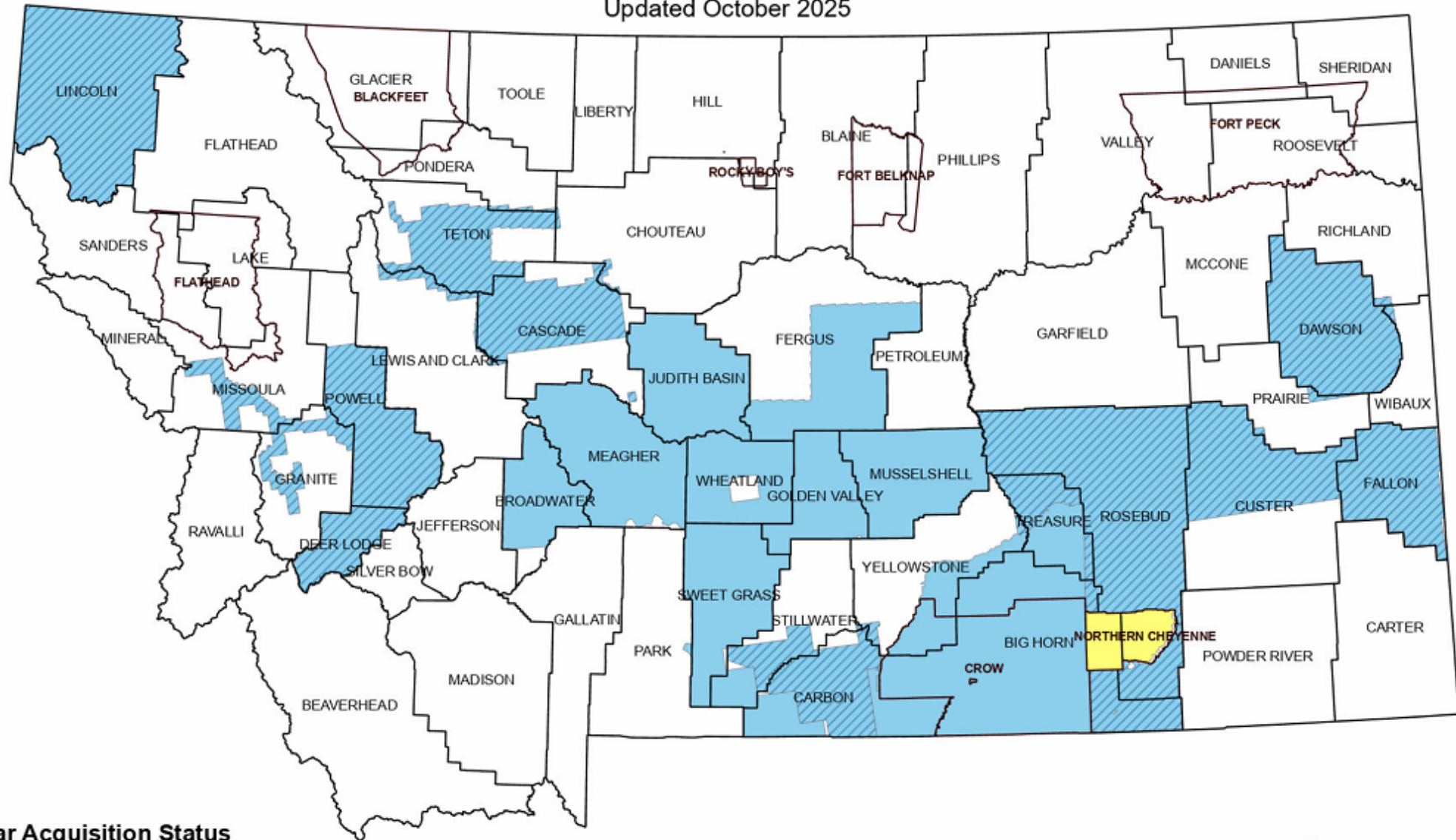
\*Includes overlapping projects and Yellowstone National Park






Map updated October 3, 2025  
Map number: 19MT0010  
<https://msl.mt.gov/gis/lidarinventory>

# Montana Lidar Inventory

Updated October 2025



## Lidar Acquisition Status

-  In Progress (45,000 sq. miles)\*
-  In Progress (Reacquire)
-  Planned

\*Includes overlapping projects and Yellowstone National Park



Map updated October 3, 2025  
Map number: 19MT0010  
<https://msl.mt.gov/gis/lidarinventory>



# Spot the Difference

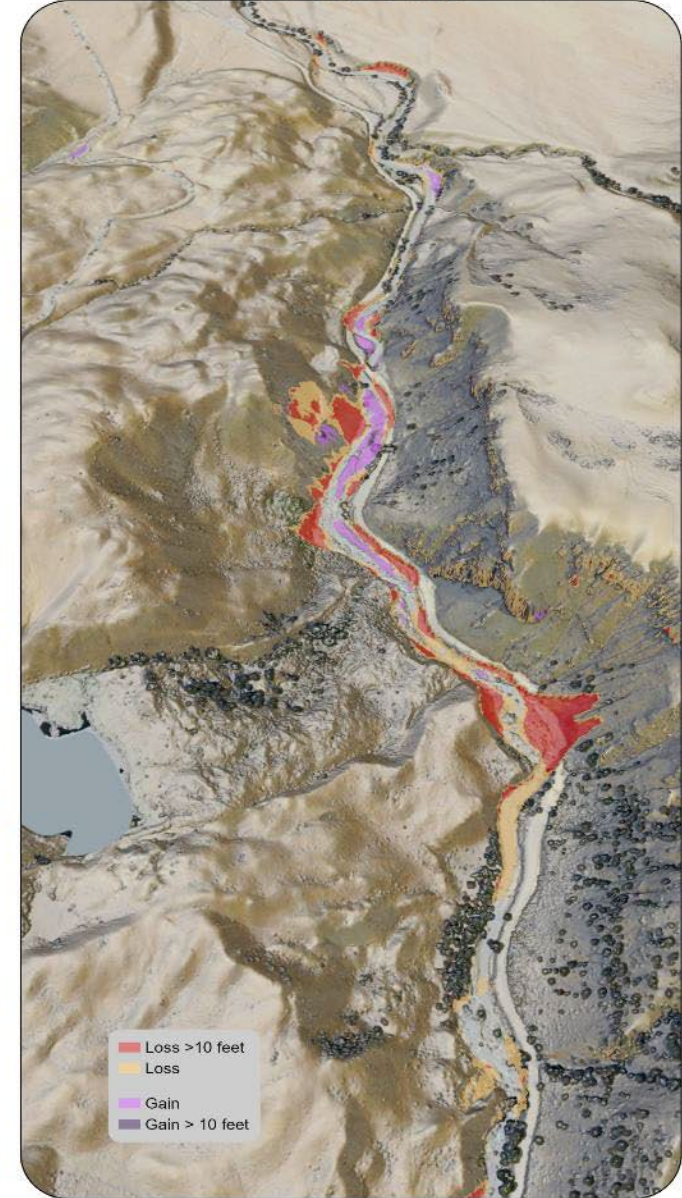
2020



2023



Difference

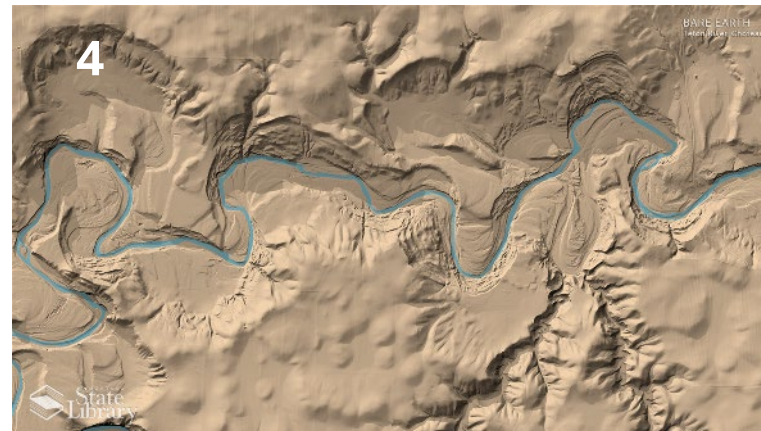
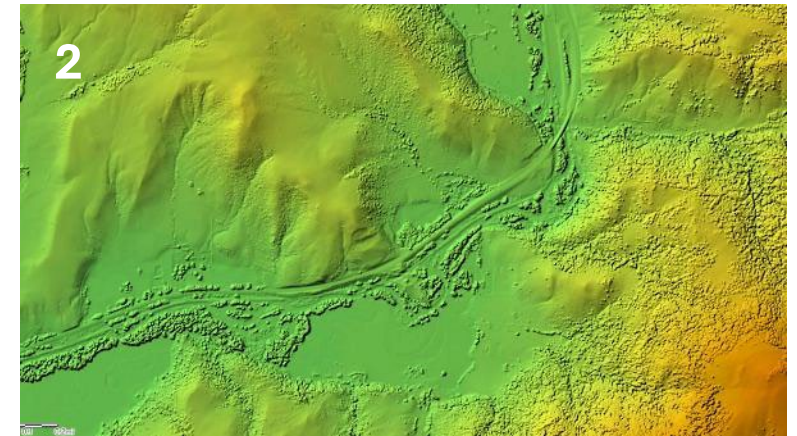
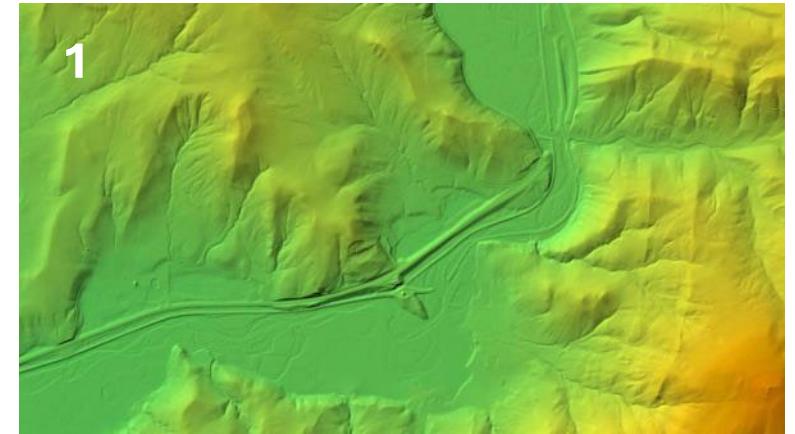




# What is available?

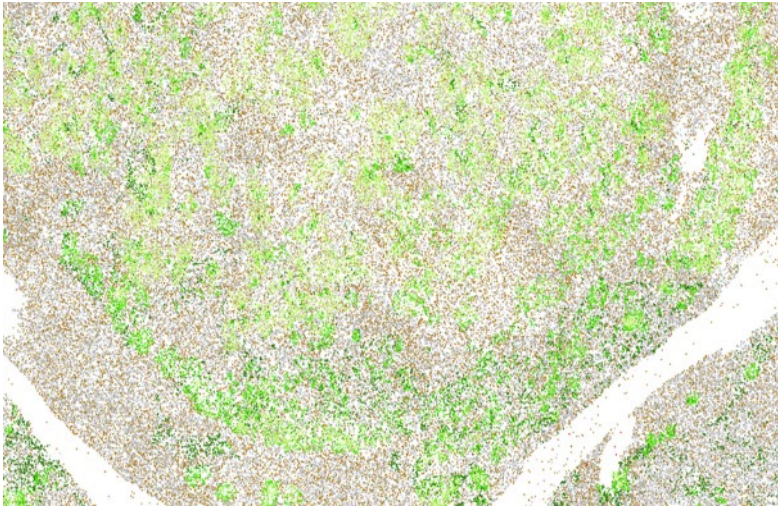
## Core Products (1 meter resolution)

1. Bare-earth Digital Elevation Model
2. Digital Surface Model
3. Canopy Height Model
4. Hillshade
5. Intensity image





# Point Cloud



# Water breaklines



# Control



# Reports and metadata

LocationData	11/3/2020 9:48 AM	File folder
Metadata	6/23/2020 1:28 PM	File folder
Mosaics	9/27/2021 2:11 PM	File folder
PointCloudData	7/21/2021 9:48 PM	File folder
Quads	10/5/2021 4:38 PM	File folder

# Building footprints



# Contours










# USGS National Map – LidarExplorer



USGS  
science for a changing world

≡ 3DEP LidarExplorer

[Search](#) [Process](#) [About](#)

LIDAR ▾ Type a lidar project name

BASE MAP

≡

Which product are you interested in?

LIDAR

DEM

OTHER

☒ Show where Lidar is available.

☐ Show Topobathy Lidar.


Click on the map to retrieve information about a lidar project.

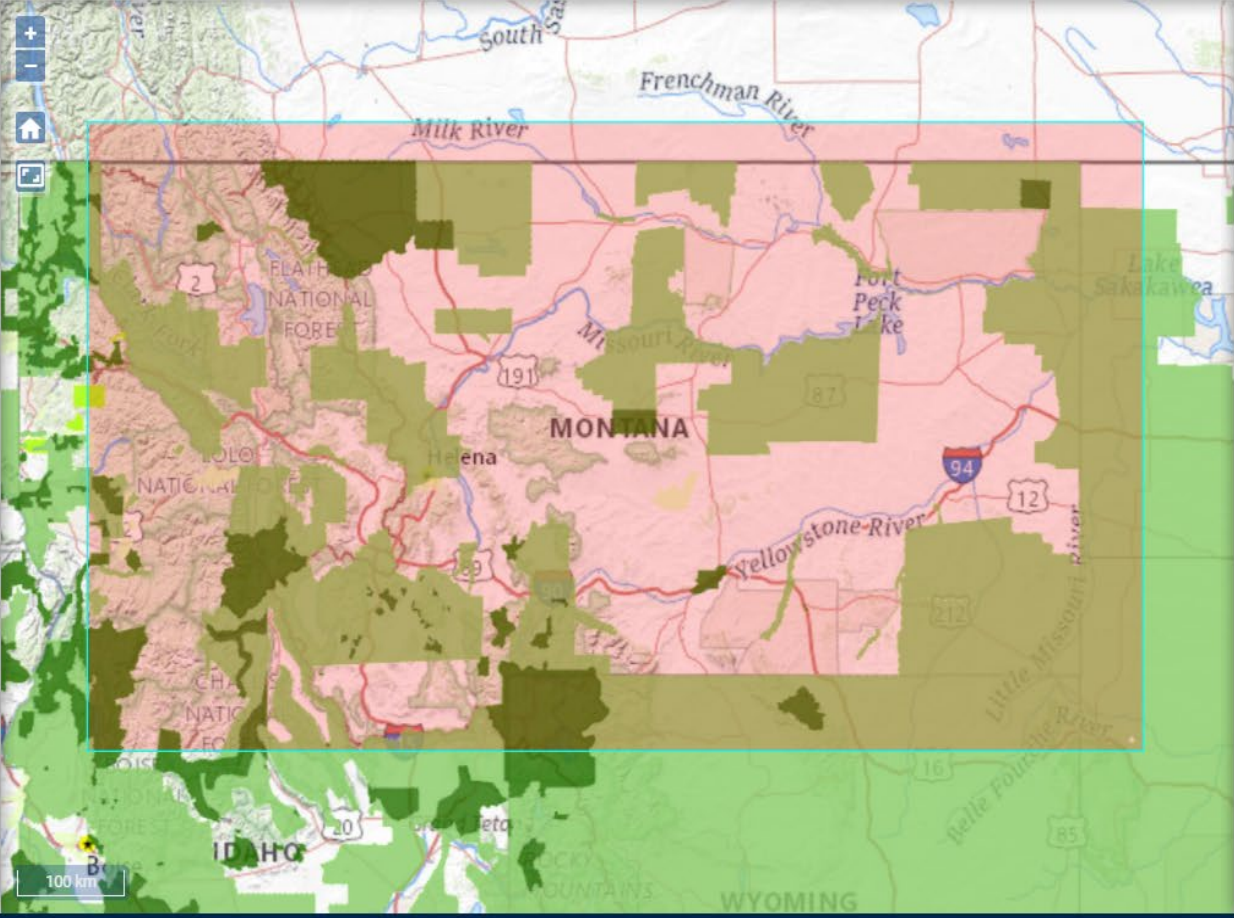
Show options for filtering the lidar map display? ▾

Show Legend


More Info


☒ Show AOI Results






MT GlacierNP 2016






▾


MT Stillwater 2016






▾


ID NezPerce QL2 2016






▾


ID Nez Perce QL2 TL 2016






▾


ND 3DEPProcessing 4 D22






▾


SD NRCS DAS 2017






▾


SD NRCS PAR 2017






▾


SD NRCS FL






▾


SD NRCS FL






▾


ID FEMAHQ






▾


MT NRCS B:






▾

MT NRCS B:





▾



# Comparison – When to use each app?

## MSL – Montana Lidar Inventory

- Download full-project mosaics (~countywide) - geotiff
- Download by 24K quadrangle - geotiff
- State-led collections
- LAZ/LAS by request only
- Additional derived products:
  - DSMs, canopy height, hillshade, and bare-earth
  - Building footprints and contours (where available)
  - Additional point cloud classification (some areas)
- Older lidar projects (>6 years)
- Data that have not yet been accepted by USGS 3DEP

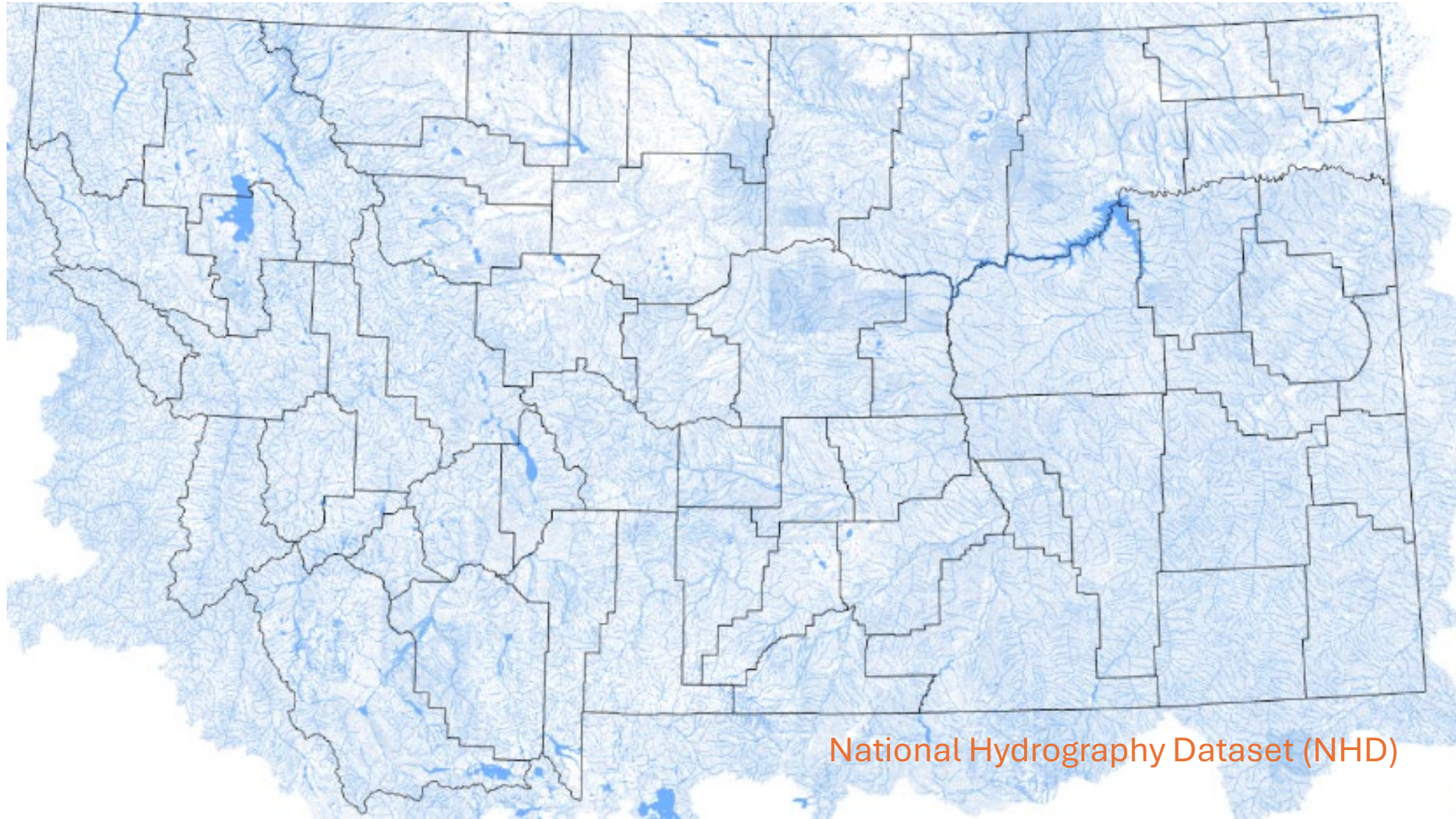
## USGS – National Map

- Download tiles (~1km by 1km tiles)
- USGS-led collections, State contributed data pending
- Newest of new data releases (work units)
- Download LAZ
- Lidar outside of Montana
- Primary focus is bare-earth
- Only lidar that meets USGS 3DEP Specifications\*



# Hydrography

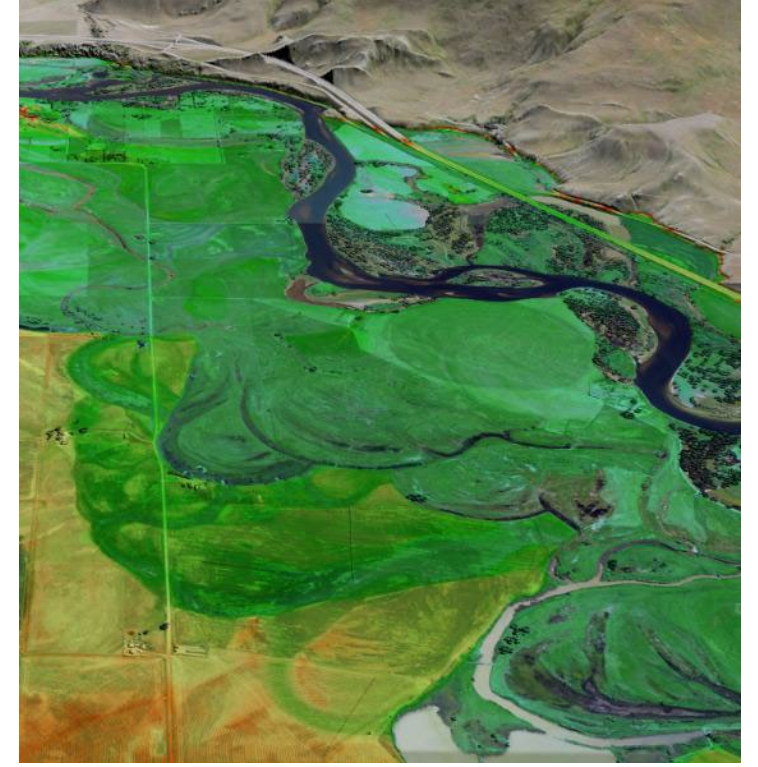
## Mapping Montana's rivers, streams, canals, lakes and other waterbodies





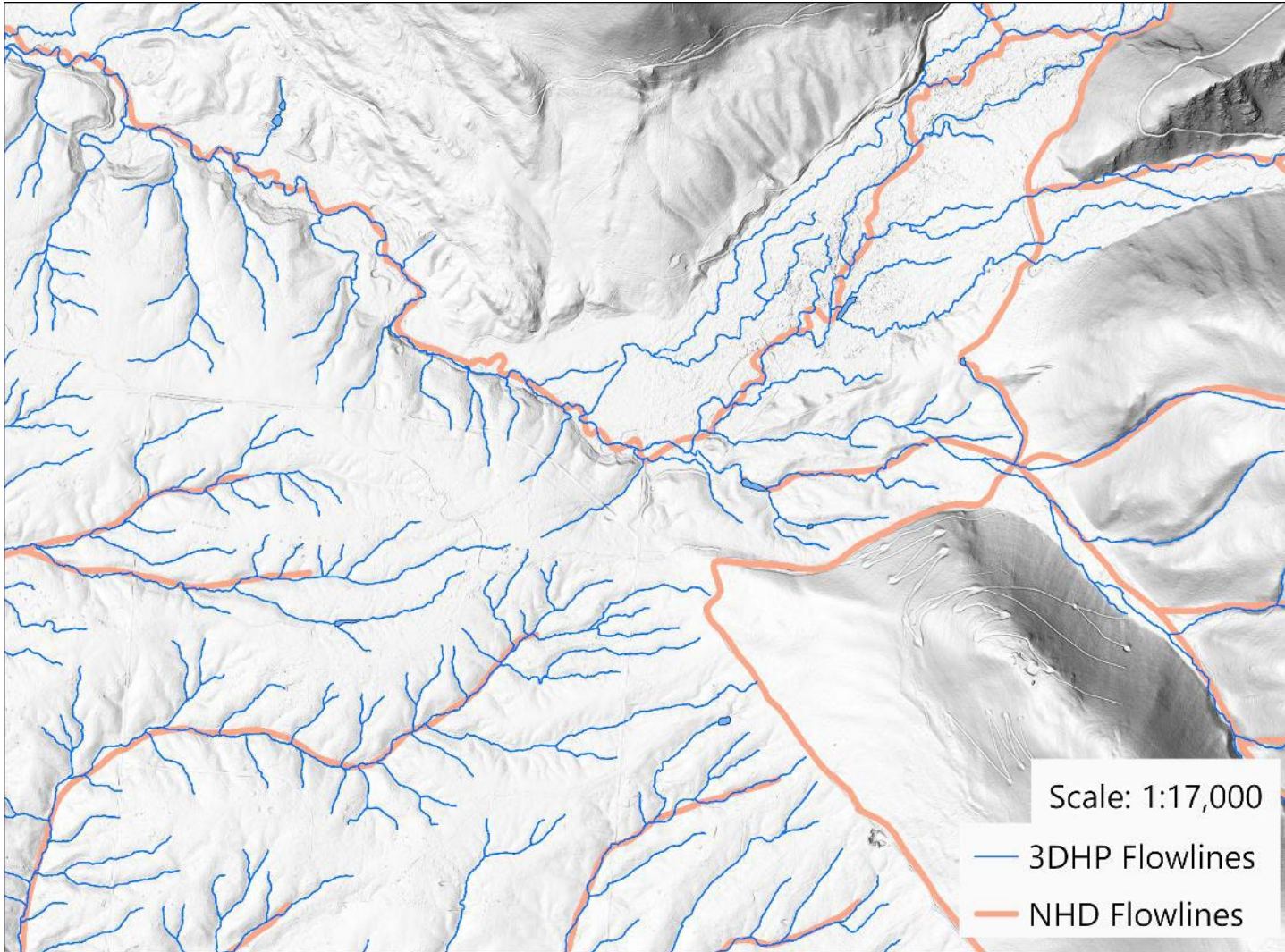
# High-accuracy elevation data (LiDAR) informs stream mapping

Topography and water shape each other



Water flows downhill > Align hydrography with elevation data

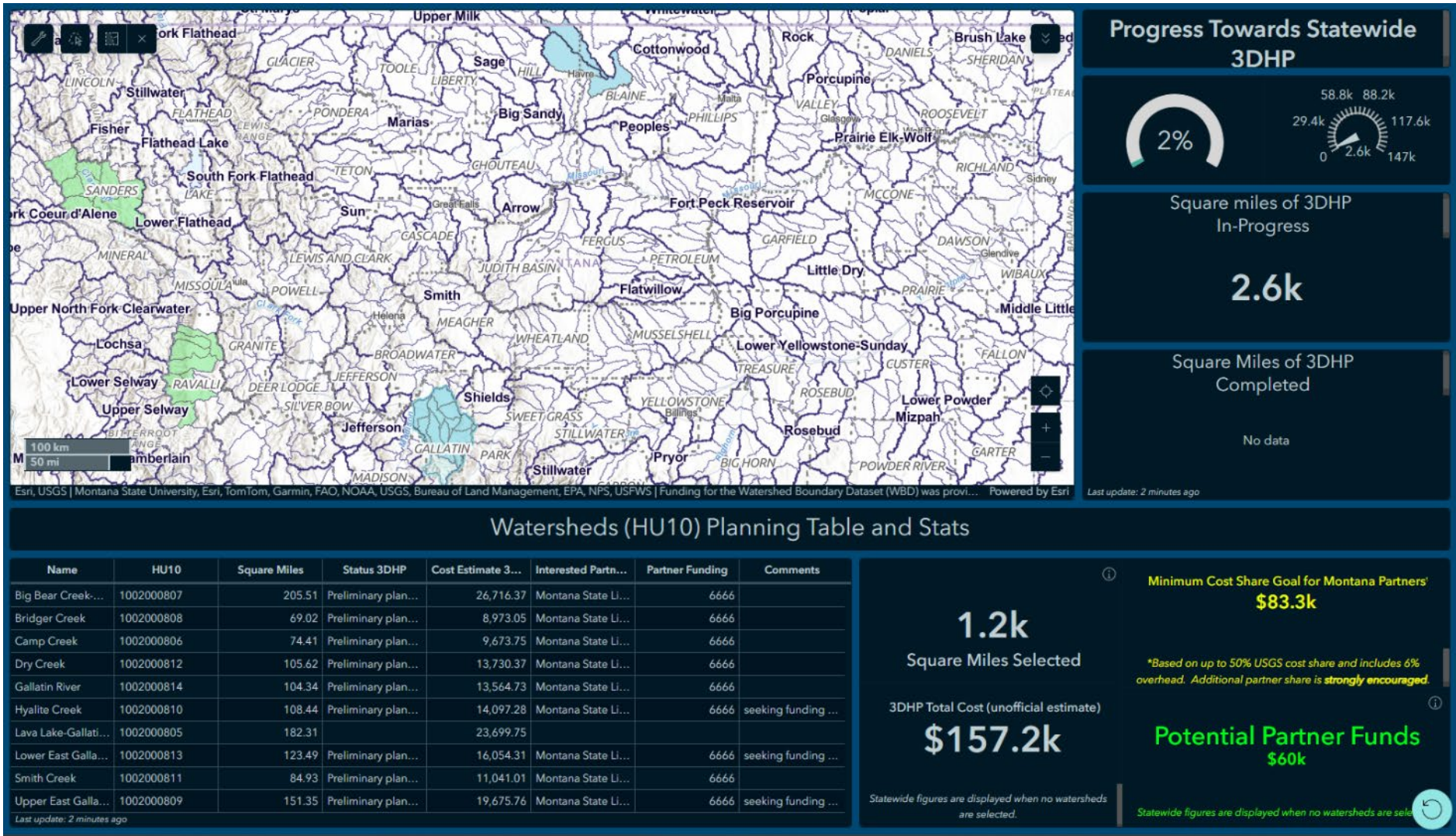
# NHD & EDH comparison - Montana



Swamp Creek in the  
Lower Noxon  
Reservoir HU-10,  
Sanders County, MT



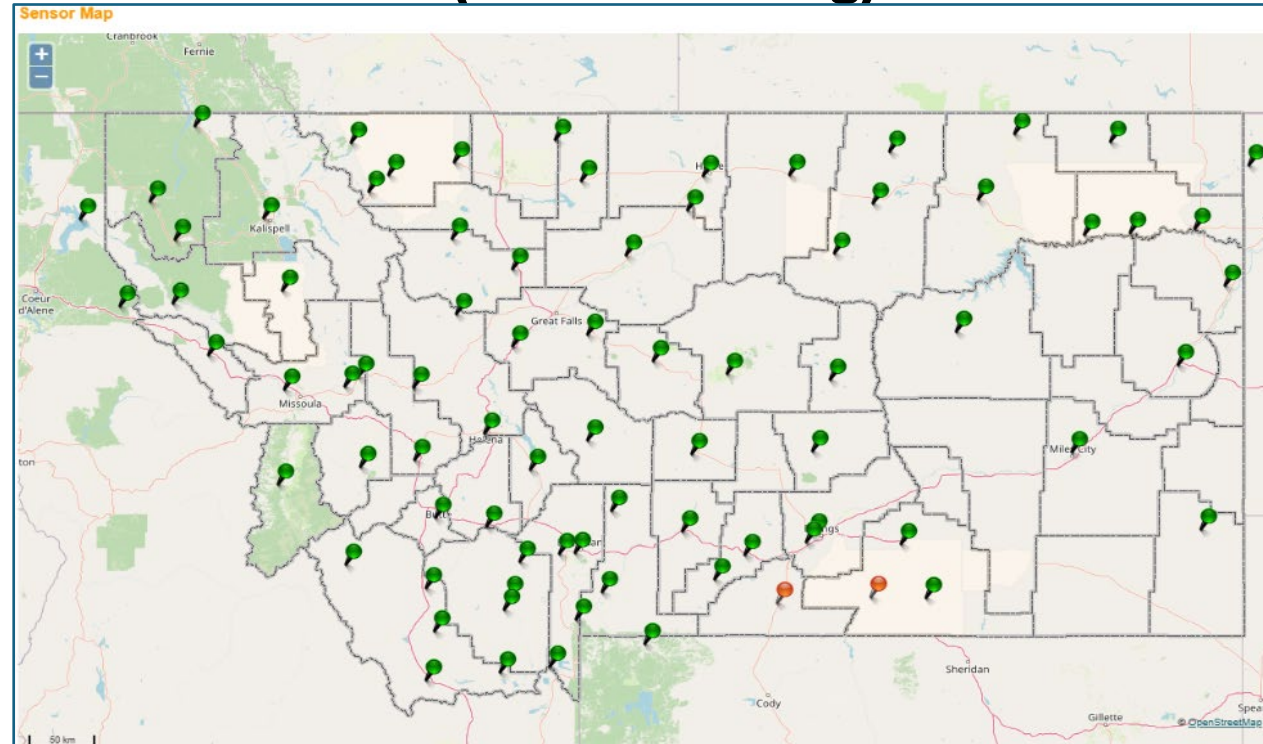
# Montana's 3DHP Planning Dashboard



# Real Time Network (RTN)

- 80 Reference Stations
- Represent true positions in current national datum
- Uninterrupted power supply and internet connection to receiver
- Low impedance antenna cable

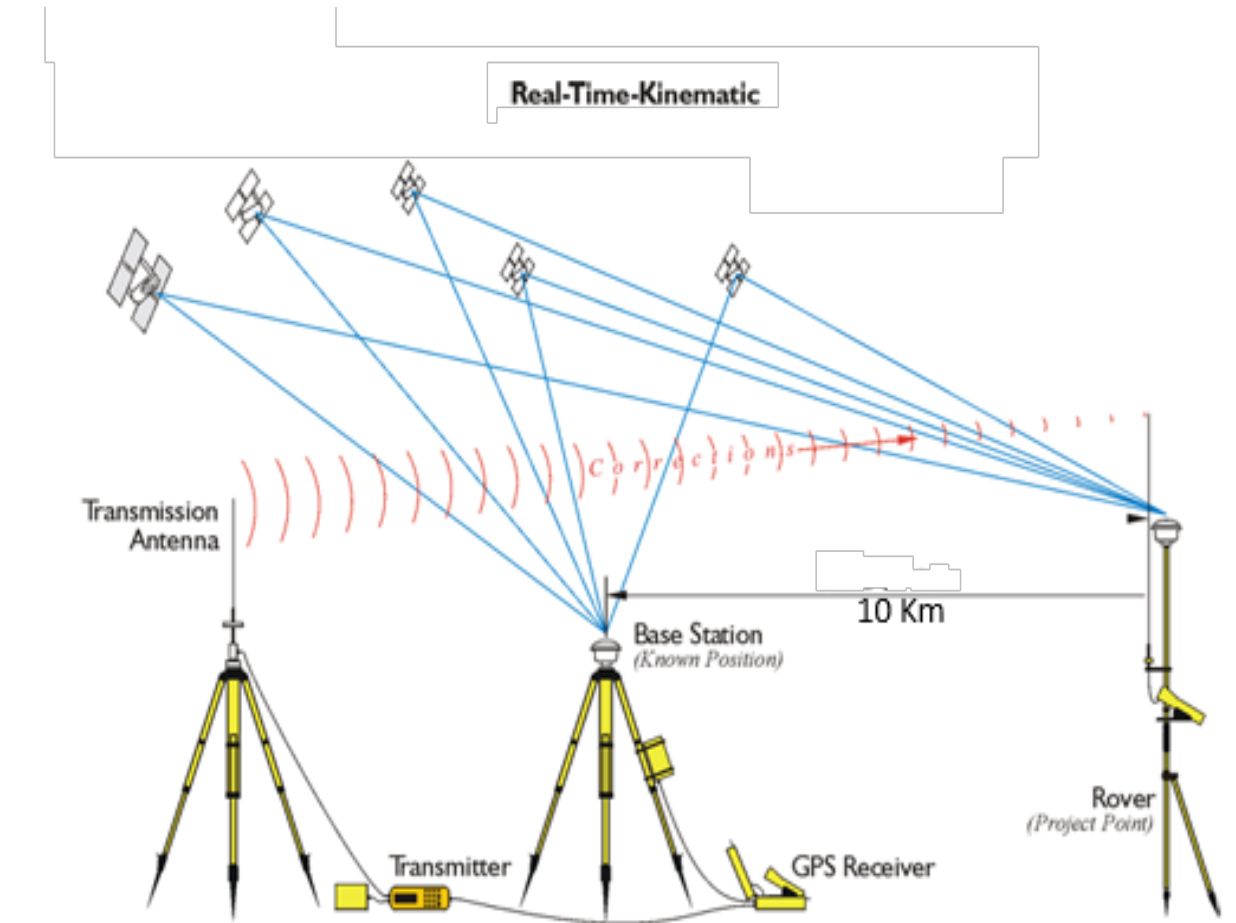
## Montana State Reference Network (MTSRN) ([www.mtsrn.org](http://www.mtsrn.org))





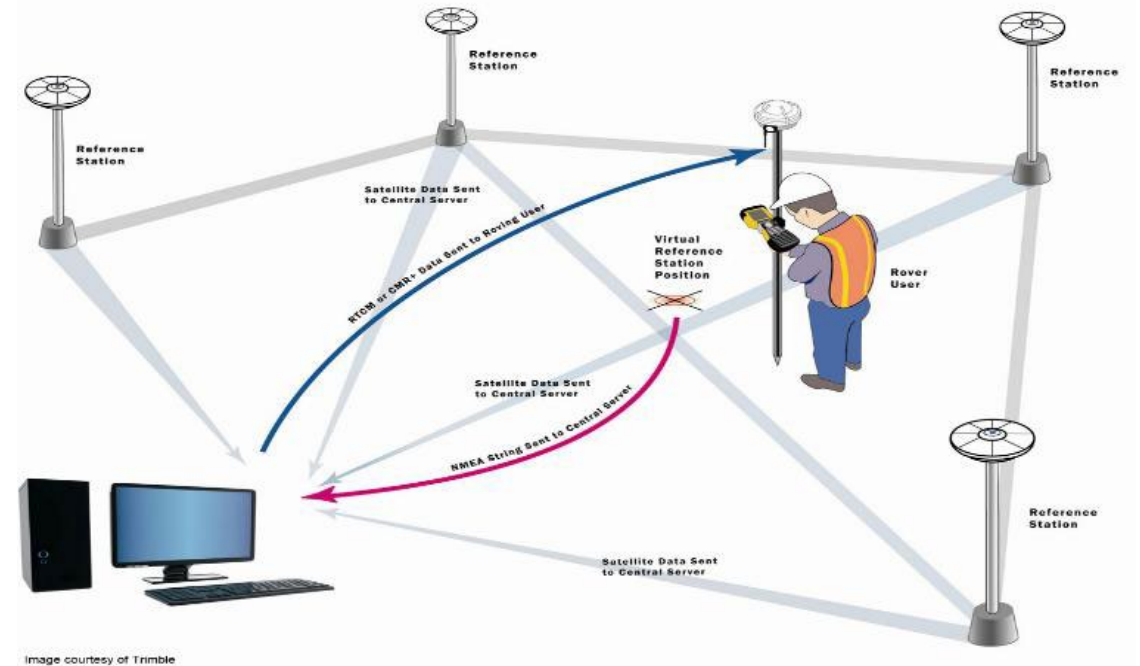
# Real Time Kinematic (RTK)

- A relative positioning technique where one antenna is set on a static point with fixed coordinates (base station). Base station transmits raw observations to rover in real time and rover can use both the rover and base observations to compute its position relative to the base station
- The precision of RTK decreases as the length of baseline increases
- To overcome this base-to-rover range limitations, **Real-Time Network (RTN)** was developed



# Real Time Network (RTN)

- Stations collect real time GNSS observations and send to a Central Processor Center (CPC)
- MTSRN uses Trimble Pivot Platform (v.5.2.3)
- CPC determines real time solutions and computes errors
- sends correction to rovers located within the bounds of the network
- Trimble uses Virtual Reference Station (VRS) concept to send correction to the rover



## Benefits to the user

- No base station necessary; no security issue with the base, no lost time setting up and breaking down the base
- Ionospheric, tropospheric and orbital errors are drastically reduced and interpolated to the site of the rover
- Since it complies NSRS, user data will fit seamlessly across the RTN coverage
- Different output formats (RTCM, CMR) are readily available
- RTN quality can be checked using OPUS

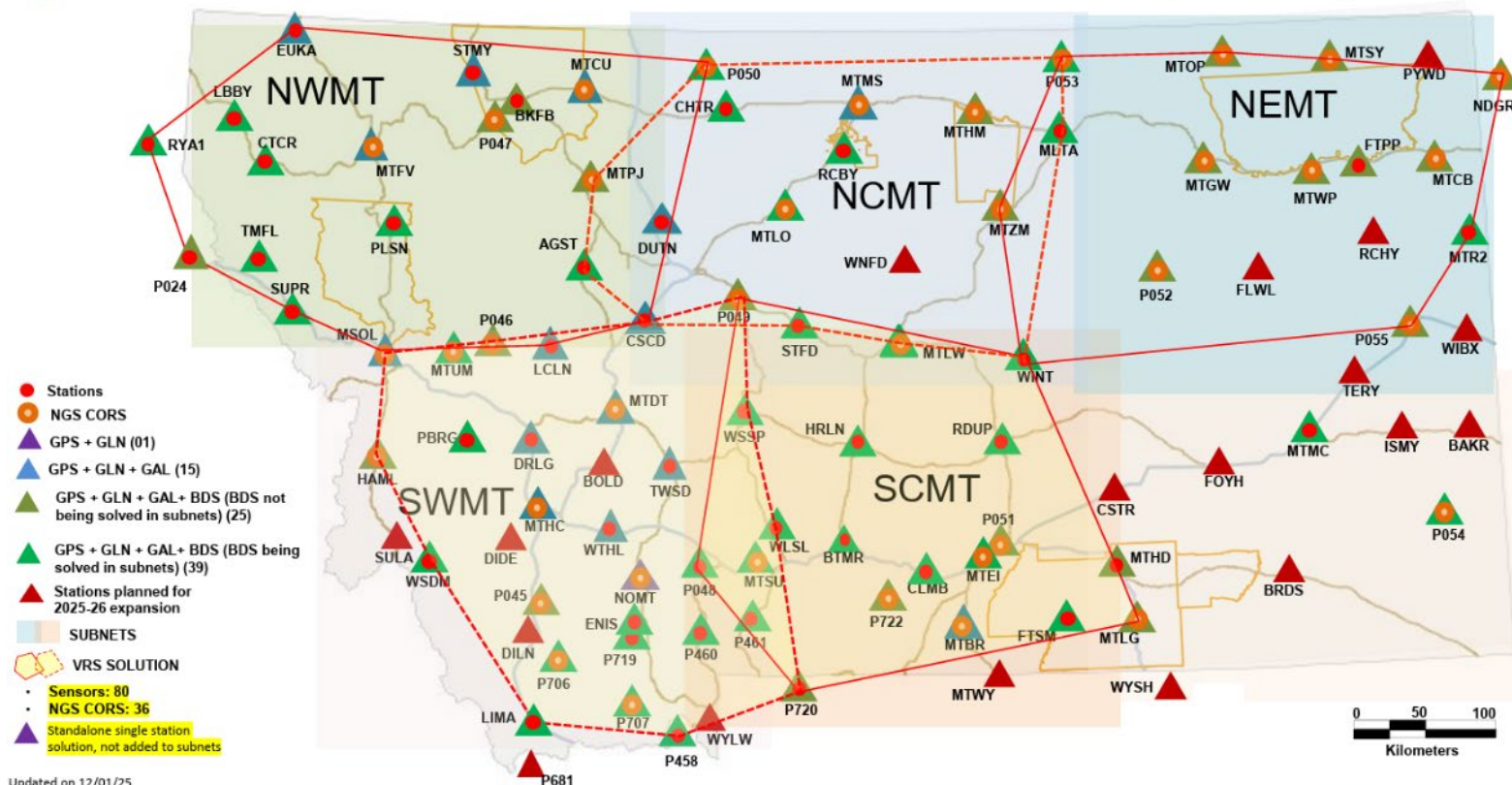


# RTN Solutions

- 5 subnets: NEMT, NCMT, NWMT, SWMT and SCMT
- Solutions:
- relative to each subnet and
- relative to each station



## Montana State Reference Network (MTSRN)



Updated on 12/01/25

[www.mtsrn.org](http://www.mtsrn.org)

Subscriptions: [www.msl.mt.gov/mtsrn](http://www.msl.mt.gov/mtsrn)

[mtsrn@mt.gov](mailto:mtsrn@mt.gov)

# MTSRN Account Types

- Trial Account for a month: Free of Cost
- Academic Account: Free of Cost
- Contributor Account: Free of Cost
- Paid Account: \$1500/year
- Create MTSRN trial account
- Register your information through [www.mtsrn.org](http://www.mtsrn.org) and submit
- Visit [www.msl.mt.gov/mtsrn](http://www.msl.mt.gov/mtsrn) and find MTSRN resources



# MTSRN – RTN Coordinator

Contact the MTSRN Coordinator Kazi Arifuzzaman

*Kazi Arifuzzaman*

Montana State Library

[mtsrn@mt.gov](mailto:mtsrn@mt.gov)

406-444-0240



# Key Take Aways

- MSL is the coordinating body for MSDI Data.
- Partnership is necessary for MSDI Data Layers.
- Lidar for Montana is here. Come and get it!
- The hydrography dataset is being modernized using lidar.
- Montana State Reference Network (MTSRN) is used for real-time, high-accuracy GPS positioning and benefits many partners.



**MSDI Working Groups are open to  
anyone interested**

**Welcome to join future meetings!**

**MSL Email Updates**





# Bios

Erin Fashoway, Montana GIS Coordinator

Mini Bio

- Spatial Data Infrastructure
- Transportation
- College Instructor
- Water & Sewer



Troy Blandford, GIS Lead

Mini Bio

- LiDAR
- Water Information
- GIS & Remote Sensing
- Env. Science/Biology



Kazi Arifuzzaman, Montana RTN Coordinator

Mini Bio

- RTN Operator & Coordinator
- Geodetic Coordinator
- College Instructor





# Thank You

*Please reach out with your questions:*

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