



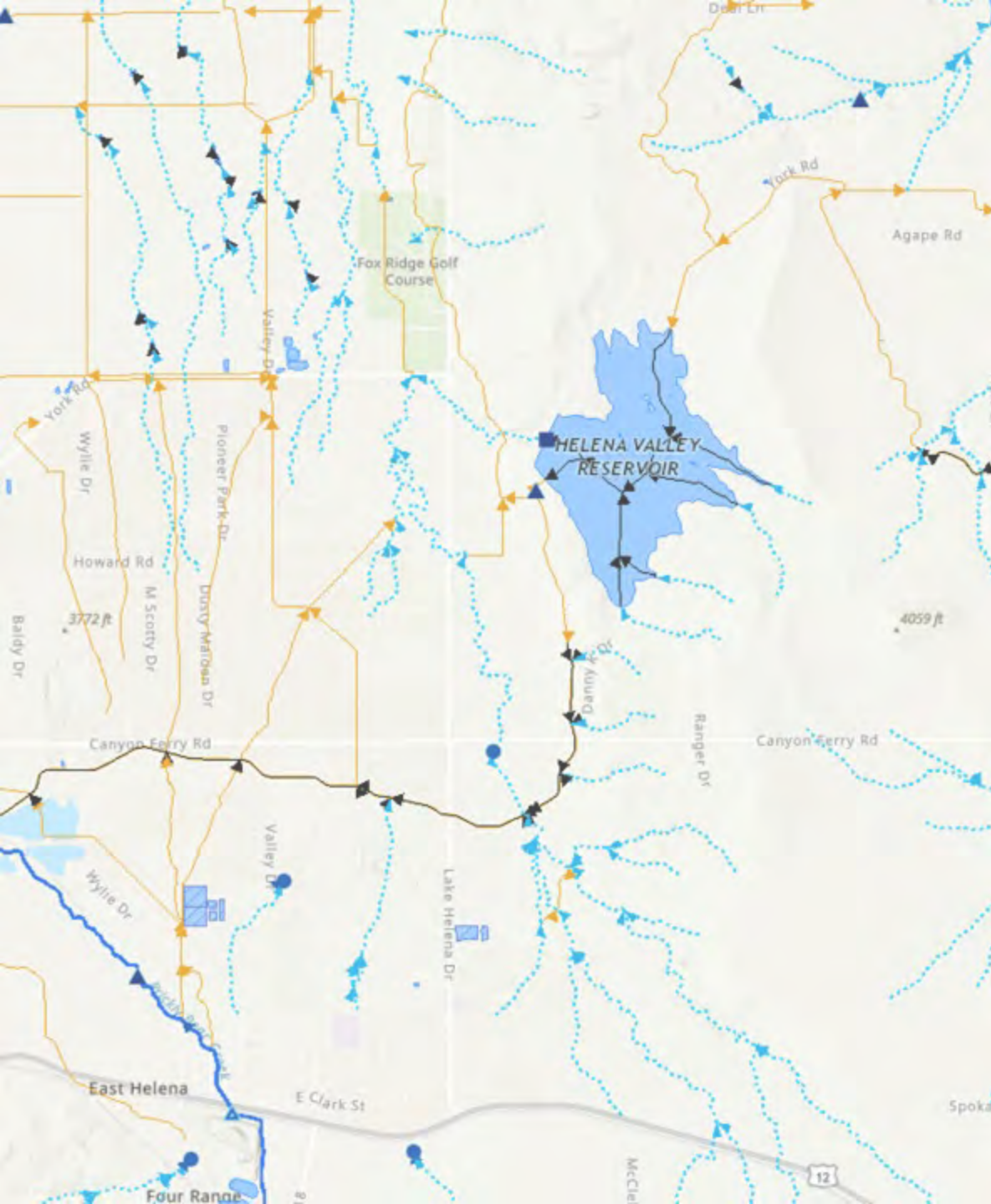
Water Information, Drought, and Lidar

Dec. 15, 2022

Natural Resource Information System (NRIS)

Natural Heritage Program
(NHP)

Water Information System
(WIS)



Outline

- Water Information System
 - NHD to 3DHP
- Drought
 - Drought monitoring process
- Lidar
 - Collection status
 - What products are available
 - What's new in 2022

For more, please join the lidar and hydro breakout session this afternoon!

Water Information



Montana Water Information System

- Coordinate with water data providers and facilitate water data discovery and access
- Update and maintain the Montana Hydrography Dataset

TITLE 90. PLANNING, RESEARCH, AND DEVELOPMENT
CHAPTER 15. NATURAL RESOURCE INFORMATION SYSTEM
Part 3. Information System

Water Information System

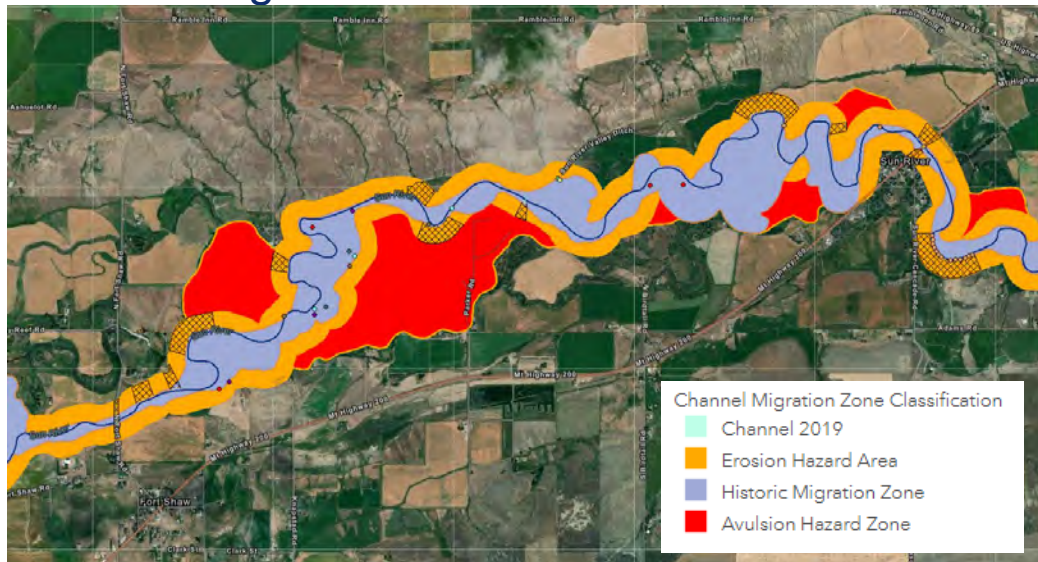
90-15-305. Water information system. (1) There is a Montana water information system, to be operated within the natural resource information system referred to in **90-15-301** and that is to be considered a part of the system.

(2) The Montana water information system shall make available and readily accessible, in a usable format, to state agencies and other interested persons, information on the state's water resources, out-of-state water resources that affect the state, existing and potential uses, and the existing and potential demand.

Water data discovery and access

- Refer people to the best sources – curate
- House and disseminate water-related data that's otherwise challenging to obtain

Channel Migration Zones



2022 Floods GIS Data Hub

Montana State Library 2022 Floods GIS Data Hub

Logos: MONTANA DEPARTMENT OF REVENUE, MONTANA DNRC, MONTANA Department of Transportation, USDA

EagleView Oblique Imagery
Oblique imagery of flood affected areas in south-central Montana. Licensed for government use only.

Yellowstone River Post Flood Aerial Photo Viewer (Sept 2022, Gardiner to Livingston)

Photo Number: 4P56_4R35-4P55_4R37
Description: Erosion and lost building

The screenshot shows the website interface for the 2022 Floods GIS Data Hub. It features a header with the Montana State Library logo and navigation links. Below the header are logos for the Montana Department of Revenue, DNRC, Department of Transportation, and USDA. The main content area includes a section for EagleView Oblique Imagery and a large aerial photo viewer for the Yellowstone River. The photo viewer shows a map with a red line indicating the river's path and a large aerial photo of the river valley. A metadata panel on the left of the photo viewer displays the photo number and description.

Montana Spatial Data Infrastructure - Hydrography

What is it?

Networked geometry and attributes representing surface water (lakes, ponds, streams, rivers, canals, ditches, etc.). Provides a system for indexing (addressing) water-relevant data.

Status

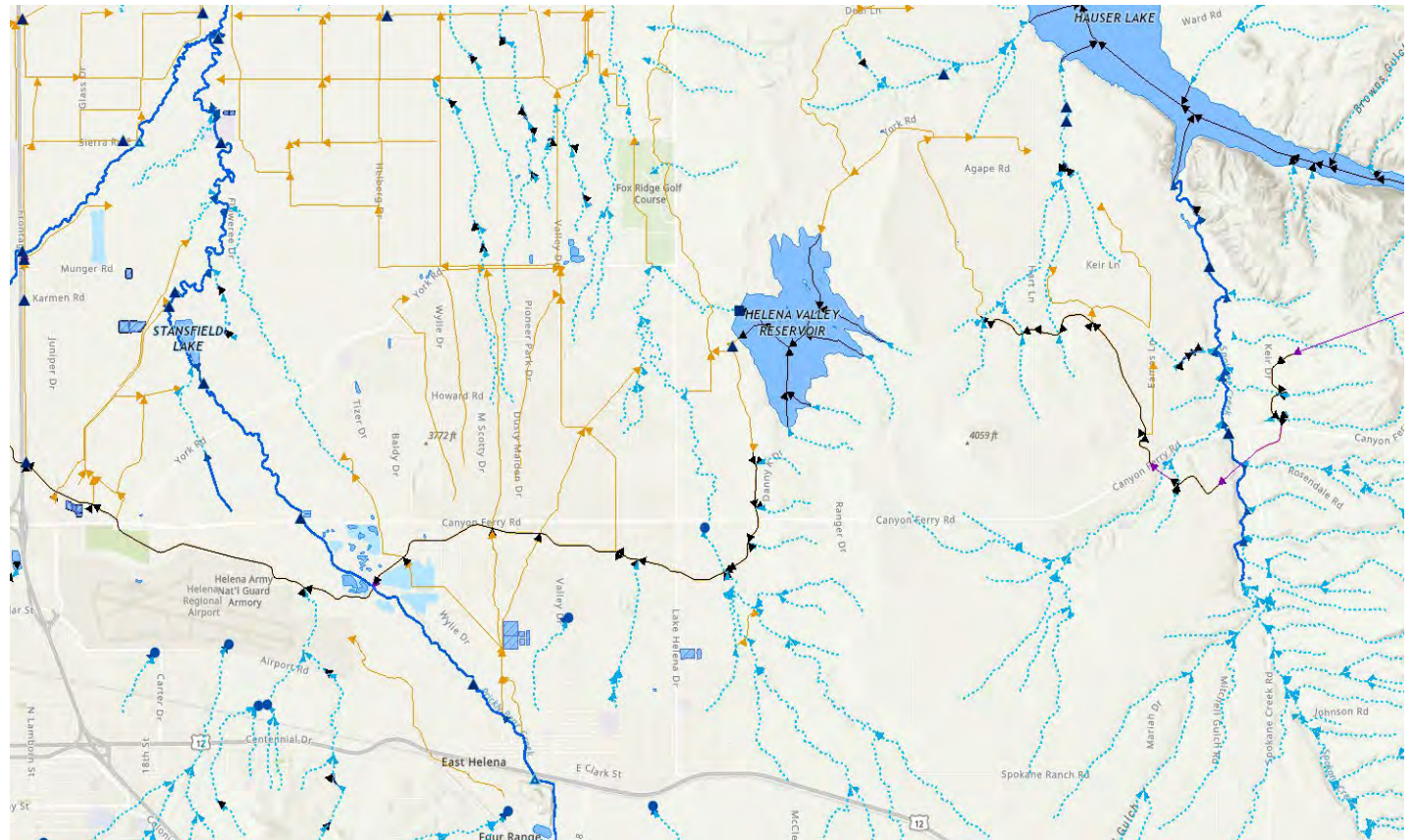
Transitioning to new model (3DHP) over next 5-10 years

Used for:

State water planning, water quality reporting, water quality monitoring locations, permitting, floodplain mapping, fisheries/wildlife, navigable waters, water rights, dam safety, streamside management.

Data Access:

Web services, downloadable data, online viewer, printed maps (PDF), Digital Atlas, Digital Bundler

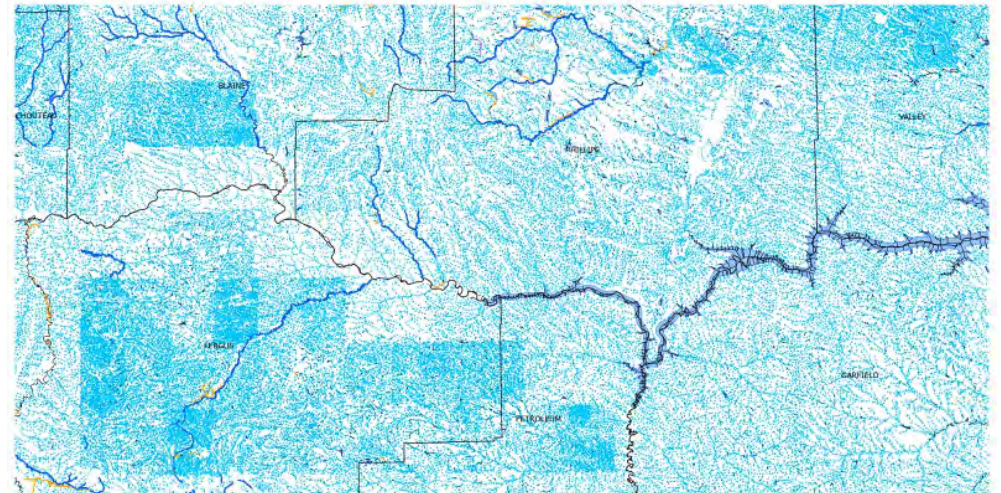


Cessation of NHD and WBD editing

- The USGS is transitioning from the NHD to the 3D Hydrography Program (3DHP)
 - “Given resource constraints, the transition to the 3DHP database and tools requires us to close Steward and internal editing of the NHD database.”
 - Editing checkins must be completed by **Dec. 31, 2022** for NHD and June 30, 2023 for Watershed Boundaries.
- This is not a temporary stoppage of editing, but a permanent end to maintenance of the NHD in its current form. Going forward, **static** versions of the NHD and WBD will be available.
 - The NHD will be replaced by 3DHP

USGS 3D Hydrography Program (3DHP)

- Elevation (lidar) – derived hydrography data
 - Terrain and water influence and shape one another, interdependent relationship
 - New hydrography that aligns with the real-world topo landscape
 - Vertical, horizontal, and temporal alignment with high-resolution elevation data
- More current
 - More frequent refresh possible (5-8 years), or as new lidar becomes available
- Improved detail (~1:5,000 scale)
- Statewide, nationwide consistency
- Primary access through web services
- Simplified model
 - Geometry, network, and flow logic are the primary focus of 3DHP; many attributes will be addressed, linked data, as opposed to distinct features



3DHP Timeline

- 2023 – 2031 (9-year) investment
 - 1-year preparation
 - 6-years of delineating hydrography data from high-resolution (1-meter) elevation data
 - 2-years inspection, processing, and publication
- As proposed, the 3DHP effort would begin providing products and services to partners and the public by the end of 2025.

Drought



Drought Monitoring

MONTANA STATE LIBRARY Current Drought Conditions

Current Maps | View Drought Impacts | Submit Drought Impacts | Archived Maps

Current Maps

In collaboration with the Montana Governor's Drought and Water Supply Advisory Committee, the Montana State Library publishes monthly maps of moisture status by county. Additionally, a robust drought monitoring team led by the Montana Department of Natural Resources and Conservation, the Montana State Library, the National Weather Service, and the Montana Climate Office coordinates weekly with the U.S Drought Monitor to map current drought conditions.

Montana Drought Status by County - December 8, 2022

U.S. Drought Monitor Montana

December 6, 2022
(Released Thursday, Dec. 8, 2022)
Valid 7 a.m. EST

| | Drought Conditions (Percent Area) | | | | | |
|--|-----------------------------------|--------|--------|-------|-------|-------|
| | D0 | D1 | D2 | D3 | D4 | D5 |
| Current | 12.07 | 87.93 | 54.64 | 38.83 | 12.15 | 0.00 |
| Last Week (12.28.2022) | 12.08 | 87.94 | 54.72 | 40.51 | 12.16 | 0.00 |
| 3 Months Ago (09.08.2022) | 21.91 | 78.09 | 42.99 | 24.43 | 3.98 | 0.00 |
| Start of Calendar Year (01.01.2022) | 7.36 | 92.64 | 89.35 | 85.39 | 93.83 | 43.87 |
| Start of Water Year (03.15.2021) | 5.40 | 94.60 | 77.49 | 45.01 | 12.00 | 0.00 |
| One Year Ago (12.06.2021) | 3.00 | 100.00 | 100.00 | 85.82 | 78.14 | 13.14 |

Intensity: D0 None, D1 Slightly Drought, D2 Moderate Drought, D3 Severe Drought, D4 Extreme Drought, D5 Exceptional Drought

The Drought Monitor provides an overview of current conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/about-us>

Author: David Gochis, Western Regional Climate Center

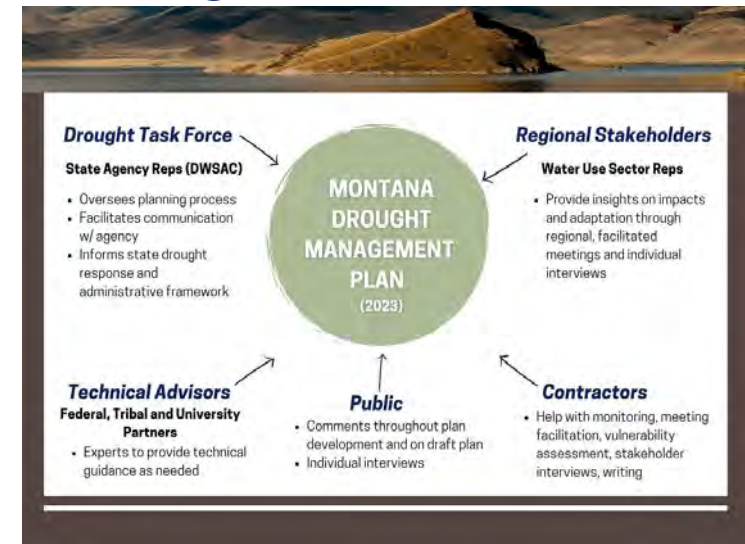
Logos: USDA, NRCS, NWS, NOAA

droughtmonitor.unl.edu

The county drought map (left) is updated monthly and depicts dry and moist conditions. The U.S Drought Monitor (right) is updated weekly and depicts dry conditions.

<https://nr.is.mt.gov/drought>

MT DNRC - Drought Management Plan 2023



<https://mtdroughtinfo.org>

Archive of drought maps

Montana Drought Status by County

2022

Filter

Items: 12 Tagged: 2022 X Clear All Share filtered gallery

Tags

Filter tags

05
06
08
09
10
11
12
✓ 2022
> Created

2022-01: Montana Drought Status by County
Moisture Status by County for January 2022
View item details

2022-02: Montana Drought status by County
Moisture Status by County for February 2022
View item details

2022-03: Montana Drought Status by County
Moisture Status by County for March 2022
View item details

2022-04: Montana Drought Status by County
Moisture Status by County for April 2022.
View item details

2022-05: Montana Drought Status by County
Moisture Status by County for May 2022.
View item details

2022-06: Montana Drought Status by County
Moisture Status by County for June 2022
View item details

2022-07: Montana Drought Status by County
Moisture Status by County for July 2022
View item details

2022-08: Montana Drought Status by County
Moisture Status by County for August 2022
View item details

2022-09: Montana Drought Status by County
Moisture Status by County for September 2022
View item details

2022-10: Drought Status by County
Status by County for October 2022
View item details

2022-11: Drought Status by County
Moisture Status by County for November 2022
View item details

2022-12: Montana Drought Status by County
Moisture Status by County for December 2022
View item details

Drought Monitoring Process

- **Governor's Drought and Water Supply Advisory Committee led by Dept. of Natural Resources and Conservation (DNRC)**
- **Weekly coordination** with the U.S Drought Monitor
 - MT Drought Liaisons
 - DNRC, Michael Downey
 - State Library, Troy Blandford
 - Montana Climate Office, Zach Hoylman
 - Montana Climate Office, Kelsey Jensco
 - NOAA NWS, Arin Peters
 - MT recommendation for changes to the drought map are drafted Monday morning > general agreement is reached > recommendation is sent to USDM Author by Tuesday afternoon > new USDM map is published Thursday morning.
 - 40-50 people on listserv. Would like to have more eyes! Email one of the contacts above to be added to the listserv.
- **Monthly meetings** (Apr – Sept) to gather local input on drought impacts
- **Montana Drought Impact Reporter** – live, ongoing survey for reporting moisture conditions. Producers, field staff, Extension, Farms Service Agency, ...open to anyone.

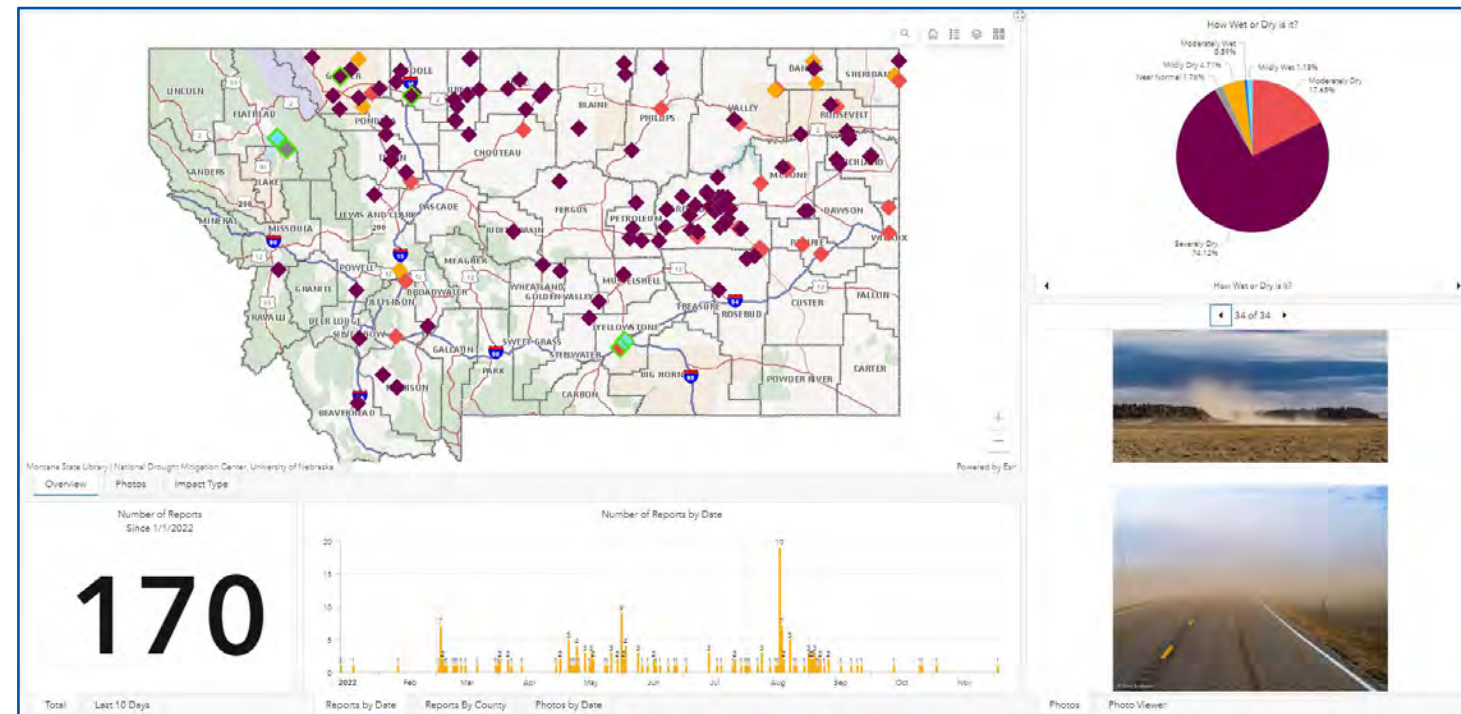
MT Drought Impact Reporter

- Report on moisture conditions
 - Anyone can submit a report
- Released July 2017
 - Live/ongoing, retake as conditions change, good or bad

- 170 reports received in 2022

- Submit reports:

<https://nrismt.gov/droughtsurvey>



Lidar



MSDI Elevation (Lidar-derived)

What is it?

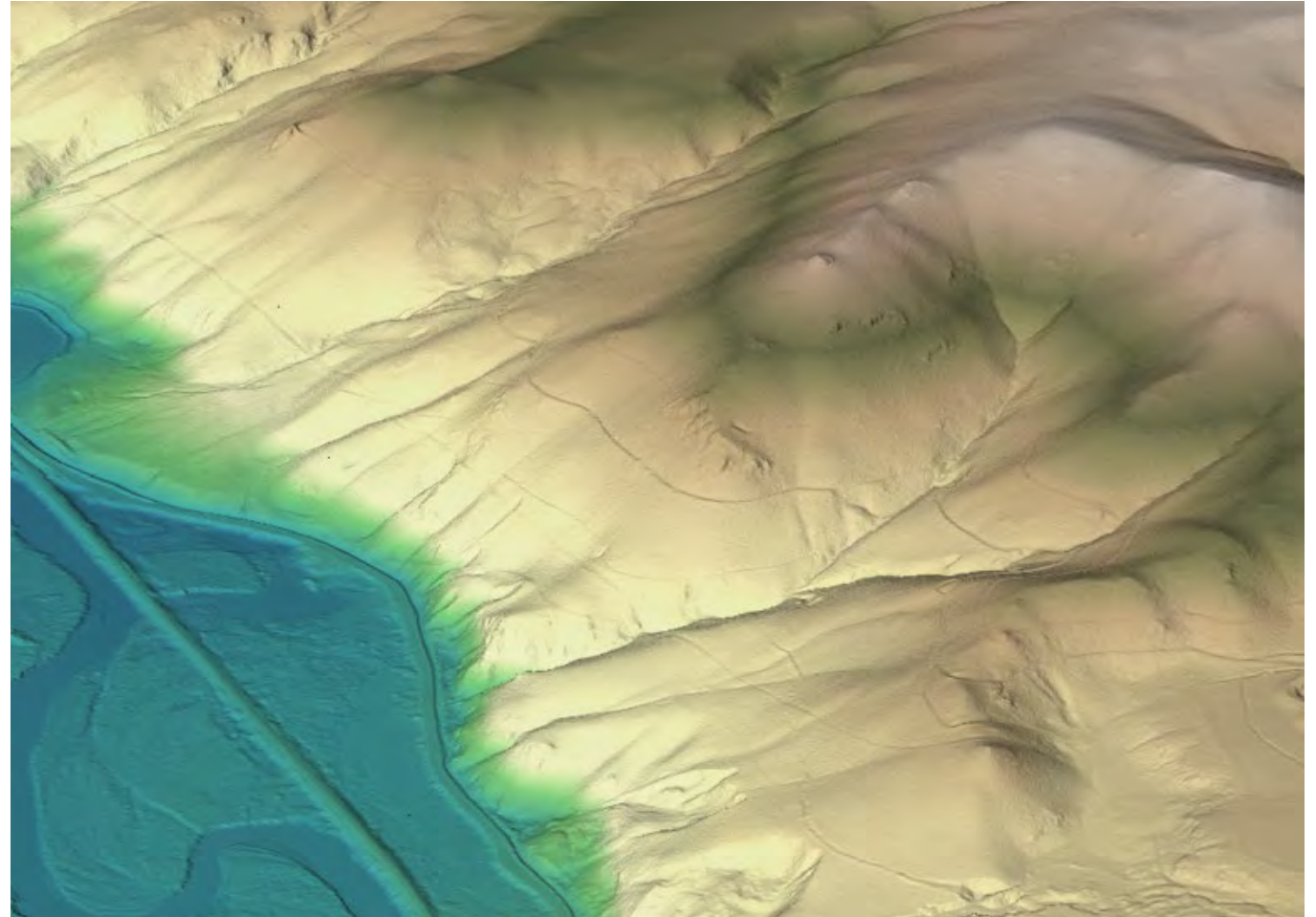
Statewide high-resolution (1-meter), high accuracy (<1 foot) elevation model derived from lidar

Status

In development, acquiring data (5-year plan began 2019)

Data Access:

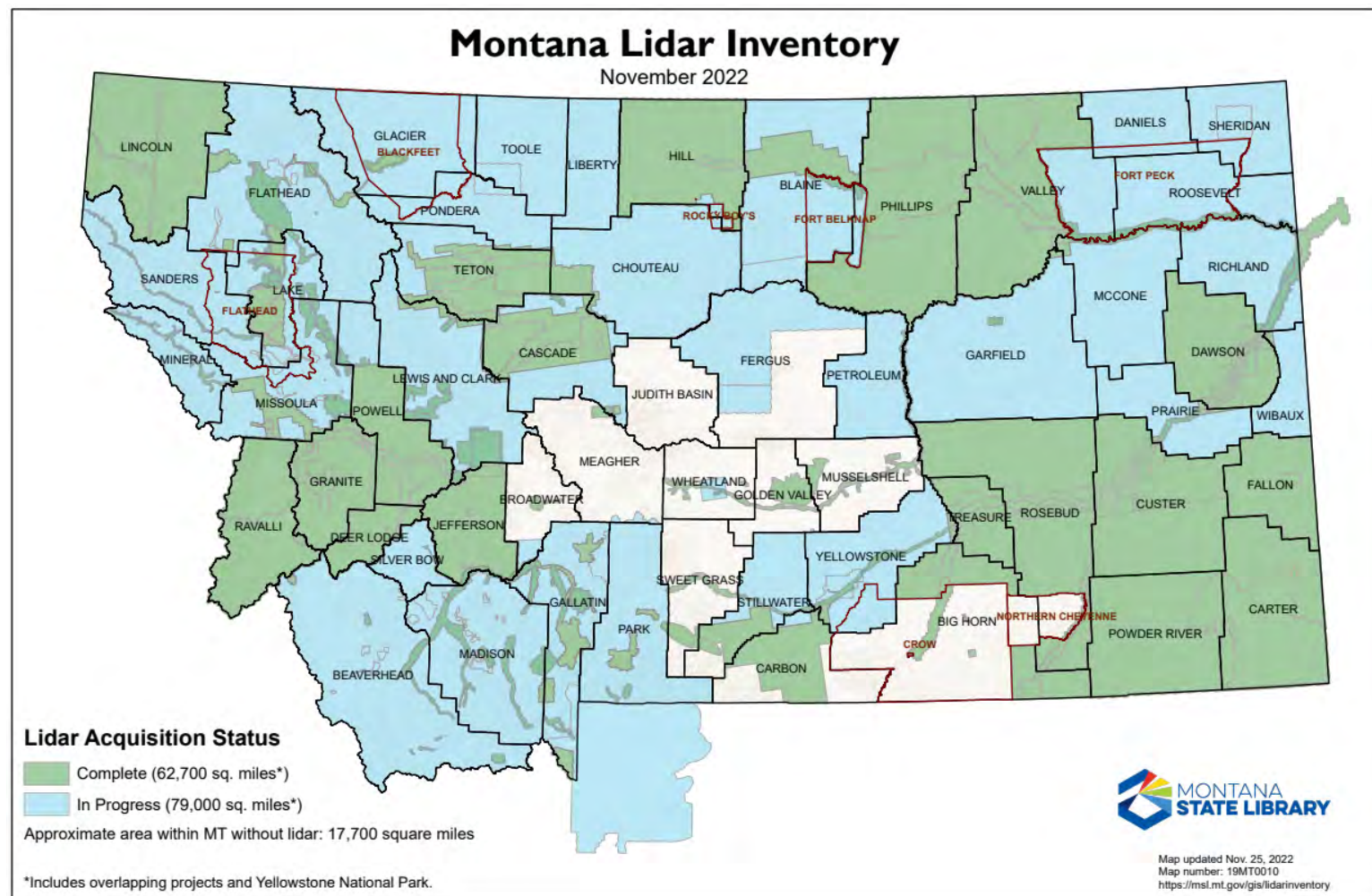
Montana Lidar Inventory
<https://msl.mt.gov/gis/lidarinventory>



Lidar Acquisition Status

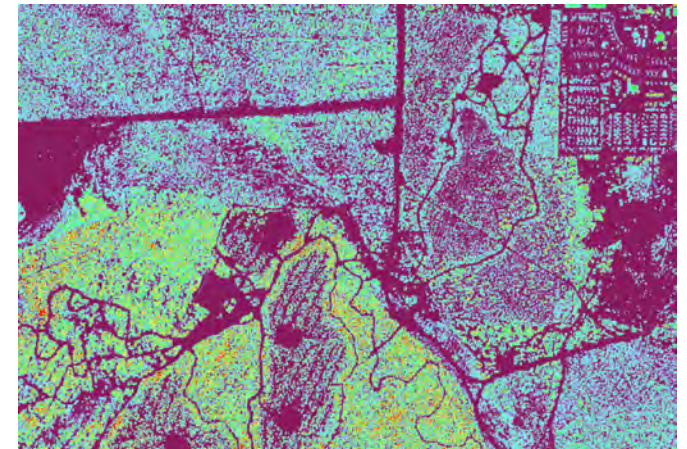
Thanks to lidar funding partners!

- Natural Resources Conservation Service
- United States Forest Service
- Bureau of Land Management
- United States Fish and Wildlife Service
- Confederated Salish and Kootenai
- Montana DNRC
- Blackfeet Nation
- Fort Belknap Indian Community
- Fort Peck Tribes
- Glacier National Park
- USGS Northern Rocky Mountain Science Center
- Bureau of Indian Affairs
- USGS 3DEP
- FEMA

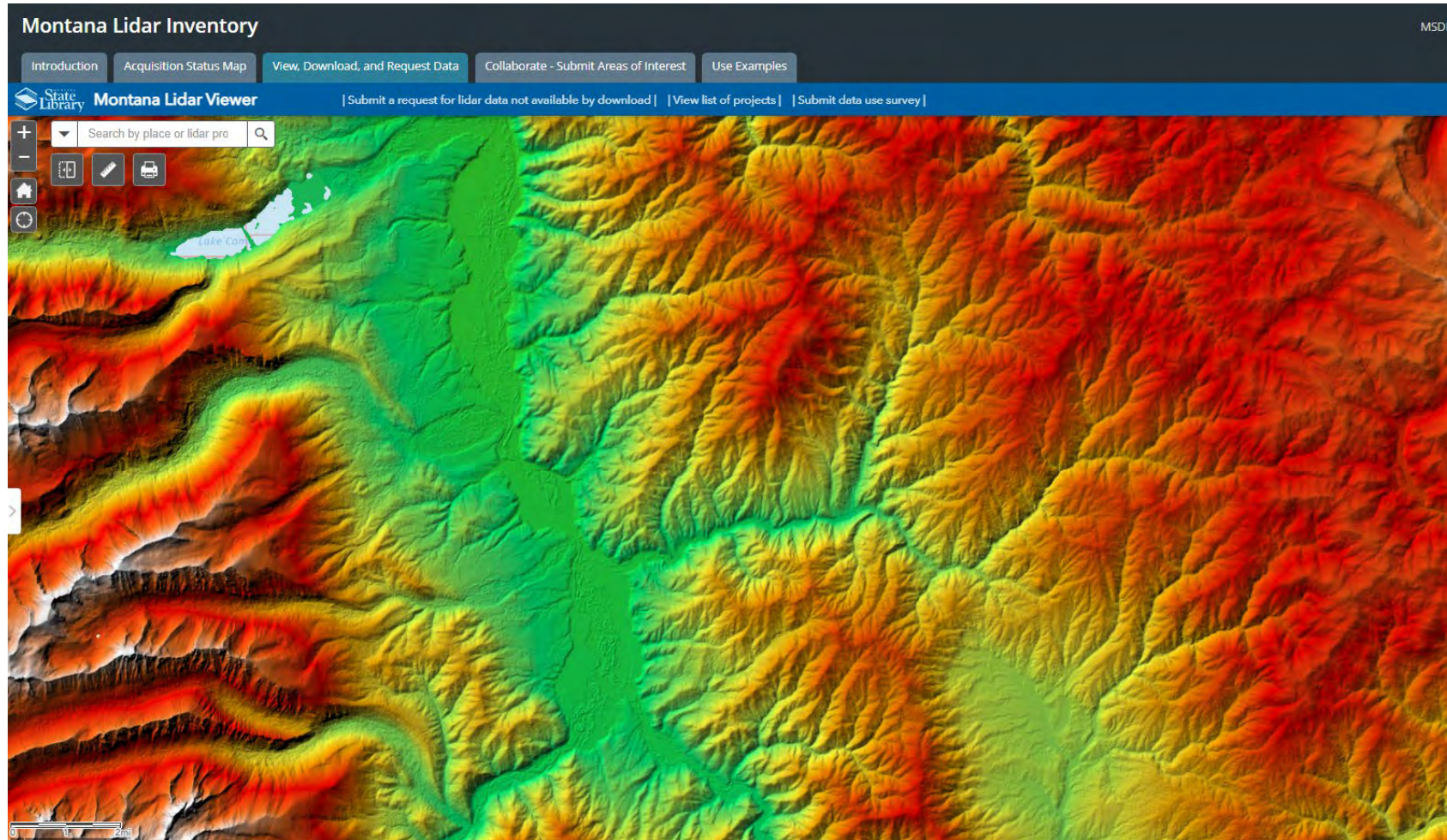


Core lidar-derived products available:

- Bare-earth Digital Elevation Model
- Hillshade
- Digital Surface Model
- Intensity
- Canopy Height Model (new in 2022)
- LAS point cloud readily available by request
- 1-foot contours and building footprints available for some projects



Montana Lidar Inventory



The Montana State Library has a long-standing partnership with the USDA-NRCS (MT office). **Thanks to the MT NRCS.** They have supported lidar acquisition, processing, and dissemination in Montana from the beginning.

<https://msl.mt.gov/gis/lidarinventory>

Relative Elevation Models

Avulsion
Feature
◆ Avulsion

Bank Armor
Feature
◆ Bank Armor

Head Cut Erosion
Feature
◆ Head Cut

Isolated Flood Plain
Feature
◆ Isolated Flood Plain

Levee
Feature
◆ Levee

Meander Cut Off
Feature
◆ Meander Cutoff

Meander Scroll
Feature
◆ Meander Scrolls

Relative Elevation Model
Relative Elevation Model
■ Red: Band 1
■ Green: Band 2
■ Blue: Band 3

Fluvial Landforms
Click on a button below to see examples of identified fluvial landforms.

Avulsion

Bank Armor

Head Cut Erosion

Isolated Floodplain


Levee


Meander Cut Off

Meander Scroll

Reset Map

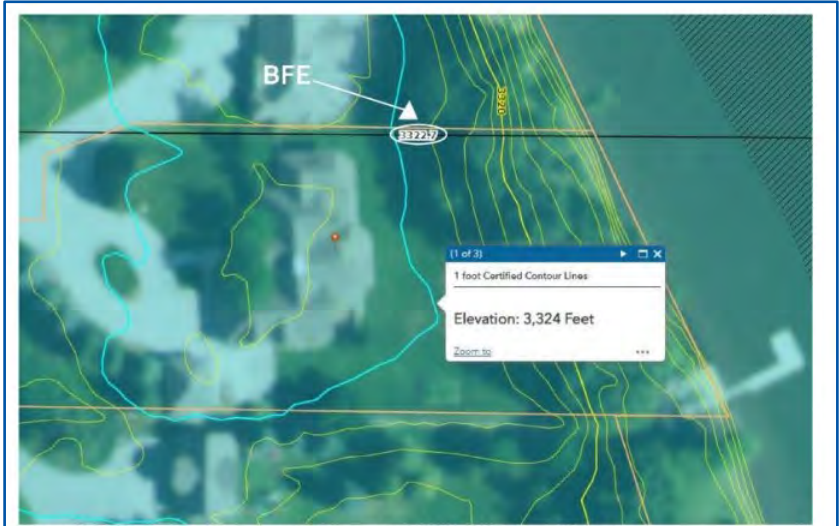
Lidar for LOMA

 Montana Lidar for LOMA



Montana Lidar for LOMA

Use lidar elevation data to request a determination from FEMA about whether a property is in or out of a Special Flood Hazard Area



Example: Calculating the Lowest Adjacent Grade (LAG) From Lidar Data:

3,324 Feet* minus 1 Foot = 3,323 **Lowest Adjacent Grade (LAG)** from Lidar
*elevation of the lowest contour adjacent to, but not touching, the building

3,322.7 Feet = **Base Flood Elevation (BFE)**

Is the Lowest Adjacent Grade (LAG) above the Base Flood Elevation (BFE)?

Yes. So, this building is eligible to submit a LOMA application to FEMA using the Montana Lidar for LOMA web application.

Thank you
Troy Blandford
tblandford@mt.gov

