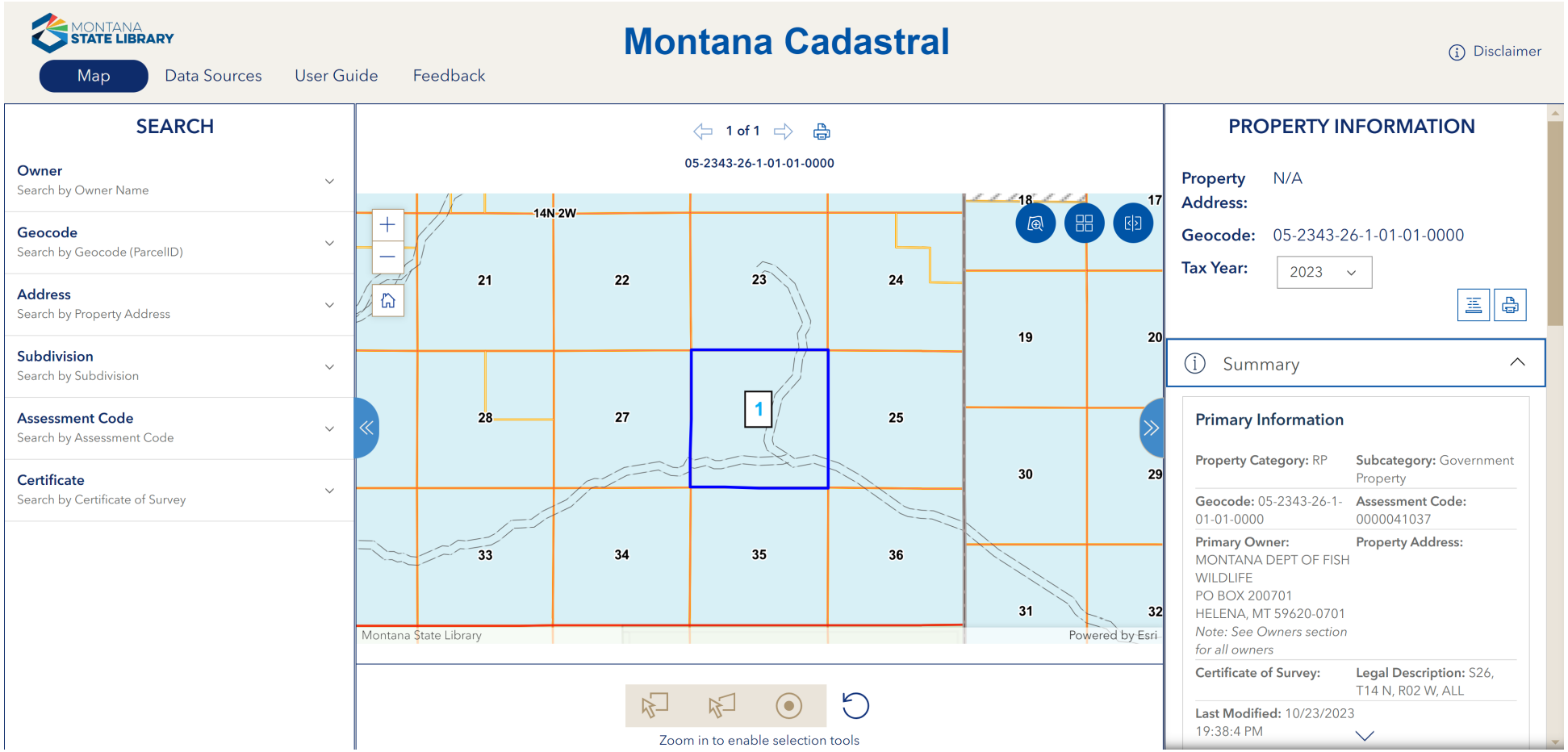
Digital Library GIS Programs

February 16, 2024

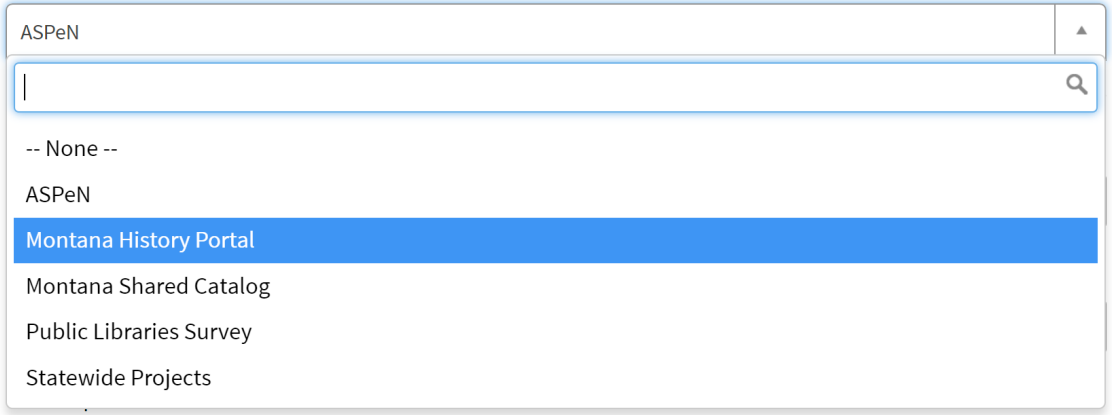
Information Products

A New Montana Cadastral Application



ServiceNow

SUPPORT TEAM	DESCRIPTION
ASPeN	Access to Services, Programs, and eNetworks (ASPeN) provides a variety of services for Montana's library community.
Montana History Portal	The Montana History Portal (Portal) is an online source for digital collections relating to Montana's cultural heritage.
Montana Shared Catalog	The Montana Shared Catalog is a consortium of multi-type libraries serving communities across the state.
Public Libraries Survey	A yearly survey on the status of public libraries in Montana as required by ARM 10.102.1155. The support team is available to help with survey submission, report generation, and data export.
Statewide Projects	Statewide Projects support collaboration and affordable resource sharing among Montana libraries.



Other Projects and Ongoing Work

- Website
  - Support for Content Editors
  - NHP Website Migration
  - MTSRN Site and Payment Processing
- Web Applications
  - ASPeN (Library Directory and Continuing Education)
  - Data List, Data Bundler, Digital Atlas
- Support / Putting out Fires
  - Support GitLab for modern software development
  - Mange monthly Esri web mapping services updates

Addressing and NG9-1-1 GIS Support

Addressing and NG9-1-1 GIS Support

- Structures/Addresses
  - MSL statewide GIS address point database
    - Based on local/tribal government address point datasets
  - Address point data critical to:
    - Elections management
    - Next Generation 9-1-1 (NG9-1-1)
  - Goal: get all of state government to use the same address data
    - Address data and use standards
    - Coordinating with state agencies to facilitate use of data/services

123	1st	Avenue	North	Fairfield
123	1ST	AVE	N	FAIRFIELD
123	FIRST	AVE	N	FAIRFIELD

Addressing and NG9-1-1 GIS Support

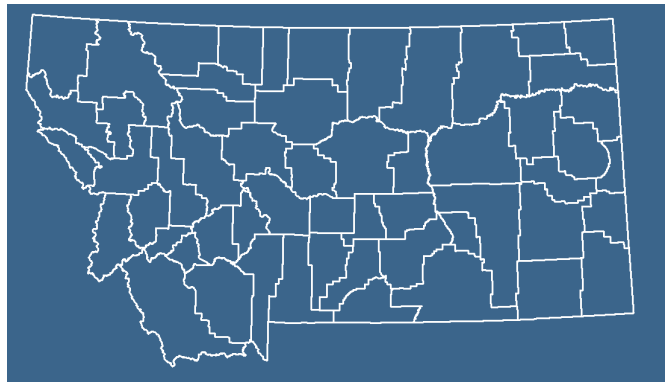
- 9-1-1 GIS Support
  - "…supporting public safety answering points on the ongoing assessment and improvement of next-generation 9-1-1 GIS data sets" (MCA 10-4-310)
  - Web-based GIS data validation and aggregation tool
  - Dedicated GIS Analyst to 9-1-1 only
    - Provides support to Public Safety Answering Points and their GIS data providers to ready their data for NG9-1-1
      - 1-on-1 support via in-person and online meetings
      - Developed GIS tools and workflows to streamline GIS data maintenance
    - Coordinate the development of NG9-1-1 required statewide GIS datasets

Geo-Enabled Elections

Key Players and Roles

Montana Secretary of State

Manages the Election Management System



County Governments

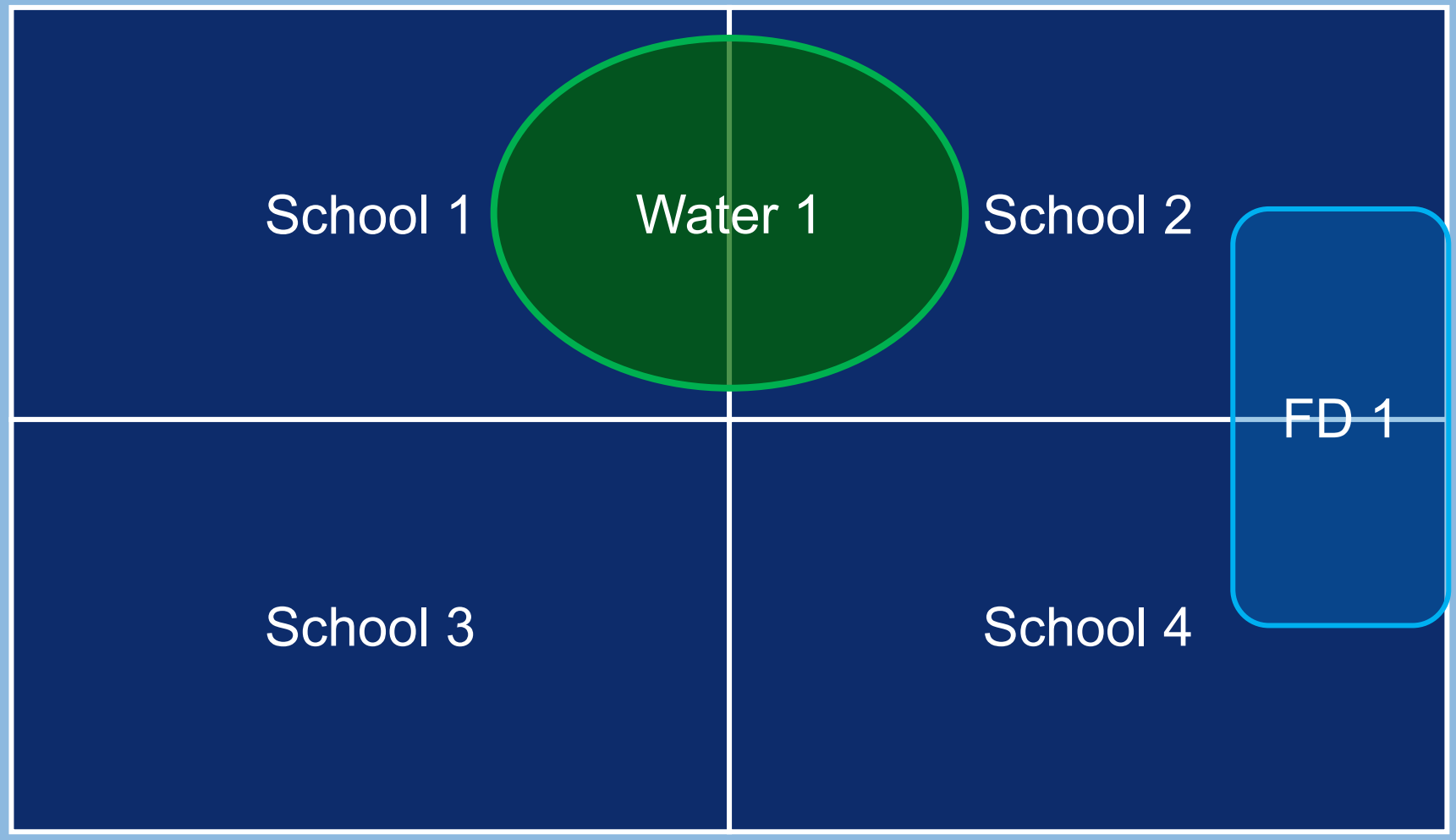
County Election Administrators update the Election Management System (EMS) with Districts, Precinct Splits, Voter Info

MONTANA STATE LIBRARY
GIS COORDINATION

Montana State Library

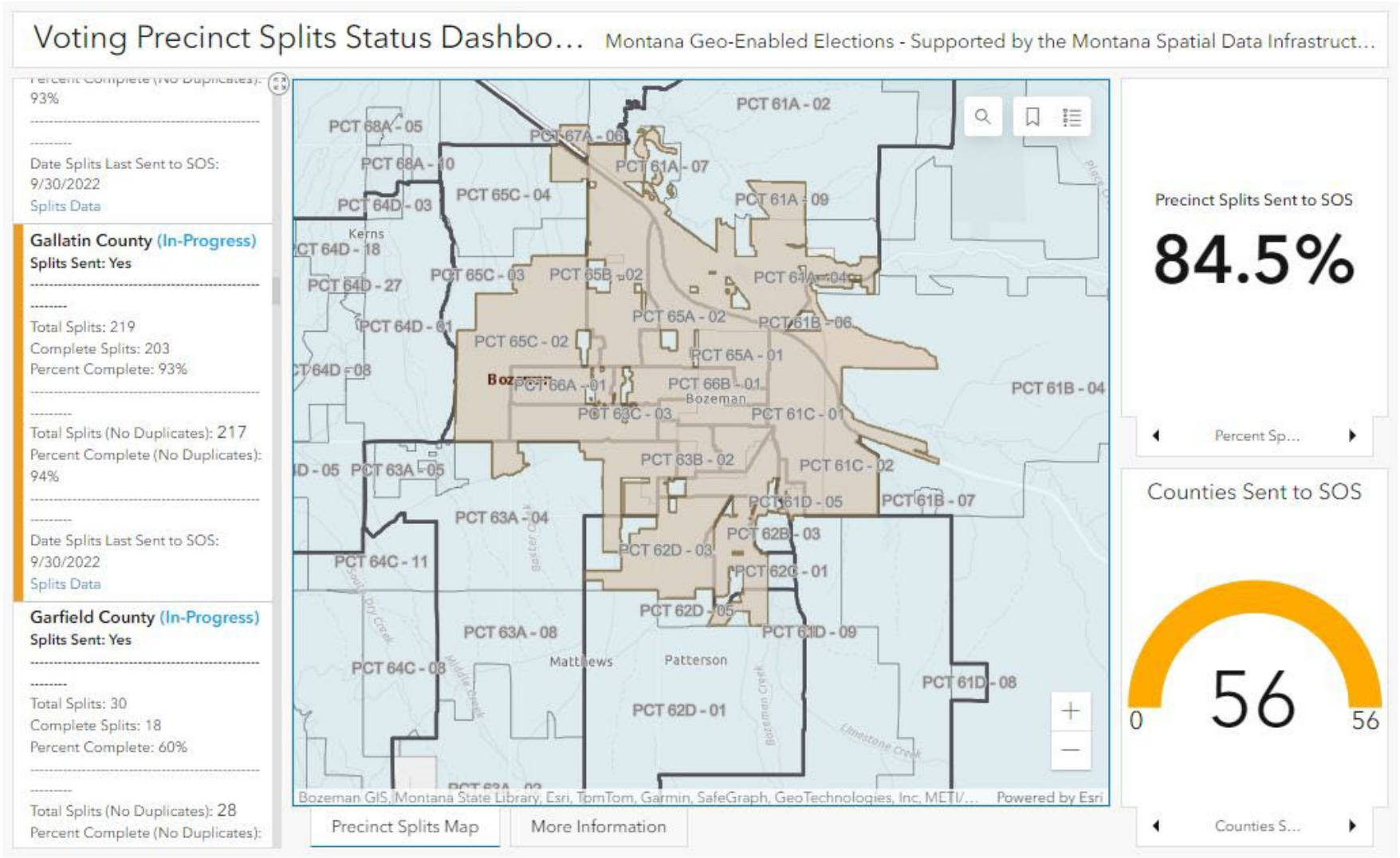
Update and Maintain Addresses & Boundaries

Administrative Boundaries Data Used



Voting Precinct Splits Data Created, Updated, & Maintained Updated

Voting Precinct Splits Status Dashboard



View Dashboard in New Tab

Lidar

What is LiDAR?

Lidar – Light Detection and Ranging

Accurately measure distances/elevation/height

Analogies: radar, sonar, rangefinder, laser measuring tool.

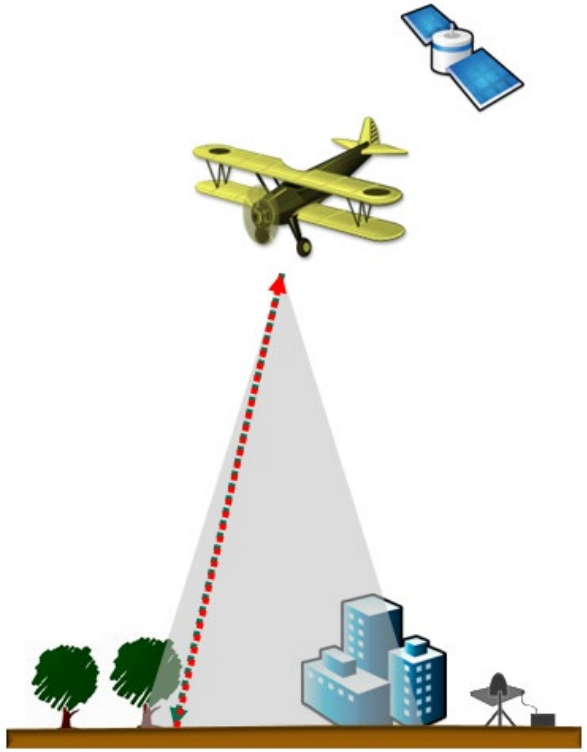
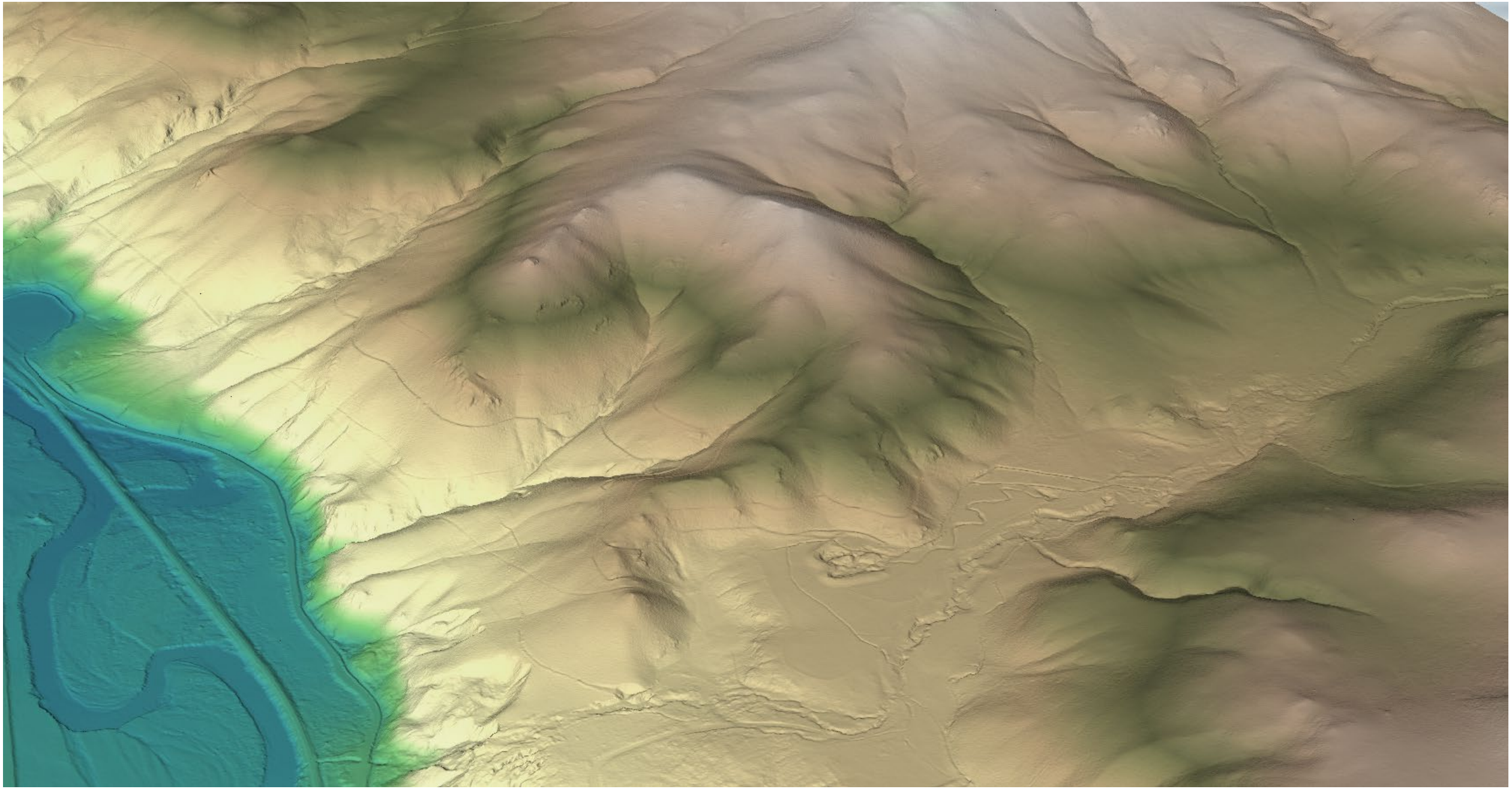
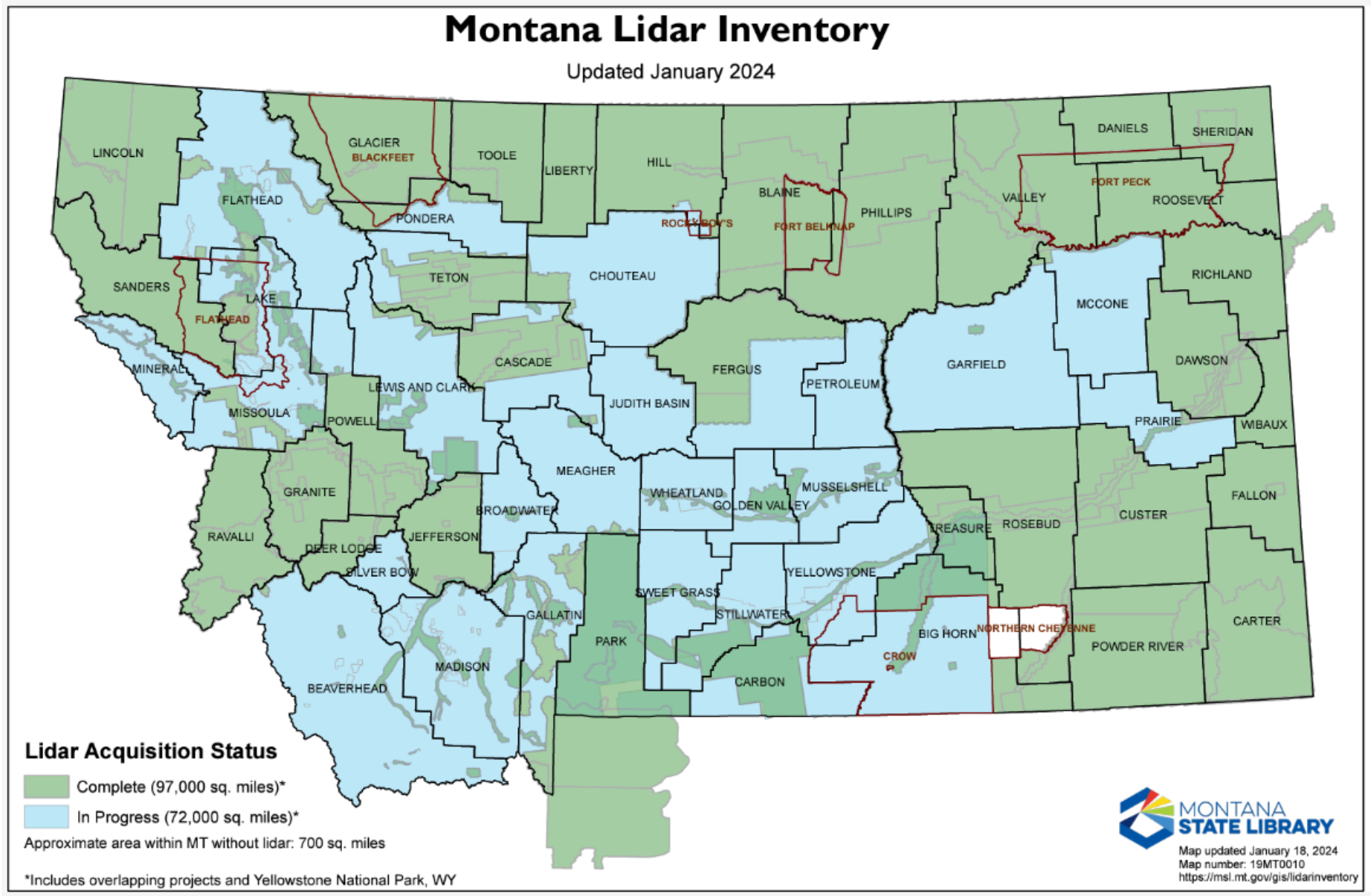


Image from ESRI ArcGIS Desktop Help



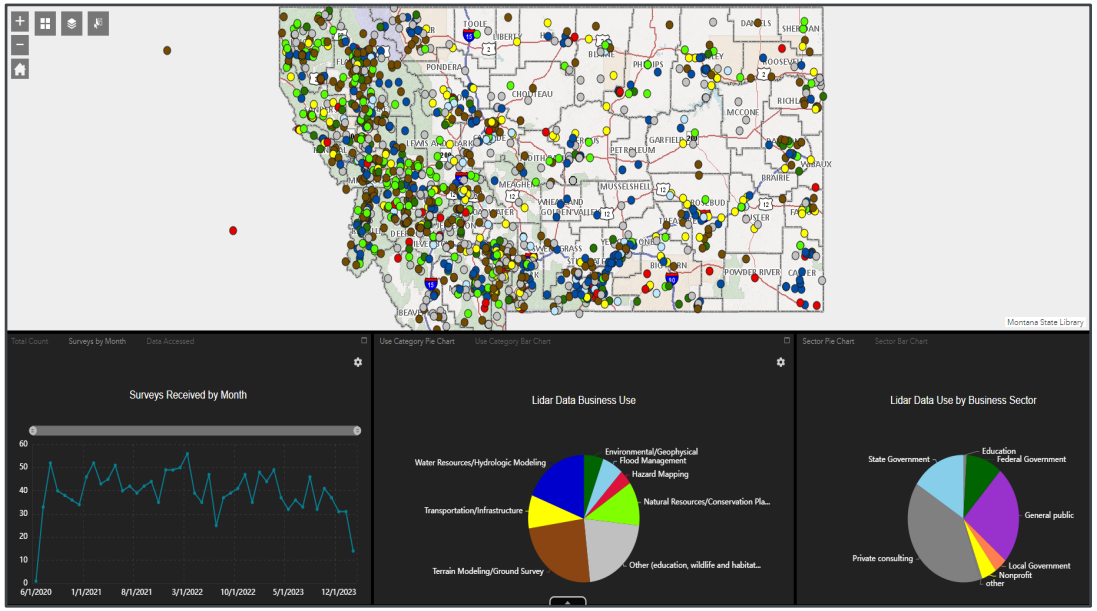
MONTANA **STATE LIBRARY**


Montana Lidar Inventory
Updated January 2024
LINCOLN
GLACIER
BLACKFEET
TOOLE
LIBERTY
HILL
BLAINE
PHILLIPS
VALLEY
DANIELS
SHERIDAN
FORT PECK
ROOSEVELT
FLATHEAD
PONDERA
ROCKY BOY'S
FORT BELKNAP
SANDERS
LAKE
FLATHEAD
TETON
CHOUTEAU
RICHLAND
MCCONE
MINERAL
CASCADE
FERGUS
PETROLEUM
GARFIELD
DAWSON
LEWIS AND CLARK
JUDITH BASIN
MISSOULA
POWELL
PRAIRIE
WIBAUX
MEAGHER
GRANITE
WHEATLAND
GOLDEN VALLEY
MUSSELSHELL
FALLON
BROADWATER
TREASURE
ROSEBUD
CUSTER
RAVALLI
JEFFERSON
DEER LODGE
SILVER BOW
YELLOWSTONE
SWEET GRASS
GALLATIN
STILLWATER
BIG HORN
NORTHERN CHEYENNE
CROW
CARTER
PARK
POWDER RIVER
MADISON
CARBON
BEAVERHEAD
Lidar Acquisition Status
Complete (97,000 sq. miles)*
In Progress (72,000 sq. miles)*
Approximate area within MT without lidar: 700 sq. miles
*Includes overlapping projects and Yellowstone National Park, WY
MONTANA STATE LIBRARY
Map updated January 18, 2024
Map number: 19MT0010
https://msl.mt.gov/gis/lidarinventory

The Value of Lidar

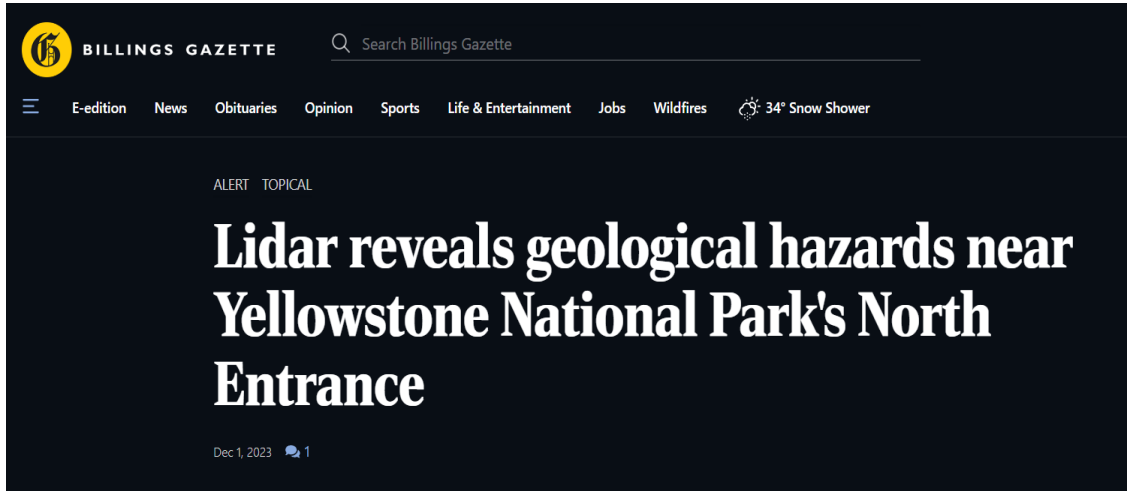
Sample lidar data use surveys
(received since January 1, 2024)

- *"Looking at my property to understand its prior uses. Also, interested in how patterns on the ground affect water flow and wind."*
- *"Creating a landscape plan for my residence."*
- *"Flood potential of landslide into Flathead Lake"*
- *"Developing inundation map for high hazard dam"*
- *"Creating topographic maps for timber harvest operational planning"*
- *"Update the Emergency Action Plan for a Crazy Mountain Dam breach"*
- *"Looking for shorelines of glacial Lake Missoula"*
- *"Locate ditches"*
- *"Exploring its uses in Cultural Resources inventory"*
- *"Terrain modeling for preliminary building site design"*
- *"Transportation planning and preliminary design"*



The need for ubiquitous access to lidar.

Lidar in the news



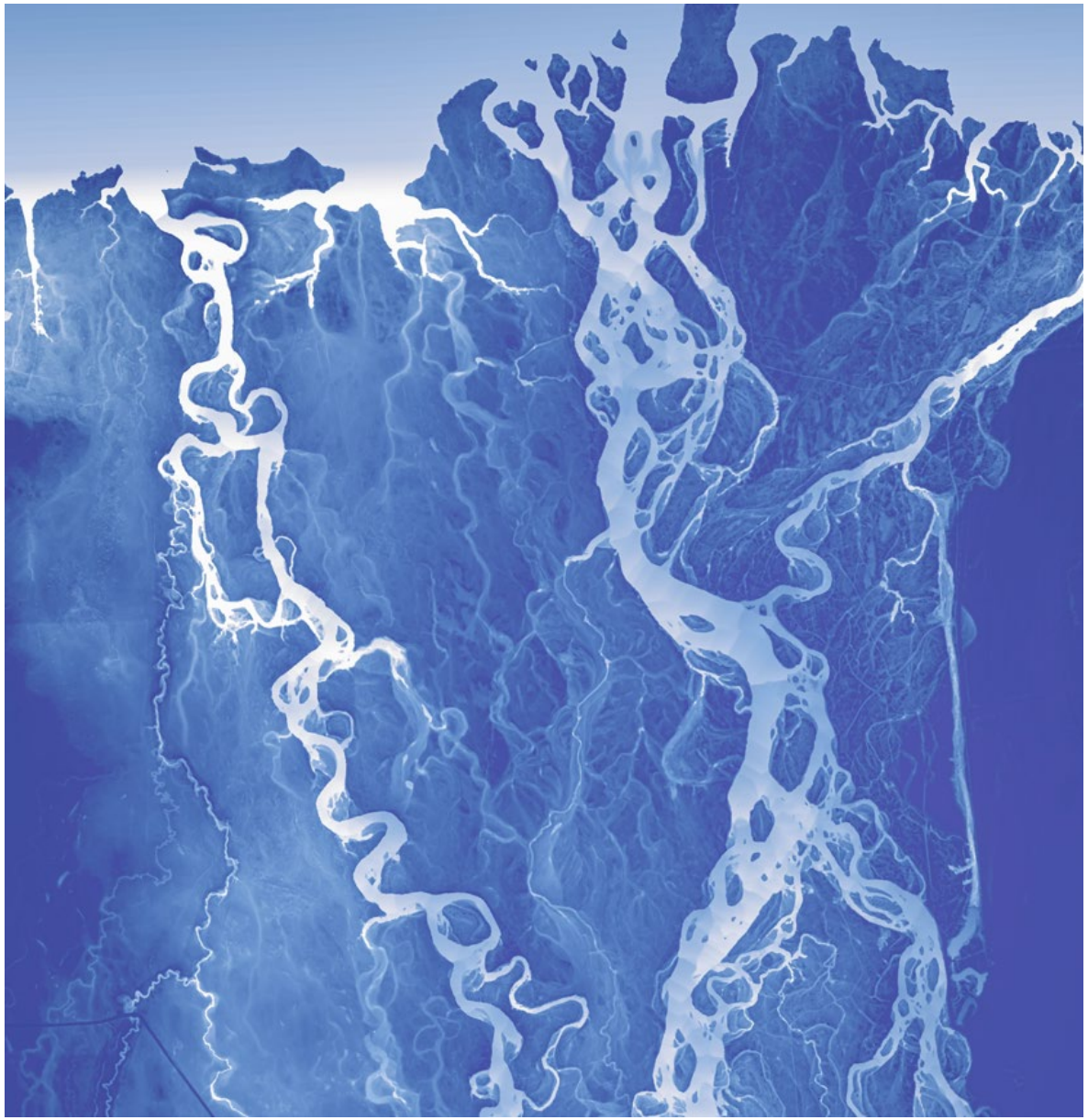
"[Lidar data] significantly improve hazards maps by allowing better characterization of the location, geometry, and activity of known faults and landslides." - *Yann Gavillot, Geologist with the Geohazards Program at Montana Bureau of Mines and Geology.*

Bitterroot fault revealed by lidar

Image by the Montana State Library, Montana Lidar Inventory

Lidar informs stream mapping.

Topography and water shape each other.

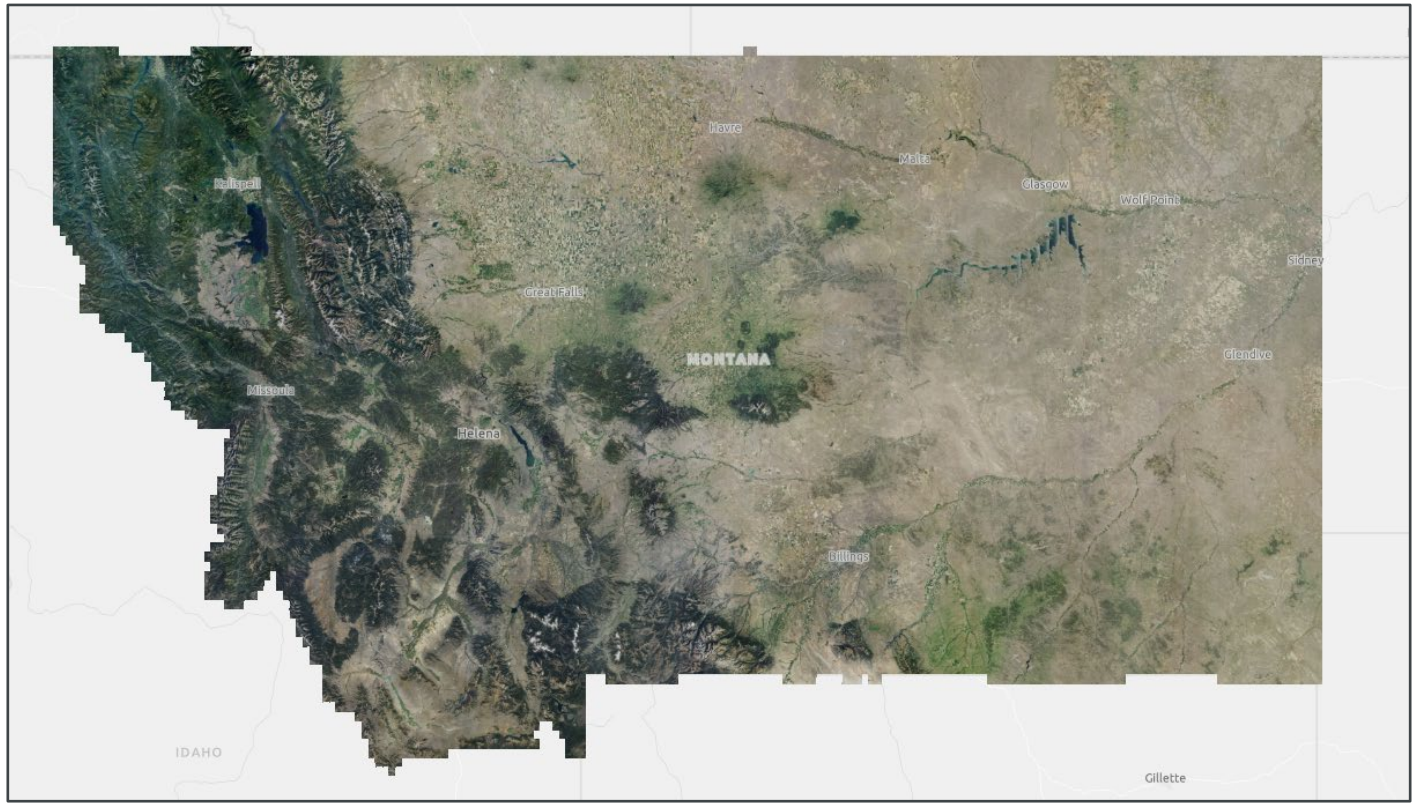


Imagery Repository

What is “imagery” in GIS?

Orthoimagery - aerial photographs that have been geometrically corrected so that scale is uniform and positions are known. True measurements can be made because the image is a representation of the Earth’s surface.

- Distortions caused by terrain and camera tilt are removed.
- Imagery that has a known coordinate system and projection, x,y location
- Typically taken from an aircraft or satellite
- Geospatially accurate “map”



Why is imagery essential in GIS?

Imagery is the bottom of the "sandwich," the base – Many geographic features, including those that are part of the Montana Spatial Data Infrastructure (MSDI), are interpreted from imagery.

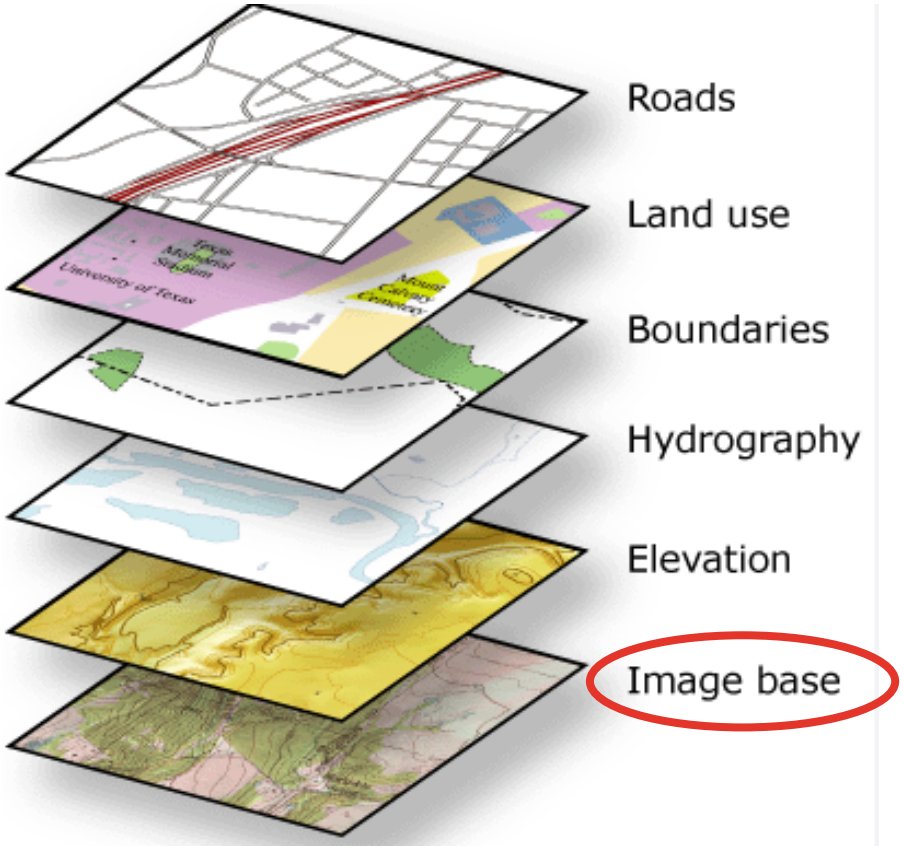
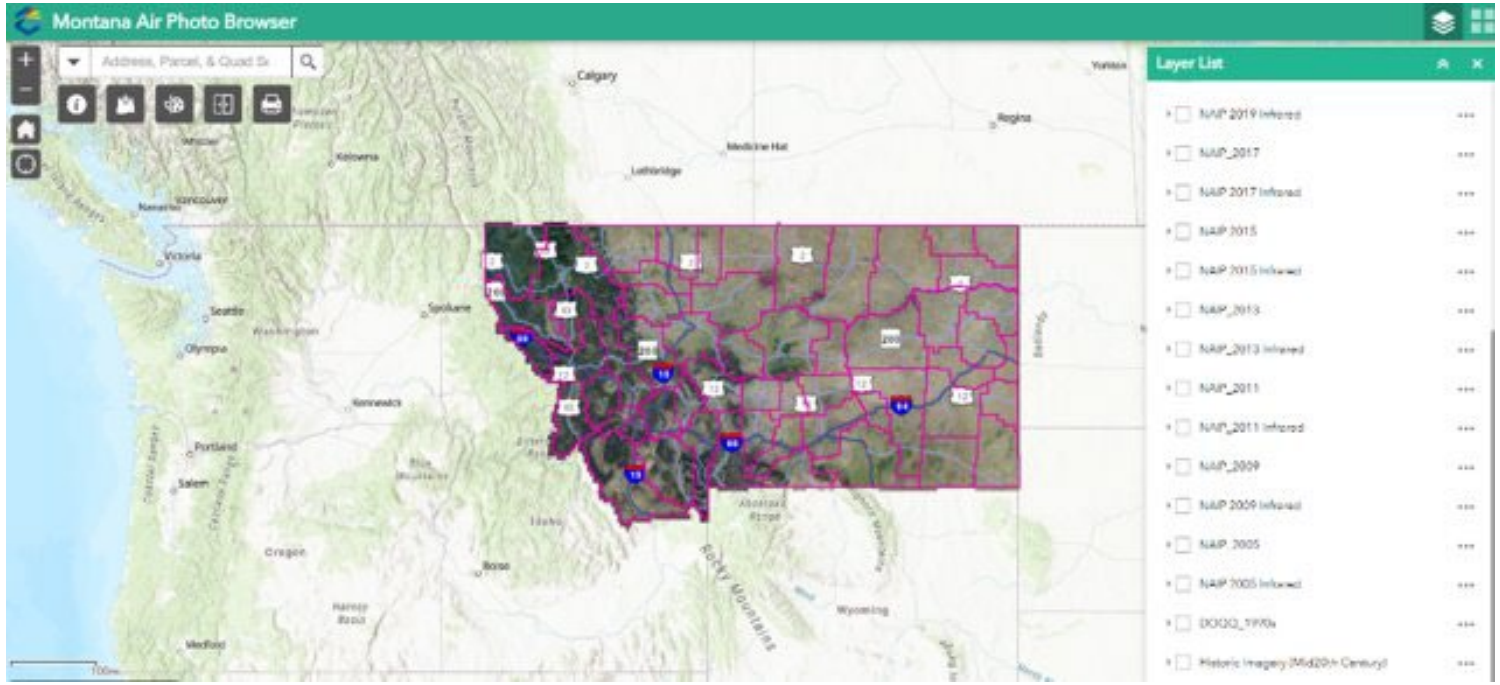


Illustration from ESRI online documentation for ArcGIS

Imagery at MSL

Montana Air Photo Browser

Statewide imagery collections



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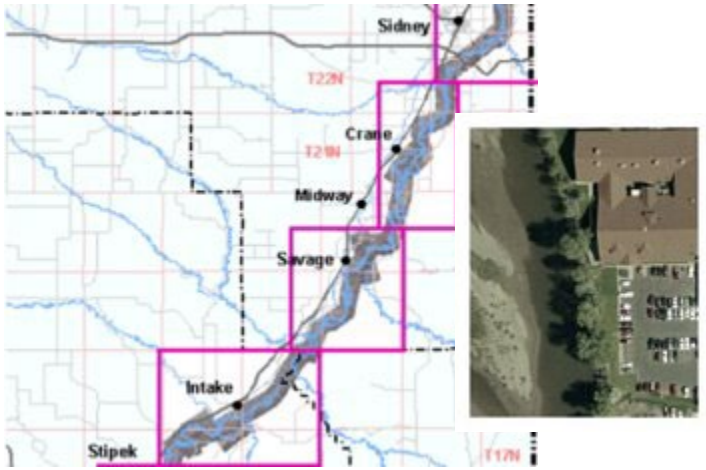
Ad hoc imagery collections



Imagery Elsewhere (Not at MSL)

Multiple state agencies have imagery, and it can be difficult to obtain. Availability would be improved through a central repository or inventory for discovering and accessing imagery.

- Montana Department of Transportation
- Department of Natural Resource and Conservation
- Department of Revenue
- Department of Environmental Quality
- County: Yellowstone, Helena/Lewis & Clark County
- City: Bozeman, Missoula, Billings
- …very likely multiple others

Imagery

Current Status	Desired Alternative
Imagery collection is minimally coordinated, increasing the risk of duplication (cost and effort)	Imagery collections are collected and coordinated by MSL or MSL-led group. Shared resources.
Challenging to know where to direct imagery requests. Must check multiple places. Other agencies spend time filling requests, which takes away from their programs and missions.	An imagery inventory or repository is maintained at MSL and includes standards, specs, and metadata. Imagery requests can be directed to a single place (one state government initiative). There is a clear reference for citizens about where to get imagery. Providing the imagery is within MSL's mission.
New imagery collections are turned down. Limited serving of the imagery means limited use and value.	New imagery collections are published by the MSL, made publicly available, and broadly used, thus, increasing value.

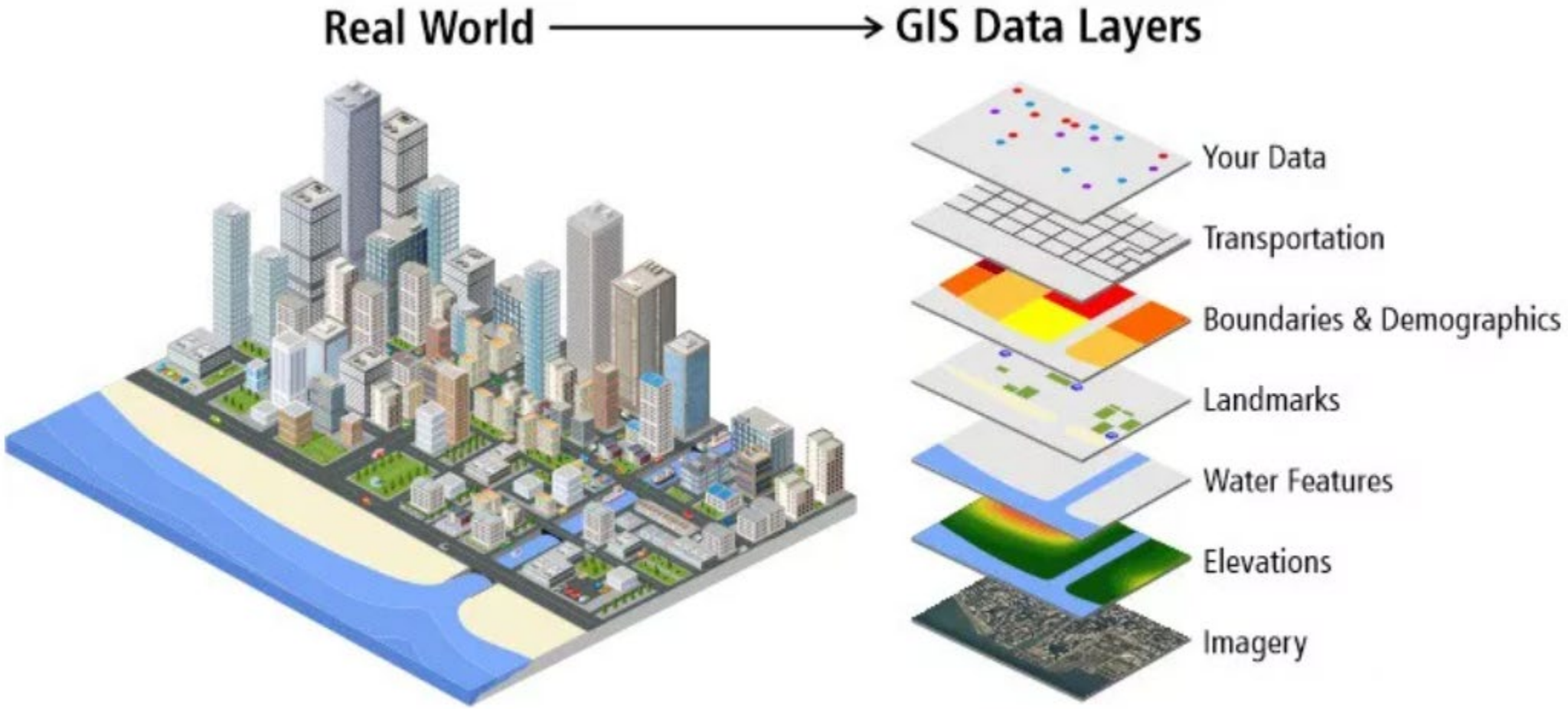
From: ----------
Sent: Tuesday, February 6, 2024 4:29 PM
To: Blandford, Troy <TBlandford@mt.gov>
Subject: Re:? on Upper Yellowstone 2023/2024 LiDAR and imagery

Hi Troy,
I just learned that Park Co obtained 2023 imagery for the cmz study.
Have they contacted you about serving the data?
Is that easy to do or does it cost?
Thanks,

The answer to this question is, “No, at this time, MSL may not be able to commit to serving additional imagery collections.”

GIS Coordination

Montana Spatial Data Infrastructure



A GIS map combines layers of data representing real world locations and entities

Coordinating Statewide Lidar

Private: Tech Companies, Energy

Local Government Partners: Yellowstone County

Tribal Partners: Fort Belknap

Federal Partners: NRCS, FEMA, USFS, NPS

State Agency Partners: DNRC, MBMG, MDT

Nonprofit: Ski/Tourism, TNC

Collaboration: Imagery Working Group

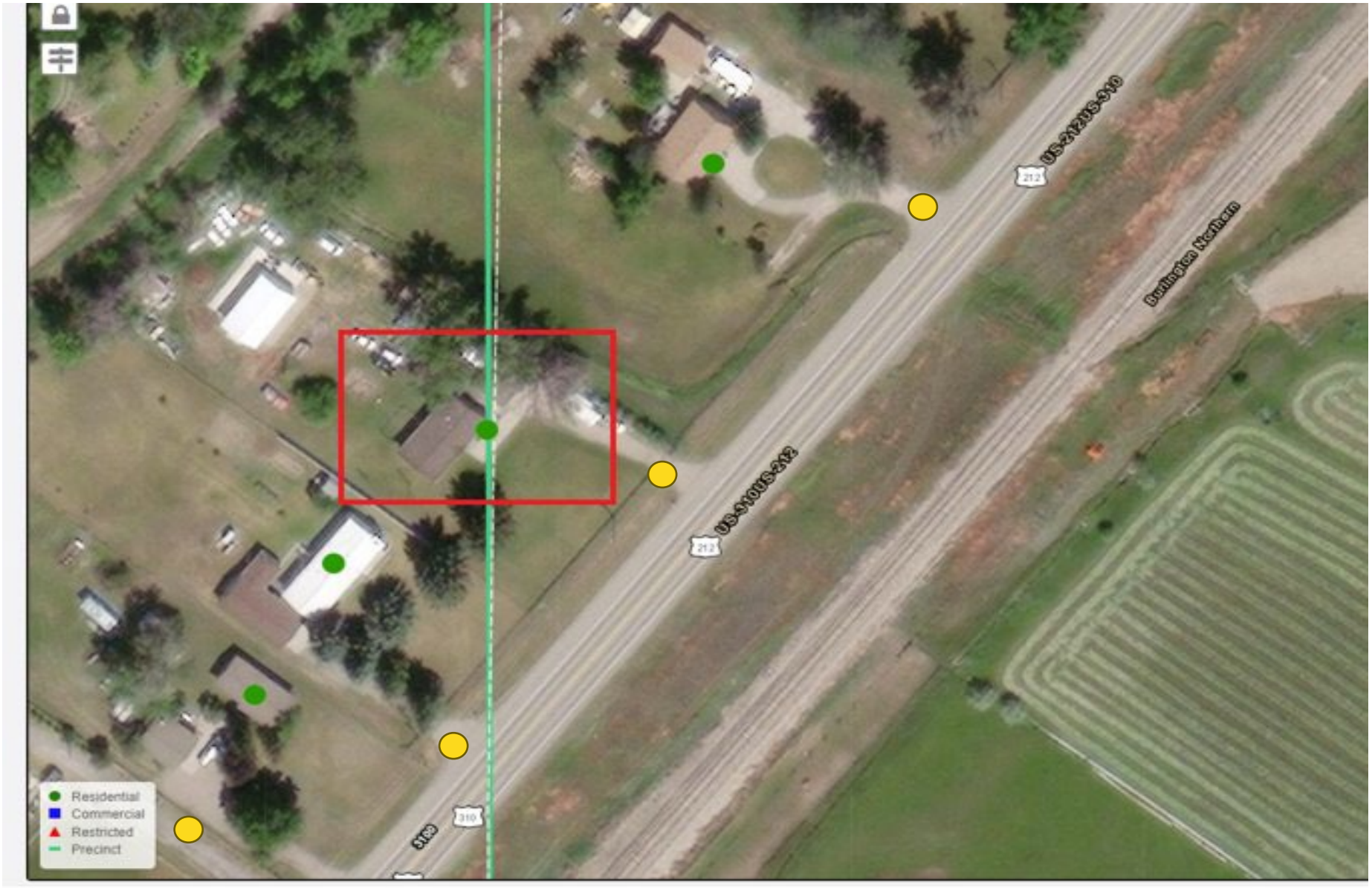
- Develop Standards for Imagery Data
- Create an Inventory of Existing Data
- Explore Cost Efficiencies of Shared Resources
- Develop MSDI Imagery Plan

Standards & Best Practices

- Create Geospatial Information & Technology Standards & Best Practices
  - Widely Used
  - Create Efficiencies
  - Reduces Duplicative Efforts
  - Saves Time
  - Saves Money

Old Way

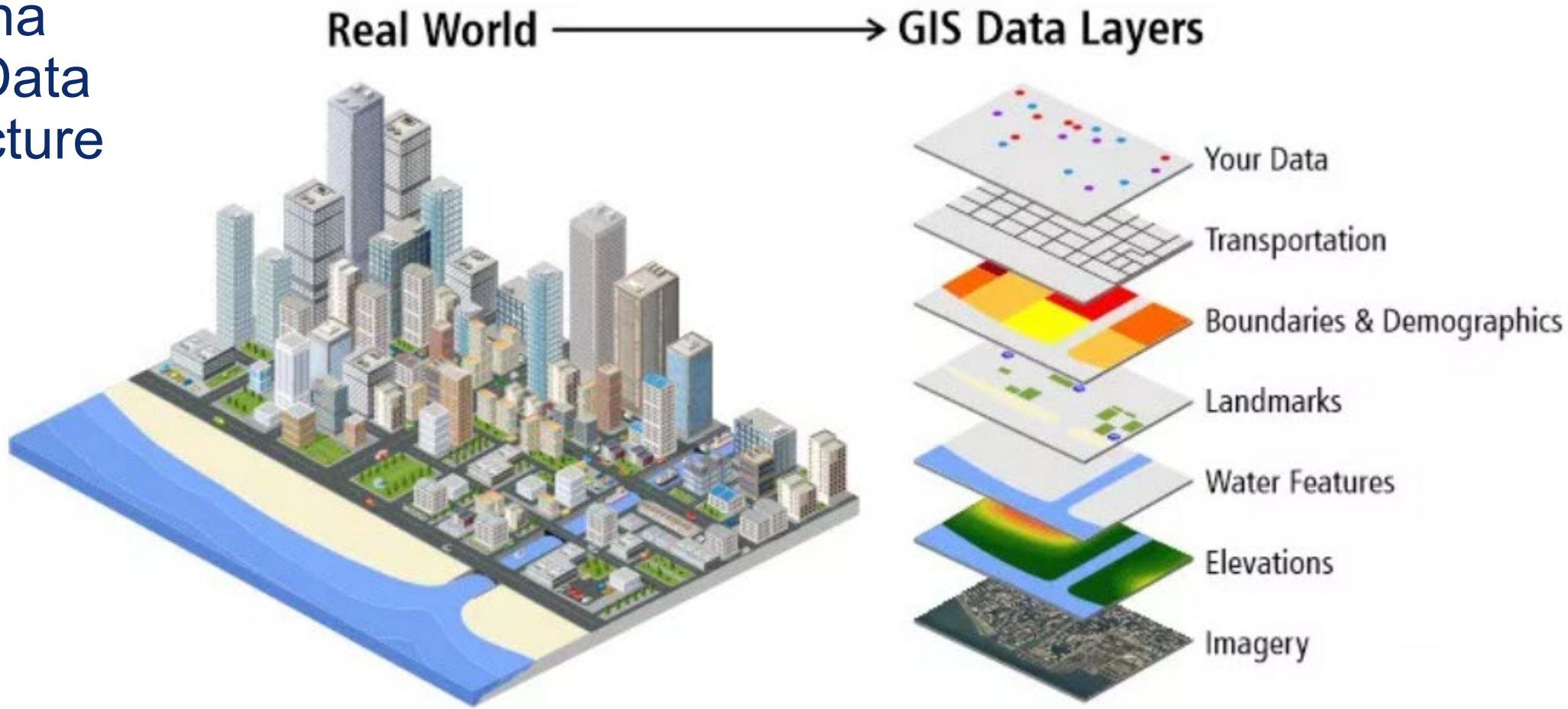
Current Standard



Addressing Data Standard Example

Coordination Makes It Possible!

Montana Spatial Data Infrastructure



A GIS map combines layers of data representing real world locations and entities