



# Montana Imagery Summit

Imagery Summit Day 1, Dec. 12th

Imagery Working Group Day 2, Dec. 13th

# Today's contacts

## In-person

- Erin Fashoway (moderator)
- Troy Blandford (moderator)
- Evan Hammer

## Registration, sponsors, tables, breaks, food, IT equipment:

- Genevieve Lighthiser
- Malissa Briggs
- Mike Lighthiser

## Online Zoom

- Meghan Burns (moderator)  
[mburns2@mt.gov](mailto:mburns2@mt.gov)
- Matt Trebesch (moderator)  
[mtrebesch@mt.gov](mailto:mtrebesch@mt.gov)
- Rebekah Kamp

# Logistics

- Please be sure to Mute. Video is encouraged when speaking.
- We have a full agenda. Please be mindful of allotted times.
  - In-person presenters, watch for heads-up regarding time from Erin and Troy
  - Online presenters, watch for chat/reactions from moderators (Meghan and Matt)
- Q&A and discussion
  - In-person
    - Mics and camera are the two Owl webcams
    - Buddy up with someone with a laptop
  - Online
    - Use the chat or raise your hand in Zoom

# Thank You to the Event Sponsors



# Why are we here today?

More picks

- Better understand the status of aerial imagery within Montana.  
Coming up next!
- Learn about aerial imagery program successes from other states and vendors.  
Coming up later this morning!
- Brainstorm and help plan for future aerial imagery and related policy within Montana.  
Coming up tomorrow, Day 2
- Express business needs, Other...



# Organization Imagery Roll Call

12/12/23, Imagery Summit Day 1

# Roll Call Format

- State, local, and tribal were invited to participate
- Each organization was given the same four questions:
  1. Describe the aerial imagery your organization has and how it is made available
  2. What are your top 2 to 3 business uses for imagery?
  3. What are your challenges with imagery (top 2 to 3 pain points)?
  4. What would you want to see out of a state imagery program (your vision)?
- Presenters will take 5-minutes to answer any or all of the questions
- Additional interested organizations will have time at the end to provide input

# Imagery Roll-Call Participants

1. Montana State Library – Troy Blandford and Erin Fashoway
2. Dept. of Natural Resources – Bret Lian
3. MT Dept. of Transportation – Mike Kuni
4. Dept. of Revenue – Robin Rude
5. Dept. of Environmental Quality – Mark Blevins
6. University of Montana, Mansfield Library – Donna McCrea
7. City of Missoula – Lee Macholz
8. City of Bozeman – Gail Jorgenson
9. Yellowstone County – Mike Powell

... Open Mic!





MONTANA  
**STATE LIBRARY**

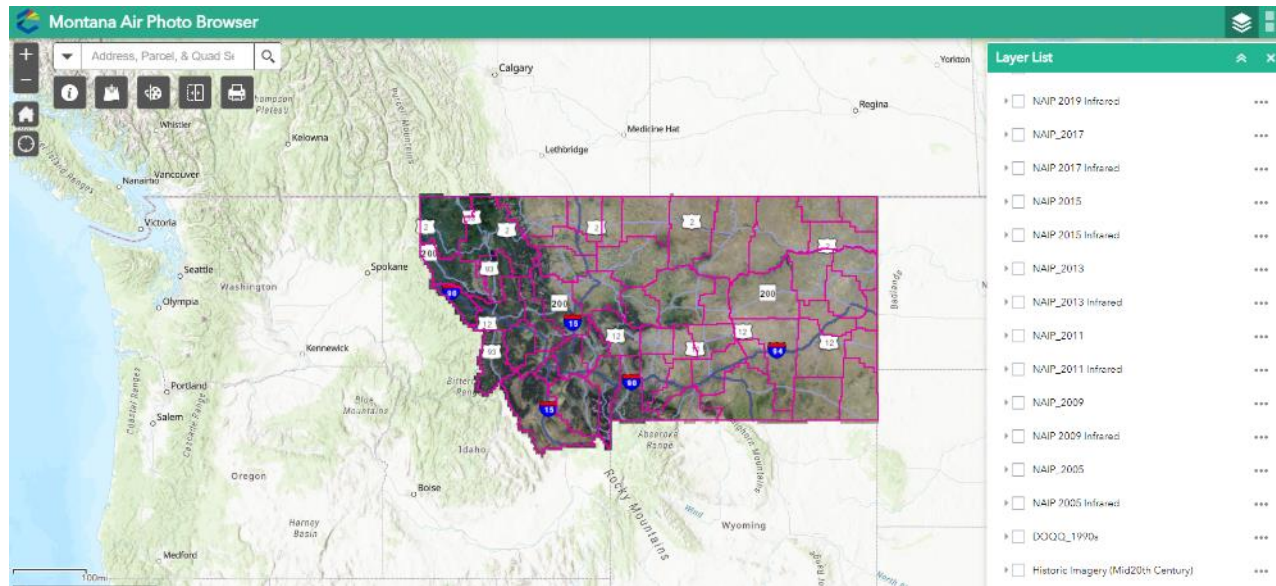
A GREATER STATE OF KNOWLEDGE



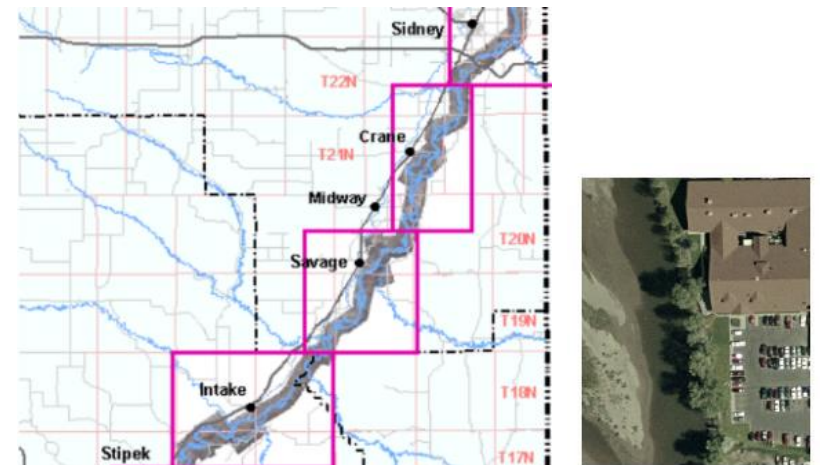


# Q1. continued

## Statewide collections



## Ad hoc imagery collections



## Q2. What are your top 2 to 3 business uses for imagery?

Top business uses:

1. Essential base layer for the MSDI themes that MSL stewards: transportation, hydro, land cover, structures and addresses . . .
2. We are a data provider. Interested in broad use to increase the value of imagery.



## Q3. What are your agency's challenges with imagery (top 2 to 3 pain points)?

1. Challenging to know where to direct requests. Must check multiple places. Having to turn down collections.
2. Our primary interest is in statewide imagery. As a huge state, the cost of new, high-res imagery is tremendous. Storage costs.
3. Sorting what imagery is available elsewhere (dup.) and the value of having a "Montana" version. Once we have the imagery, it is hard to discard.

## Q4. What would you want to see out of a state imagery program (your vision)?

- Imagery becomes more valuable with more use, so let's make that happen. There is an inventory of aerial imagery collected within Montana by various organizations and the imagery is readily available in common geospatial formats. Imagery acquisitions are coordinated, cost-effective, and do not duplicate.

Thank you!



# Montana Department of Natural Resources and Conservation

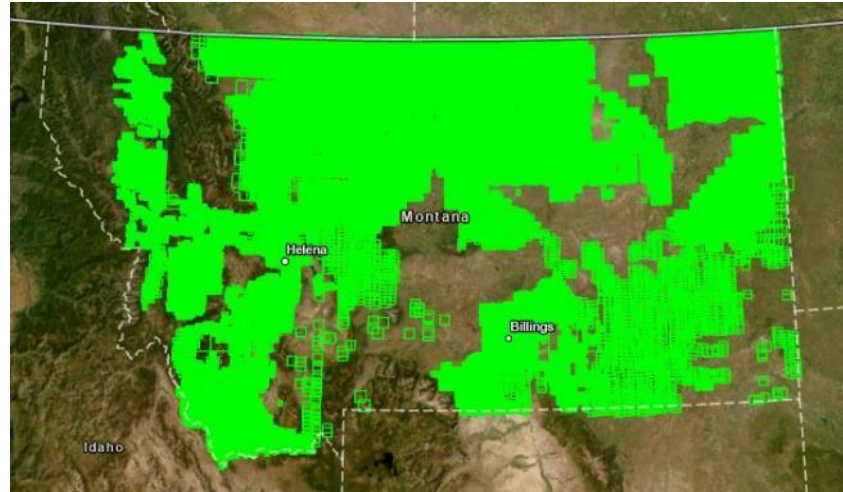




# Q1. Describe the aerial imagery your agency has and how it is made available

DNRC

- Water Resources Survey (WRS) Imagery (Late 1930s – 1970s) ~36,000 images
- USDA 1979 Imagery ~7,500 images
- UAS-Derived Orthomosaics ~ 500 images



## Historic Imagery

- WRS and 1979 Imagery Web Services  
<https://gis.dnrc.mt.gov/imagery/rest/services/Historic>
- Largescale public requests by ext. hard drive.

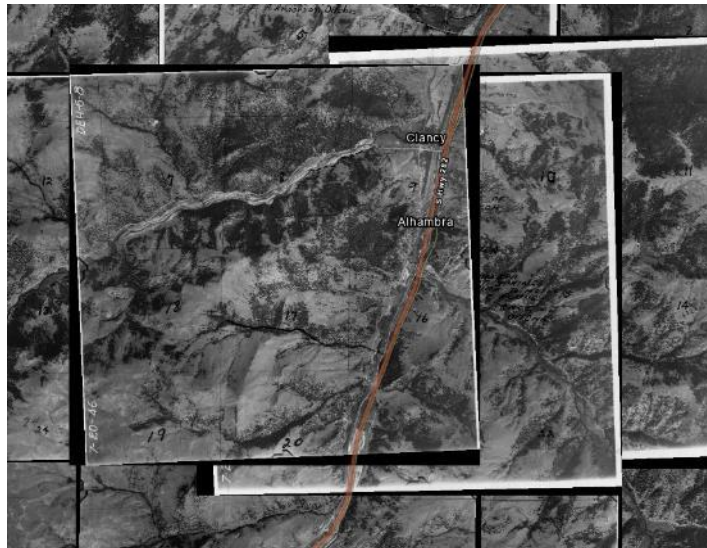
## UAS

- Currently almost entirely internal use. Pix4D(Web) or direct connects to .tifs

# Q2. What are your top 2 to 3 business uses for imagery?

## Historic Imagery

1. Water Rights Adjudication
2. Trust Lands -Historic Land Use for internal purposes (Roads, Bridges, Dams, Easement)



## UAS

1. Dam inspections
2. Volume Calculations of material
3. Forestry applications
4. Documenting Cultural Resources



## Q3. What are your agency's challenges with imagery (top 2 to 3 pain points)?

1. Volume of imagery size and number of images (40,000 +)
2. Data inconsistency (naming, years, lack of attributes)
3. Older technology. Image Server serving out mosaic dataset, internal file server storage.

## Q4. What would you want to see out of a state imagery program (your vision)?

- Single access point for acquisition– could search many different imagery datasets based on intersection with their footprints
- Storage with room to grow. We are currently about to dive into cloud storage for our GIS imagery/other media. If something analogous but centralized existed that the right contributors had access to, that would be powerful
- Simple flexibility for recognized contributors. (Not too many hoops to jump through to get one's data into the common pile)

Thank you!





**MONTANA**  
Department of Transportation

Presented by: Mike Kuni



# Q1. Describe the aerial imagery your agency has and how it is made available

MT Department of Transportation

## List the imagery:

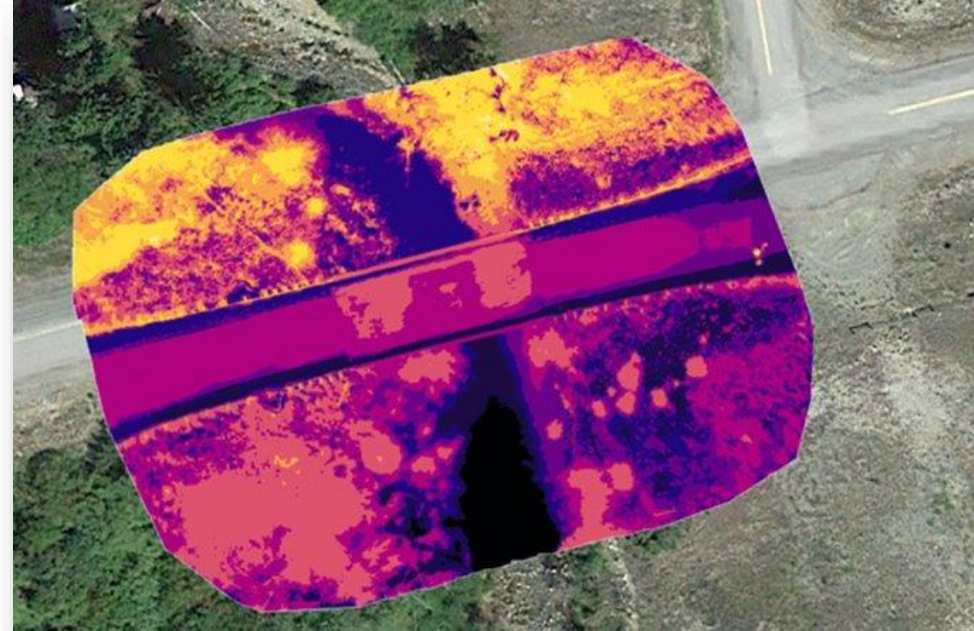
- **Environmental:**
  - Yearly inventory
  - Stream mitigation sites
  - Boundary delineation
- **Engineering/Construction:**
  - Photogrammetry → design surface → orthomosaics
  - 3D terrain model
  - Aerial and terrestrial LiDAR
  - Thermal
  - Mobile network imagery
- **Maintenance:**
  - Stockpile volumetrics
  - Videography
  - Project documentation



## How is imagery made available:

- Current imagery stored as TIFF files in a file directory.
  - Most imagery is not easily accessible with current practices.
- Photogrammetry data is currently being stored in Project Folders.
  - End products are typically not stored in PCMS.
- Currently, aerial LiDAR data is project based, stored in project folders.
- Maintenance volumetric data is managed by each division.

## Example imagery:

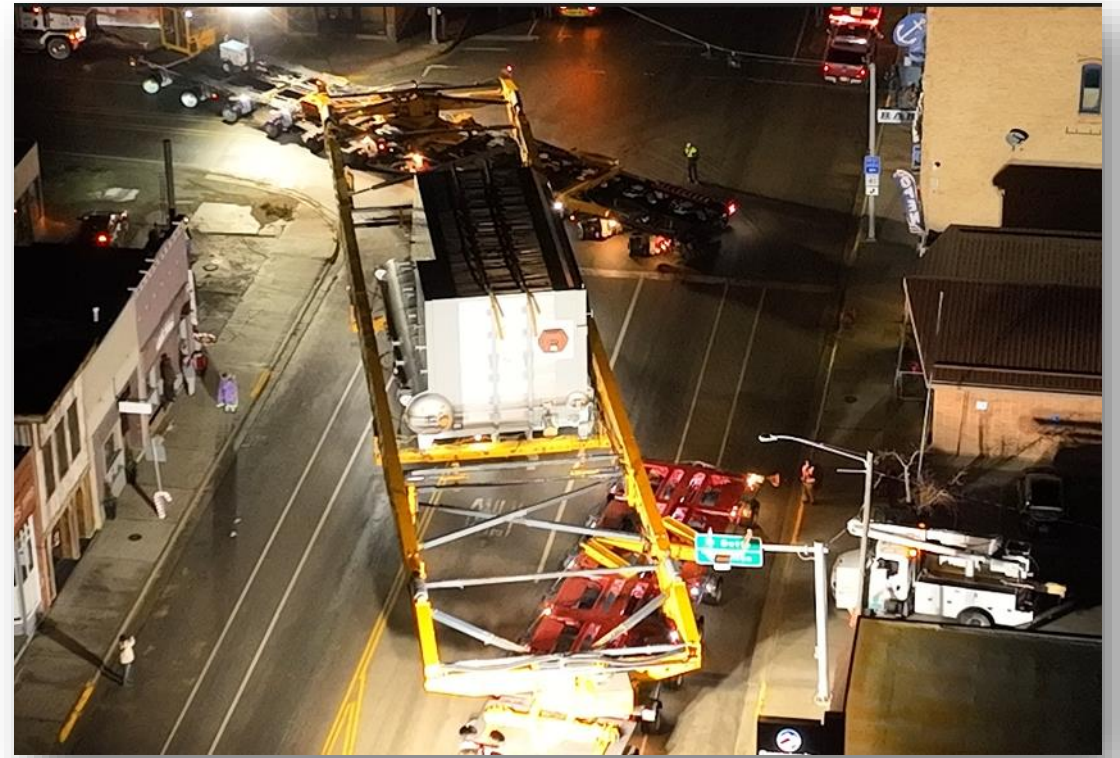




# MDT top business uses for imagery:

## Top business uses:

1. Decision making:
  - The value is in having data which reduces uncertainties in decision making.
2. Record keeping:
  - Whether it's project documentation or asset management, UAS imagery can provide an accurate, permanent visual record.
3. Planning:
  - Survey work, geotech, etc.



# MDT challenges with imagery:

1. Limited imagery tools and licensing
2. Non-standardized data collection methods
3. Knowledge or access to data collected by other departments



# MDT's vision for a state imagery program:

- One vision is for individual agencies to collect and manage their own imagery based off guidelines and best practices for sharing and managing imagery provided by MSL. MDT would like to leverage ESRI's software to increase accessibility and sharing using a web service-based approach.
- Another vision is to have the department move toward a full integration into a BIM (Building Information Modeling) philosophy.
- Lastly, a vision for a state imagery program with standardized data collection methodologies that categorizes or indexes data in a logical format for use by other agencies who may need the data.



**MONTANA**  
Department of Transportation

Thank you!





# Q1. Describe the aerial imagery your agency has and how it is made available

MT Dept. of Revenue

List the imagery:

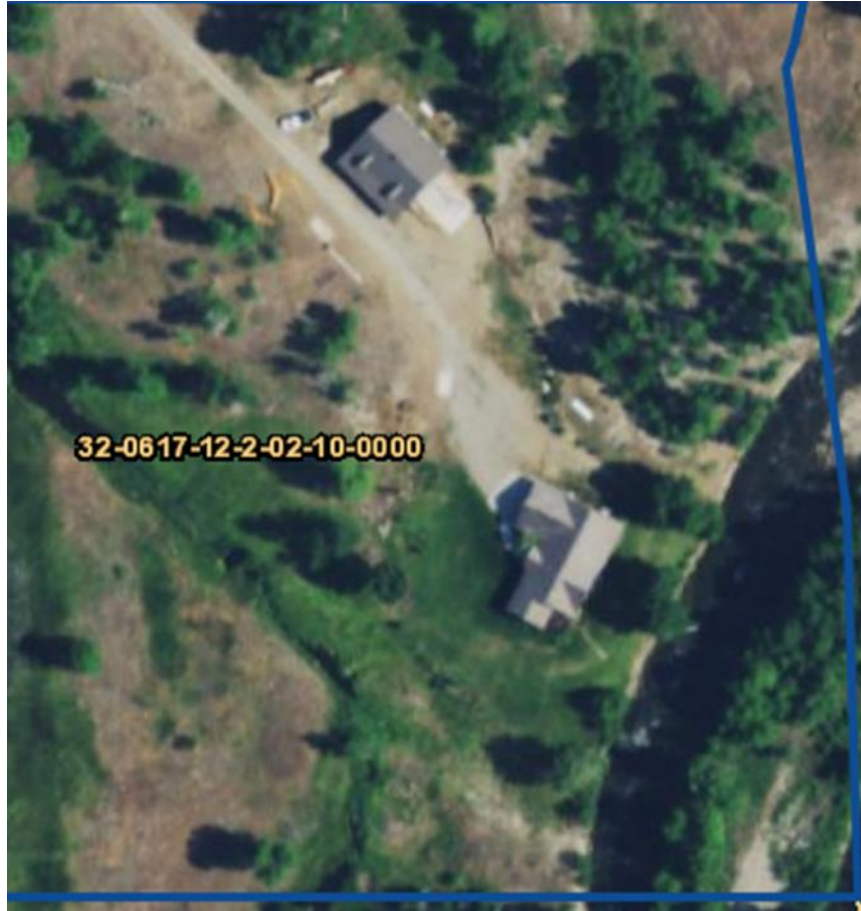
- a. NAIP
- b. Eagleview-2022 Flooding
- c. ArcGIS Pro Imagery
- d. County flown imagery
- e. Nearmap



How is imagery made available:

- a. Provided by State Library
- b. Harddrive or Flood Hub
- c. ESRI Service
- d. Single fly-overs harddrive
- e. Webservice subscription

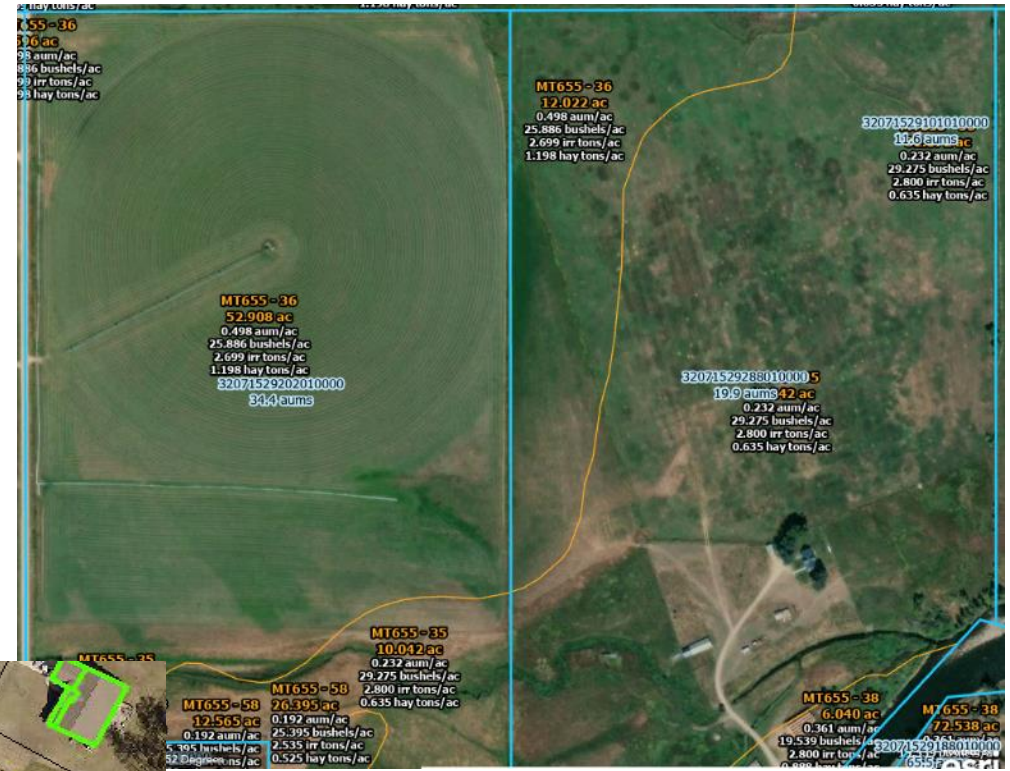
# Q1cont.



# Q2. What are your top 2 to 3 business uses for imagery?

Top business uses:

1. Ag and Timber productivity analysis
2. Change Detection
3. Property Appraisal
  - Ability to measure





## Q3. What are your agency's challenges with imagery (top 2 to 3 pain points)?

1. Cost
2. Quality - resolution, clouds, fires
3. Coverage - high quality is in limited areas
4. Budget office's hesitancy to purchasing imagery for DOR

## Q4. What would you want to see out of a state imagery program (your vision)?

- High quality statewide imagery
  - Available to all agencies - higher quality more frequent flights
  - Shared buy from agencies for affordable access
- Hub where different state agencies can share their purchased imagery
- More frequent imagery updates (NAIP is 2 years + wait time)

Thank you!



DEQ  
MONTANA



# Q1. Describe the aerial imagery your agency has and how it is made available

MT Dept. Of Environmental Quality

## List the imagery:

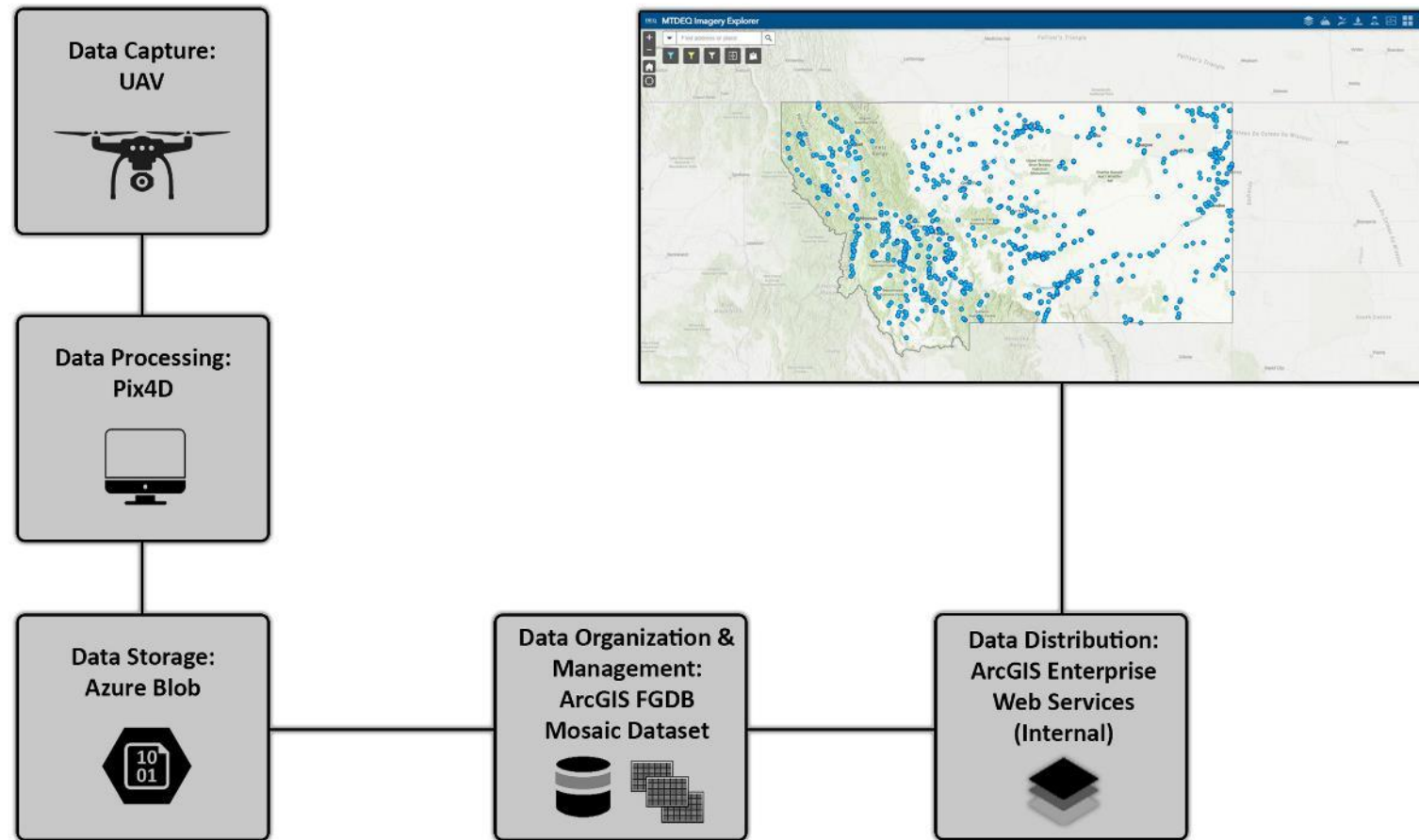
- DEQ image collection consists primarily of 4-band orthomosaics and DSMs captured "in house" with UAVs
- Collected for specific DEQ-permitted sites (such as open-cut mining permits)
- Resolution typically between 2 and 3 centimeters depending on UAV/camera
- Median footprint = ~60 acres
- ~250 flights in 2023



## How is imagery made available:

- Imagery is made available to internal users of DEQ's Enterprise GIS via ArcGIS web services

# Q1. (cont.) DEQ Imagery Management Workflow



## Q2. What are your top 2 to 3 business uses for imagery?

Top business uses:

### 1. Permit Compliance

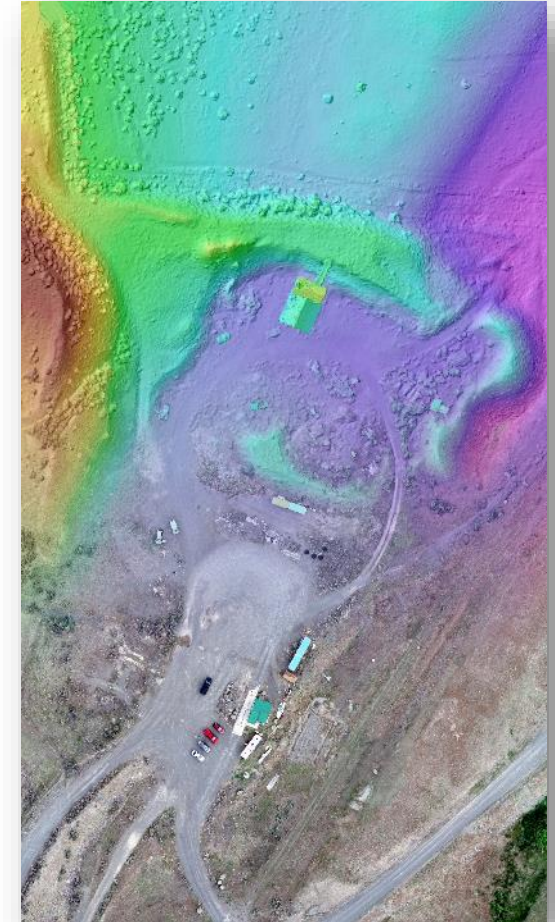
- Easy to identify and communicate permit violations

### 2. Change Detection

- Visualize how sites evolve over time

### 3. Inspection Efficiency

- Drastically reduces time needed to inspect sites, essentially can inspect 2x more sites during a typical inspection trip



## Q3. What are your agency's challenges with imagery (top 2 to 3 pain points)?

1. Automation of workflow (specific to DEQ current process)
  - Workflow from collection through service creation still has a few "manual" steps, is a bit clunky, and only managed by a small group of people
2. Public Data vs Confidentiality Concerns
  - Figuring out the right balance between providing public access to data we collect vs concerns about confidentiality of sensitive data
3. "Filling the Gaps"
  - Finding readily available, high quality, and timely imagery in a State as big and as sparsely populated as MT is challenging



## Q4. What would you want to see out of a state imagery program (your vision)?

- A publicly available State imagery data hub/portal where agencies provide access to image services
- Coordination among agencies where applicable to reduce duplicative collection efforts

Thank you!





**MAUREEN AND MIKE  
MANSFIELD LIBRARY**

# Archives and Special Collections Aerial Photography Project

Montana Imagery Summit Roll-Call  
December 12, 2023

Donna E. McCrea, Professor  
Head of Archives and Special Collections  
Mansfield Library, University of Montana

# Describe the imagery your organization has

- Aerial negatives on 9" reels
- Primarily from 1932-1944
  - also some color infrared from the late 60s and early 70s
- 30k+ images from 1932-1939
  - we believe these include some of the first aerials of Montana
- Most images are of Montana, but also Idaho and Washington (and a few British Columbia and Alberta)
- These are duplicates returned to USFS Region 1 from the National Archives
  - though some may be unique
- No logical organization to a reel - multiple flight lines / projects / years

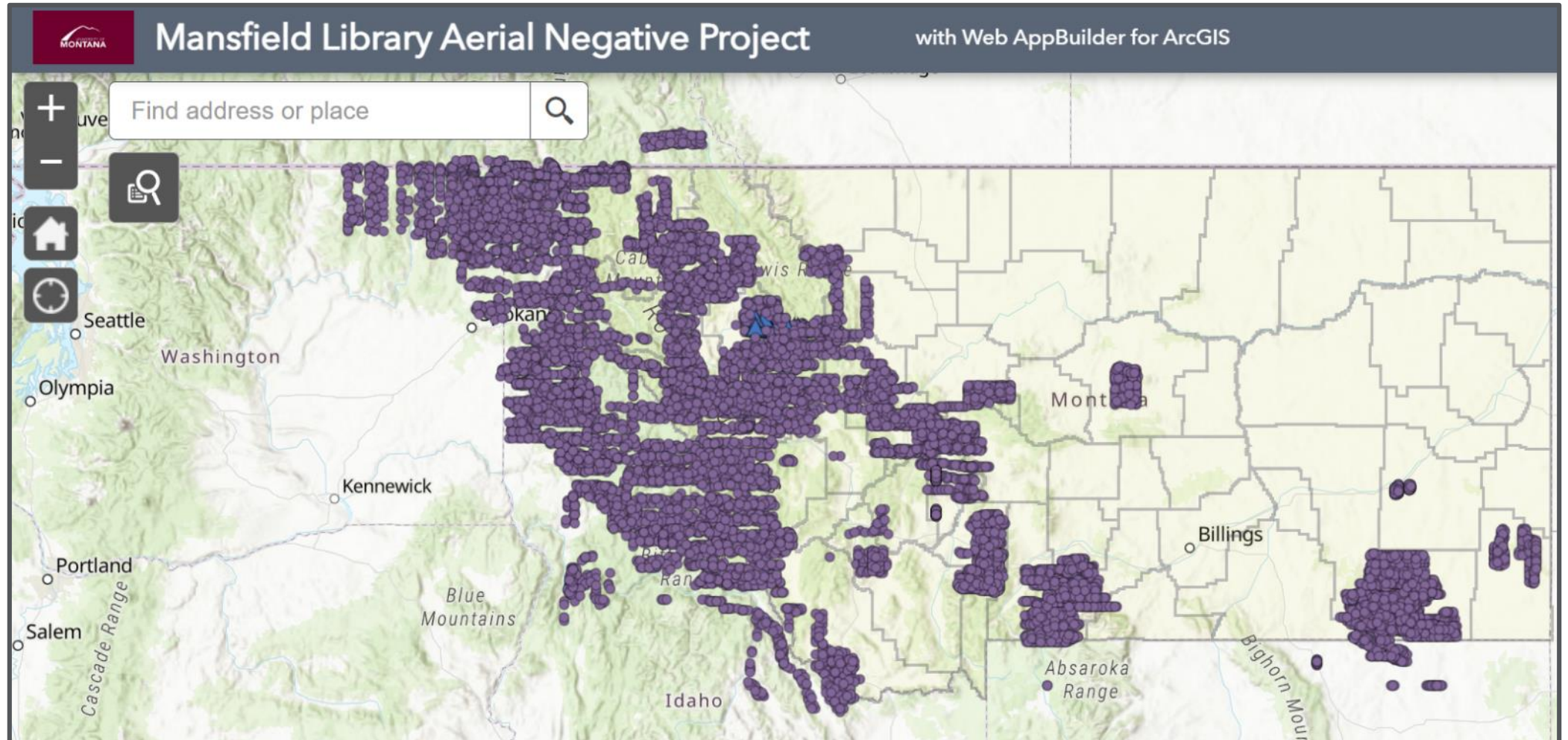


# Describe how your imagery is made available

The primary public access 'index' to collection images is an ArcGIS webmap –

<https://umontana.maps.arcgis.com/apps/webappviewer/index.html?id=5467e94ab6b743148f226e097e1a26bf>

- Purple circles = images in the collection (not all images are on this map yet)
- Blue triangles = jpgs available online



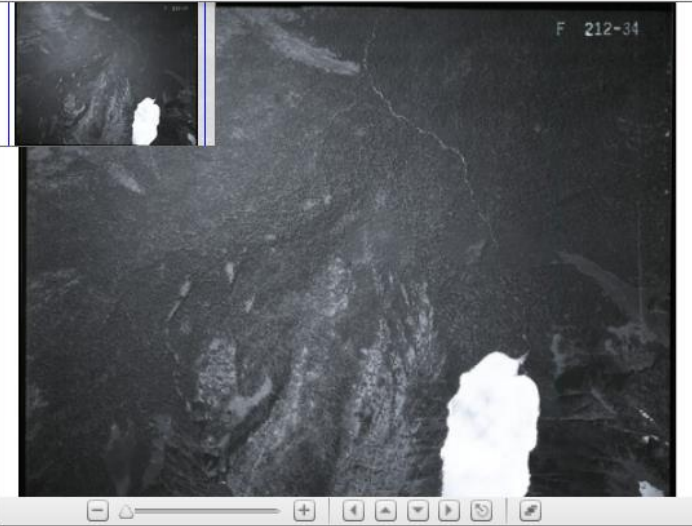
# Describe how your imagery is made available

[Next >](#)

[Home](#) > [Mansfield Library](#) > [Archives and Special Collections](#) > [Photograph Collections](#) > [U.S.F.S. Aerial Photos](#) > [U.S.F.S. Aerial Photos, 1934](#) > 1

## UNITED STATES FOREST SERVICE AERIAL PHOTOGRAPHS, 1934

Aerial photograph F\_03\_0212, Flathead County, Montana, 1934



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[Thumbnail](#)

PLUMX METRICS


**KEYWORDS**

Aerial photographs; Aerial photography in forestry--West (U.S.)

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**IMAGE LOCATION**



**Date Created**  
7-11-1934

**Center Latitude Dec**  
47.7480833333

**Center Longitude Dec**  
-113.606191667

[View gallery on map](#)

[View gallery in Google Earth](#)

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**Author Corner**


[Author FAQ](#)

**Links**

[University of Montana](#)

[Maureen and Mike Mansfield Library](#)

**Gallery Locations**



Scanned images are made available online via UM's institutional repository, ScholarWorks.

[https://scholarworks.umt.edu/aerial\\_photographs/](https://scholarworks.umt.edu/aerial_photographs/)



# What are your top 2 to 3 business uses for imagery?

Archives and Special Collections is the image provider, not the image user. We believe uses include (but are not limited to):

- Documenting changes in landscape (such as the size of glaciers, the channels of rivers, evidence of forest fires, etc.)
- Documenting the footprint of industrial sites (for example, to inform cleanup / remediation efforts.)
- Documenting changes in municipalities through time.
- Documenting the existence or non-existence of access points (for example, to prove there was a road through an area that pre-dates a private land acquisition.)

# What are your organization's challenges / pain points with aerial imagery?

- No Archives staff have GIS experience, and this is no one's primary project.
- Is this the best use of our time and effort?
- Uncertain who our audience is and how to reach them effectively.
- Uncertain if we are providing data in a useful way.
- Are we duplicating efforts? Is someone else scanning 1930s Montana?
- Image scans take a long time, and we have many 'skips' (images that won't scan).





# What would you want to see out of a state imagery program?

- Help us determine if these images do have value / do have an audience.
- If they have value, help us get the word out about the image collection, and help connect Archives and Special Collections with that audience.
- If possible, help with resources for making images and associated data available in ways that are beneficial and that facilitate access and use.

thank you

[donna.mccrea@umontana.edu](mailto:donna.mccrea@umontana.edu) / (406) 243-4403



# Q1. Describe the aerial imagery your organization has and how it is made available

City of Missoula



## List the imagery:

- 2023 color imagery of Missoula valley – 3" leaf-off
- 2020 color imagery of Missoula valley – 3" leaf-off
- 2014 color imagery of Missoula Valley – 6" leaf-off
- 2004, 2002 color imagery of Missoula Valley – unk resolution

## How is imagery made available:

- 2023 & 2020 are available via web service
  - Can be shared as native files via a cloud-share site with minimal effort on our part
- 2014, 2004, 2002 are available for internal use (DB direct connection)

# Q1cont.



## Q2. What are your top 2 to 3 business uses for imagery?

Top business uses:

1. Public Works Project Research & Planning
2. Parks & Recreation
3. Growth Visualization



## Q3. What are your organization's challenges with imagery (top 2 to 3 pain points)?

1. Acquisition window: Leaf-off imagery is very important to us
2. Size of file/service: Trouble loading it to AGO
3. Cost of acquisition & justification to City Council when they see imagery in Google Maps for free

## Q4. What would you want to see out of a state imagery program (your vision)?

- A patchwork of various agency's photography into one cohesive easily-obtained image; with the understanding that there will be differences in areas due to financial or practical reasons.
- Not interested in a single acquisition approach as we all have varying needs regarding vegetation.



Thank you!



# BOZEMAN<sup>MT</sup>

Geographic Information System



# Q1. Describe the aerial imagery your organization has and how it is made available

- Earliest maps of the city which are scanned, georeferenced, to scale and are in .PNG format are Sanborn maps beginning in 1884 through 1912
- NAIP Imagery – 2005, 2009, 2011, 2013, 2015 & 2017
- LiDAR 2012, 2018, 2024
- Landcover – 2023
- Imagery – 1969, 1980, 1987, 1990, 1992, 1994, 1995, 1996, 2000, 2004, 2007, 2012, 2015, 2016, 2018, 2021, 2023,

City of Bozeman



## How is imagery made available:

- [Open Data Portal](#)
  - Down load and services
- For internal and external use
- External hard drives that we share (leave your business card)
- FTP portal sharing

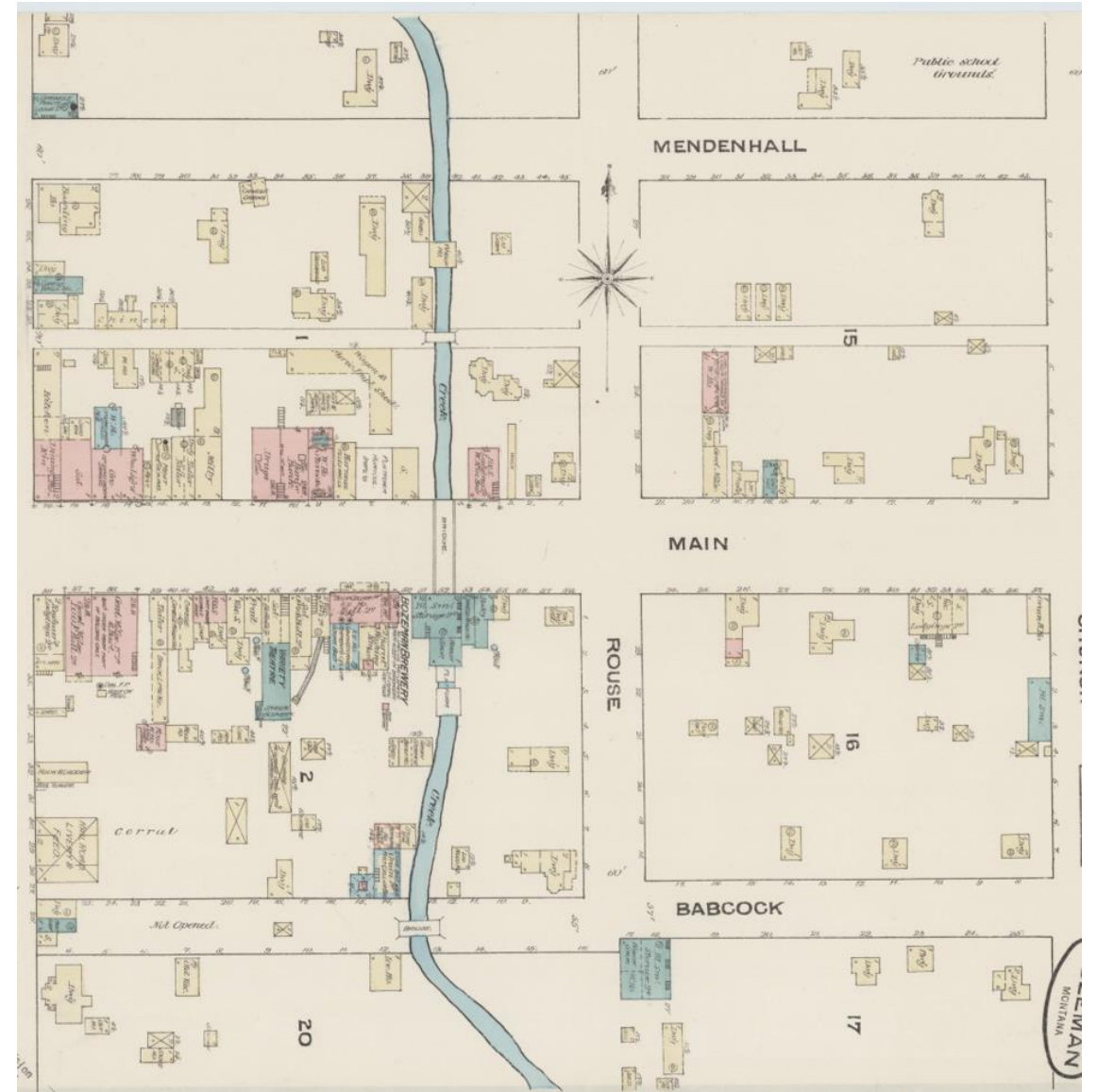
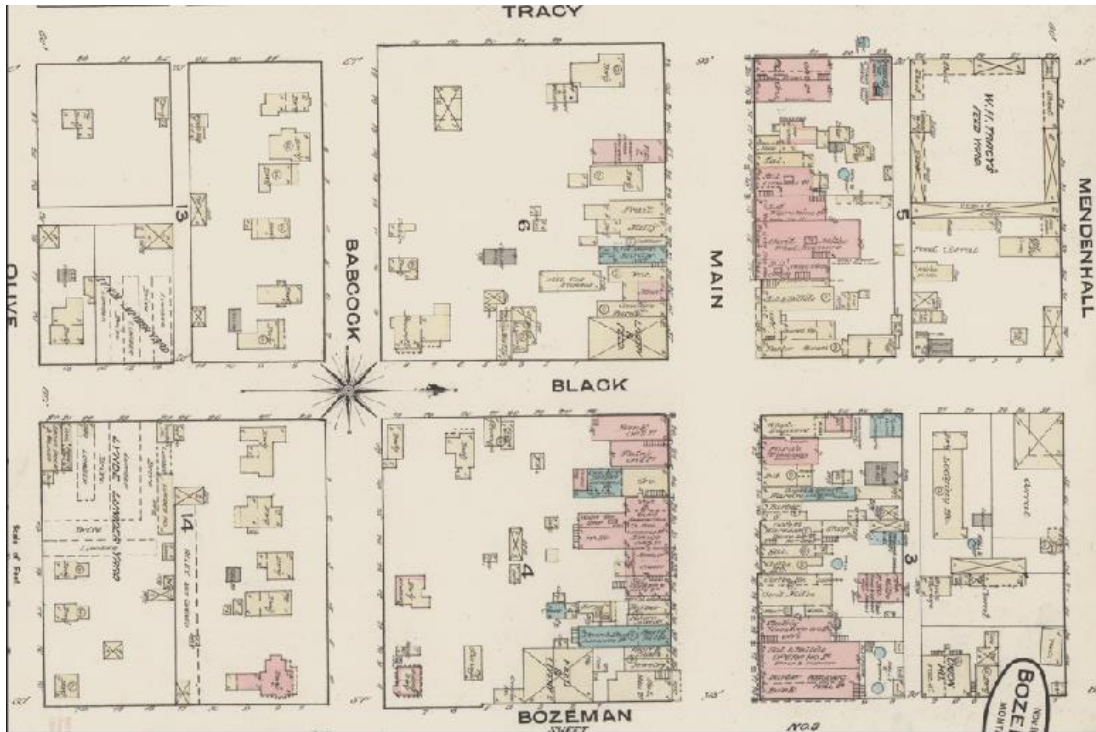
# Q1 cont.



## Q2. What are your top 2 to 3 business uses for imagery?

Top business uses:

1. Planimetric Data
2. Planning Projects
3. Engineering Projects
4. Regulatory Compliance



# Q3. What are your organization's challenges with imagery (top 2 to 3 pain points)?

feel free to add pics to illustrate your point

1. Request for Proposals
2. Time it takes to receive the data back
3. Size of the data (terabytes)



## Q4. What would you want to see out of a state imagery program (your vision)?

- The City of Bozeman has an extensive collection of imagery. Two years ago the City moved to a yearly collection cycle for imagery and two year collection cycle for LiDAR (imagery and LiDAR collected during the same flight). We also began collecting leaf on imagery (August 2023) along with Land Classifications that include a Lawn/Turf layer (12" pixel scale).
- We would like to incorporate **oblique imagery** into our GIS/Asset Management workflows and are actively researching this.
- While we have explored incorporating **drone imagery** into our data repository mostly it is on a case by case basis.

Thank you!





# Yellowstone County



# Q1. Describe the aerial imagery your county has and how it is made available

Yellowstone County

## List the imagery:

- Relied on NAIP in past
- Along with high-resolution imagery of the populated parts of the county flown locally
- Recently obtained high-resolution imagery for entire county, including obliques

## How is imagery made available:

- Available to county
- Licensed: available to those with contract
- Public is limited

## Q2. What are your top 2 to 3 business uses for imagery?

Online viewing is biggest use:

1. New construction and new roads that we didn't know were happening
2. DES and emergency response
3. Public Works and floodplain analysis

## Q3. What are your agency's challenges with imagery (top 2 to 3 pain points)?

1. More license restrictions with viewing than we anticipated
2. Public is limited
3. Reliant on vendor's website for doing any work with Oblique imagery

## Q4. What would you want to see out of a state imagery program (your vision)?

- I would love to see better quality, higher-resolution than NAIP. Maybe an idea would be that the counties pay a certain amount to the state, annually, to be able to get that kind of quality. I am sure that will probably not go over well with many counties, but it is a thought.

Thank you!



Who else would like to  
share! Open mic



1. Describe the aerial imagery your organization has and how it is made available
2. What are your top 2 to 3 business uses for imagery?
3. What are your challenges with imagery (top 2 to 3 pain points)?
4. What would you want to see out of a state imagery program (your vision)?



**Thank You Roll Call  
Presenters!**



Take a Break  
Be back at 11a MST

Break sponsored by: **N|V|5** GEOSPATIAL



# Invited State Imagery Programs

Indiana

Kentucky



Lunch  
Be back at 1:00p<sub>MST</sub>



# Invited Speaker

## USDA NAIP



# Submitted Abstracts Part 1

Woolpert

Ayres

ESRI

Hexagon



Take a Break  
Be back at 3:10p<sub>MST</sub>

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sanborn  
geospatial

# Submitted Abstracts Part 2

Dewberry

Ecopia

Sanborn

Fugro

Vexcel





# Imagery Social and Mappy Hour

Happy hour sponsored by:

