

The Difficulties of Monitoring Wet Meadow Restoration Projects in Central Utah

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Wet Meadows and Why They Matter



Wet meadows see surface flow during high water but may become dry throughout the rest of the year



Wet meadows benefit ungulates, small mammals, birds, and fish



Wet meadows recharge groundwater flow and provide saturated soils for grasses, rushes, and sedges that need it.

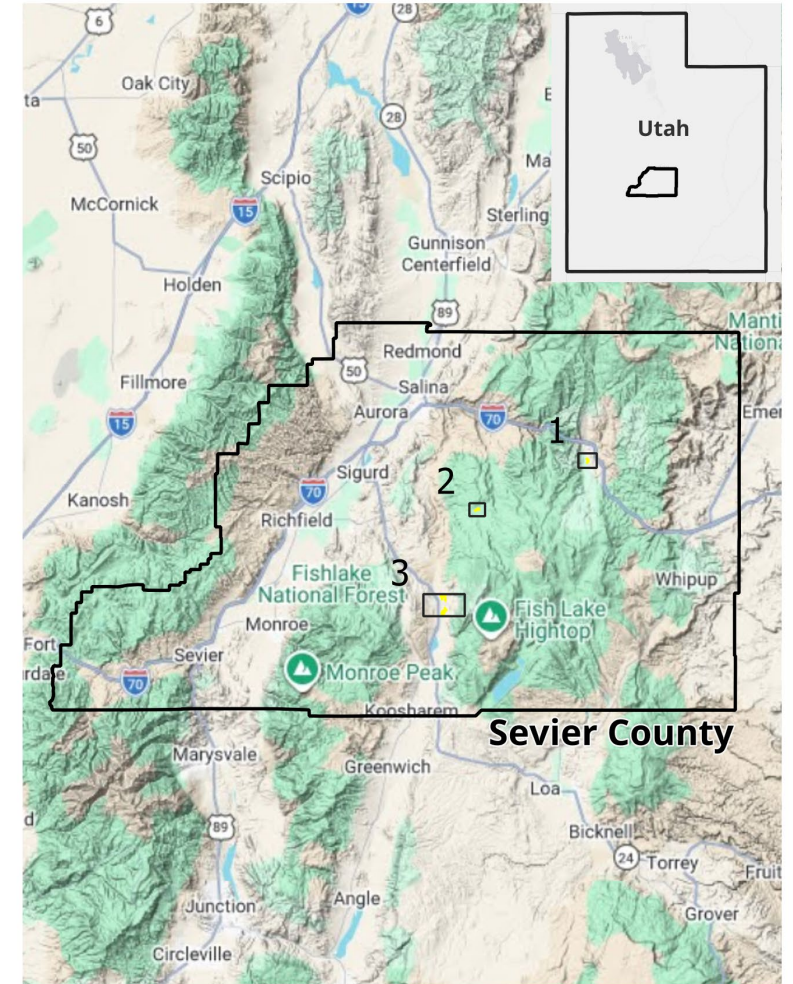
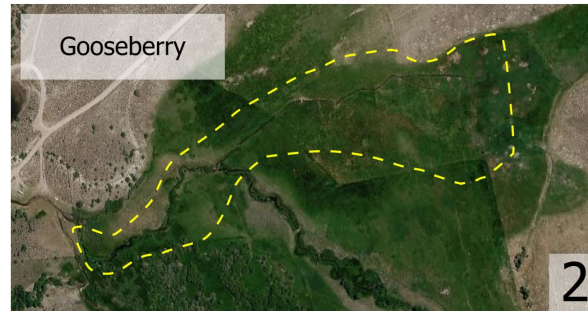
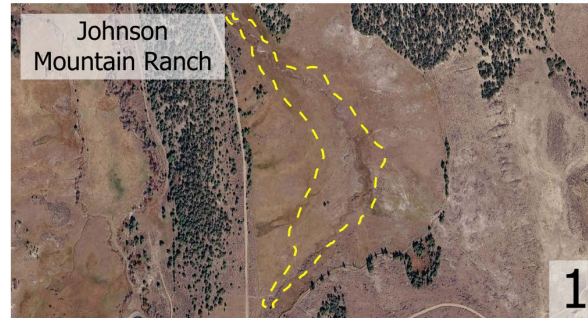
Degradation to Wet Meadows

- Causes:
 - Cattle grazing
 - Agricultural diversions
 - Climate change
- Degradation seen at wet meadows:
 - Channelization
 - Incision
 - Head cuts
 - Upland Encroachment



Wet Meadow Restoration Areas

- Boobe Hole (August 2023 – Present)
- Gooseberry (August 2024 – Present)
- Johnson Mountain Ranch (August 2025 – Present)



Project Location

Boobe Hole (Upper
Otter Creek)



Project Location

Gooseberry (Bar J)



Project Location

Johnson
Mountain Ranch



Restoration Approach in Central Utah

- Zeedyk Structures – One Rock Dams
- Spread the flow – Slow flow and force water laterally
- Promote aggradation – reverse incision



Gooseberry Before and After, Clint Wirick, USFWS

Restoration At a Glance



Typical Stream Restoration Monitoring Approach

Where

- Streams and Rivers
 - Predictable spring flow/base flow

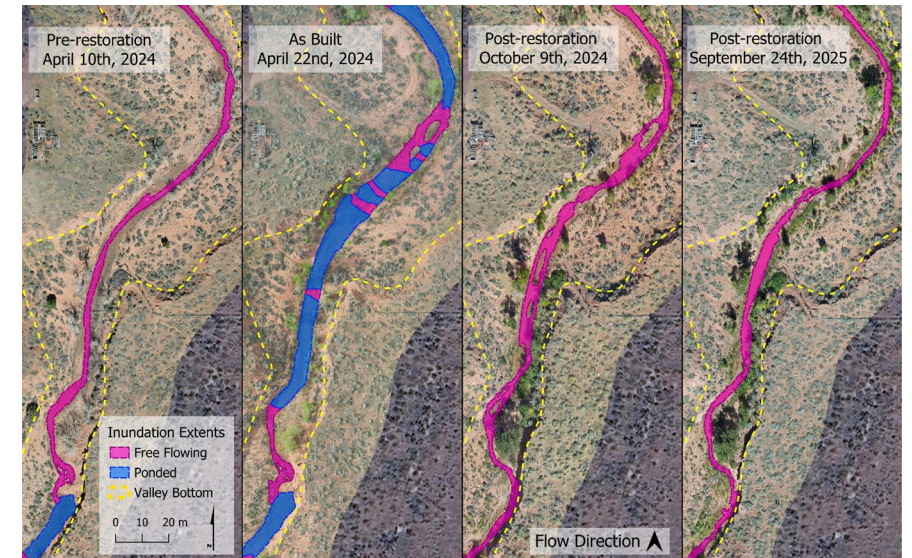
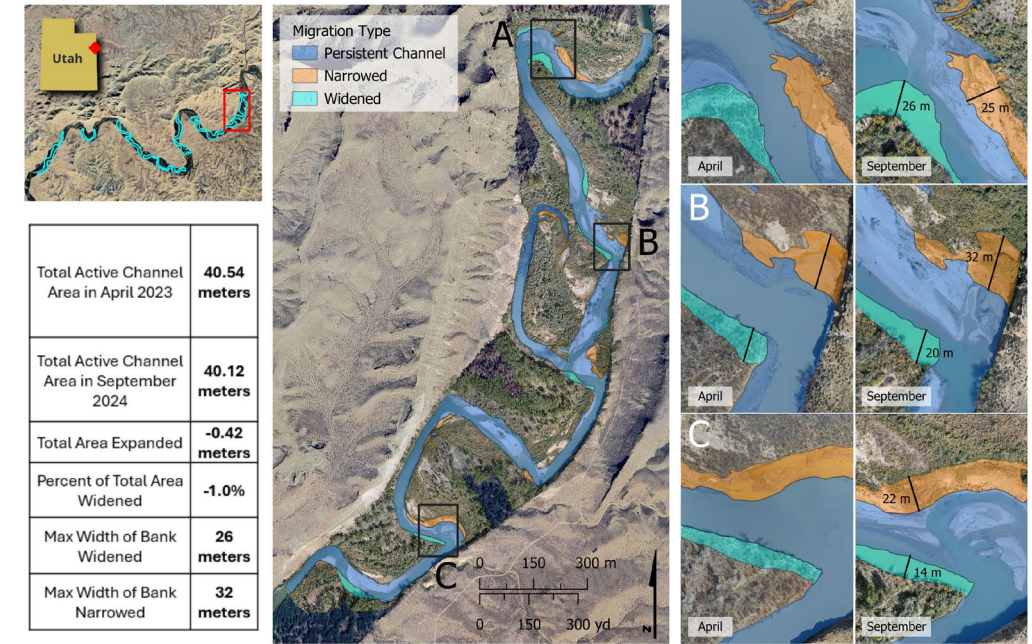
How

- Drone Imagery Capture
 - Manual digitization at a set scale (e.g. 1:50 consistently)

What Response

- Active Channel
- Inundation Extent
- Geomorphic Units
- Riparian Vegetation

Channel Migration: April 2023 to September 2024



Monitoring Wet Meadows

– Initial Approach

What has worked

- Vegetation Response
- Channelization

What has been difficult

- Inundated area over time



Why Monitoring These Projects is Difficult

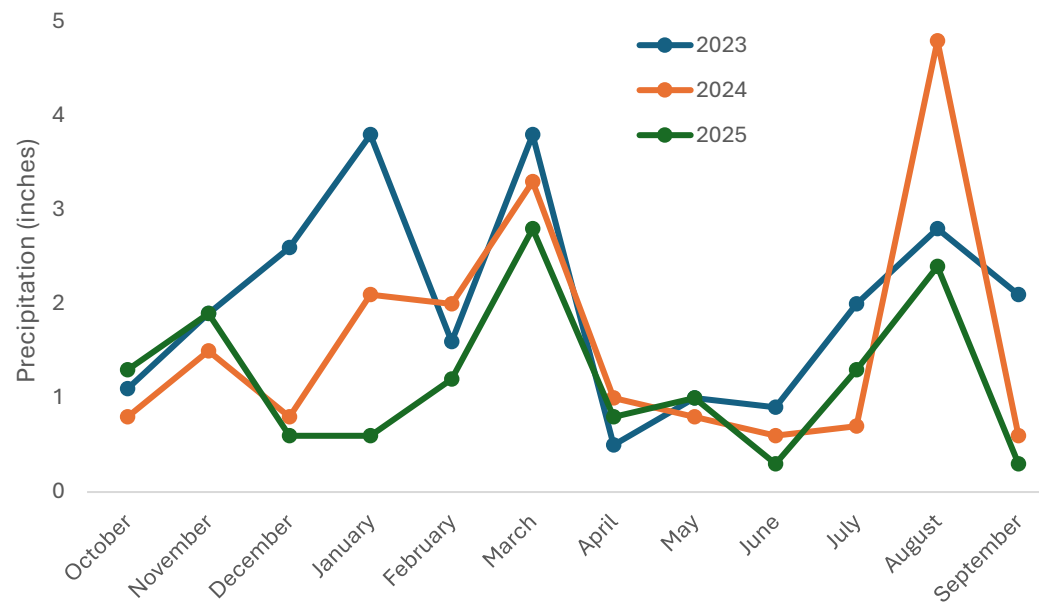
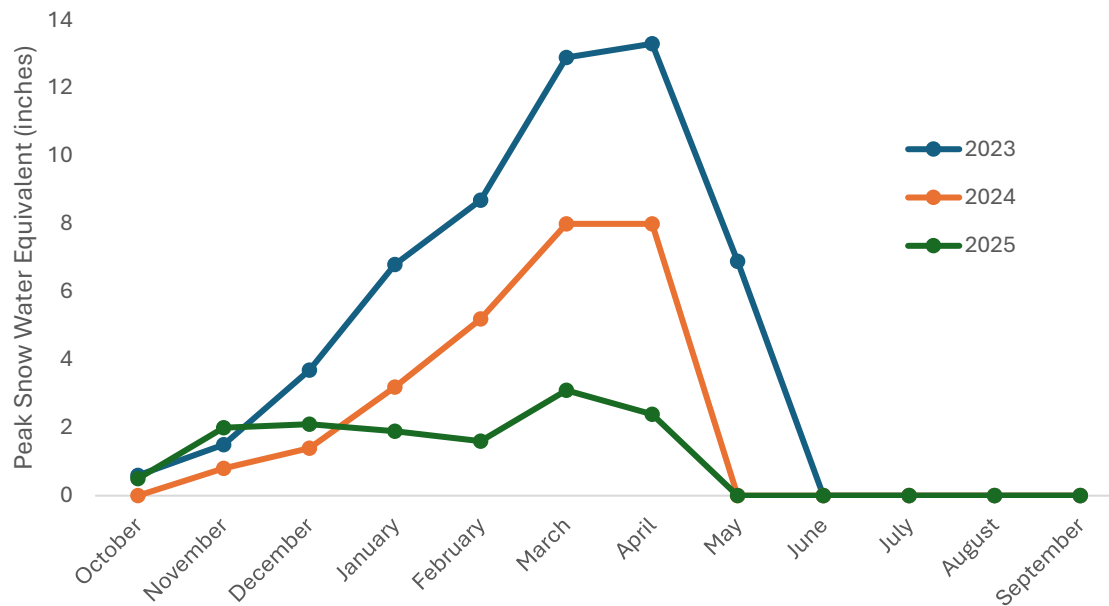
Small change in discharge more obvious

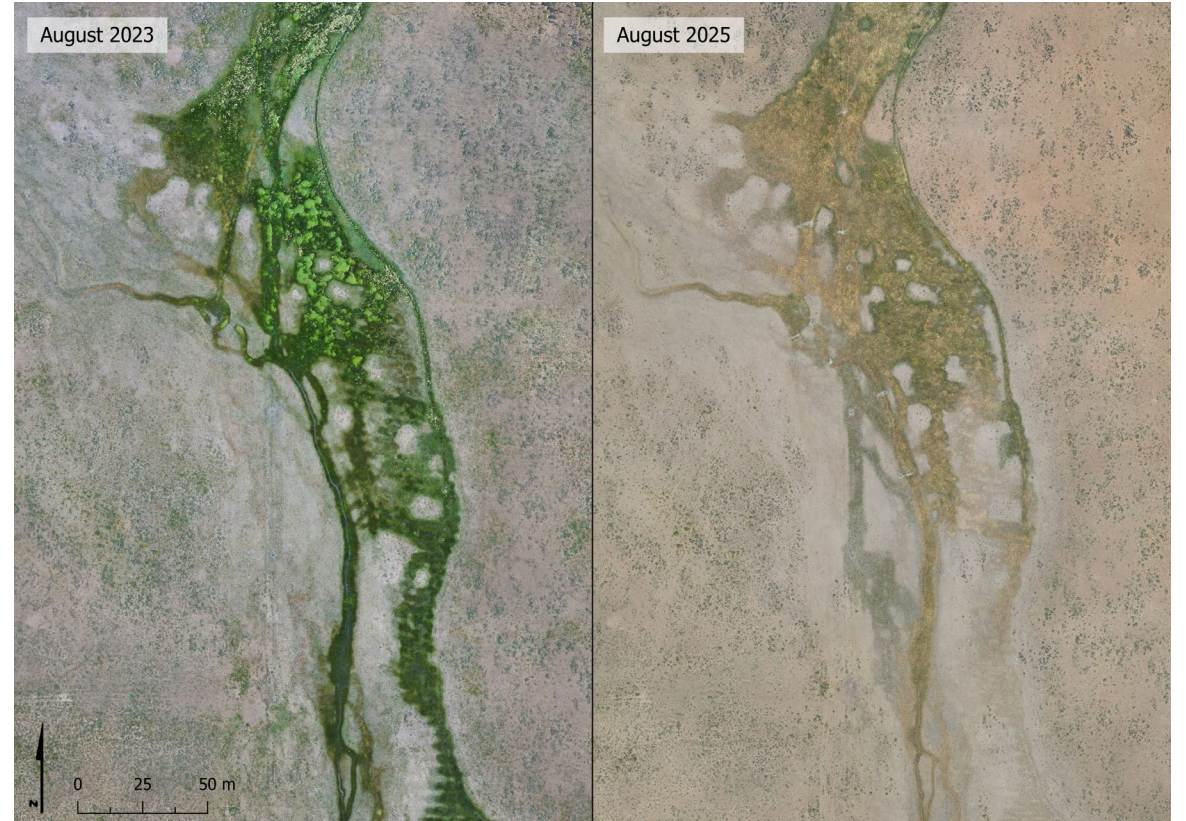
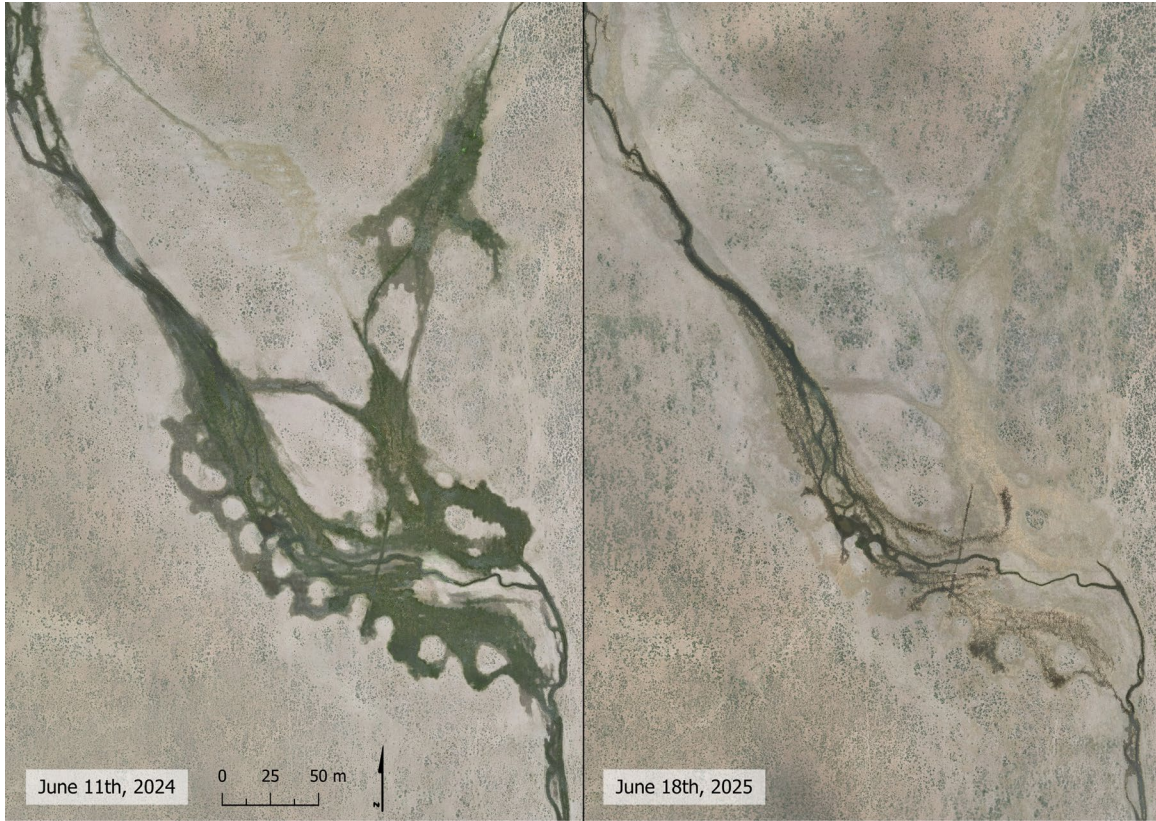
Can have significant flow year-round, or be dry by summer

“Ideal” time of year to collect imagery hard to predict

Drought and Snowpack

- Box Creek, Utah SNOTEL station
 - Deep snowpack 2023
 - Low Precipitation 2025
 - Shallow snowpack 2025
- Correlates to flow levels at wet meadow sites





Flow Conditions Change By Year

Metrics and Indices That Have Been Useful

- Identifying overflow areas
- Dead sagebrush showing consistent wetting
- Increased meadow vegetation area



How To Improve Monitoring

Ground-based monitoring

- Structure Survey

Vegetation Surveys

- Random quadrat sampling

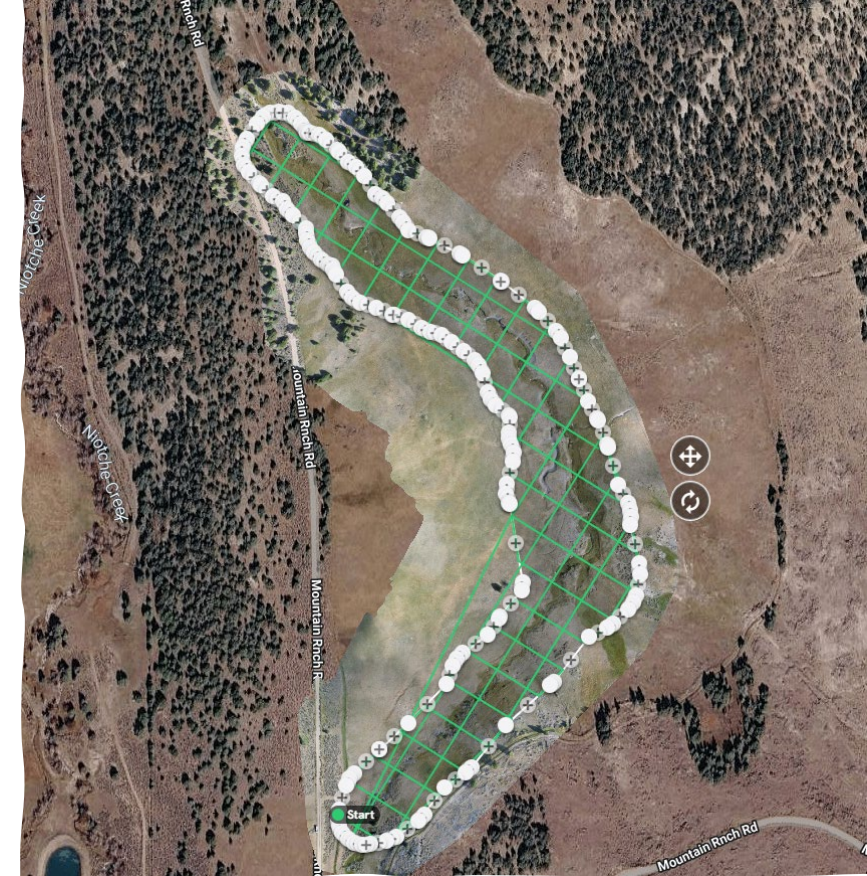
The image shows a screenshot of a mobile application interface titled "Instream Structure Assessment Form". The form is organized into several sections with various input fields:

- Condition:** A group of six checkboxes for "Natural", "Breached", "Augmented", "Intact", "Blown-out", and "Buried".
- Posts?:** Two radio buttons for "Yes" and "No".
- Hydrological:** A collapsed section containing:
 - Flow:** A dropdown menu.
 - Ponding?:** Two radio buttons for "Yes" and "No".
 - Overbank?:** Two radio buttons for "Yes" and "No".
 - Split flow?:** Two radio buttons for "Yes" and "No".
- Geomorphic:** A collapsed section containing:
 - Net Response:** A dropdown menu.
 - Depositional Geomorphic Units:** Four checkboxes for "Uniform Deposition", "Bar", "Overbank Deposits", and "None".
 - Eroional Geomorphic Units:** Five checkboxes for "Uniform Erosion", "Channel", "Scour Pool", "Bank Erosion", and "None".
- Does this structure need maintenance?:** Three radio buttons for "Yes", "No", and "Not Sure".

A checkmark icon is visible at the bottom right corner of the form.

How To Improve Monitoring

- Improved Flight Pattern
 - Cross-hatch flight pattern for better topographic output
 - RTK drone add-on for precise GPS location and elevation data



Takeaways and Future Direction of Monitoring Wet Meadows

- Drone imagery can cover a lot of bases, but may be insufficient for wet meadows without supplemental data
- Future monitoring will include on-the-ground structure and vegetation surveys
- Potential groundwater or soil moisture monitoring for long-term funded sites

