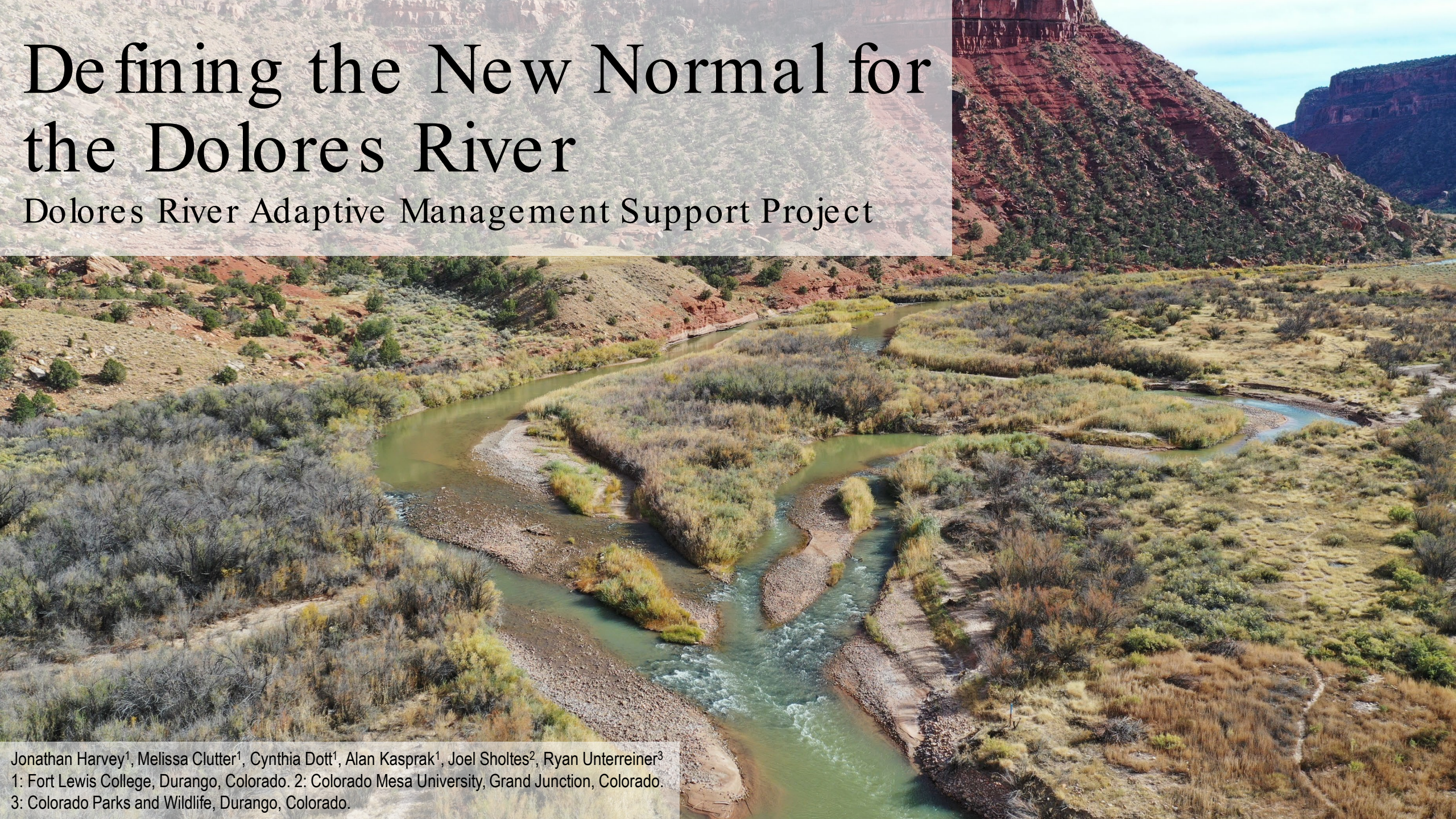
Defining the New Normal for the Dolores River

Dolores River Adaptive Management Support Project



Jonathan Harvey[1], Melissa Clutter[1], Cynthia Dott[1], Alan Kasprak[1], Joel Sholtes[2], Ryan Unterreiner[3]
1: Fort Lewis College, Durango, Colorado. 2: Colorado Mesa University, Grand Junction, Colorado.
3: Colorado Parks and Wildlife, Durango, Colorado.

DRAMS Project

Funding

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Partners

Academic Team

- Melissa Clutter, FLC Geosci
- Cynthia Dott, FLC Biology
- Jon Harvey, FLC Geosciences
- Alan Kasprak, FLC Geosciences
- Gigi Richard, FLC Water Center
- Joel Sholtes, CMU Engineering

Other Team Members

- Rica Fulton, DRBA
- Montana Cohn, RiversEdge West
- Shauna Jensen, USFS
- Shannon Hatch, USBR
- Kevin Hyatt, BLM
- Nate Peters, Conservation Legacy
- Jimbo Buickerood, SJCA

M&R Team Members

- Celene Hawkins, TNC
- Robert Stump, USBR
- David Graf, CPW
- Ryan Unterreiner, CPW
- Ken Curtis, DWCD
- Bruce Smart, DWCD
- Mike Preston, DWCD

Consultants

- Seth Mason & Bill Hoblitzell, Lotic Hydrologic

5-Year DRAMS Project Timeline

Year 1 Feb - Sept 2021	Year 2 Sept 21 – Aug 22	Year 3 Sept 22 – Aug 23	Year 4 Sept 23 – Aug 24	Year 5 Sept 24 – Aug 25

Task 1 – Monitoring Protocol Development

doloresriver.org

Task 2 – Perform annual and responsive monitoring

Task 3 – Reporting and communications

Task 4 – Database development and maintenance

Task 5 – Grant administration

FOUR CORNERS WATER CENTER at FORT LEWIS COLLEGE

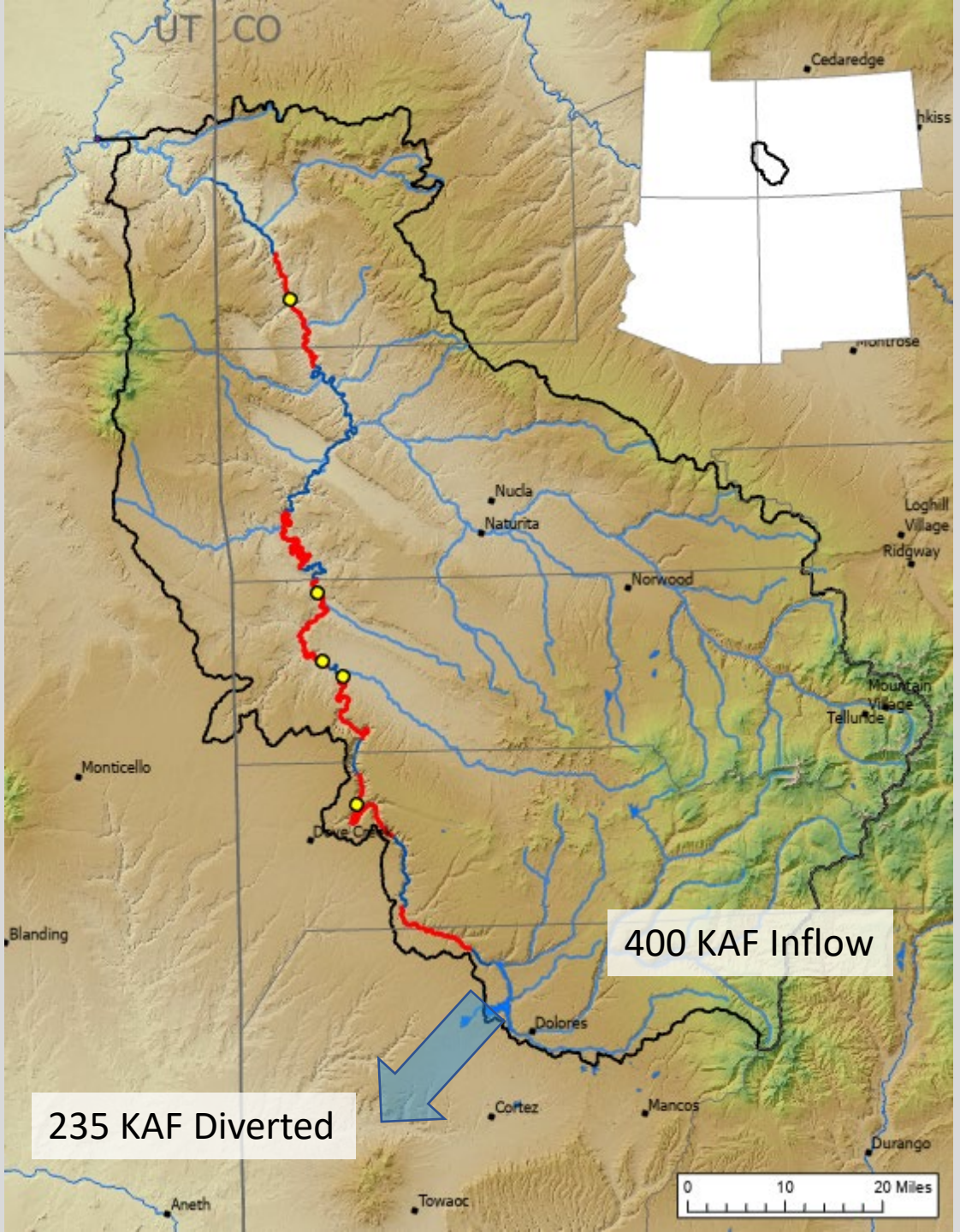
Exploring the New Normal of the Dolores

- Diminished / Hybrid Hydrology of the Dolores
- Impacts to Native Fish
- Geomorphic Trajectory and Response
- Vegetation Trajectory and Response

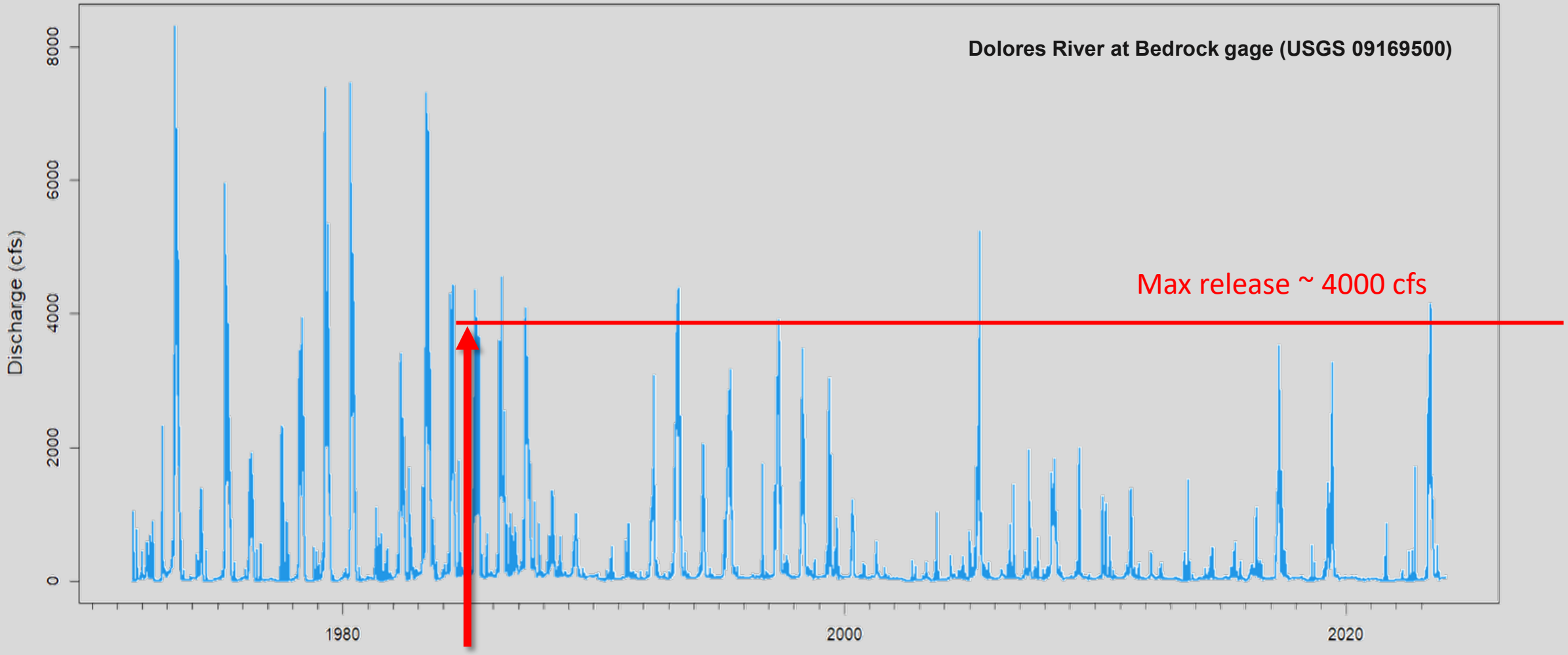
5 study sites for field monitoring

- ***Annual* monitoring every fall**
- ***Responsive* monitoring before/after floods**

5 study segments for satellite/remote monitoring



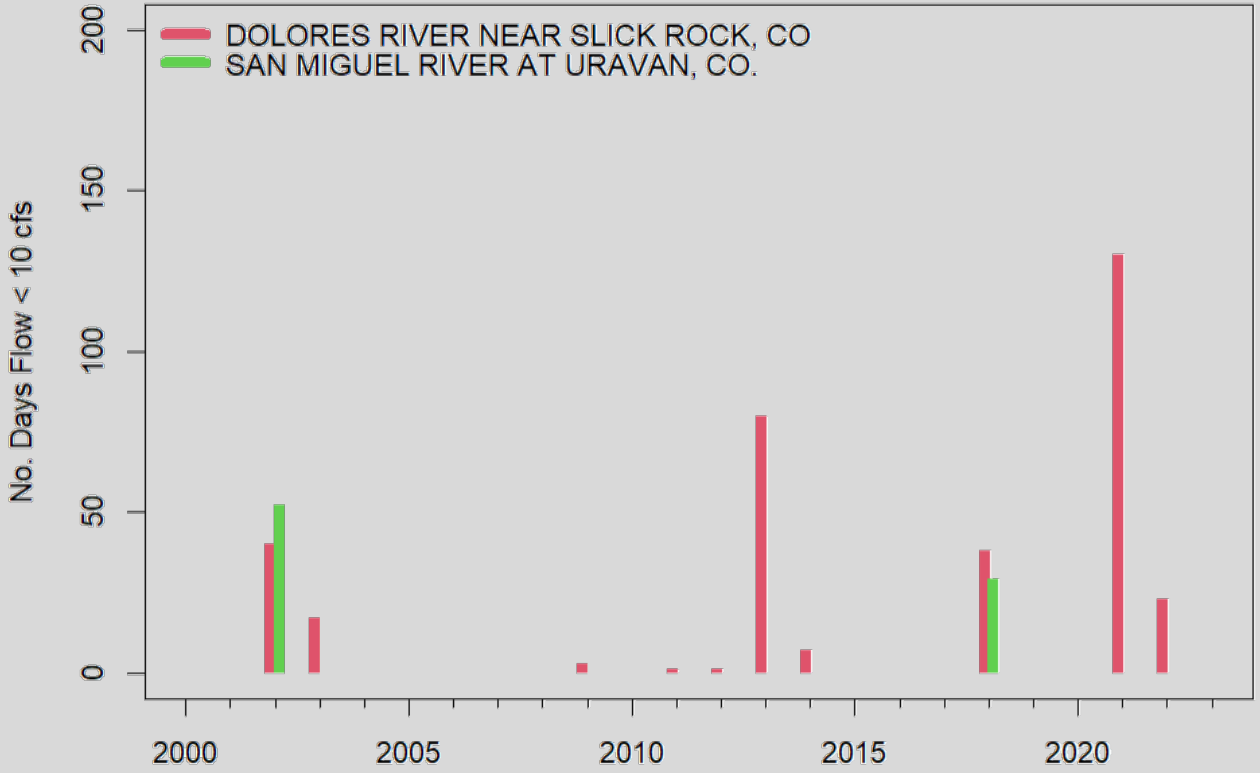
Changing Hydrology on the Dolores



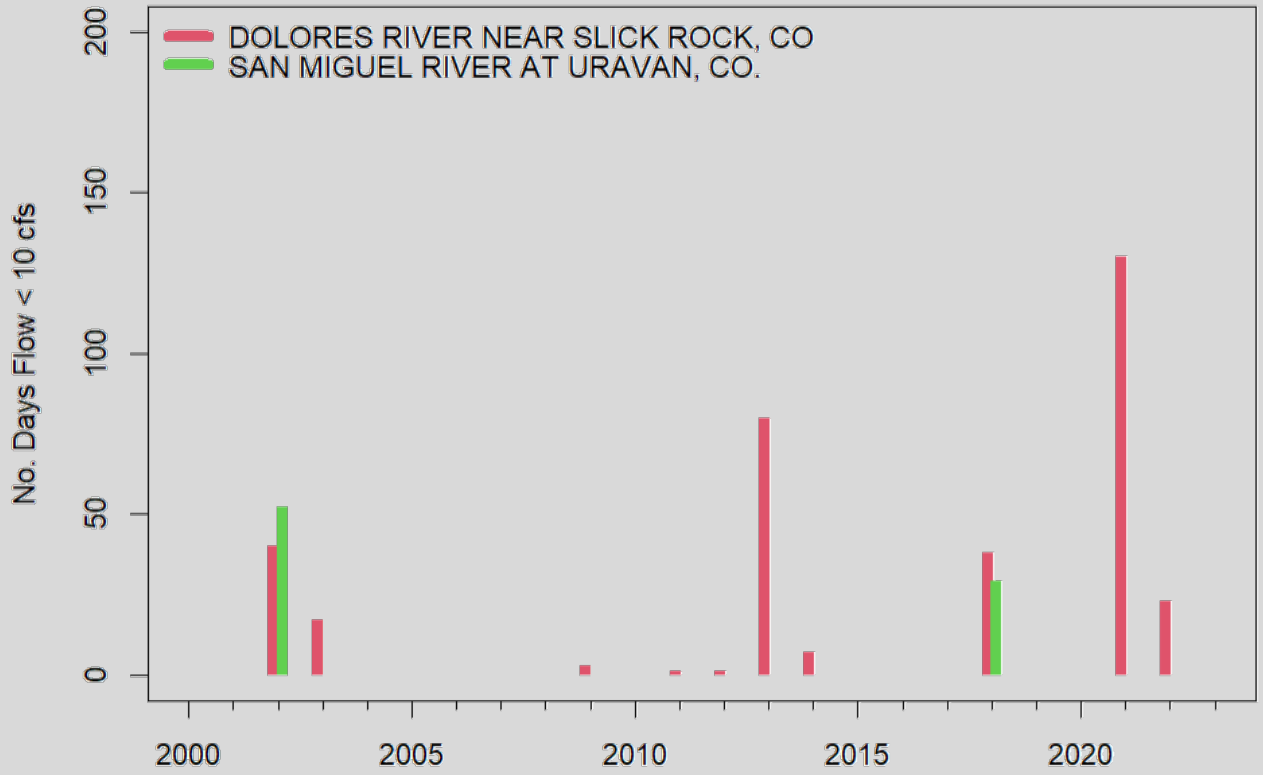
McPhee Reservoir Constructed

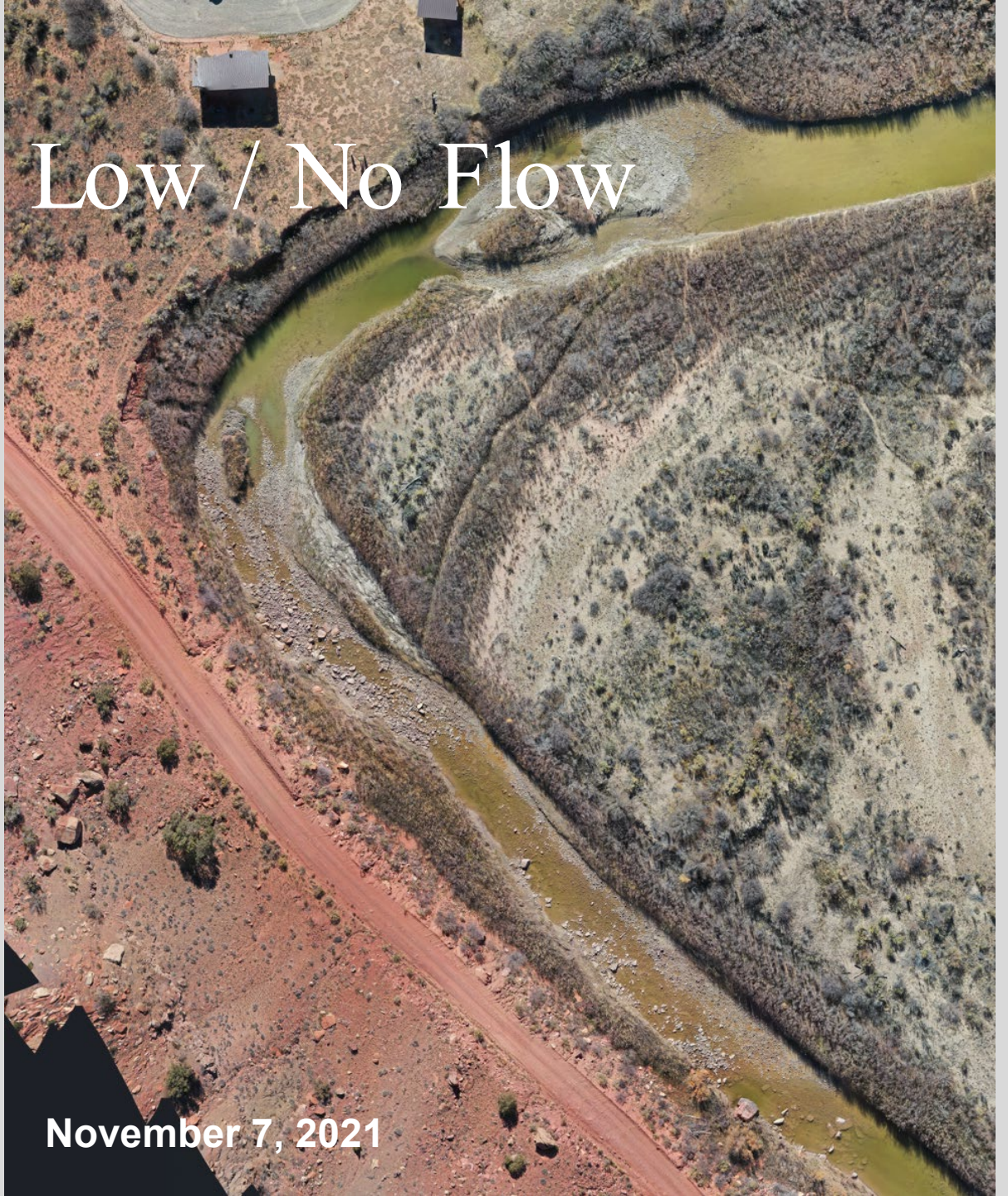
- Decreased peak flows
- Consecutive years with ~no spring runoff
- Higher baseflow (fish pool) in some years

Dolores River Hydrology: Low / No Flow



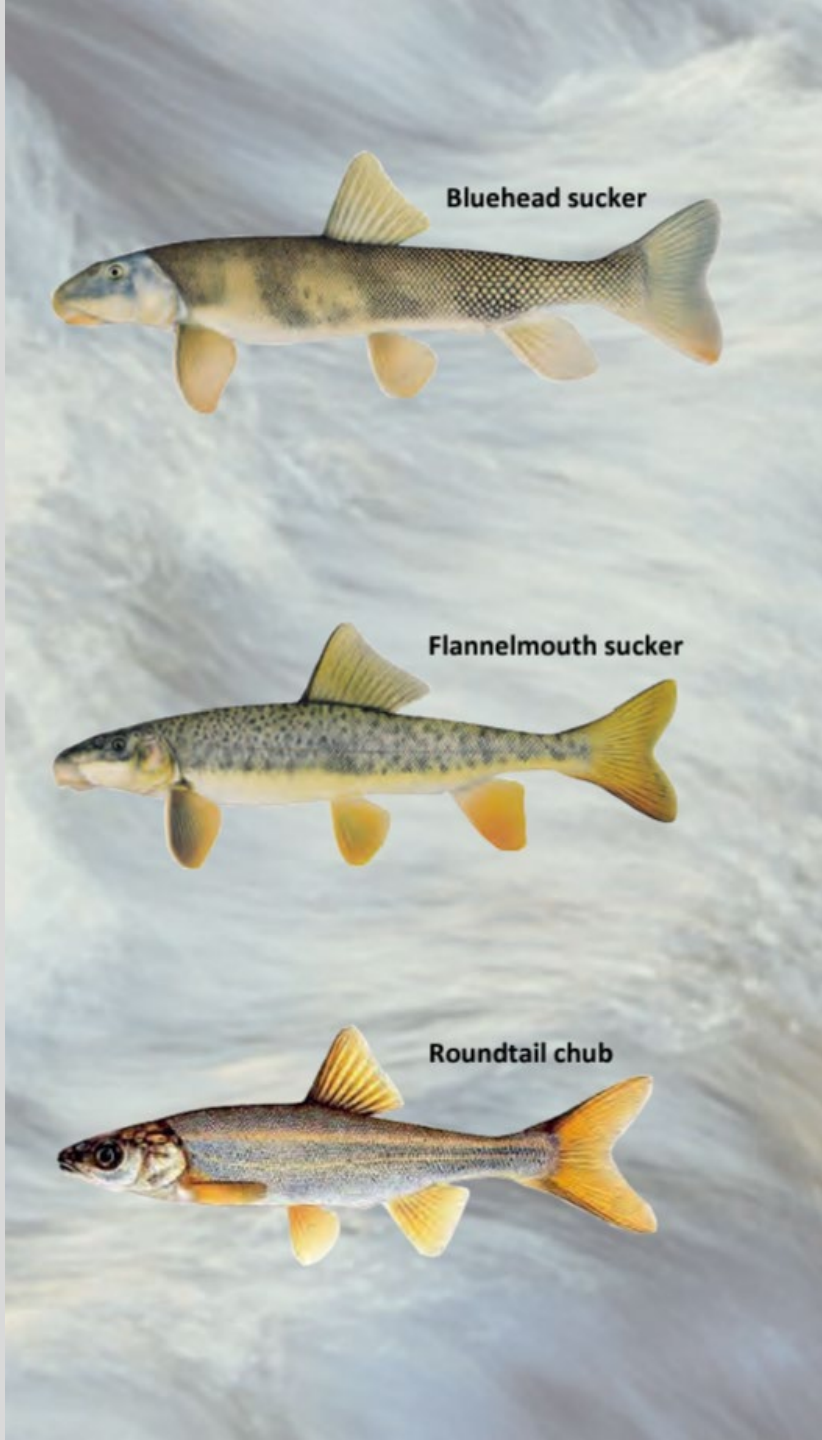
Dolores River Hydrology: Low / No Flow





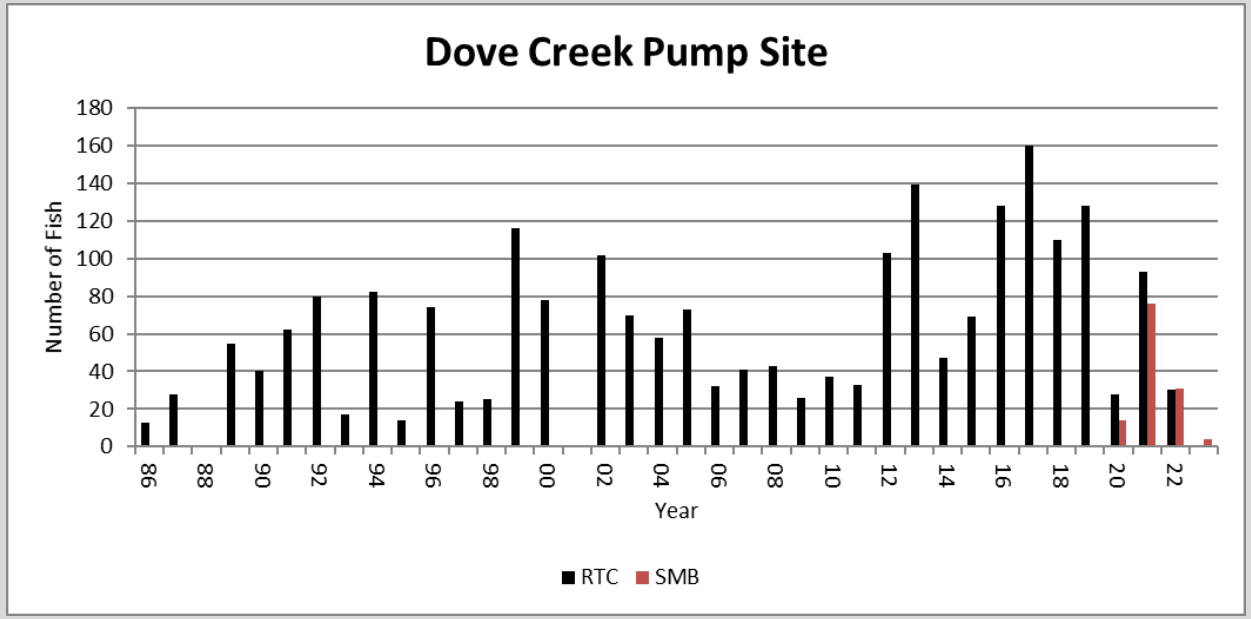
Native Fish in the Dolores

- Declining numbers of native fish.
  - CO: Species of Greatest Consv. Need
  - Federal: Sensitive Species
- ESA and Water Rights
- Colorado Parks and Wildlife Annual Monitoring



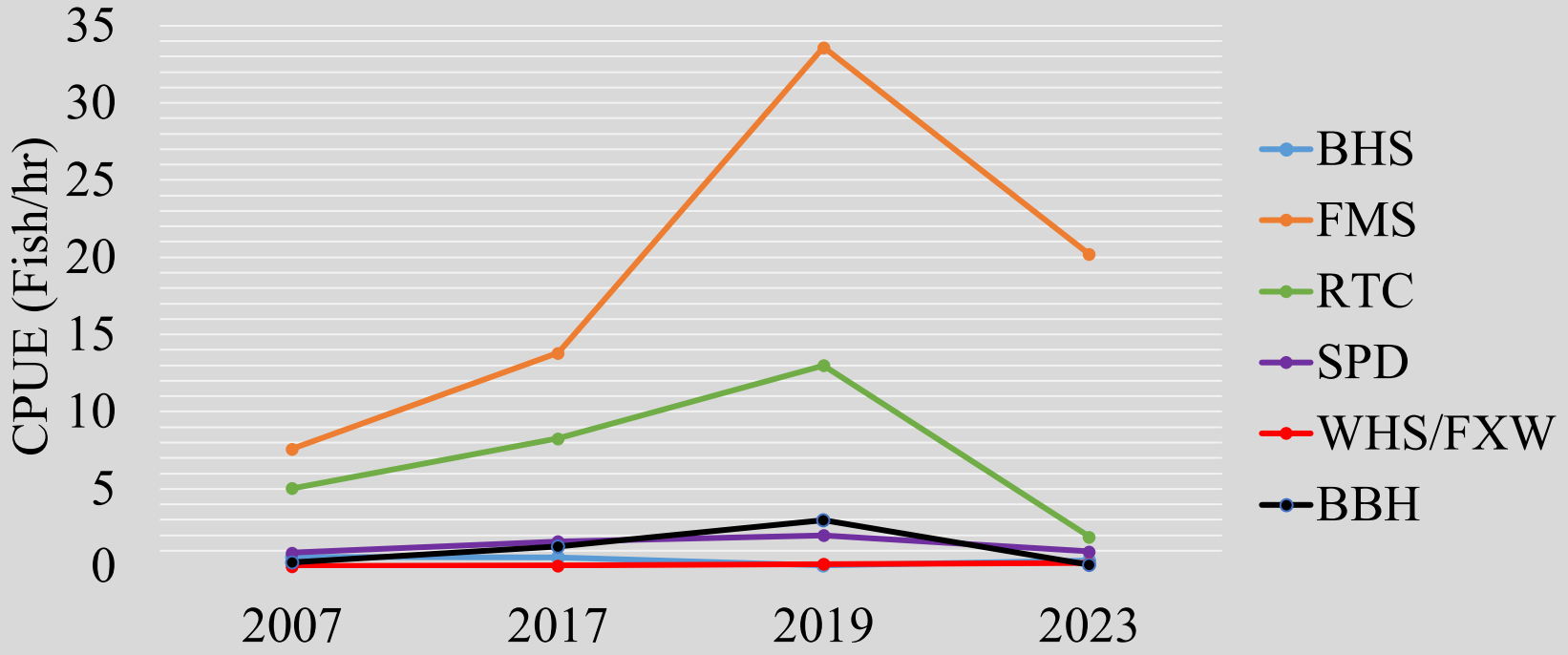
CPW Native Fish Survey
Dove Creek Pumps

- September 2023
- Low Fish Abundance
- Only caught 9 fish in 1,000 feet of river (6 larger fish)
- 4 were SMB (67% of large fish)
- 1 Roundtail Chub (62 avg; historic low)
- NO SPECKLED DACE (54 avg)

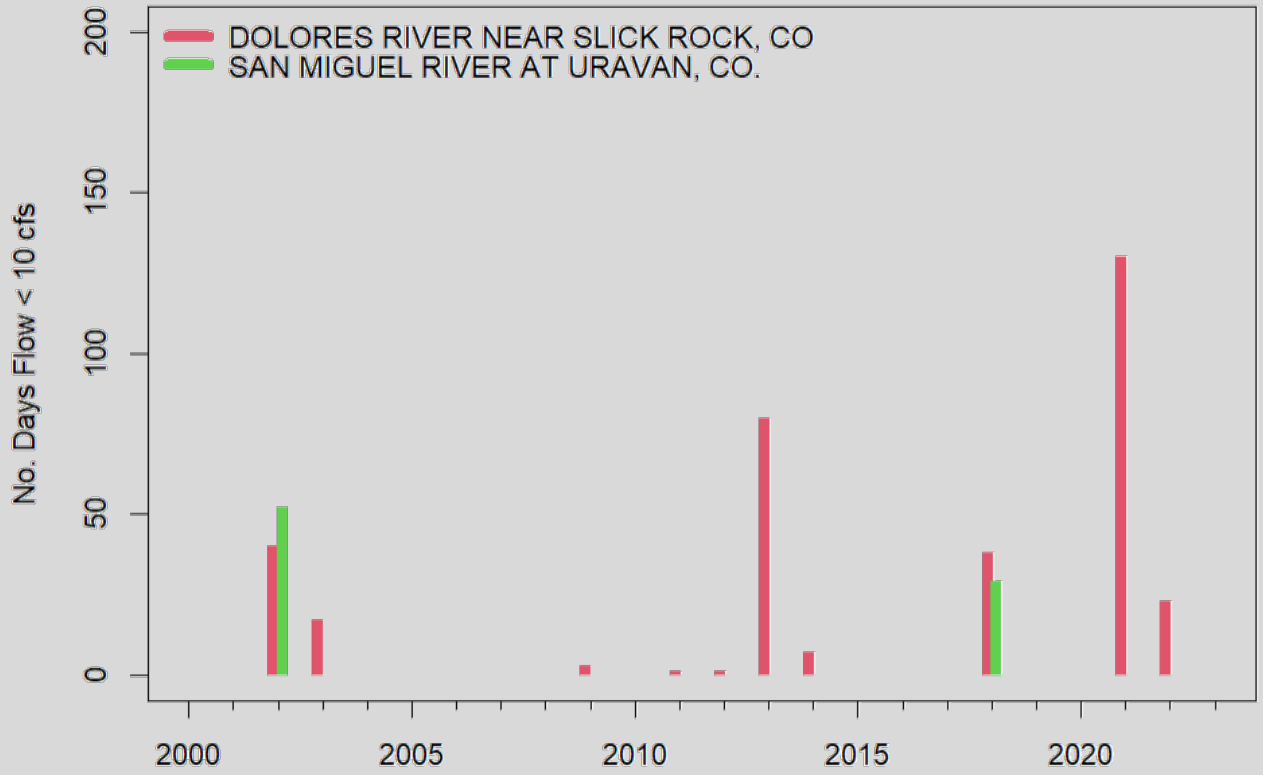


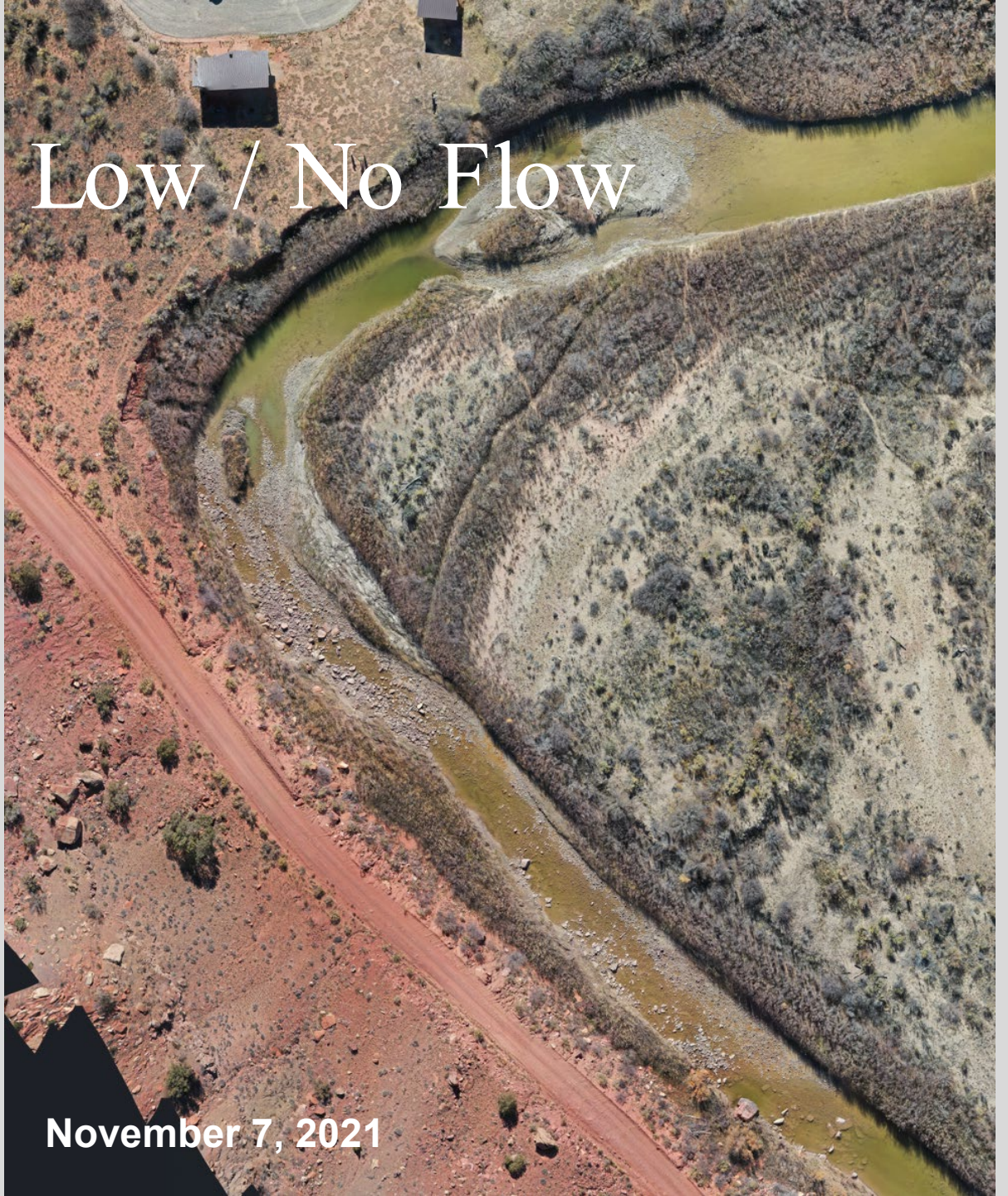
Native Fish Survey – Slickrock Canyon

- Floating survey during high flows, # caught per time (unit effort)
- 90% Native
- Low abundance
- Decline from 2019



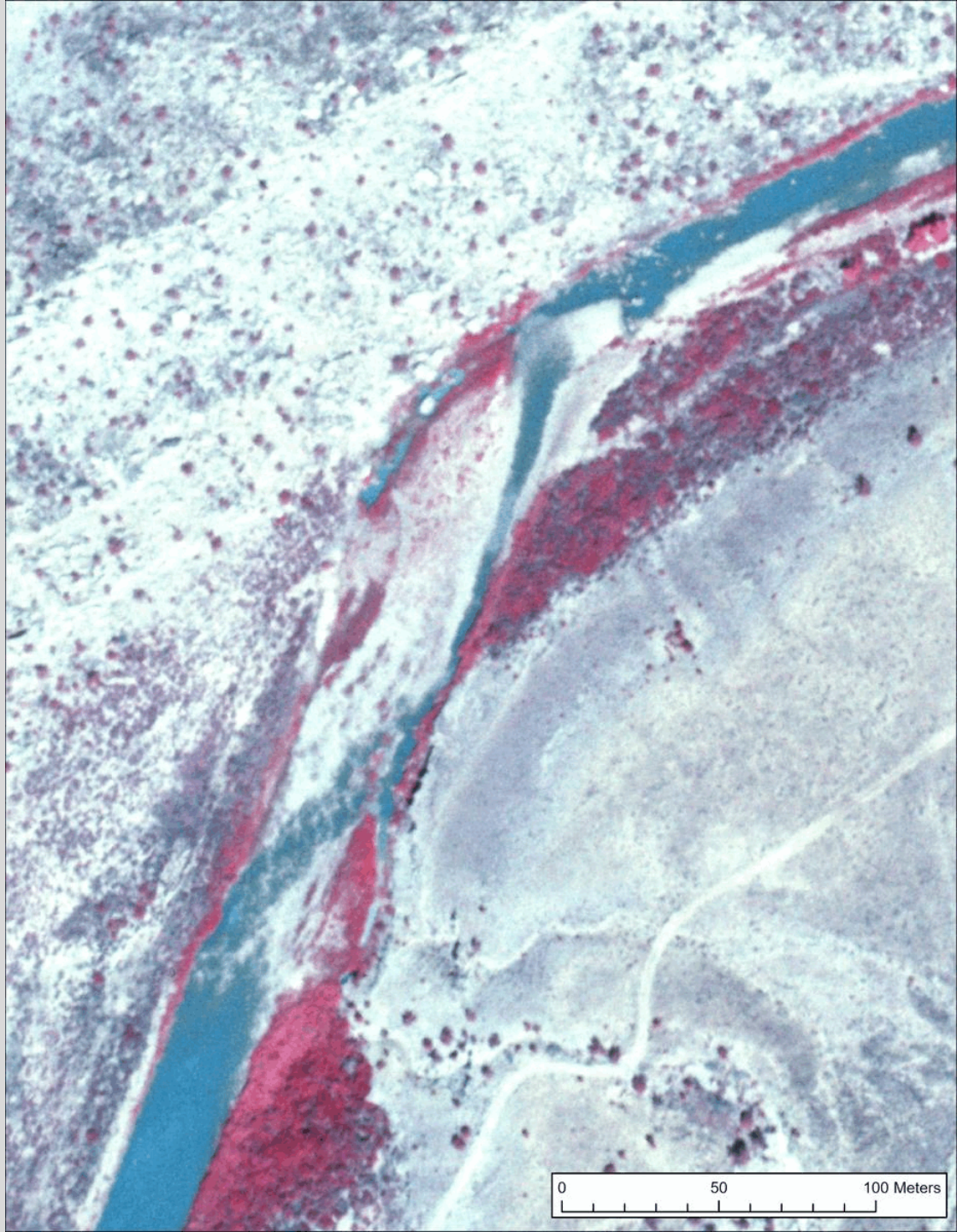
Dolores River Hydrology: Low / No Flow





Post McPhee Geomorphic Trajectory

- Abandonment of side channels
- Veg encroachment into channel
- Channel narrowing/simplification
- Multi-thread -> Single Thread



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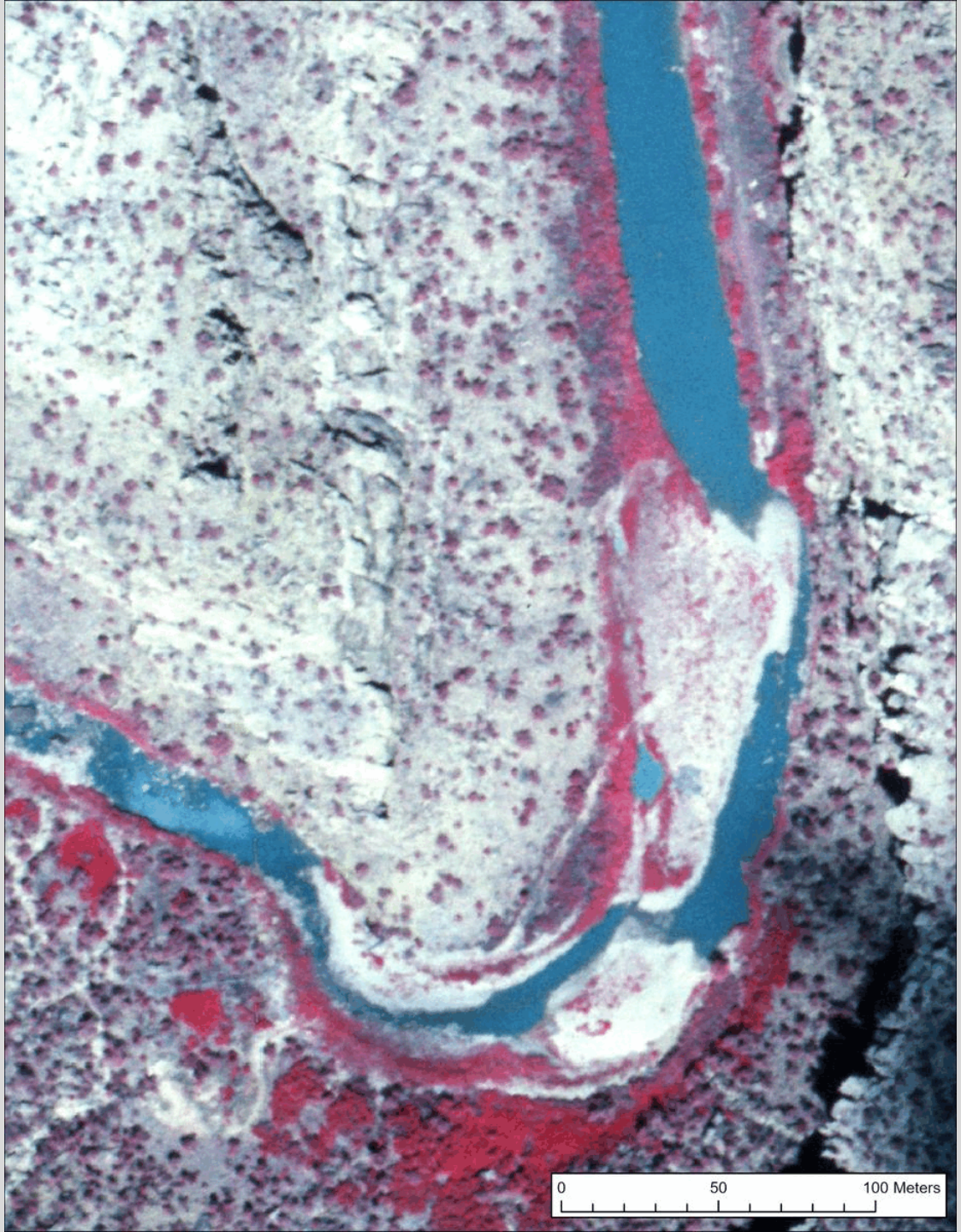
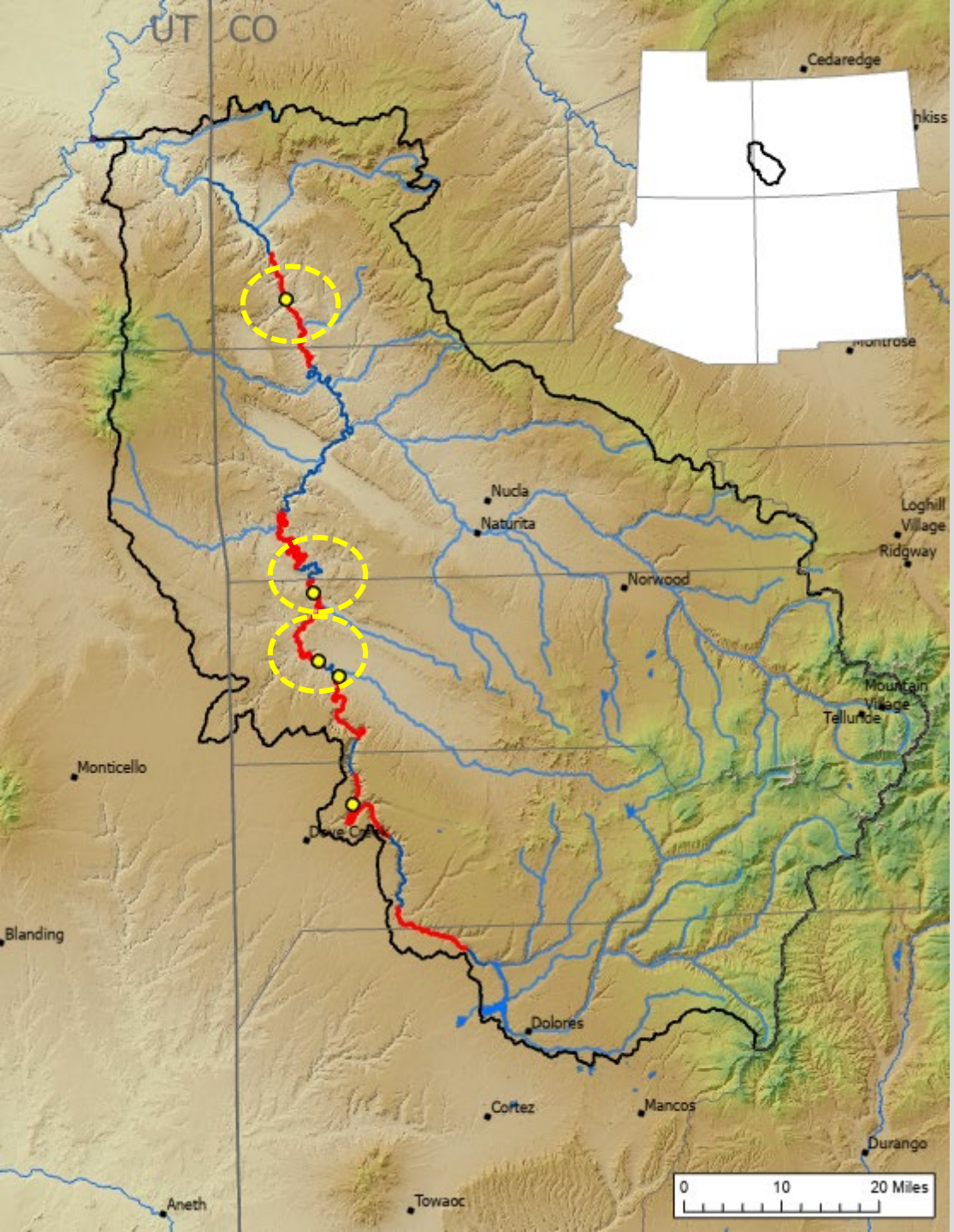
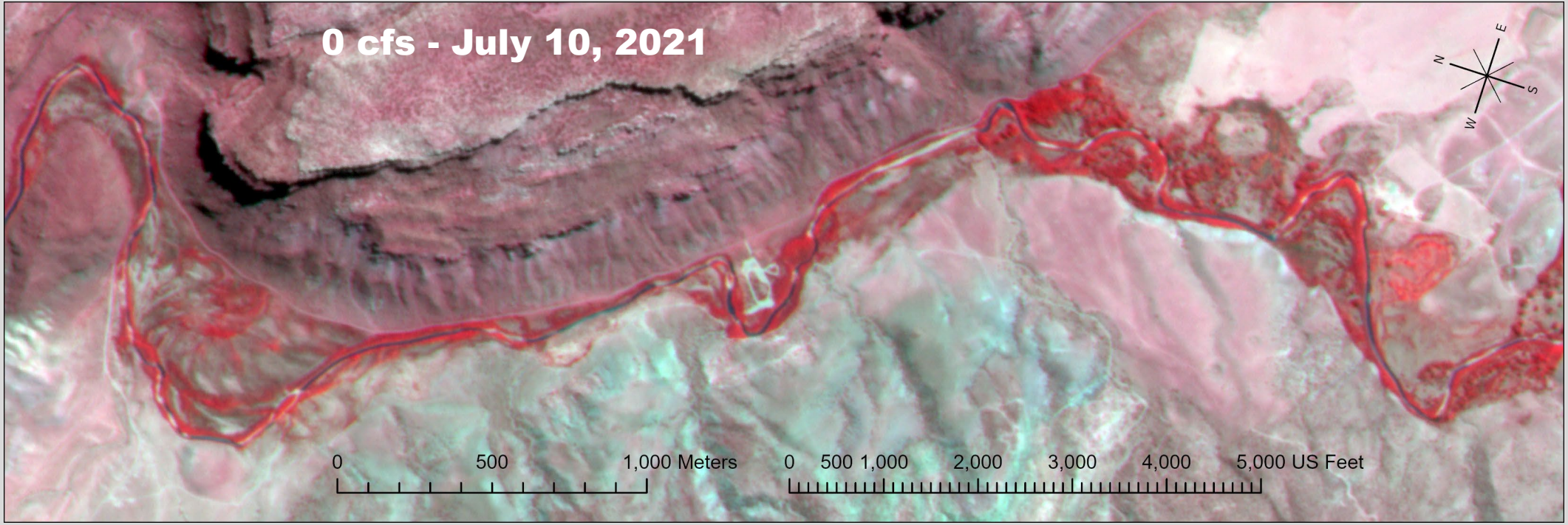


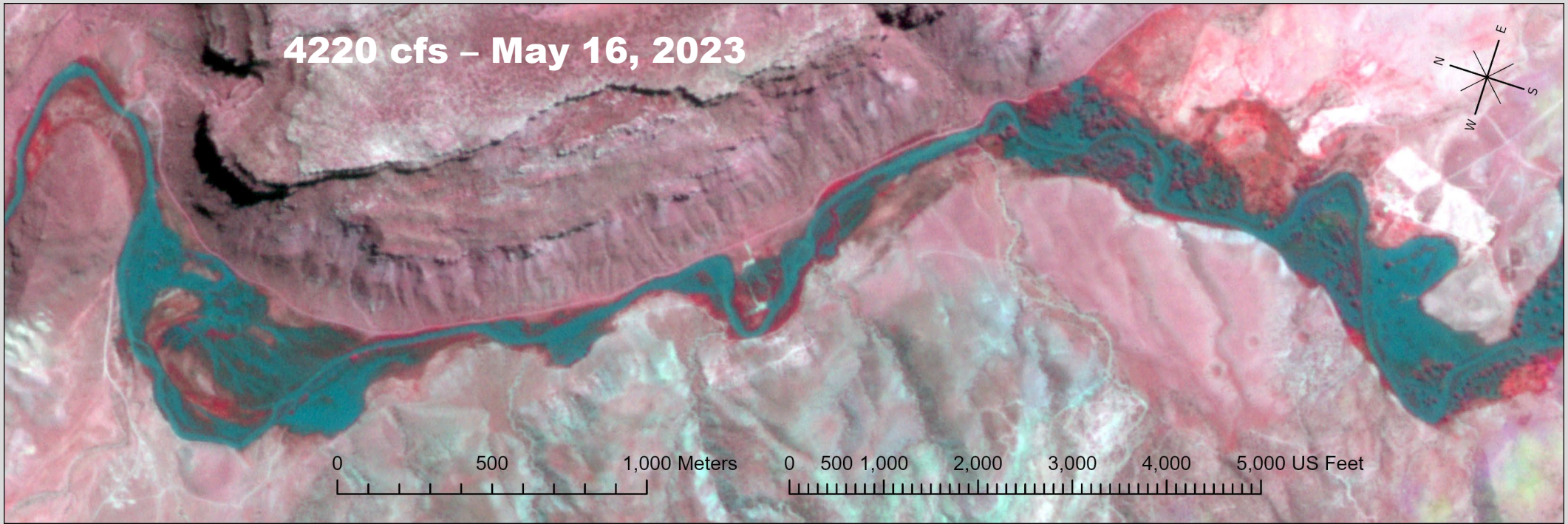
Dolores River 2023 Runoff



2023 Runoff Geomorphic Response

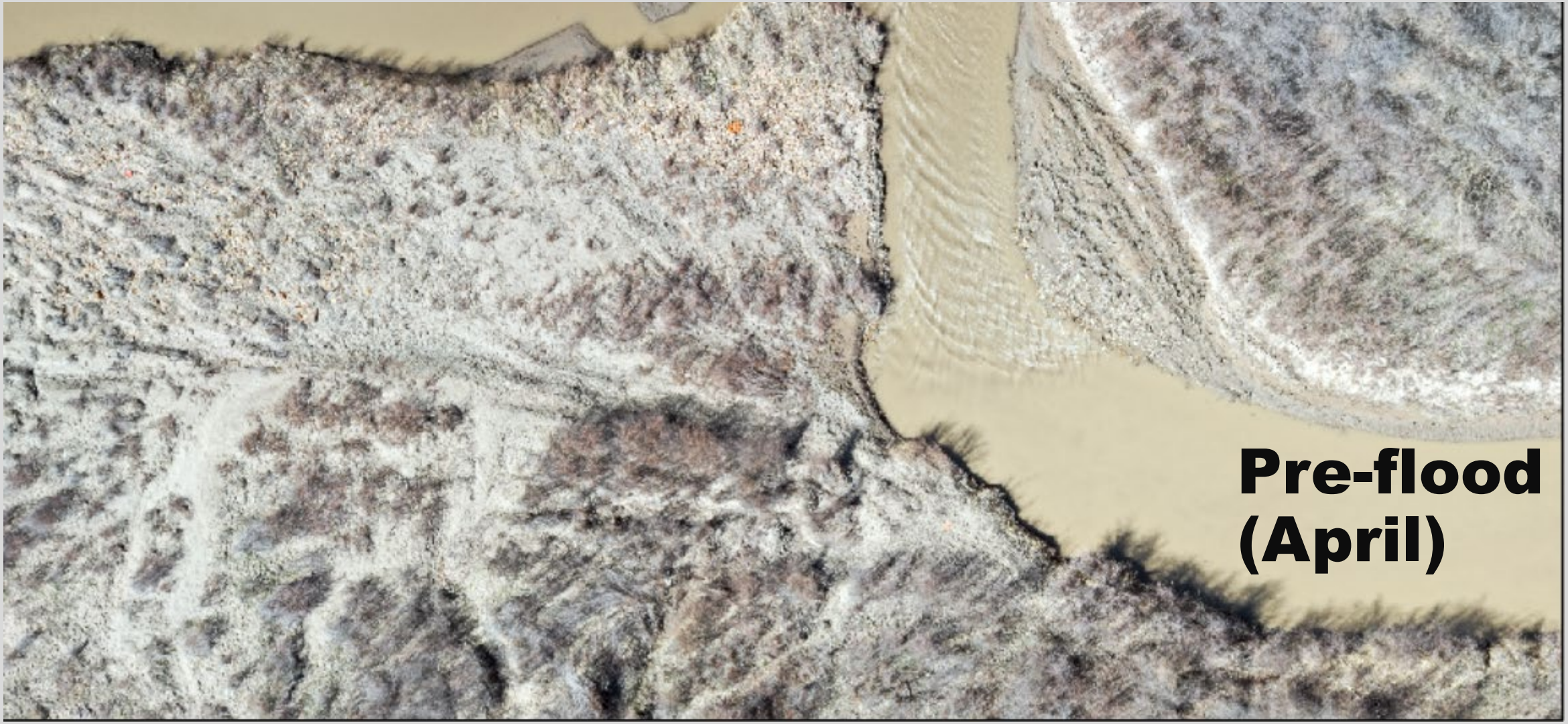
- Pre- Post-Runoff response


0 cfs - July 10, 2021
N
E
S
W
0
500
1,000 Meters
0
500 1,000
2,000
3,000
4,000
5,000 US Feet

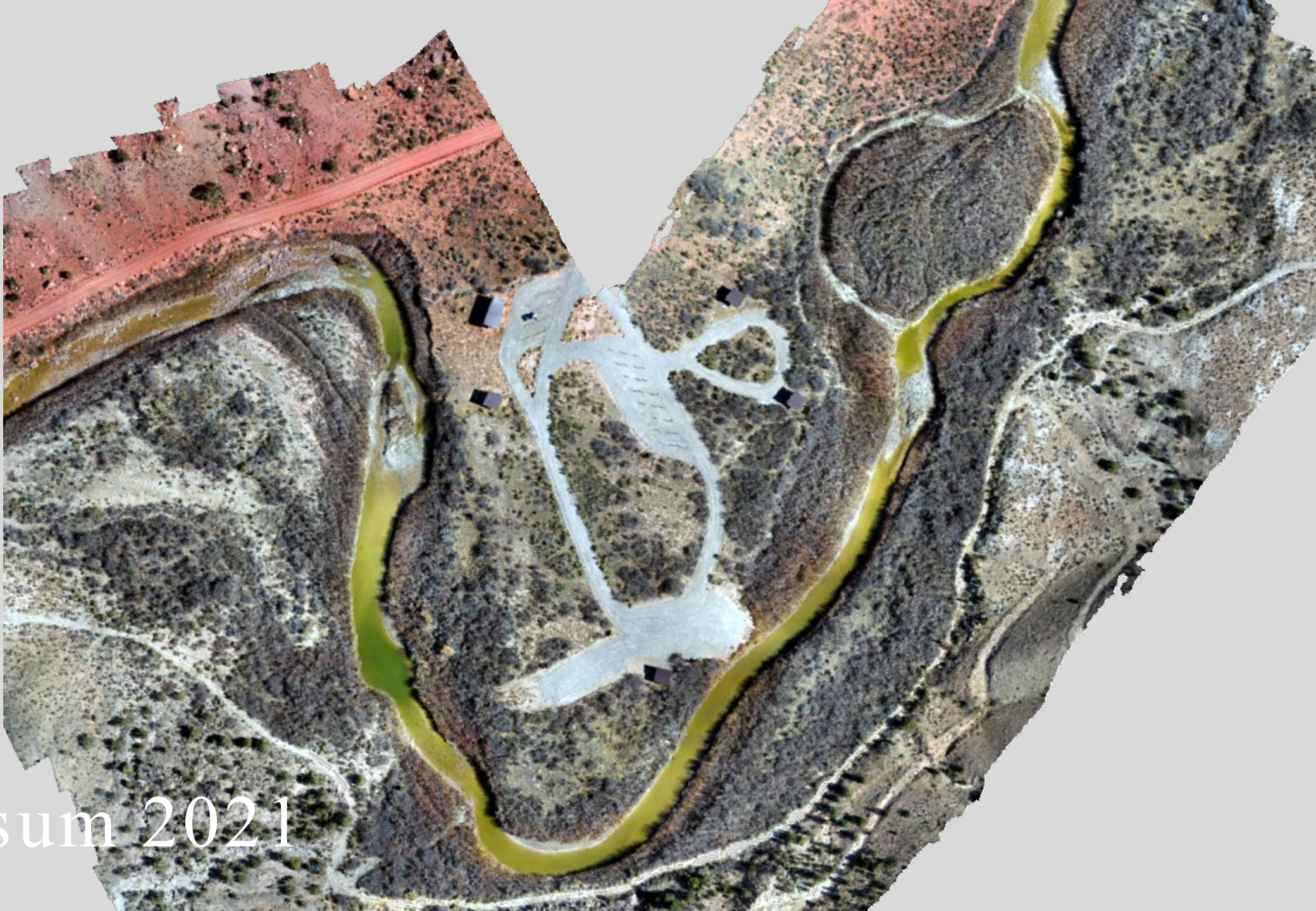

4220 cfs – May 16, 2023
N
E
S
W
0
500
1,000 Meters
0
500 1,000
2,000
3,000
4,000
5,000 US Feet

Slick Rock below Disappointment Ck (April 2023)

Slick Rock below Disappointment Ck (Sep 2023)


Pre-flood
(April)

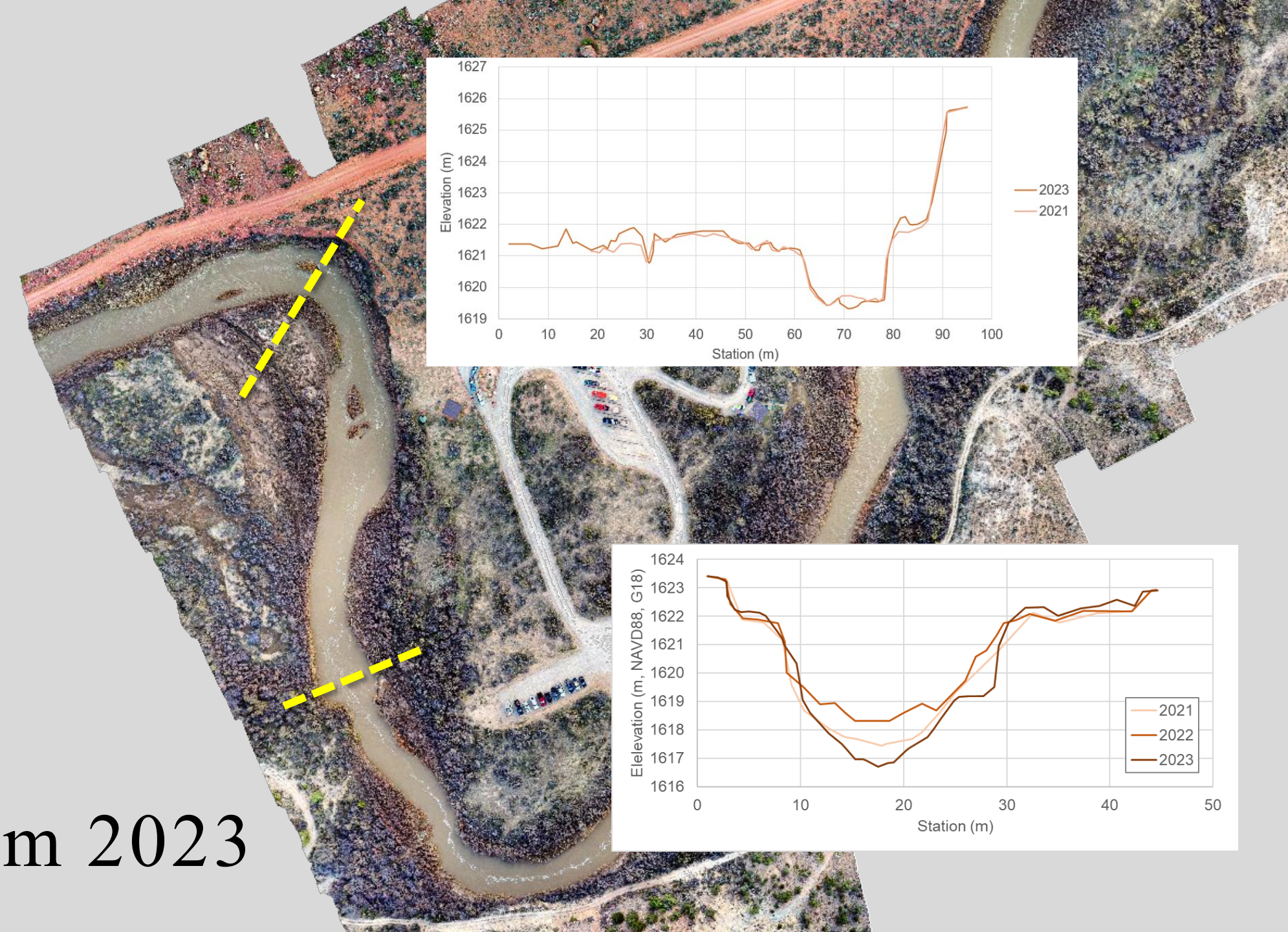

Post-flood
(Sep)



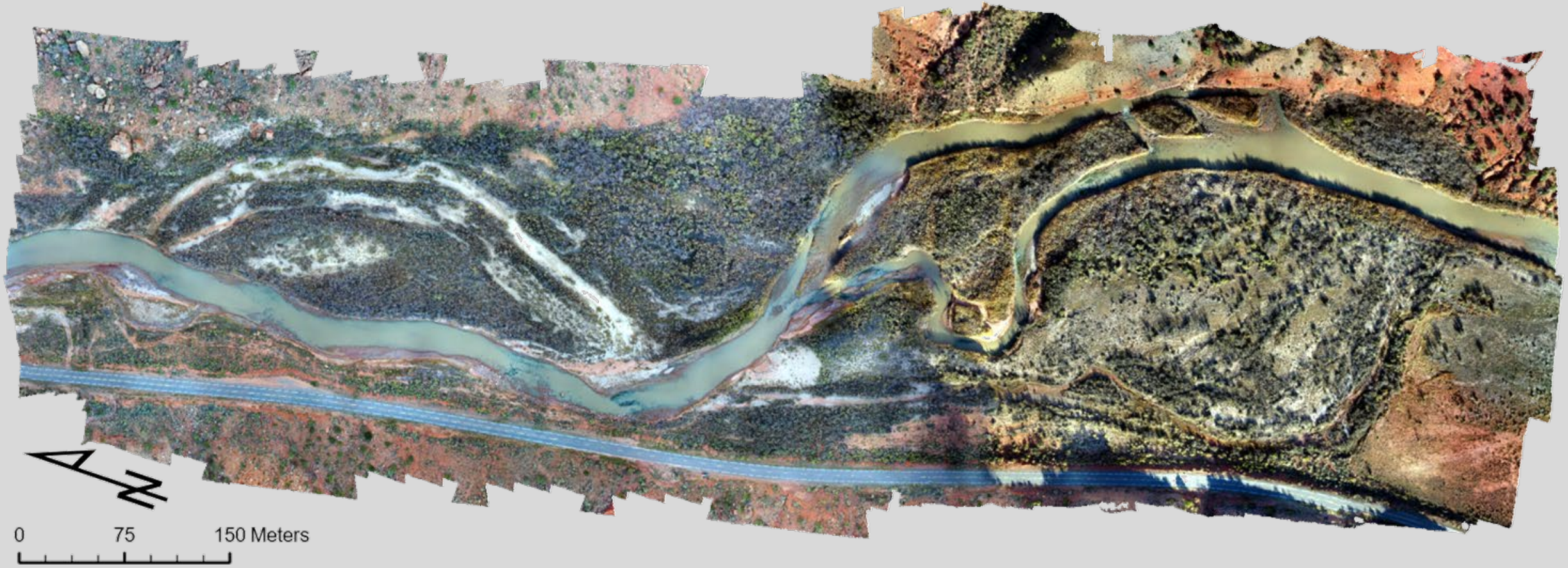
Big Gypsum 2021

Big Gypsum 2023

Big Gypsum 2023

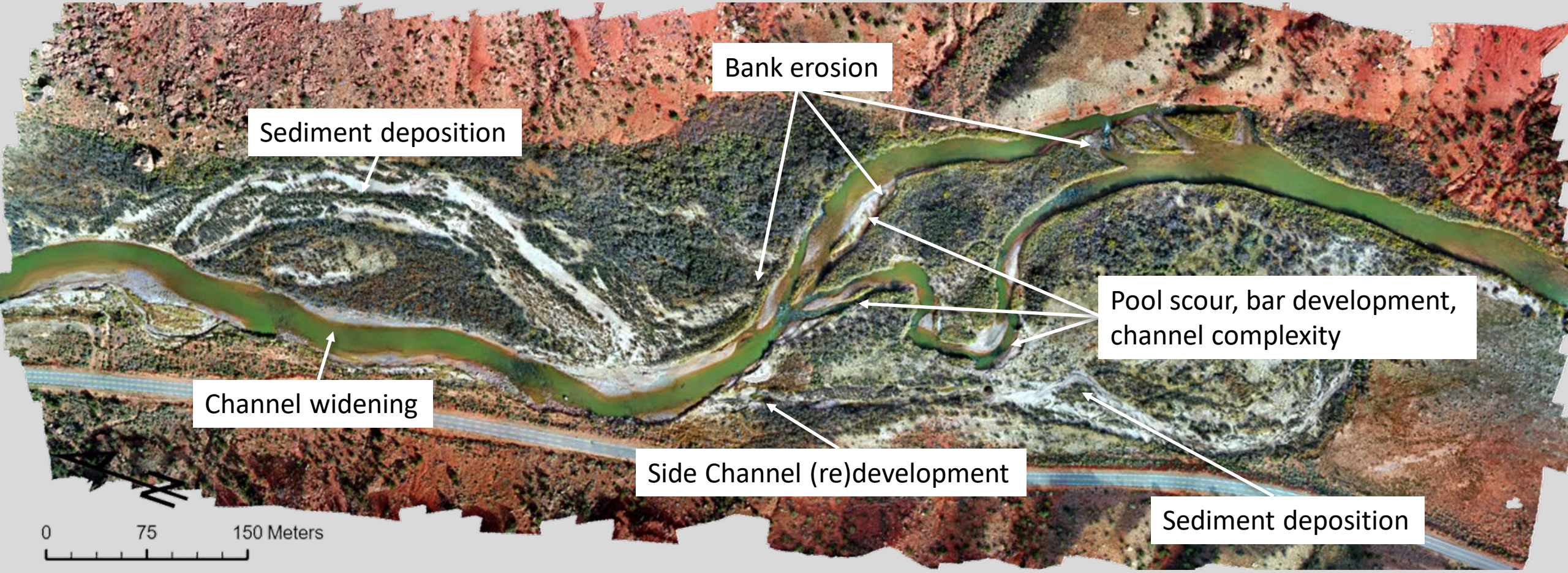


Salt Creek Site - 2021

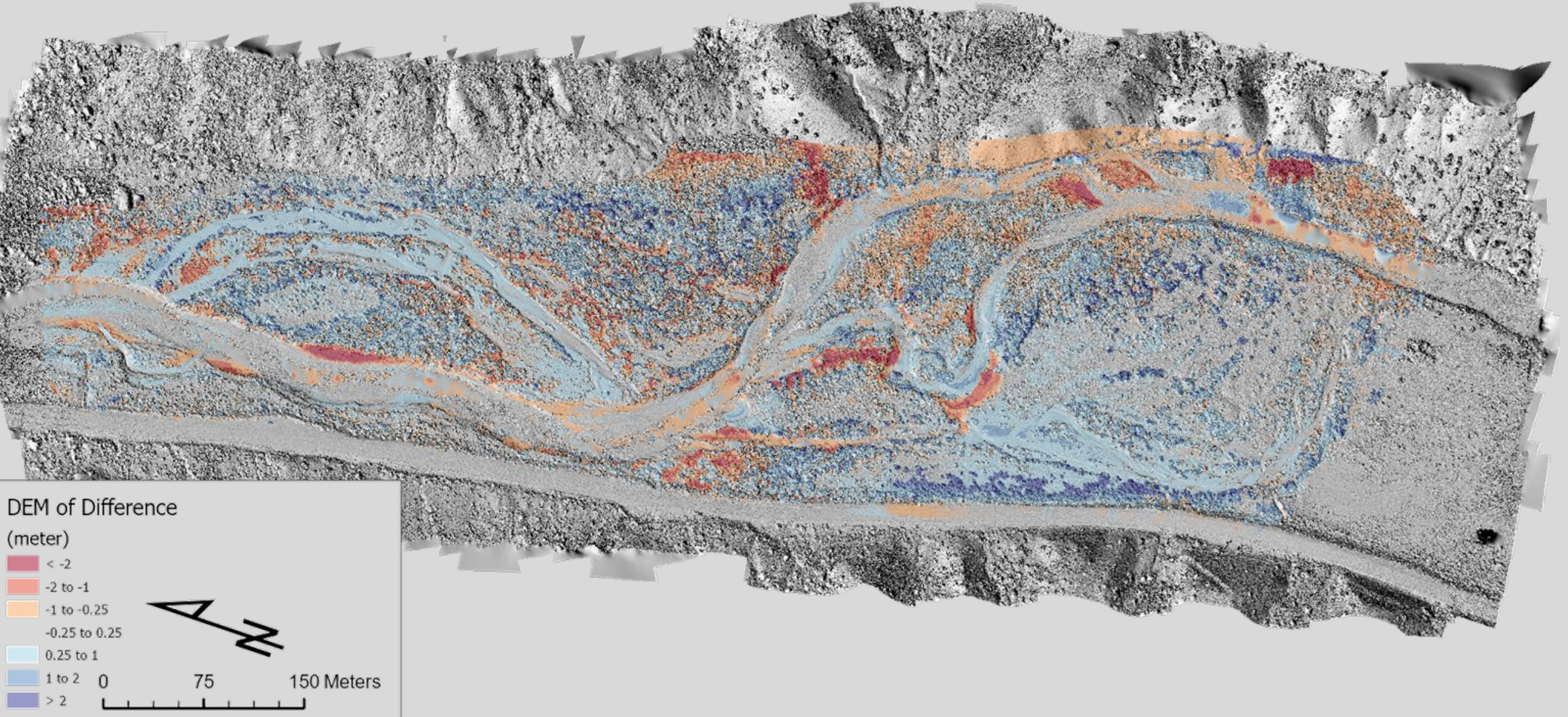


Salt Creek Site - 2023

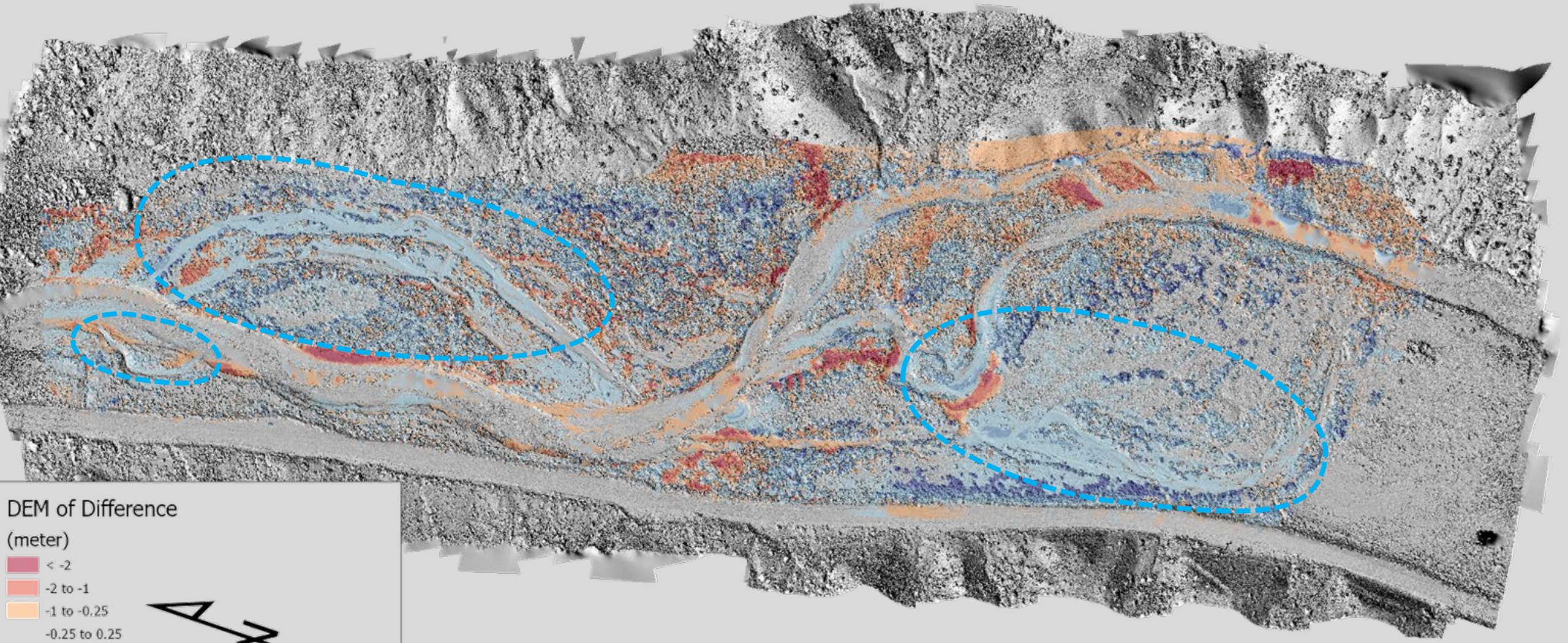
Salt Creek Site - 2023



DEM of Difference 2023 – 2021

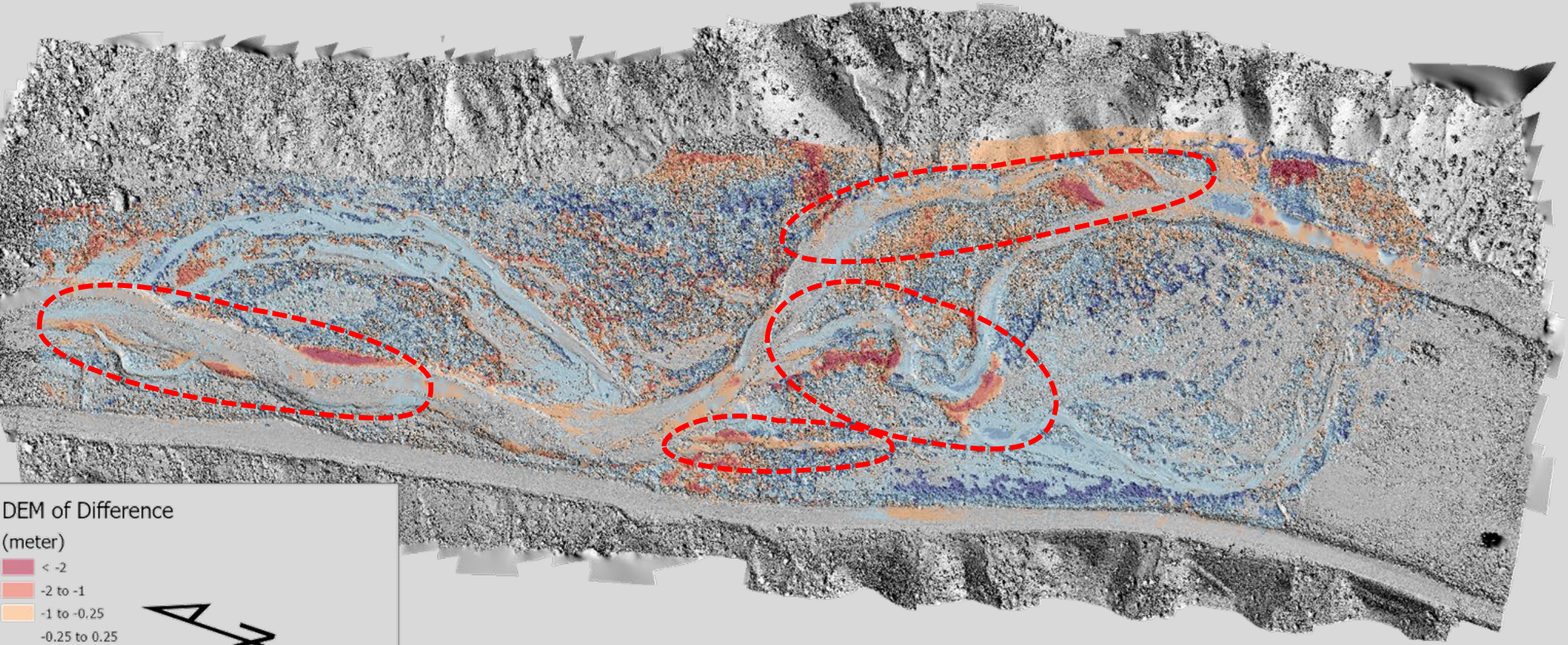


DEM of Difference 2023 – 2021



Floodplain and Side Channel Deposition 0.25 to 1.0 m

DEM of Difference 2023 – 2021



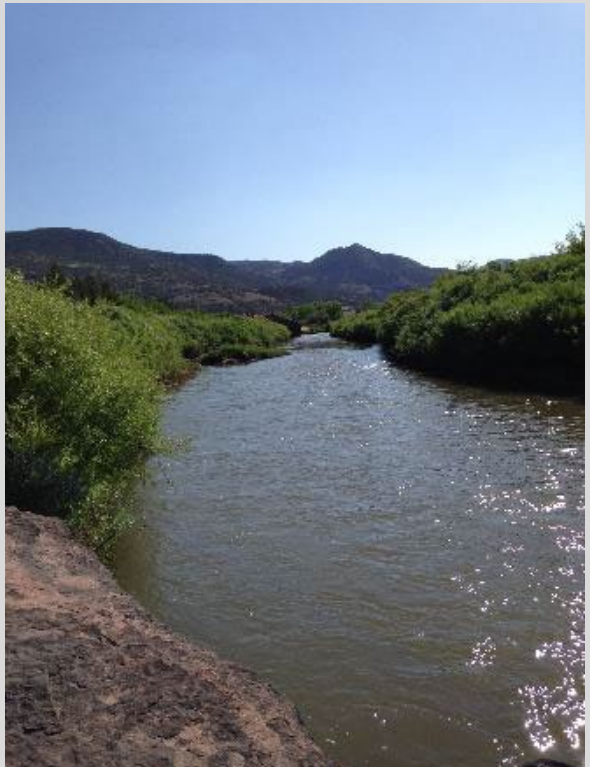
Bar, bank, and side channel erosion 0.25 to > 2m

Fish and Geomorphic Responses

- Low / No Flow years likely dramatically reduced abundance of native fish
- Riparian vegetation has “fossilized” river corridor, especially upstream of confluence with the San Miguel
- Some but marginal geomorphic response to 2023 flood

Dolores River Vegetation Monitoring

- Vegetation encroachment on the channel margin is a key component in the channel narrowing and habitat simplification that is impacting native fish



2017 post-spill images, Big Gypsum Valley

Big Gypsum Valley

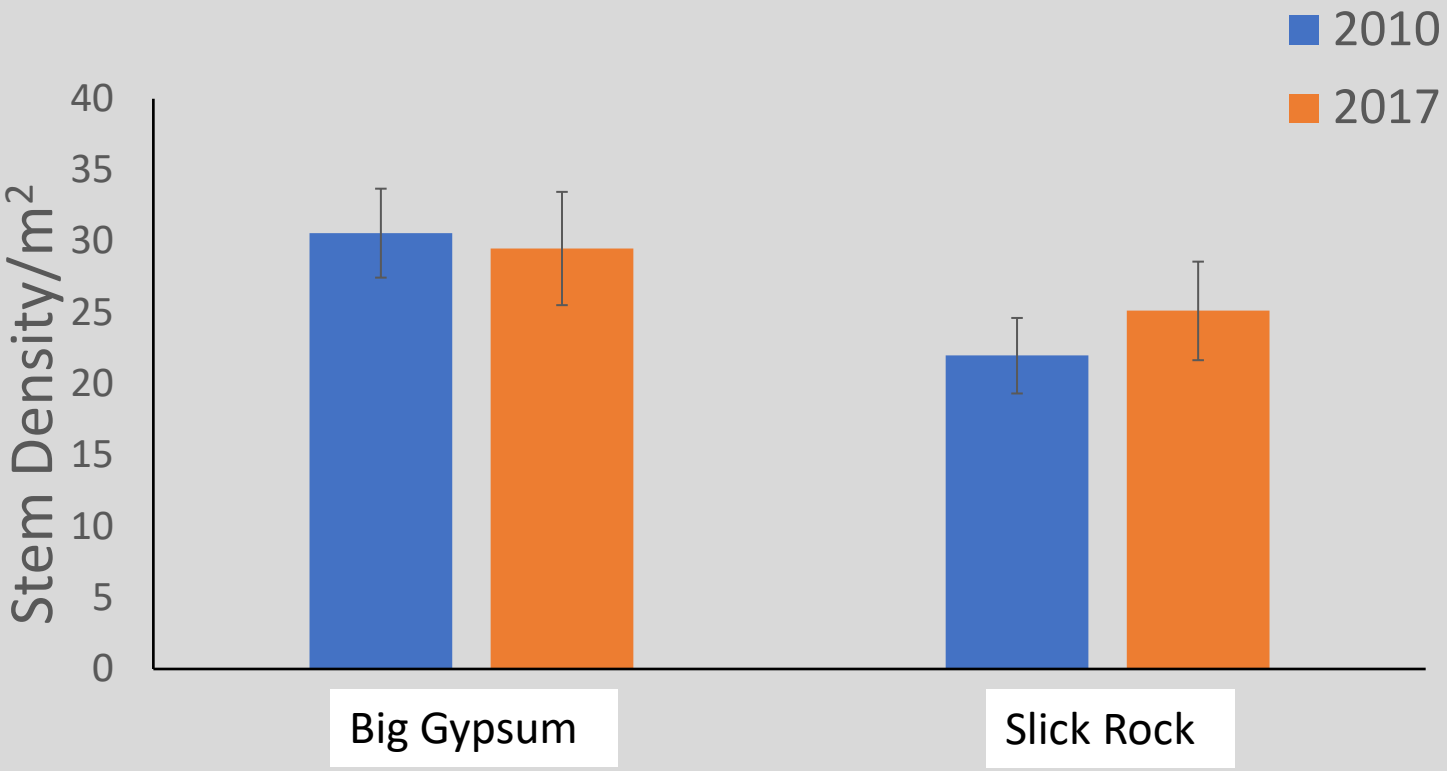
Gigi Richard photo: Upstream view from Base Pin bluff. – on left bank

Big Gypsum Valley

Increase in native Willow along the Dolores

- Very high willow stem density

High Willow stem density, with no change at re-visited sites: Pre- (2010) vs. Post- (2017) high flow



More in-depth monitoring to understand how flow dynamics may drive vegetation patterns

- 2021 (Conservation Legacy Strike Teams collected baseline data!)
  - No-flow below McPhee Dam
- 2022
  - Very low flows below Dam
- 2023
  - Long duration high flows below Dam

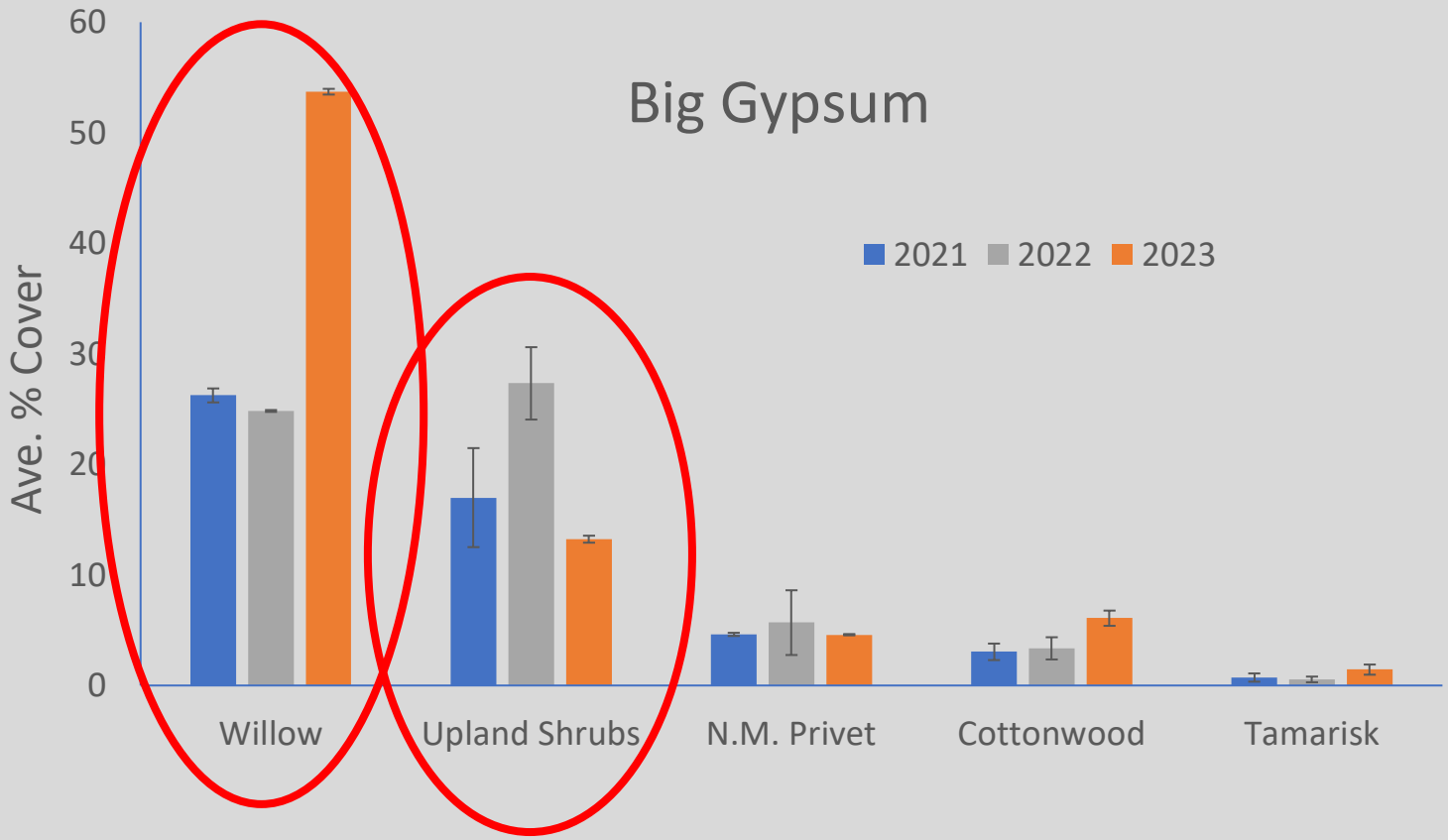
Vegetation Trends:

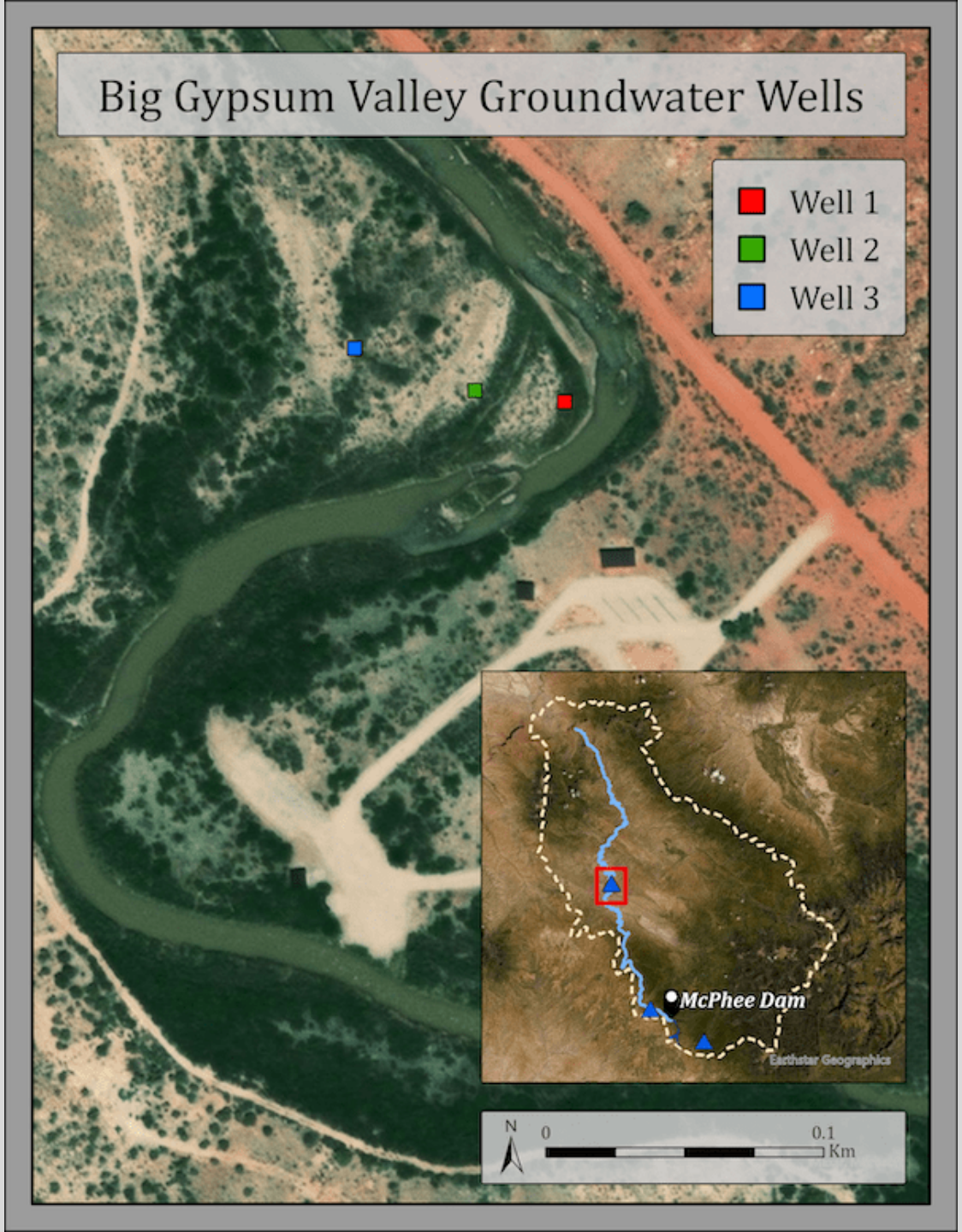
..

Big Gypsum

- Willow cover steady in dry years
- Major increase after wet year

- Upland shrubs increase during dry years
- Decline after high flow year




Big Gypsum Valley Groundwater Wells
Well 1
Well 2
Well 3
McPhee Dam
Earthstar Geographics
N
0
0.1
Km

2023: Big Gypsum

Hydraulic Head (ft)

1620
1619
1618
1617
1616
1615
1614
1613

Discharge (cfs)

5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0

4/4/2023
5/4/2023
6/3/2023
7/3/2023
8/2/2023
9/1/2023
10/1/2023
10/31/2023

Date

Well 1
Well 3
Discharge

Big Gypsum Field Site

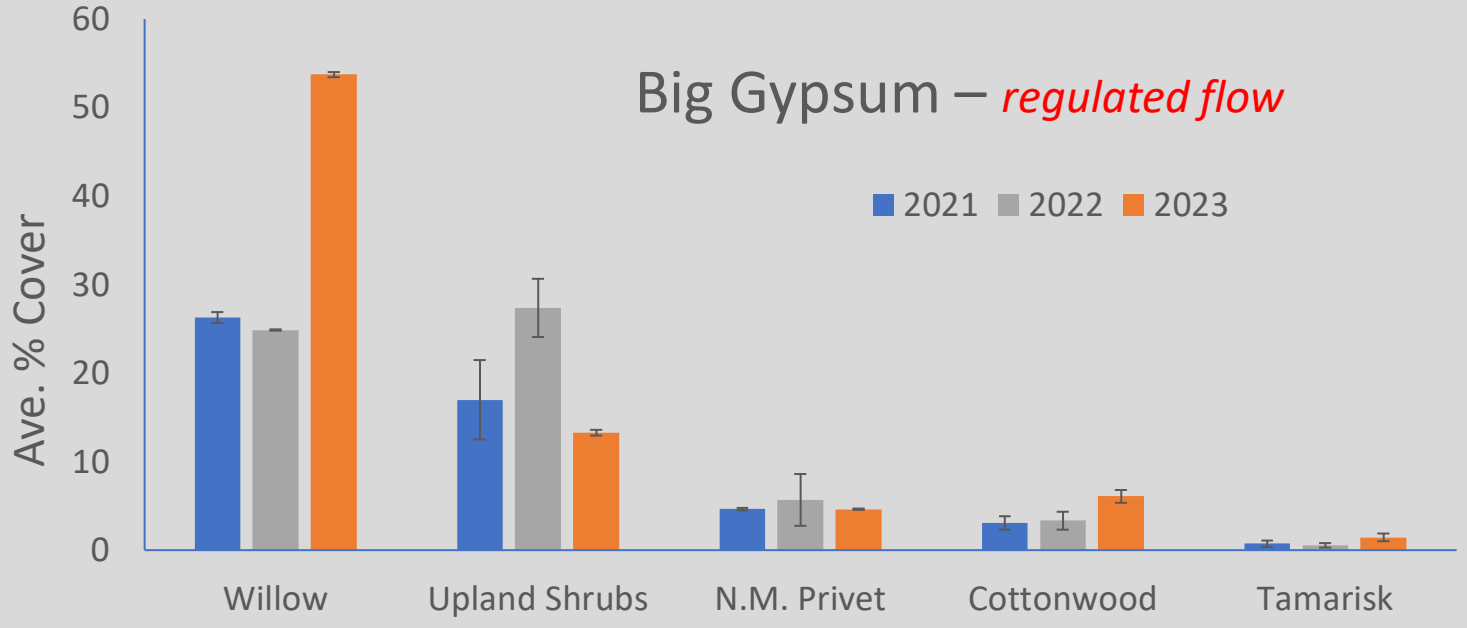
2021

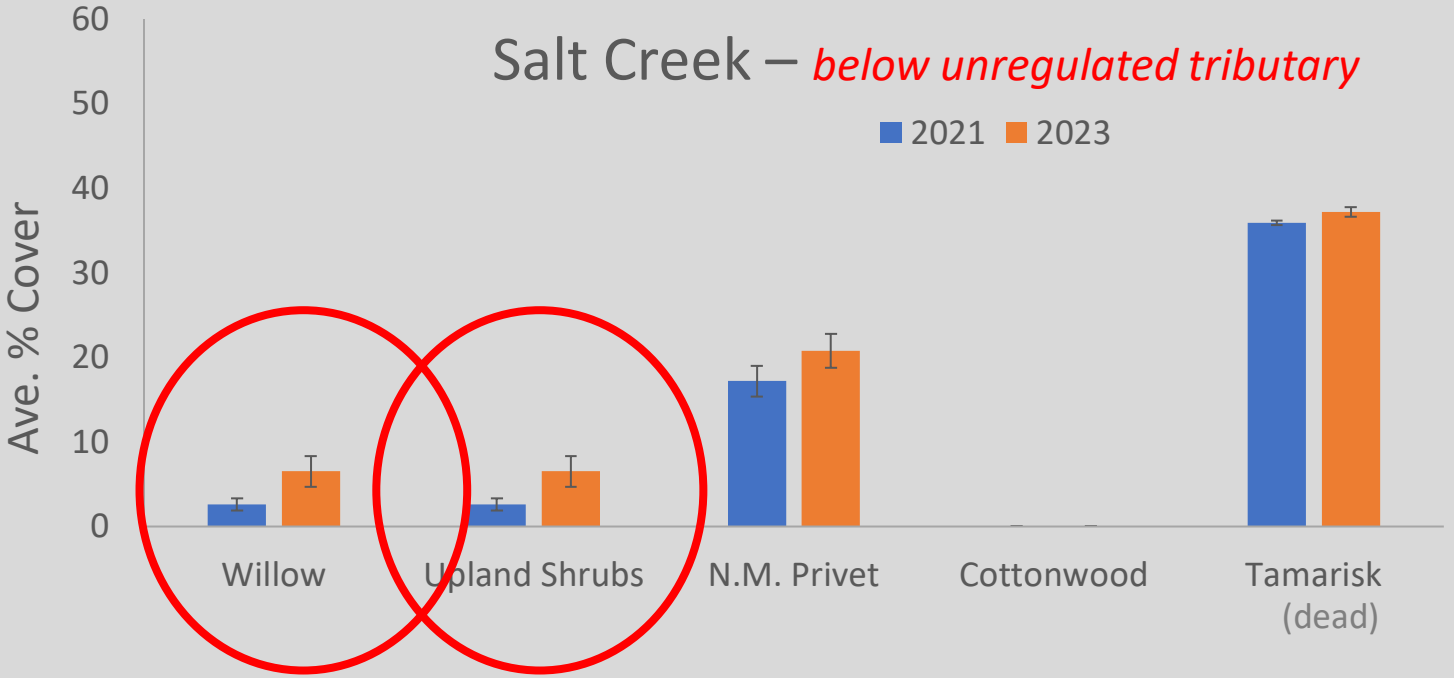
2023

★ Same spot on point bar

- Contrast between sites depending on flow dynamics

- Salt Creek:
  - Much lower willow cover
  - Lower upland shrubs
  - More Privet & (dead!) Tamarisk
    - DRRP, Cons. Corps Crews!





Take-Aways:

- High Flows favor riparian species (surprise!)
- Multiple Low Flow years drive transition towards more upland species
  - …which decline immediately when flooded
- Sites/Reaches that have shown the most vegetation change so far:
  - Open areas with potential for high flow inundation

Dynamic Reaches:

Big Gypsum Valley

Slick Rock (below Disappointment Cr)

Less Dynamic Reaches:

Big Gypsum Valley

Slick Rock (below Disappointment Cr)