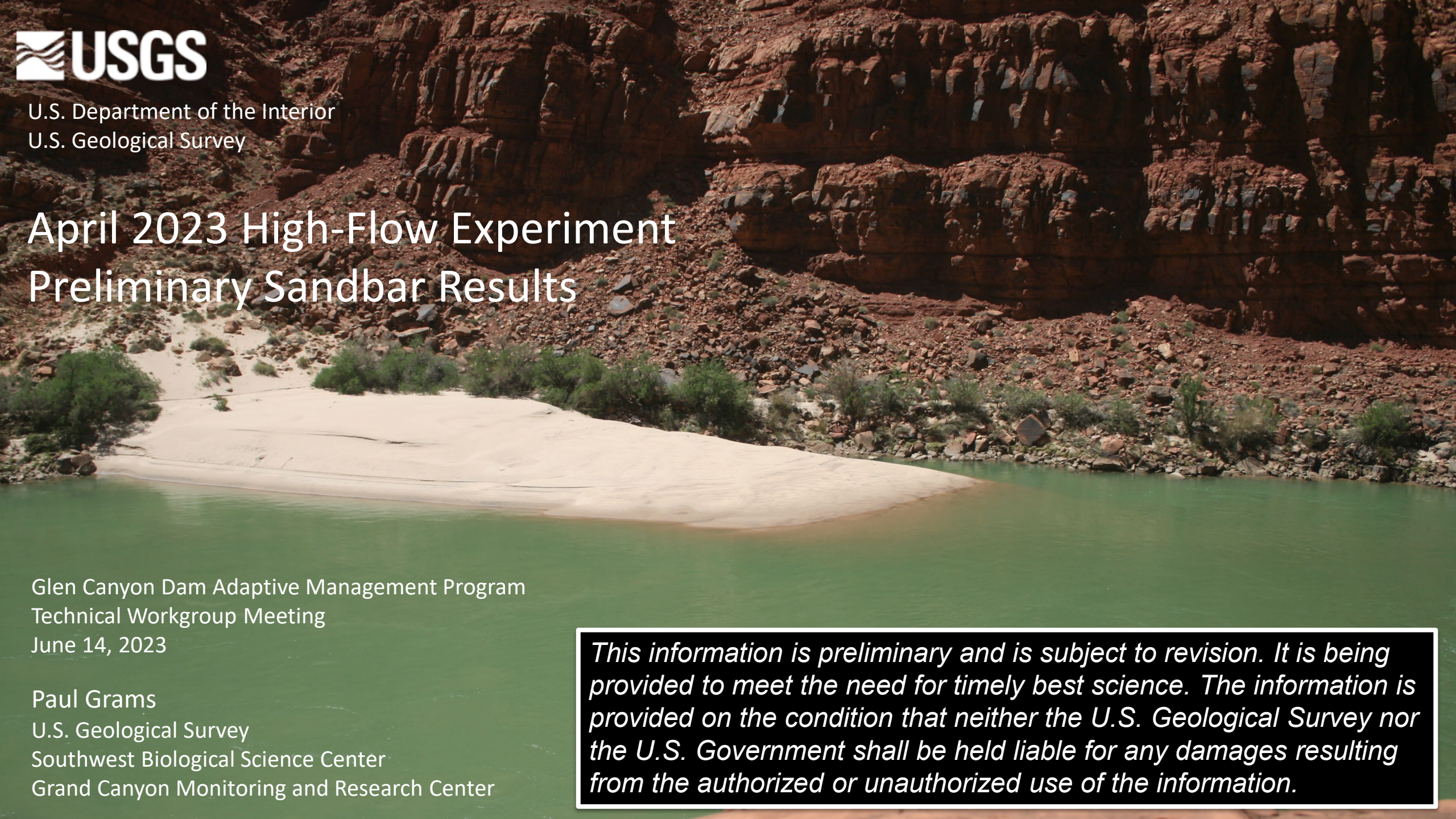


U.S. Department of the Interior
U.S. Geological Survey

April 2023 High-Flow Experiment Preliminary Sandbar Results

Glen Canyon Dam Adaptive Management Program
Technical Workgroup Meeting
June 14, 2023

Paul Grams
U.S. Geological Survey
Southwest Biological Science Center
Grand Canyon Monitoring and Research Center

Acknowledgements

Website:
Bob Tusso

https://www.usgs.gov/apps/sandbar/
Or
www.gcmrc.gov/sandbar/

Suspended Sediment:
David Topping and Project A staff

Remote Camera Downloads:
Bob Tusso and Katie Chapman

Columbine Reach Surveys:
Paul Grams, Katie Chapman, Matt Kaplinski, Erica Byerley, Gerard Salter, Shannon Sartain, Karen Koestner, and Keith Kohl

NORTHERN ARIZONA UNIVERSITY

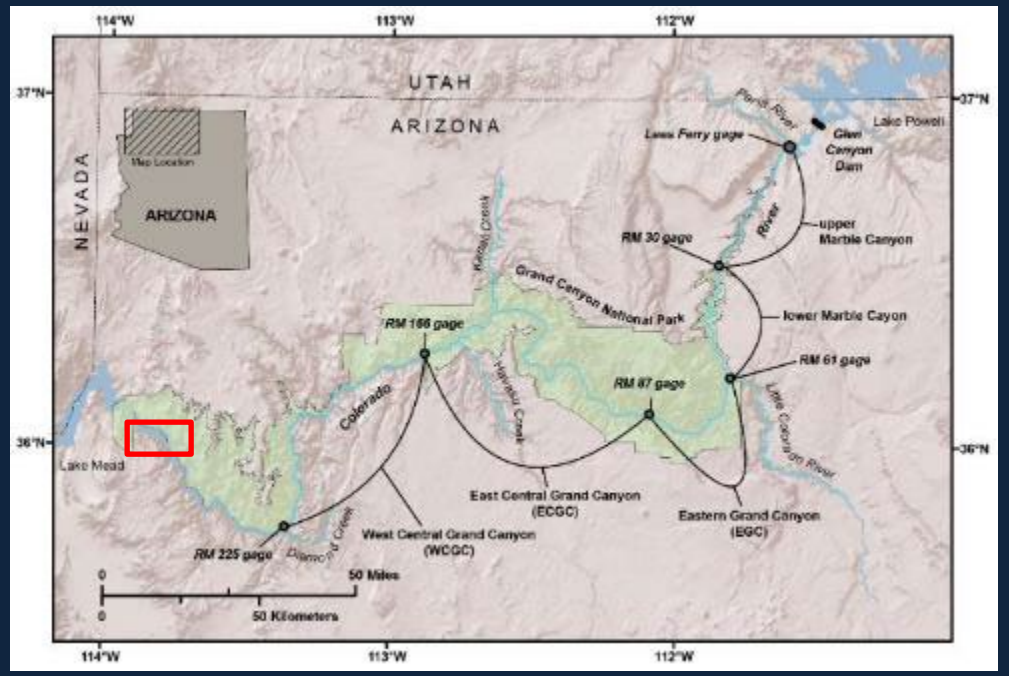
USGS

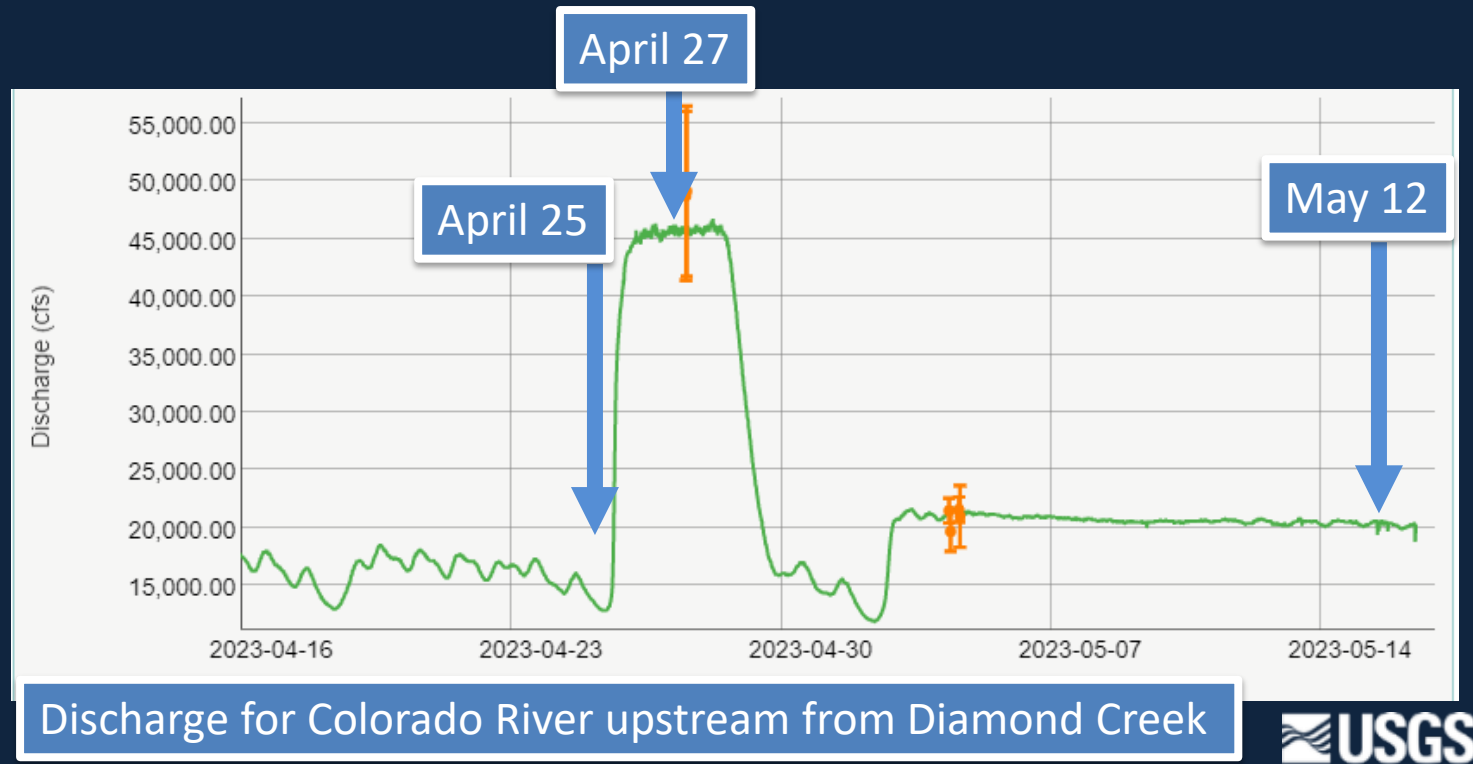
Columbine Study Reach in Western Grand Canyon

View of study reach from outside of bend at RM 273.6R

Repeat surveys to study bed elevation change and bank erosion

- Three surveys collected before, during and after HFE
- One additional survey planned for late summer or early fall





Discharge for Colorado River upstream from Diamond Creek

USGS

Project A Preliminary HFE Results

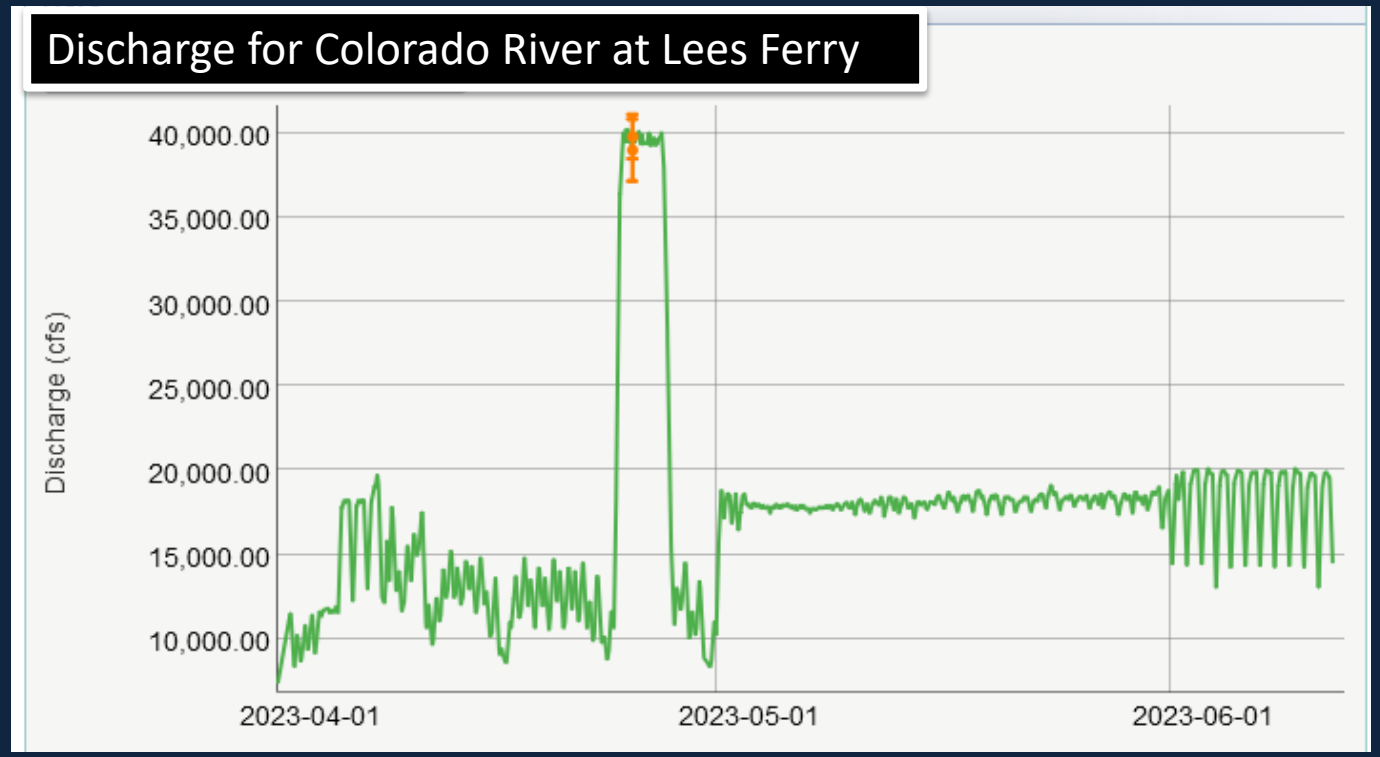
- Sand concentrations were twice as high in mid Marble Canyon during the April 2023 HFE than during any of the 2004–2018 HFEs, but sand grain size was slightly coarser than during most of these earlier HFEs

- This result is consistent with Topping and others (*JGR*, 2021); there was substantial sand accumulation in upper Marble Canyon before this HFE but a generally longer interval between the Paria River sand inputs and the HFE

- Lack of laboratory staff continues to prevent timely reporting of results; stay tuned for comprehensive sediment-transport and sand-budgeting results posted to Project A's website at (https://www.gcmrc.gov/discharge_qw_sediment/) before the August AMWG Meeting

Sandbar monitoring for April 2023 HFE

- Daily photos by remote cameras (45 sites) https://www.usgs.gov/apps/sandbar/
- Grand Canyon River Guides Adopt-a-Beach program
- Annual topographic surveys in October (45 sites)

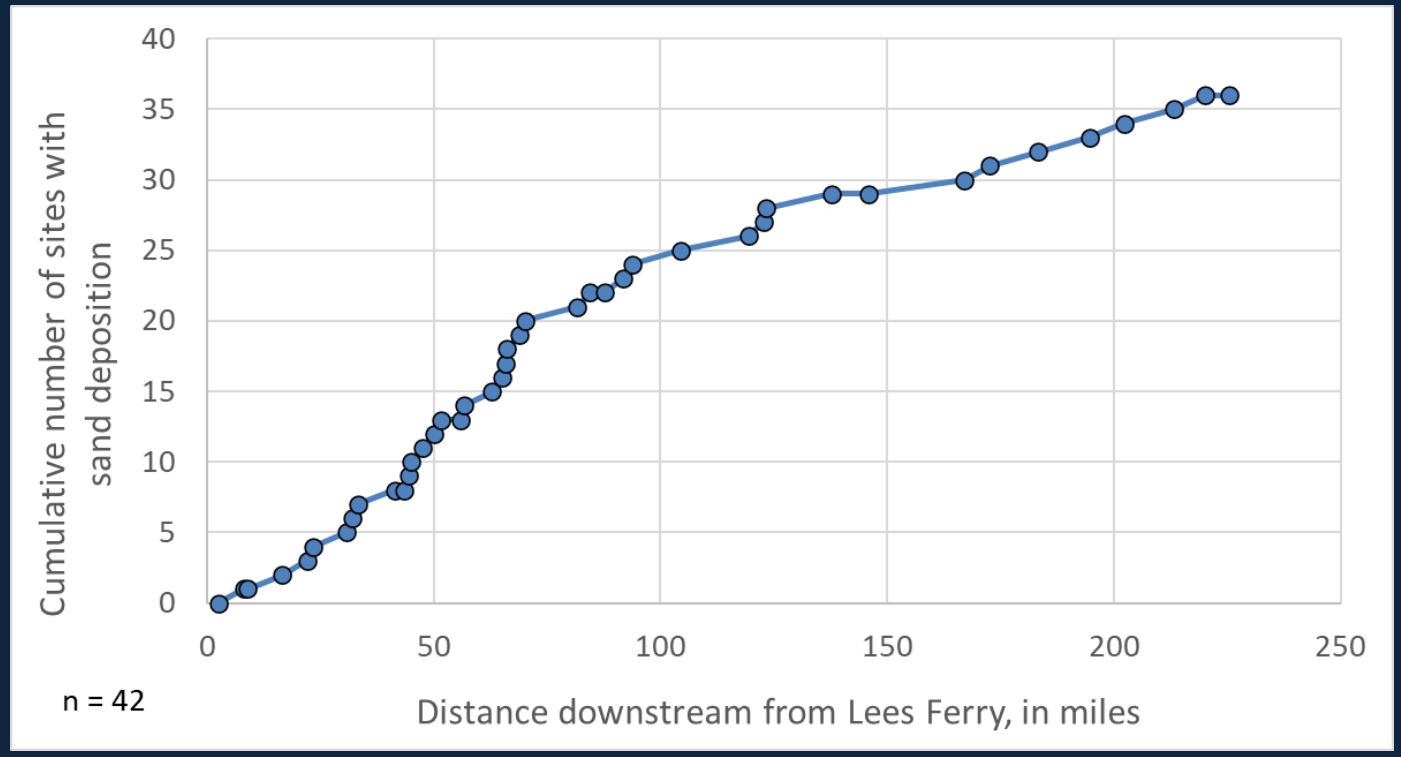


Flows
- Pre-HFE: 10,000 to 14,000 cfs
- Beginning May 1: ~18,000 cfs

That difference can result in a large decrease in the size of the exposed sandbar (25% to 50% decrease)

Preliminary Remote Camera Results from April HFE

- At least some deposition at more than 85% of monitoring sites with remote cameras
- At some sites, deposition was offset by erosion
- Vegetation scour or burial at many sites
- Gullies eroded by monsoon storms filled
- *Different water levels make comparison with previous HFEs difficult*



Jackass Camp – River Mile 8, Left

Jackass Camp – River Mile 8, Left

Jackass Camp – River Mile 8, Left

Lone Cedar Camp – River Mile 24.5, Left

USGS

Lone Cedar Camp – River Mile 24.5, Left

USGS

Lone Cedar Camp – River Mile 24.5, Left

USGS

Lone Cedar Camp – River Mile 24.5, Left

USGS

Lone Cedar Camp – River Mile 24.5, Left

USGS

The Sand Pile – River Mile 30, Right

The Sand Pile – River Mile 30, Right

The Sand Pile – River Mile 30, Right

Buck Farm – River Mile 41, Right

Buck Farm – River Mile 41, Right

Willie Taylor Camp – River Mile 45, Left

USGS

Willie Taylor Camp – River Mile 45, Left

Kwagunt Marsh – RM 55, Right

Grapevine Camp – River Mile 81, Left

USGS

Grapevine Camp – River Mile 81, Left

USGS

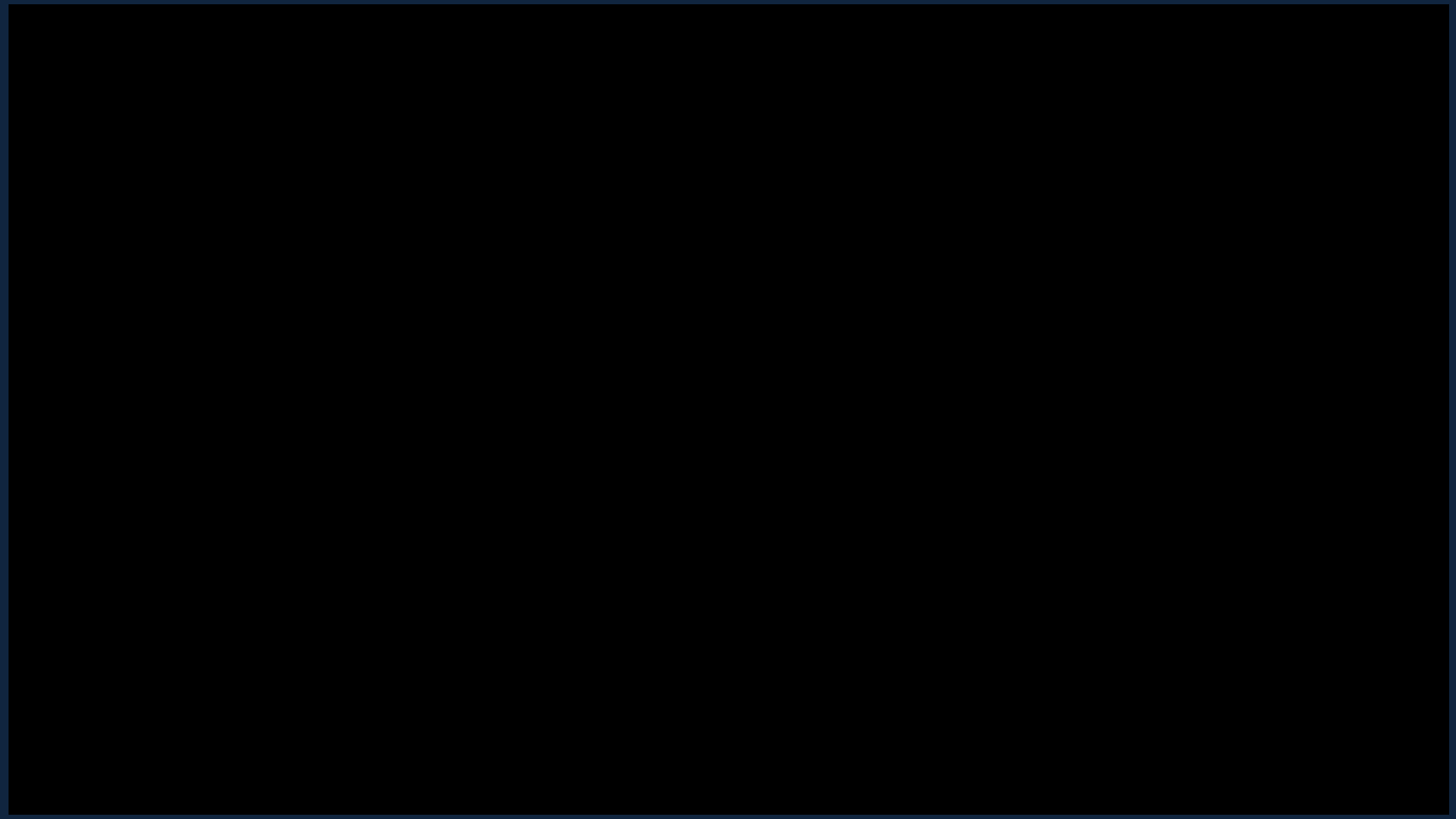
Big Dune Camp – River Mile 119, Right

USGS

Big Dune Camp – River Mile 119, Right

USGS

National Canyon – RM 166, Left



River Mile 202, Right

River Mile 202, Right

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Pumpkin Spring Camp – River Mile 213, Left

USGS

Pumpkin Spring Camp – River Mile 213, Left

Pumpkin Spring Camp – River Mile 213, Left

USGS

Summary

- In Marble Canyon, sand concentrations were high relative to previous HFEs though grain size was a bit coarser
  - *Lots of sample processing still to be done before final results on sand concentrations and sand budgets for HFE*
- Substantial deposition at most sites from Upper Marble Canyon to Diamond Creek
- High dam releases in May and June inundate much of the newly deposited sand and will likely result in accelerated rates of erosion through the summer
- We will conduct a complete sandbar survey in October and measure how much of the HFE deposits remain

Website:
https://www.usgs.gov/apps/sandbar/