

Tuttle Creek Lake Water Injection Dredging Demonstration Update

- Presented by: *Connie Owen and Richard Rockel*



Tuttle Creek Lake Water Injection Dredging Demonstration

• Problem:

- Federal Lakes/Reservoirs that are used by Kansans for water supply are getting filled in by sediment
- Rural, urban, industrial, agricultural water supply capacities reducing
- Reduced opportunities for recreational and ecological water uses

Reservoir Name	Initial Year	Initial Storage (AF)	Most Recent Survey	Most Recent Survey Storage (AF)	Historical Average Annual Sedimentation Rate - Since Initial Year (AF)	Projected 2026 Storage (AF)
Kanopolis	1946	73,187	2017 *	47,156	364	43,745
Milford	1967	415,403	2020	357,186	1,082	350,536
Tuttle Creek	1962	425,312	2020	225,825	3,412	204,565
Perry	1969	243,261	2021	189,958	1,007	184,942
Hillsdale	1981	82,207	2022	75,851	156	75,162
Clinton	1975	129,171	2019 *	111,842	413	108,901
Elk City	1966	52,261	2024	34,399	307	33,650
John Redmond	1963	102,254	2023	59,016	723	56,497
Marion	1968	84,948	2024	76,837	144	76,477
Council Grove	1965	52,736	2024	42,543	173	42,111
Fall River	1948	30,401	2009 *	20,643	158	18,117
Toronto	1960	27,320	2010 *	16,528	215	13,224
Big Hill	1981	27,215	2010 *	23,361	132	21,226
Pomona	1963	70,603	2024	50,354	334	49,524
Melvern	1972	154,370	2017	147,972	142	146,624

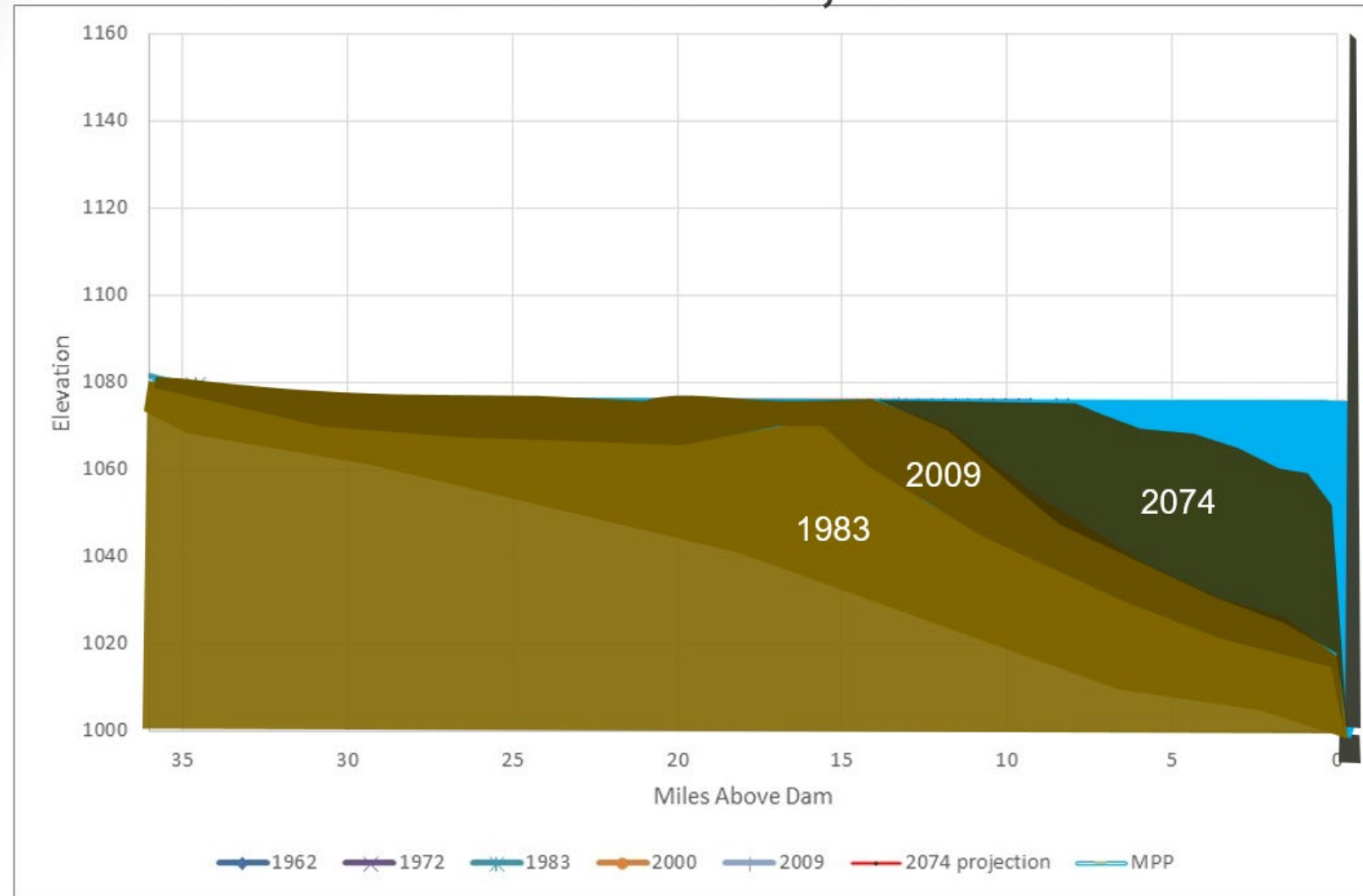
* New survey has been conducted, awaiting data processing or delivery

Tuttle Creek Lake Water Injection Dredging Demonstration

- **Problem:**
 - Reduction of water storage volume
 - Reduction of water that can be used for needs of Kansans through droughts.



TUTTLE CREEK LAKE, KS



Tuttle Creek Lake Water Injection Dredging Demonstration

- **Authorization:** Flood Control Act of 1938
- **Funding:** Total Project Cost \$9.1M
 - Federal: Consolidated Appropriations Act FY22 (\$1.3M); FY23 (\$2.8M) Operations and Maintenance – Water Supply (WS); and \$3M reprogrammed from Tuttle Creek operations project
 - State: State of Kansas - Kansas Water Office contributed an additional \$2M directly to USACE for the project.
- **Project Managers:** Laura Totten (USACE); Josh Olson (KWO)
- **Technical Lead:** Michael Mansfield (USACE)



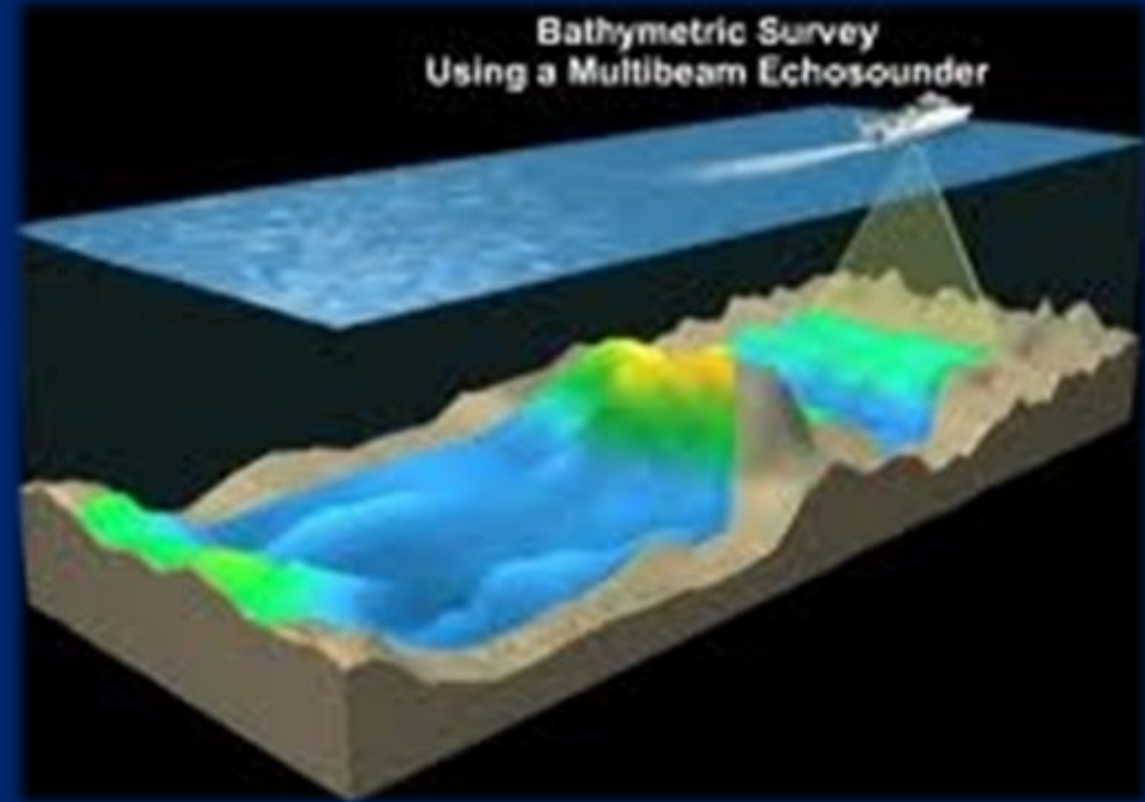
Demonstration Objectives

Test of the technology– not a typical dredging project

- Goal: Answer questions
- Not: Dredge to a certain elevation or volume

Tuttle Creek Lake Primary Questions

- How much sediment can WID move?
- WID production rate (Cubic yards/hour)
- How much will it cost per cubic yard?
- What are the downstream effects? (Water quality/ecological/geomorphology)
- Fully successful if we answer these questions.



Extensive multibeam bathymetric data and downstream sediment and water quality monitoring



WID Demonstration Schedule

- **WID Demonstration Fall 2025 – September 17 – September 27**
 - Dredging operation for 10 total days and demobilization.
(200 hours of active dredging)
- **WID Demonstration Spring 2026 – Mid to Late March**
 - Dredging operation for 10 total days and demobilization.
(200 hours of active dredging – assumes 20 hours of dredging per day)
- **WID Demonstration Summer 2026 – June-July***
 - Dredging operation for 10 total days and demobilization.
(200 hours of active dredging – assumes 20 hours of dredging per day)

*Subject to change







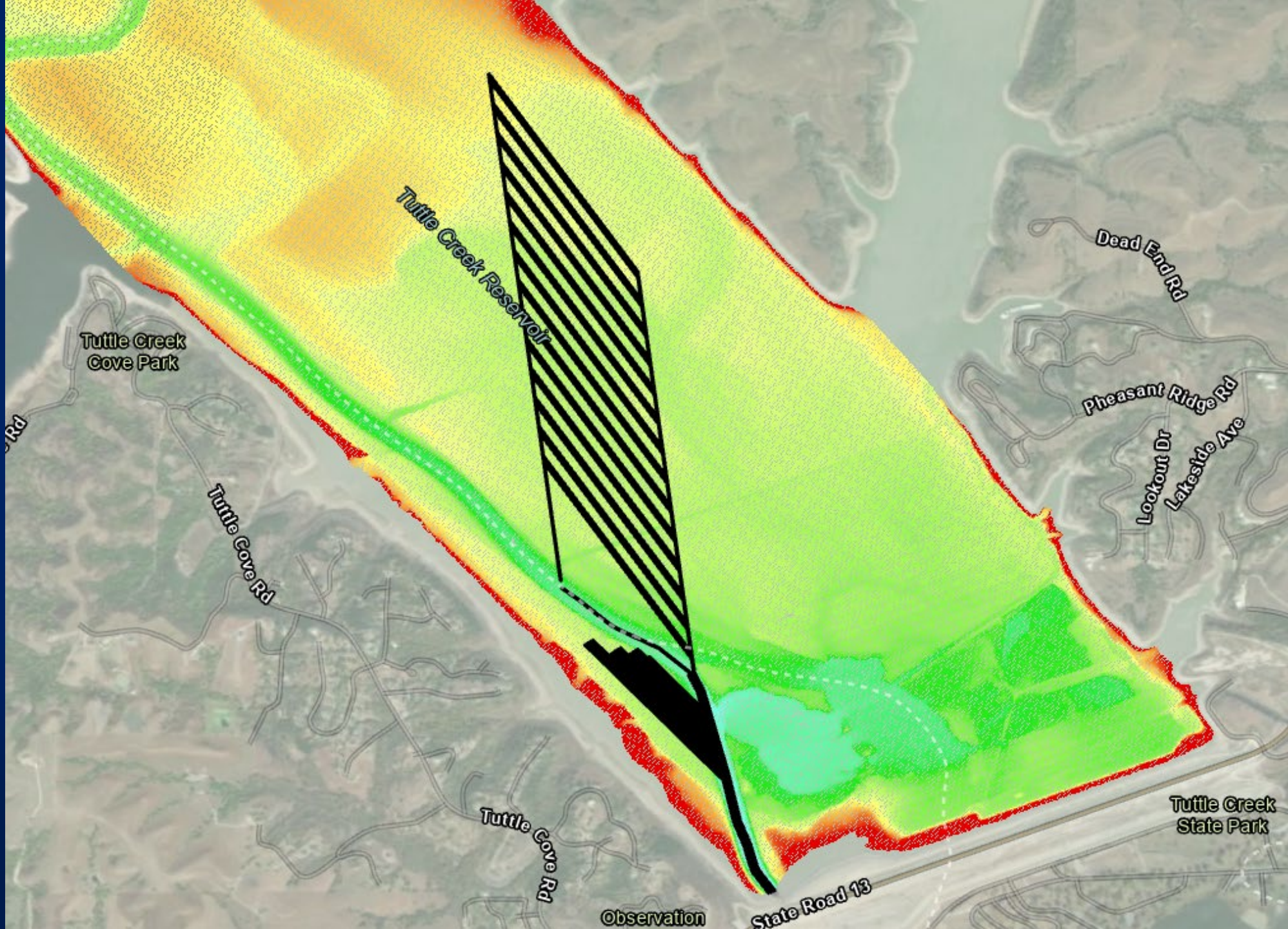
Dredging began around 11:45 AM on
Wednesday, September 17th.





Dredging operations continued during the night.



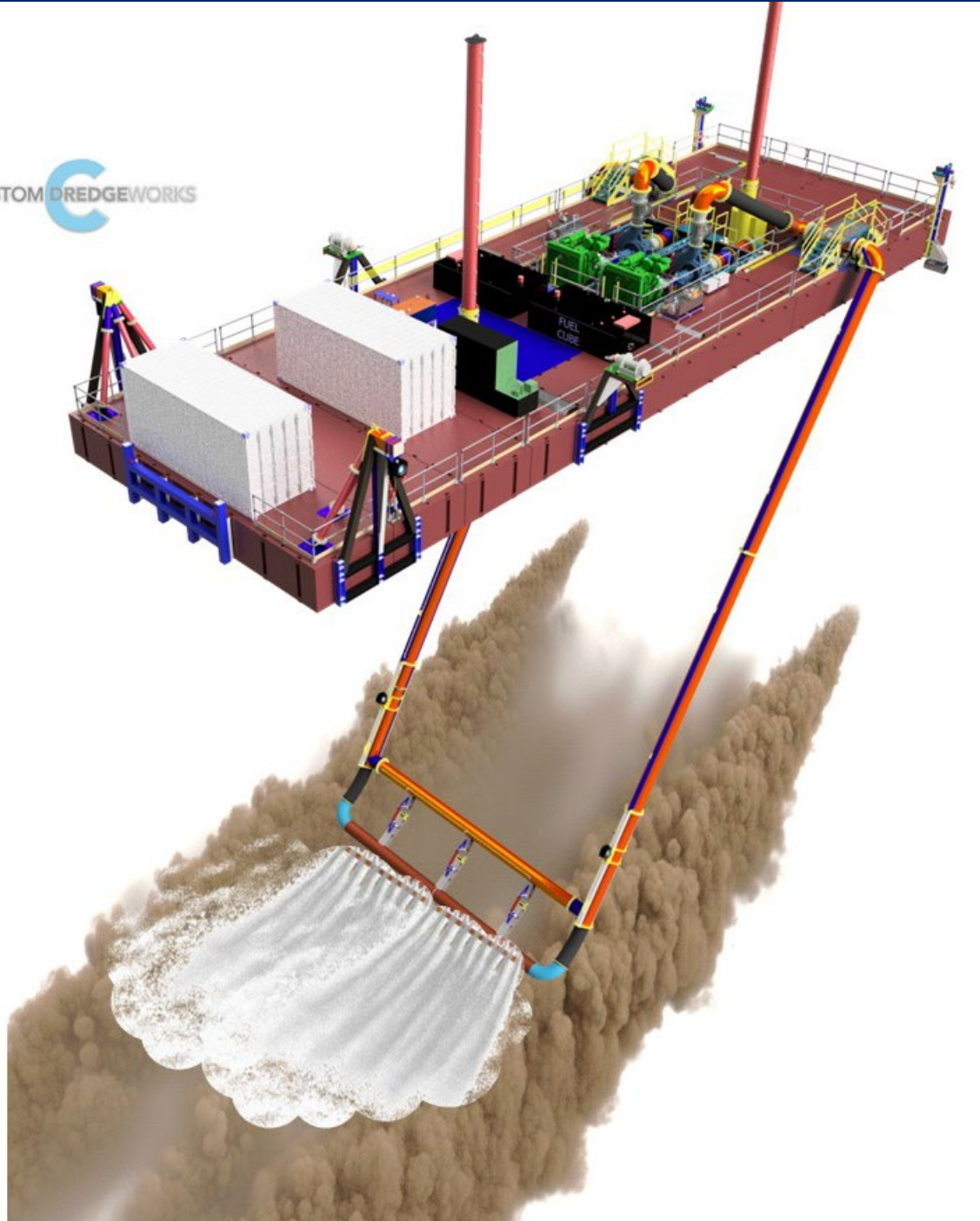


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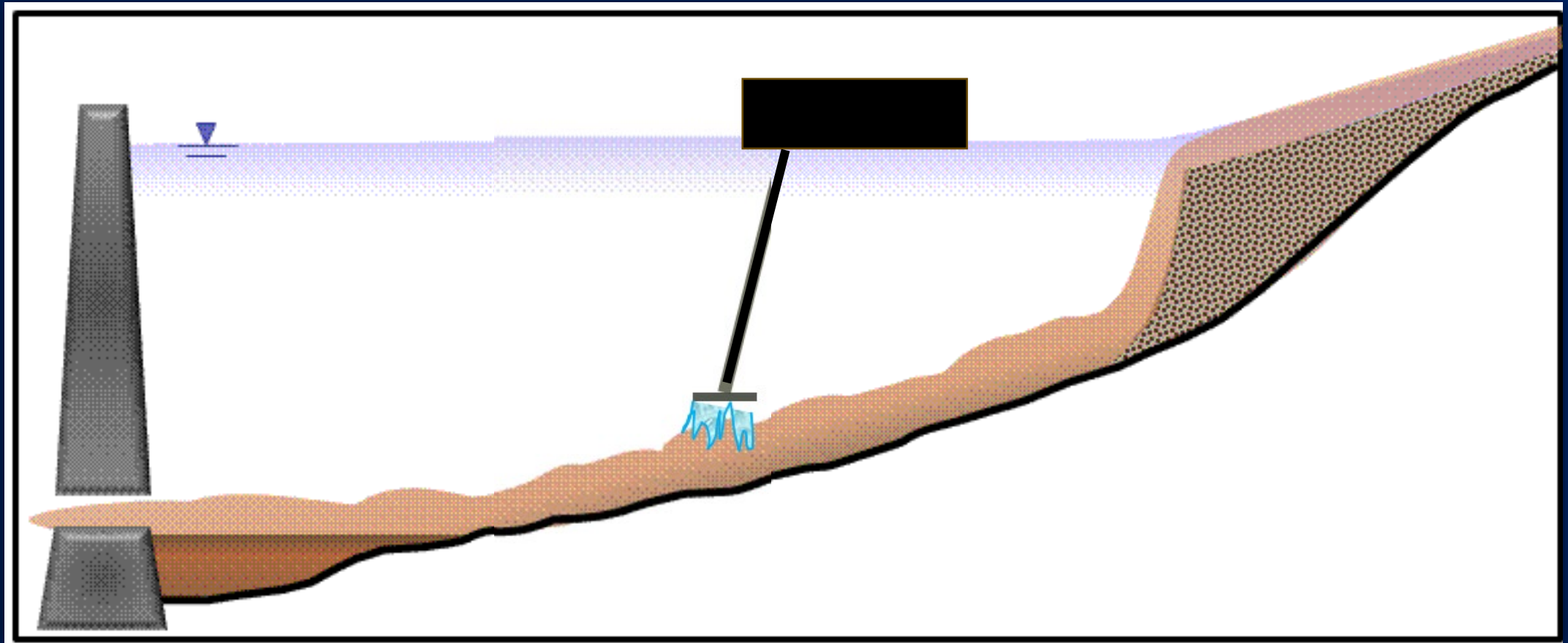
CUSTOM DREDGEWORKS



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Density Current



Density Current



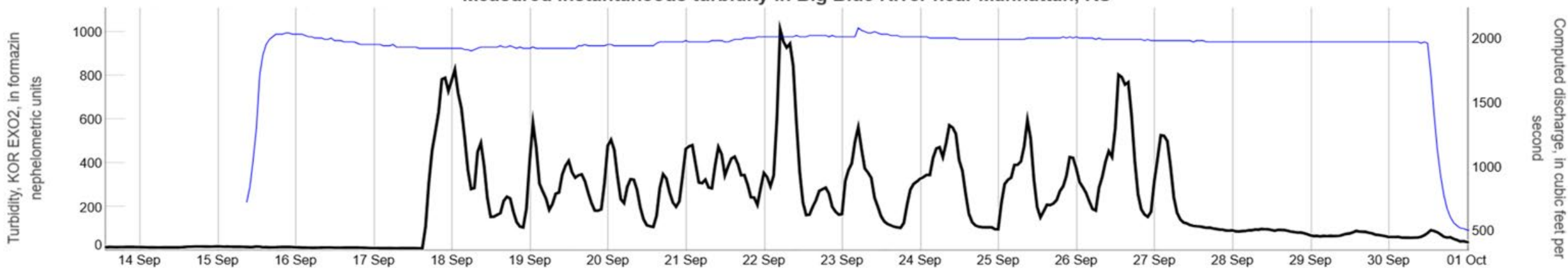
No extra sediment

A few minutes later

Note the color change

Slide Credit: John Shelley

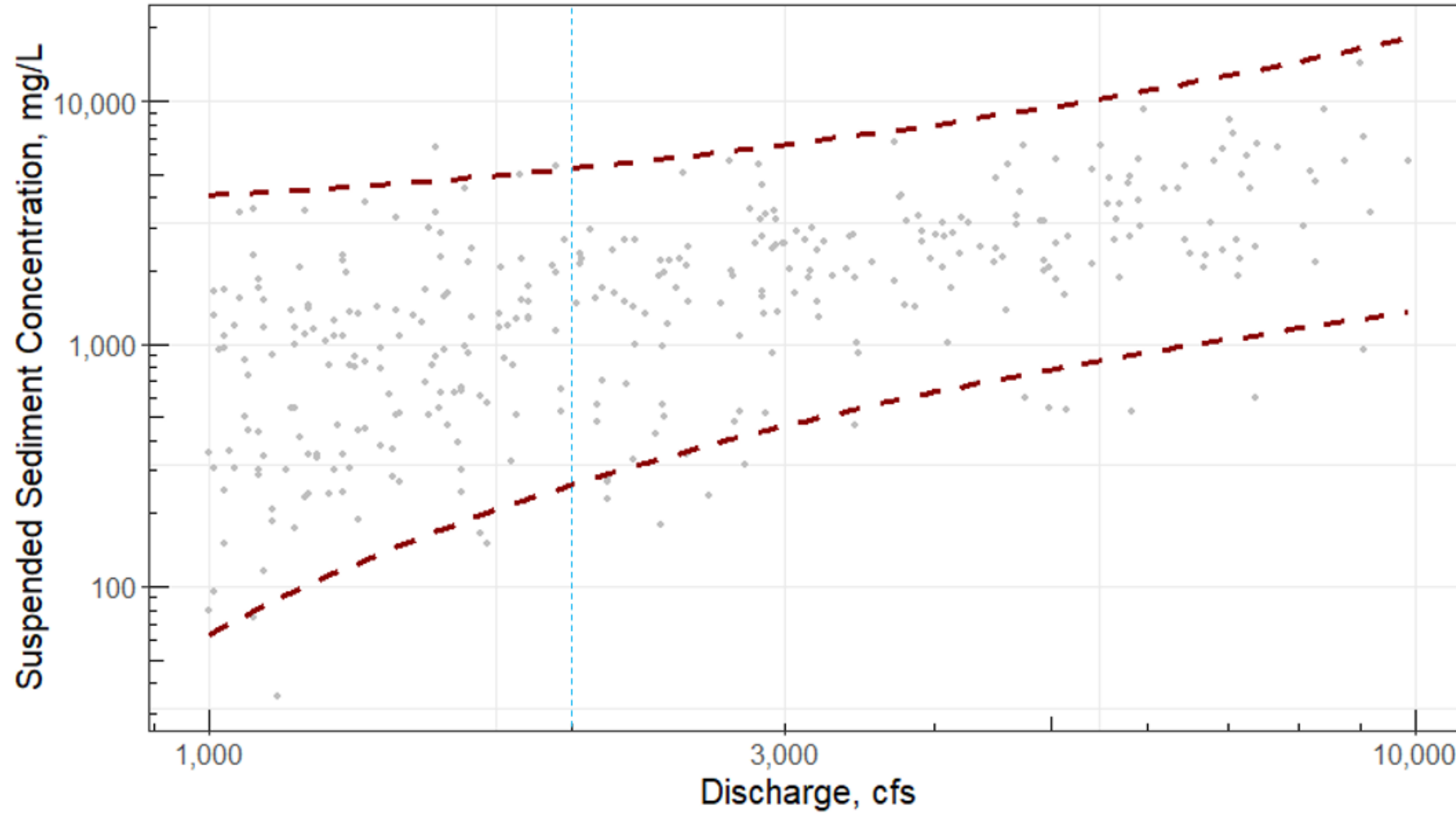
Measured instantaneous turbidity in Big Blue River near Manhattan, KS



Discharge (blue line) and turbidity (black line) in the channel downstream of Tuttle Creek Lake September 2025, showing a very significant release of sediment during the Water Injection Dredging Demonstration Project.



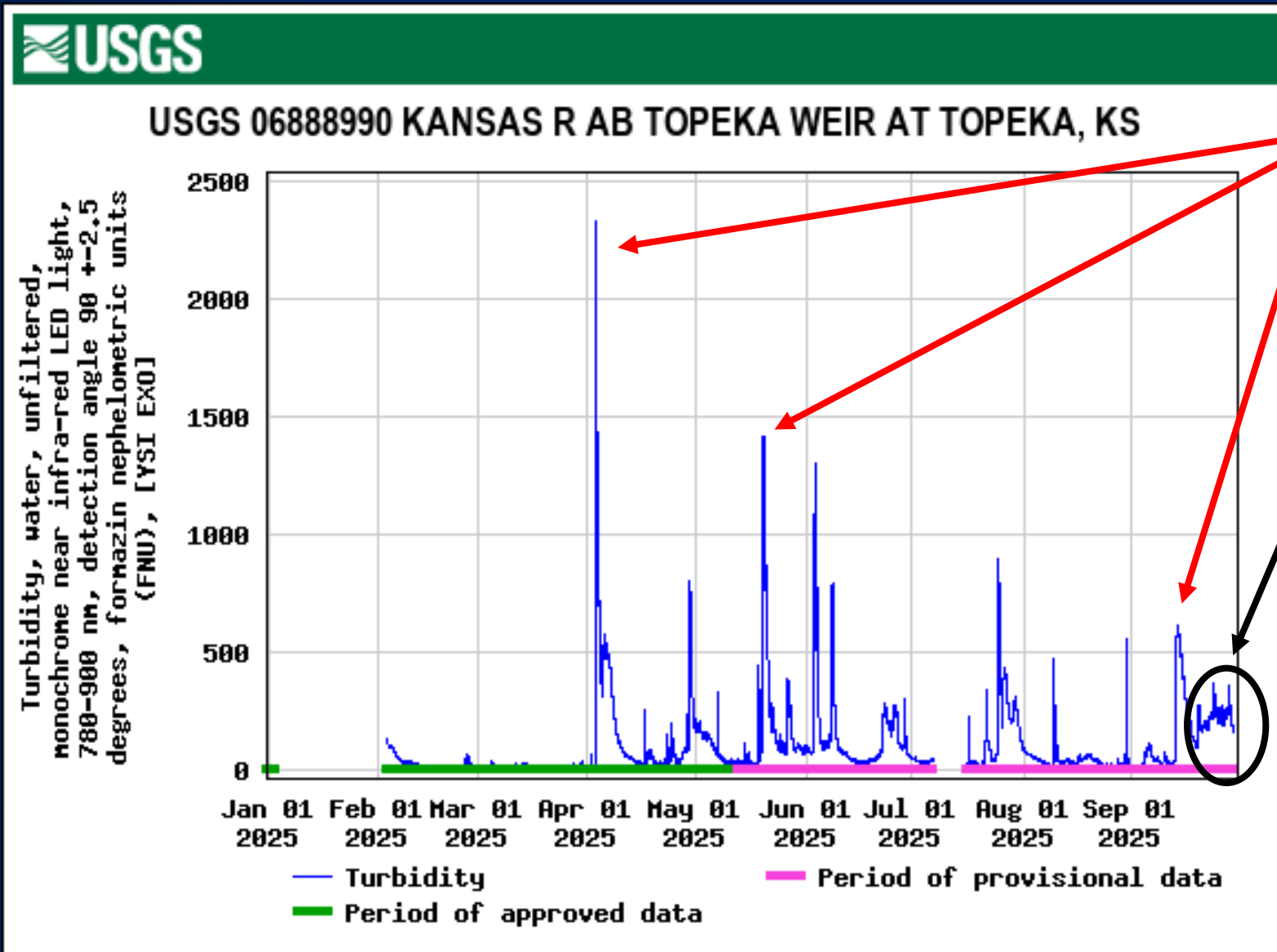
DOWNSTREAM CONCENTRATION LIMITED TO INFLOWING SEDIMENT



• • 95% Confidence Intervals • • Tuttle Creek Lake Incoming Sediment Concentrations

Slide Credit:
John Shelley

Turbidity at Topeka – 1/1/2025 to Arrival of WID Sediment



- Note prior turbidity spikes for year from natural runoff events
- Water Injection Dredging (WID) sediment arrival at Topeka



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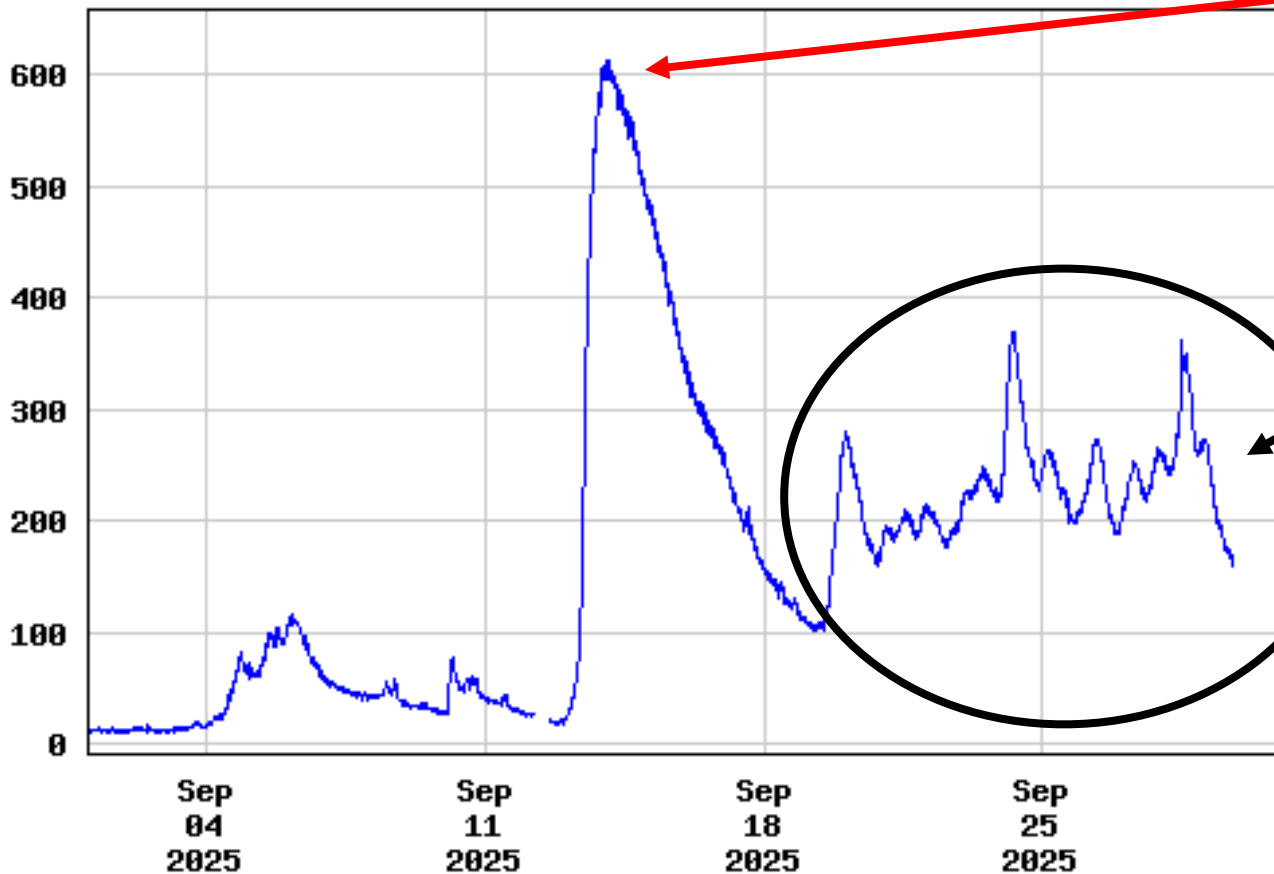


Turbidity at Topeka – 9/1/2025 to Arrival of WID Sediment



USGS 06888990 KANSAS R AB TOPEKA WEIR AT TOPEKA, KS

Turbidity, water, unfiltered, monochrome near infra-red LED light, 780-900 nm, detection angle 90 +/-2.5 degrees, formazin nephelometric units (FNU), [YSI EX0]



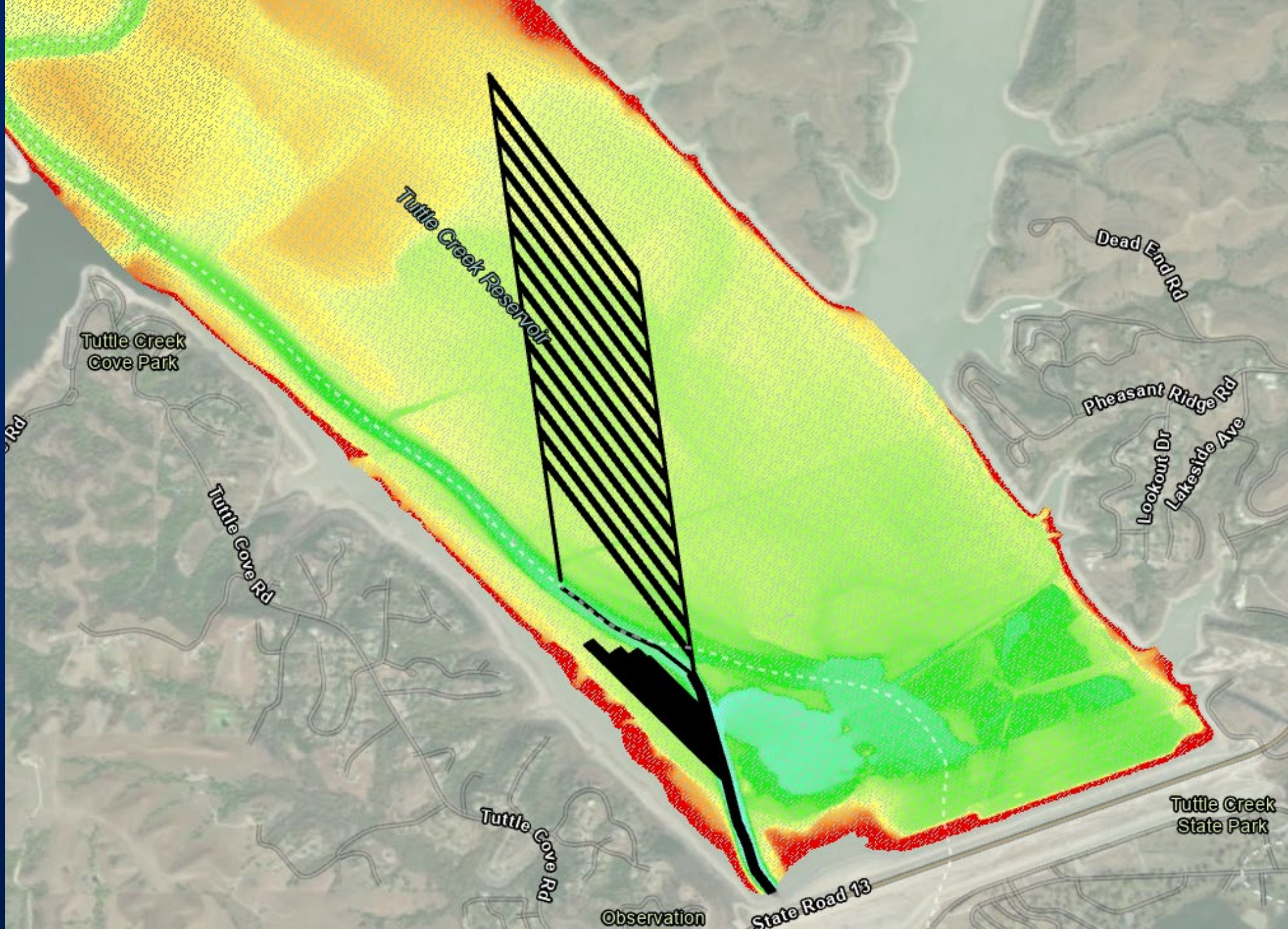
----- Provisional Data Subject to Revision -----

- Turbidity increase from Smoky Hill River high flow event.
- Water Injection Dredging (WID) sediment arrival at Topeka



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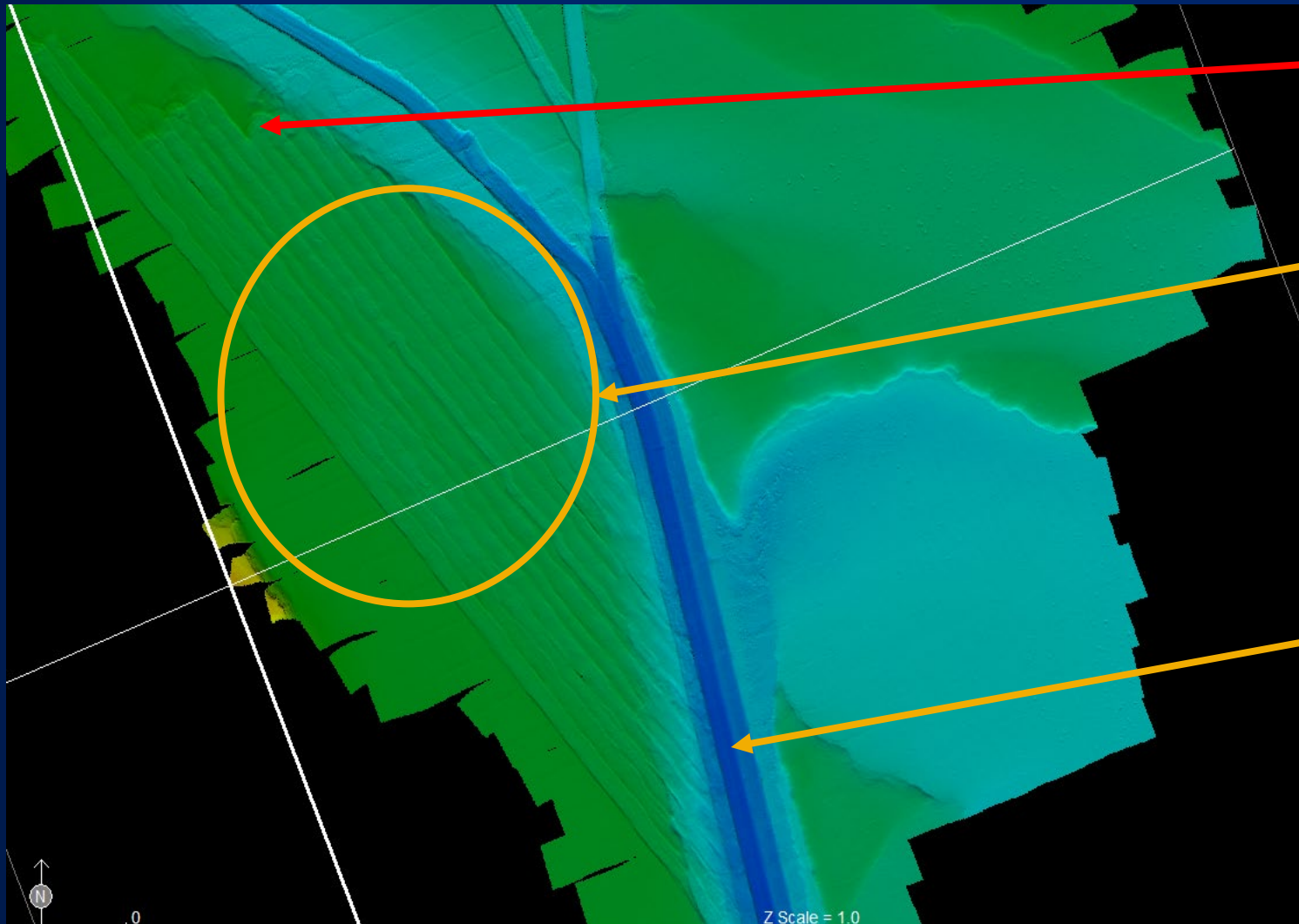




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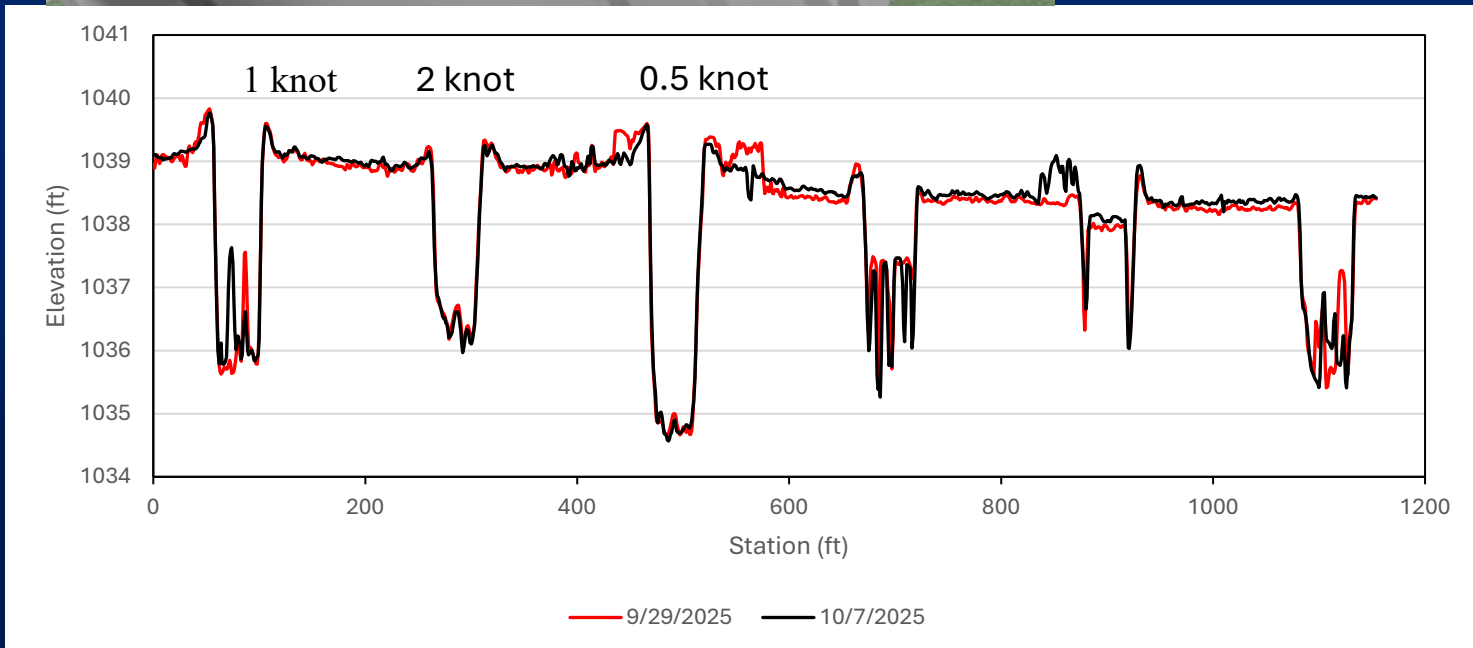
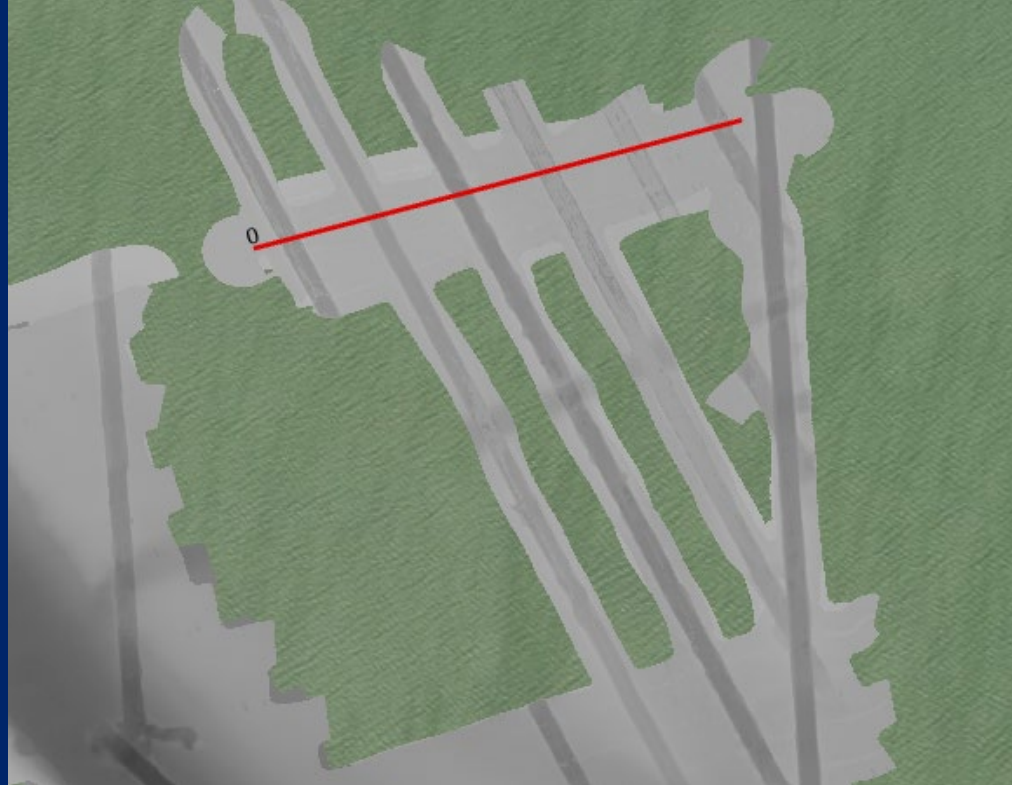
Fall 2025 WID Demo – Post Dredging Survey 10/17/2025



- North/south lines where dredge ran
- Differences of multiple feet from pre-dredge survey
- Outlet channel deepened



- Area of project used to investigate variables for efficiency and effectiveness in a reservoir.



Next Steps

- Spring 2026: WID Demo #2
- Summer 2026: WID Demo #3
- 2027: Final Report

