

CALIFORNIA DEPARTMENT OF WATER RESOURCES

Monitoring Special Study

MSS Program Updates, March 15, 2024



Bill McLaughlin, P.E., Supervising Engineer

Agenda

Start time	Agenda Item
9:30 am	Welcome (5 minutes)
9:35 am	Agenda & Logistics (5 minutes)
9:40 am	General MSS Updates/Timeline and Q&A (10 minutes)
9:50 am	Technical Presentations and Q&A (95 min) <ul style="list-style-type: none">▪ High-Speed Salinity Transect Mapping▪ Salinity Point-Source and Ion Sampling▪ Modeling: SCHISM 3D, Water Quality Data Integration (Data Assimilation) and Flow Monitoring Activities
11:25 am	Closing & next steps (5 minutes)
11:30 am	Meeting Adjourn



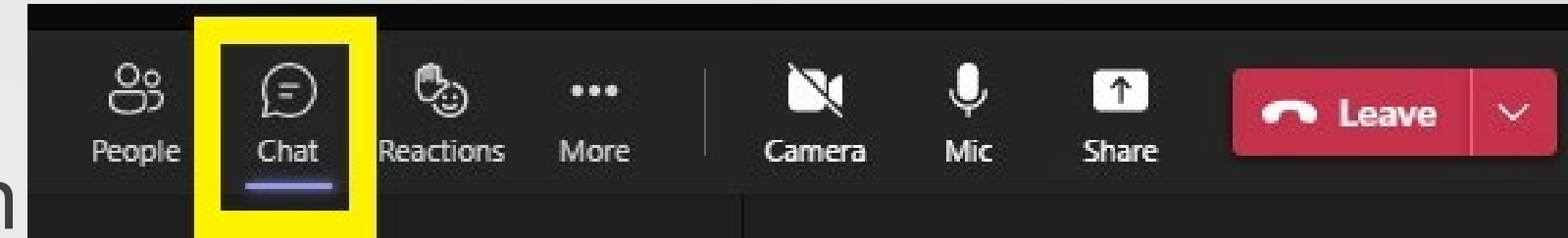
Ground Rules & Logistics

This meeting is focused on providing updates on the Draft MSS.

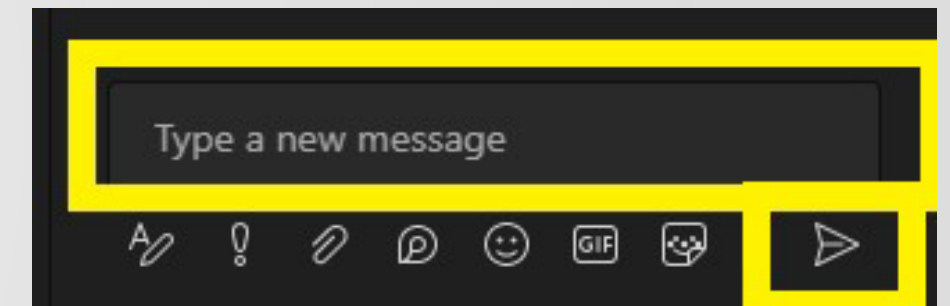
If you have a question or comment:

- Type it in the **Chat** box:

1st, click "Chat" in the upper right of your screen



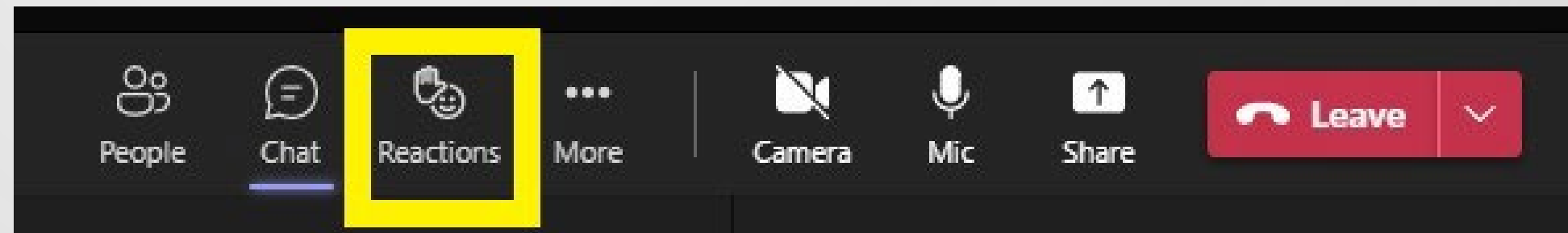
2nd type in the chat box that opens on the right & hit "Send"



- OR, 'Raise your hand' to speak. Commenters will be called on in the order in which they 'raise their hands'

**On a Phone:

Dial *9 to "Raise Hand"

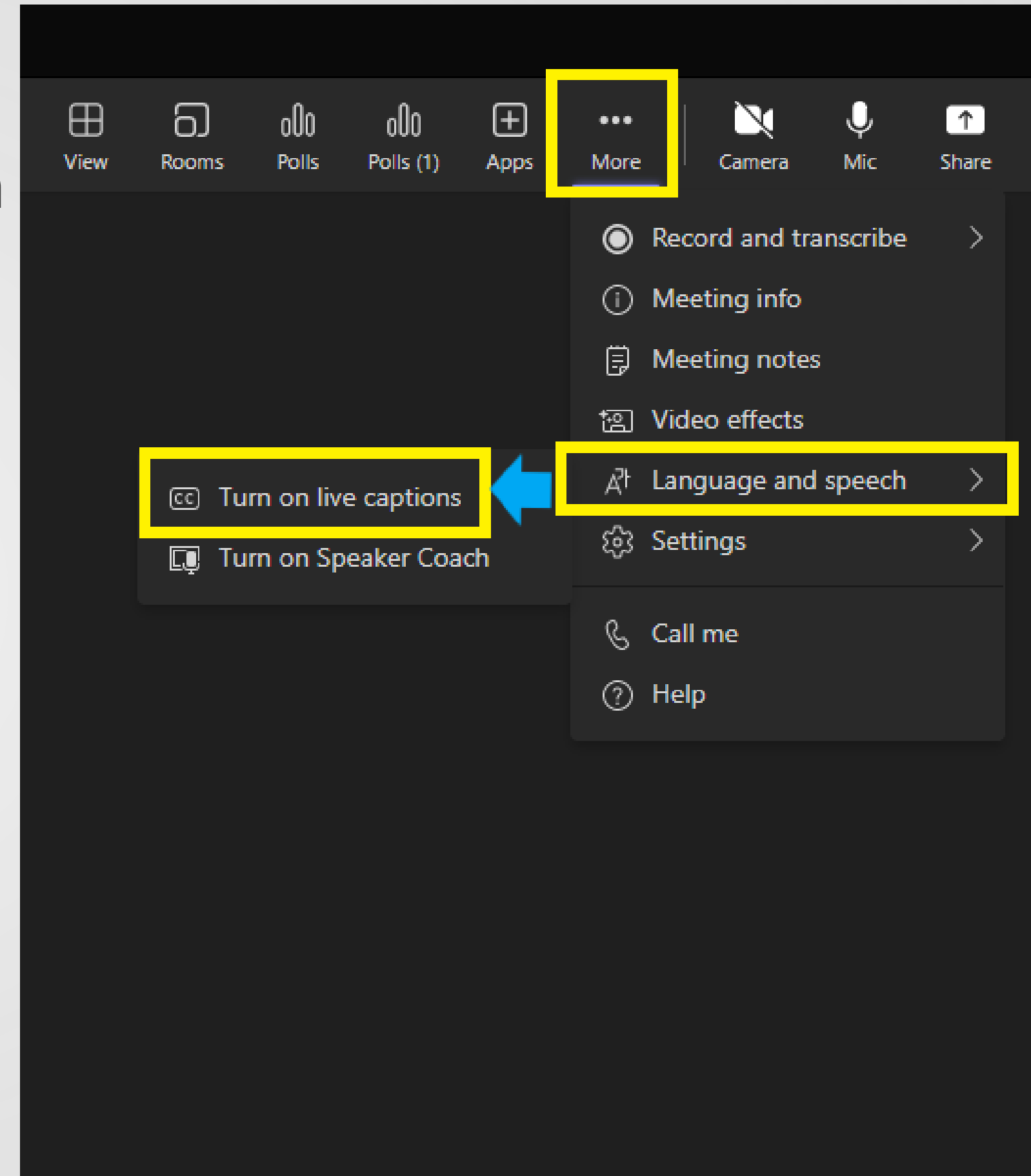


Accessibility

This meeting is being transcribed in real time with closed captions

To turn on closed captioning:

- Click on “More”
- Then click on “Turn on live captions”



General MSS Updates

MSS final report preparation underway since January 2024

- Ongoing EC data collection from the temporary stations to further characterize salinity conditions

Target delivery of the MSS final report to the SWRCB by end of 2024

- Findings from each technical study to be completed by the end of June 2024
- Analysis and synthesis of findings for the final report to be completed by end of August 2024
- Full MSS final report to be distributed to the public in late September for a 30-day review

Ongoing Public/Technical Meetings



QUESTIONS OR COMMENTS?

Raise your hand or type in the chat

State your name and affiliation

High-Speed Salinity Transect Mapping



High-Speed Salinity Transect Mapping



MSS High Speed Salinity Transect Technical Study 6-Month Update – Oct 2023 –Mar 2024

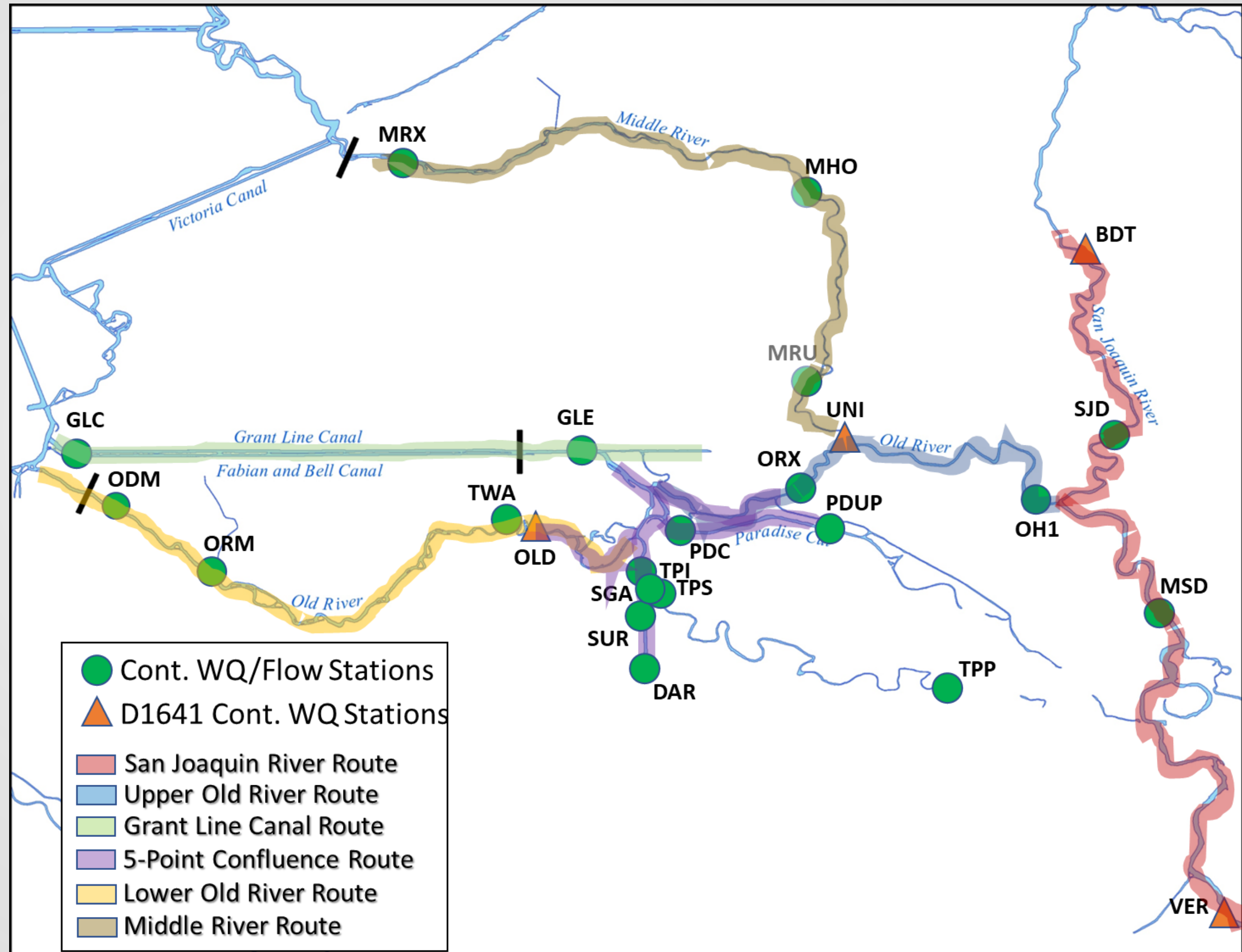
1. Field data collection finished – last High-Speed Salinity Transect 12/11/2023
2. High-Speed Salinity Transect Data Collection and Data Post-Processing SOP Development
3. All High-Speed Salinity Transect Data Reviewed, Organized, and QA/QC-ed
4. Started Report Outlining, Figure Development, Analysis and Writing
5. Data Published to the DWR Atlas for Public Access



Reviewing High-Speed Salinity Transect Field Data Collection 2021-23

Work Plan Transect Routes

Transect Routes	Transect Name	Total Transects Completed
1	San Joaquin River	2
2	Upper Old River	4
3	Grant Line Canal	6
4	5-Point Confluence	15
5	Lower Old River	10
6	**Middle River	4



**Middle River Transects completed using land-based point sample collection due to shallowness and vegetation coverage in the channel



Reviewing High-Speed Salinity Transect Field Data Collection 2021-23

Transect Routes	Transect Name
1	San Joaquin River
2	Upper Old River
3	Grant Line Canal
4	5-Point Confluence
5	Lower Old River

#	Year	Transect Location	Date
1	2021	5-Point Confluence & San Joaquin River & Upper Old River	9/2/2021
2		5-Point Confluence	9/29/2021
3		Lower Old River	10/26/2021
4		5-Point Confluence	11/16/2021
5	2022	San Joaquin River	1/27/2022
6		Fabian Tract	3/2/2022
7		5-Point Confluence & Upper Paradise Cut & Lower Old River	3/31/2022
8		Lower Old River	6/1/2022
9		Lower Old River	7/27/2022
10		Grant Line Canal & 5-Point Confluence	8/24/2022
11		Lower Old River	10/26/2022
12		Grant Line Canal & 5-Point Confluence	10/27/2022
13		5-Point Confluence	11/3/2022
14	2023	5-Point Confluence & Upper Paradise Cut	2/1/2023
15		Middle River (MRX to MHO)	3/8/2023
16		5-Point Confluence	4/26/2023
17		Upper Old River & Grant Line Canal	5/9/2023
18		5-Point Confluence & Upper Paradise Cut	6/22/2023
19		Fabian Tract & 5-Point Confluence & Upper Paradise Cut	6/28/2023
20		Upper Old River & 5-Point Confluence	7/5/2023
21		5-Point Confluence & Upper Paradise Cut	7/12/2023
22		Fabian Tract & 5-Point Confluence	7/20/2023
23		Fabian Tract & 5-Point Confluence	8/24/2023
24	Lower Old River	9/27/2023	
25	Upper Old River	10/4/2023	
26	Upper Paradise Cut	10/30/2023	
27	5-Point Confluence and Lower Old River	12/11/2023	

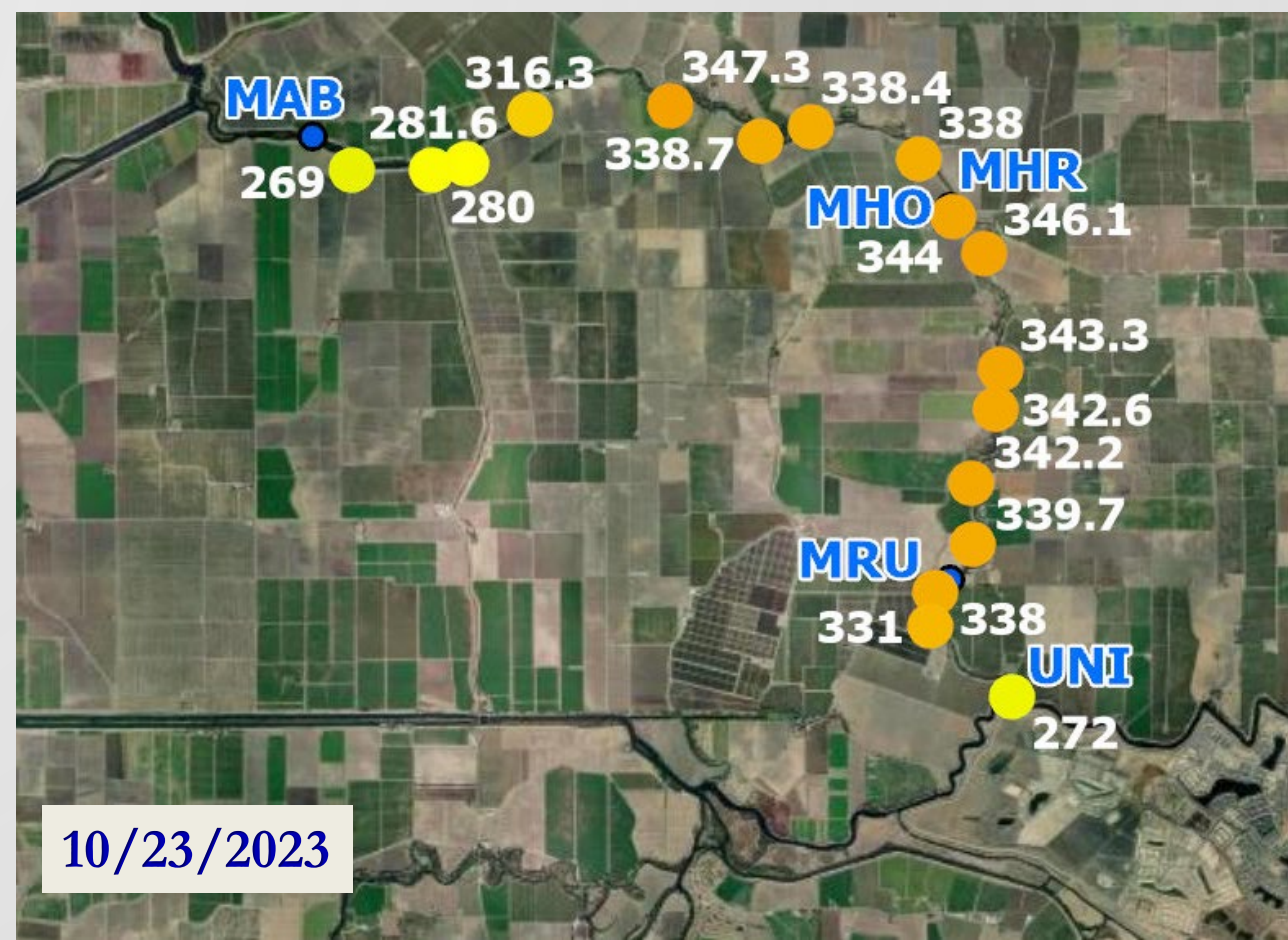
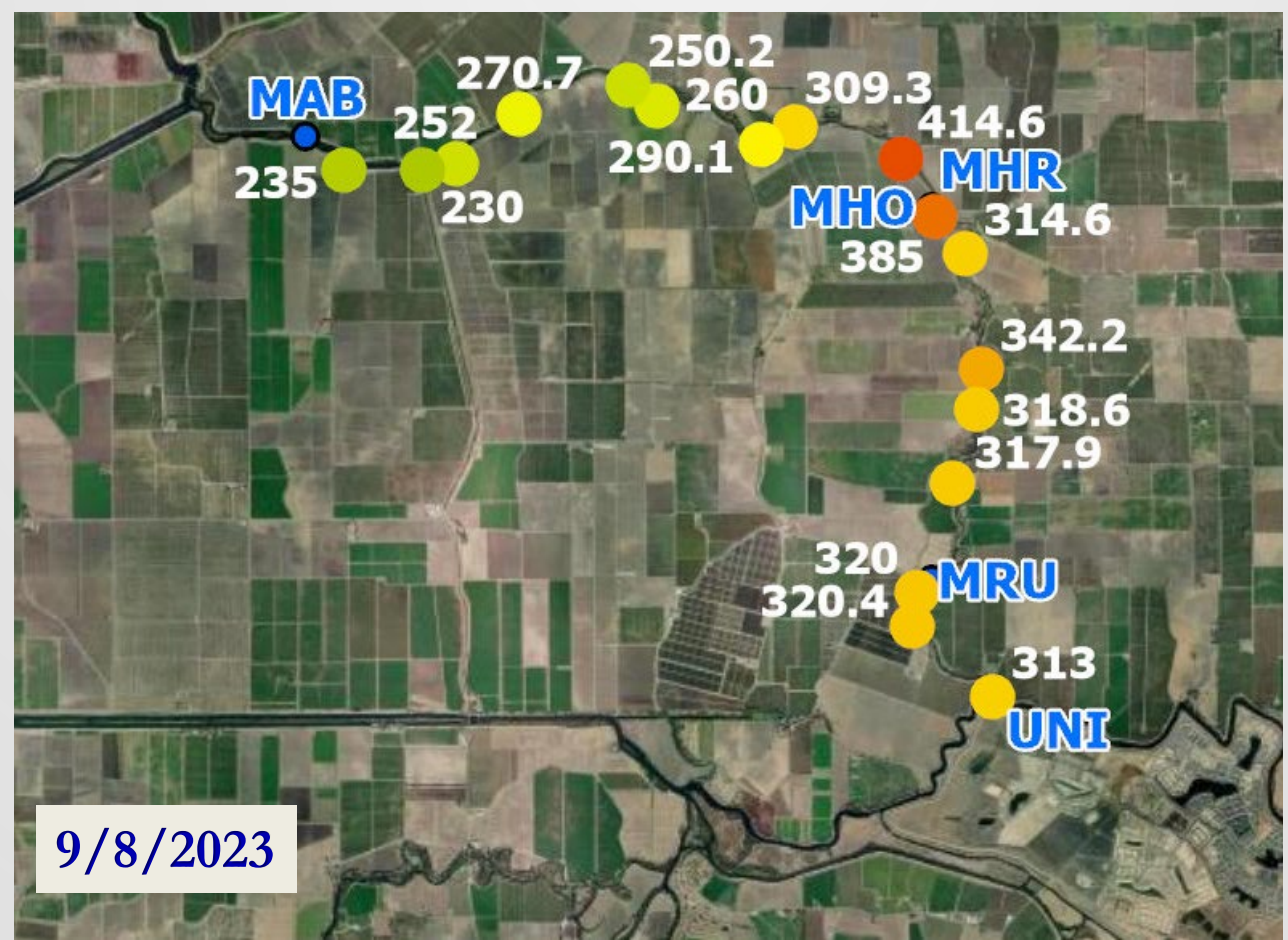
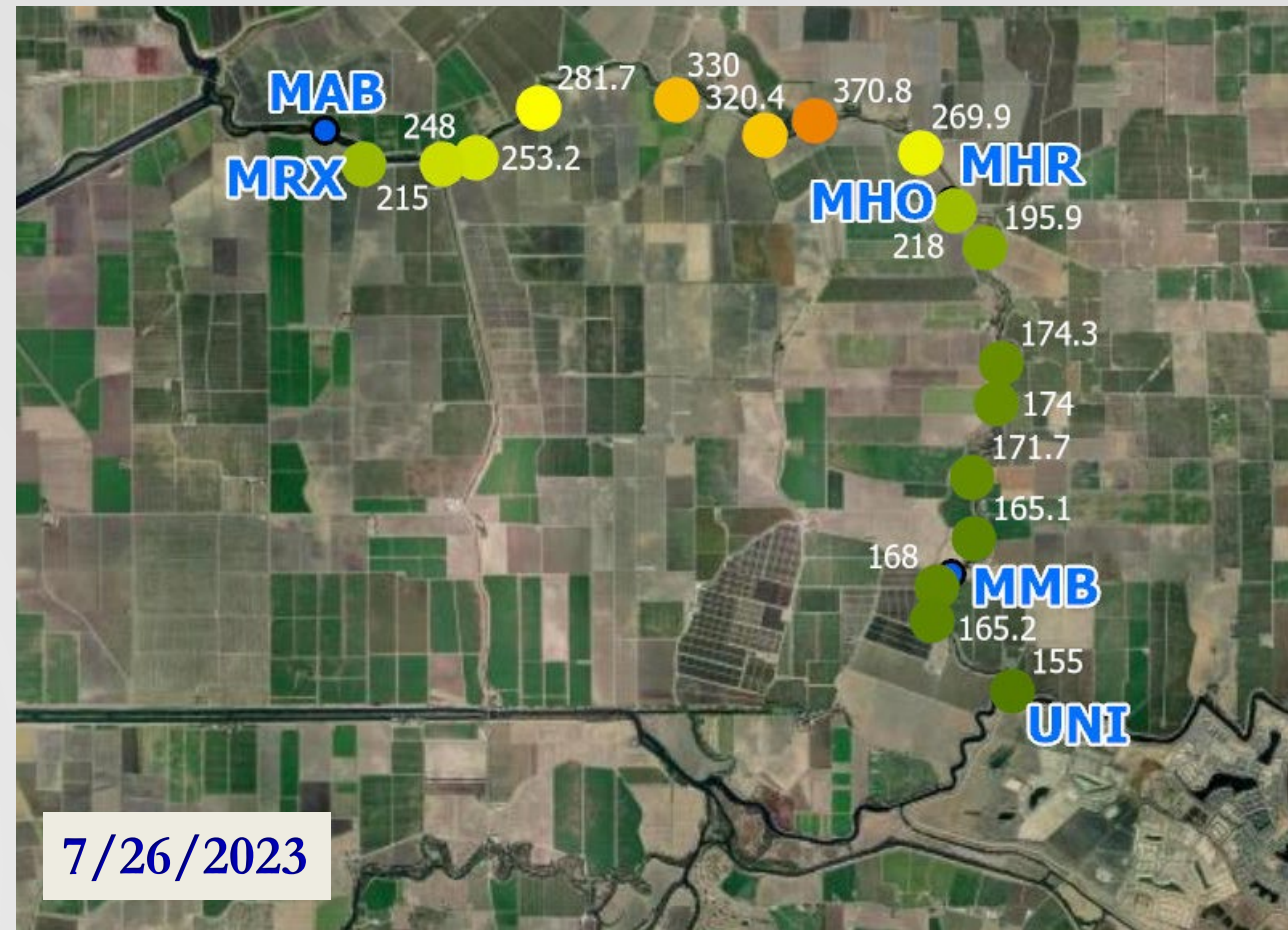
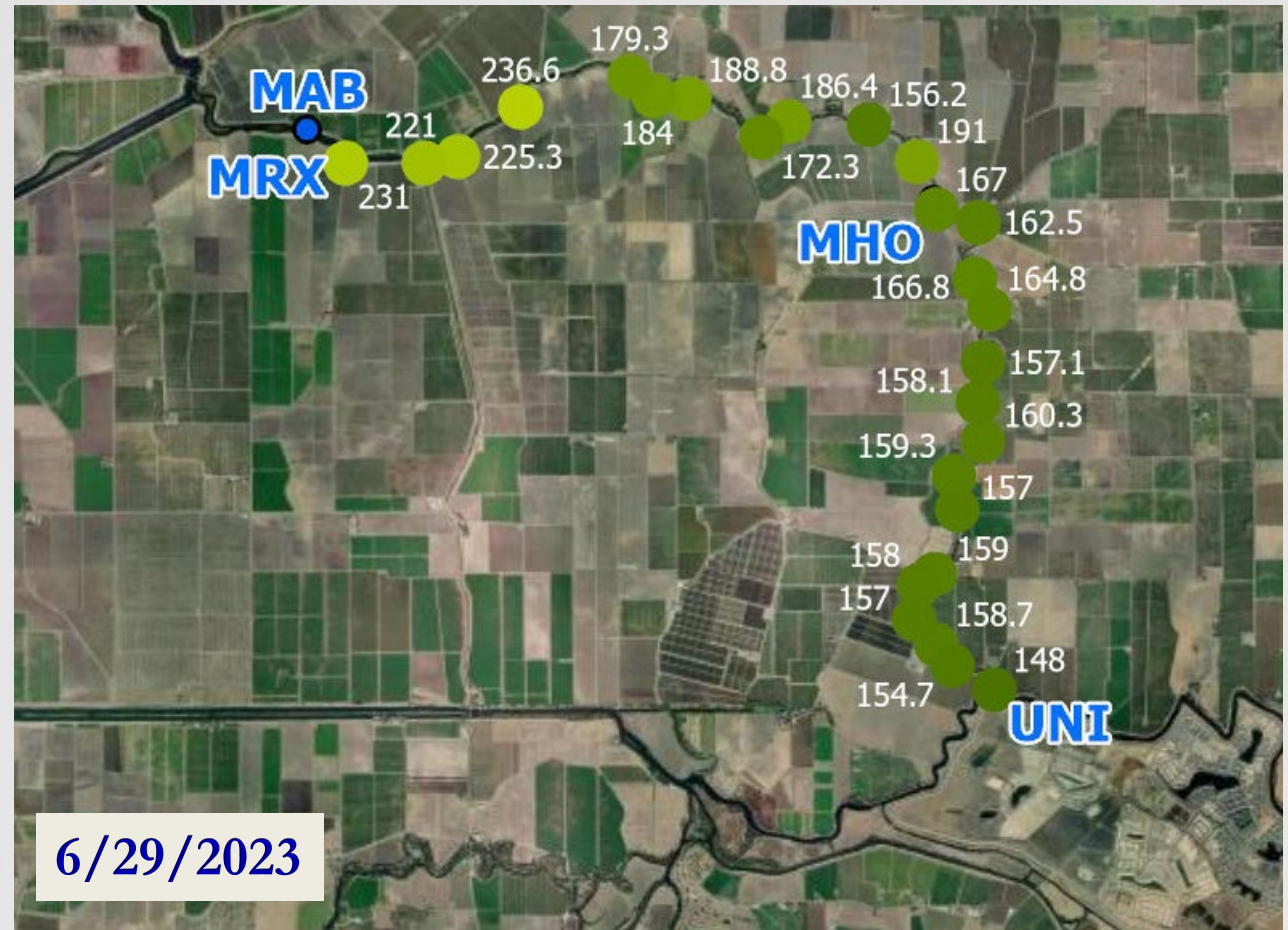
- **A total of 27 Field Days over CY2021-2023**
- **Transects were collected across differing water years, seasons, tides, flows, operational scenarios, and salinity conditions**



Middle River Transects

- Middle River Transects completed to meet conditional approval of MSS Study Plan

Transect Location	Date	Description
Middle River	6/29/2023	Pre-TBP Barrier Install
Middle River	7/26/2023	Pre-TBP Barrier Install
Middle River	9/8/2023	Post-TBP Barrier Install
Middle River	10/23/2023	Post-TBP Barrier Install



MSS Work Plan Goals and Reporting Objectives

1. Characterize the spatial and temporal distribution and associated dynamics of water level, flow, and salinity conditions in the southern Delta waterways.

Meeting Goal #1

High-Speed Salinity Transect Mapping

- Salinity transects provide timestamps of salinity conditions across all major river segments in the interior southern Delta, including adjacent dead-end sloughs, like Paradise Cut and Sugar Cut.
- Transects will capture salinity variability and be analyzed based on tidal, seasonal, and operational changes in the interior southern Delta.
- Transects are scheduled throughout the navigable interior southern Delta waterways over 2 years to capture a wide range of water level, flow, and EC conditions in the study area.
- Transects are scheduled to capture a range of tidal scenarios with differing magnitudes.



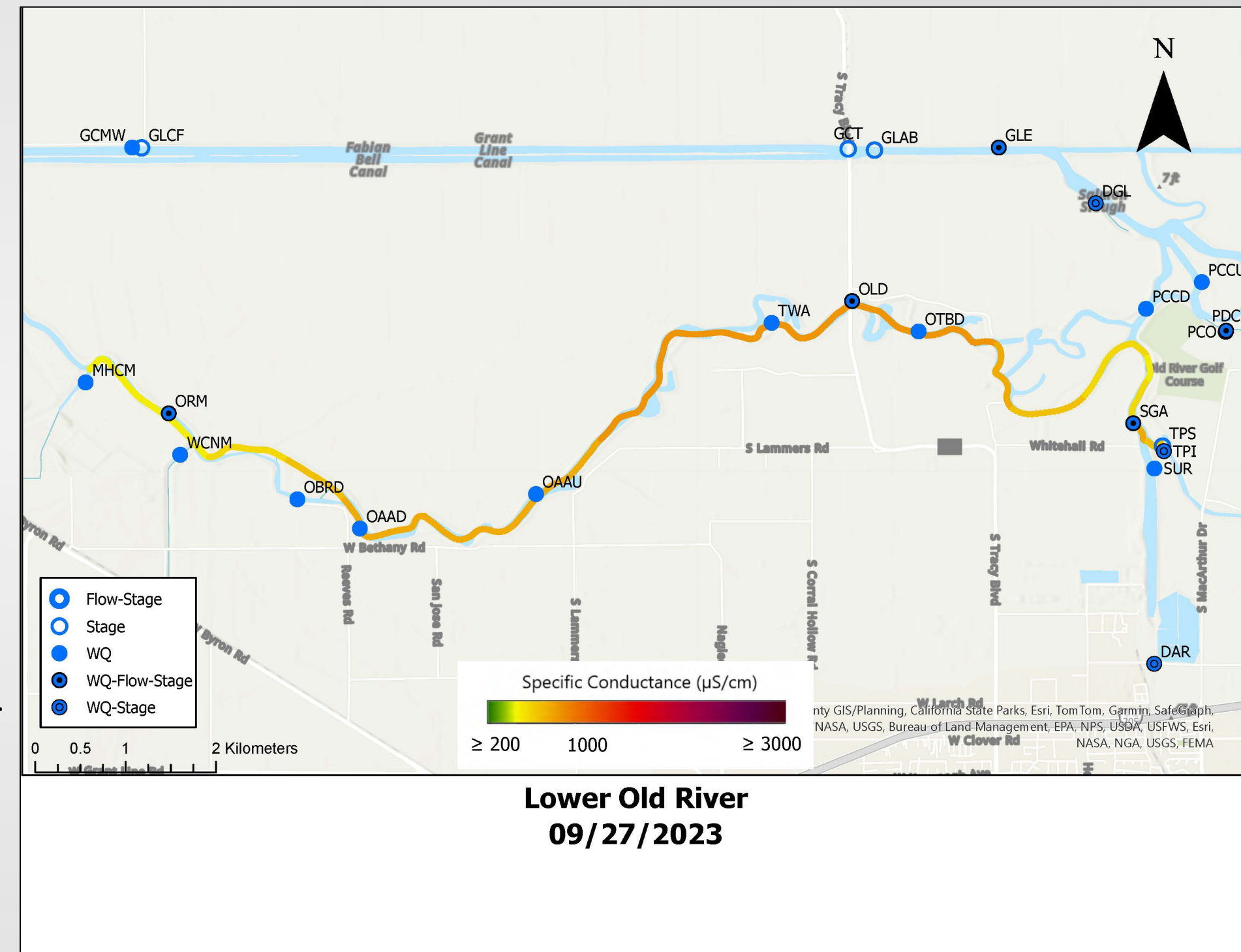
MSS Work Plan Goals and Reporting Objectives

2. Identify the extent of low- or null flow conditions and any associated concentrations of local salt discharges.

Meeting Goal #2

High-Speed Salinity Transect Mapping

- Once mapped, data that show areas higher in salinity relative to surrounding channels will be analyzed to show if salinity changes throughout multiple runs or during different conditions. The spatial data could identify where in Lower Old River up and downstream tidal movement converges.
- High frequency temporal and spatial measurements can identify areas with concentrated salinity. The maps will help identify the sphere of influence of high-salinity discharges in the study area.



MSS Work Plan Goals and Reporting Objectives

3. Inform the development of a Long-Term Monitoring and Reporting Plan that will: 1) Assess attainment of the salinity objective in the interior southern Delta; and 2) Include long-term monitoring and reporting protocols, including specific compliance locations in, or monitoring protocols for, the three river segments that comprise the interior southern Delta salinity compliance locations

Meeting Goal #3

High Speed Salinity Transect Mapping

- Salinity transects will provide insight about salinity conditions between stationary EC-monitoring locations. Maps will be analyzed to assess existing compliance objectives and inform recommendations for long-term monitoring protocols.
- The data collected during the transects will be used to help develop and validate any modeling outputs of interior southern Delta EC.
- Salinity transects may be incorporated into a long-term monitoring plan as a tool for periodic validation during development of monitoring protocols.



Data Available on DWR GIS Atlas

- CY 2021-23 Transect QC'd data is publicly available through ArcGIS Online
- Post-Processing of WY 23 Transects is complete



AGOL Link:

<https://www.arcgis.com/home/item.html?id=c2b6fe1bd21d4a86b3052fac01b212f1>

Direct Service URL (ArcGIS Pro):

https://utility.arcgis.com/usrvcs/servers/c2b6fe1bd21d4a86b3052fac01b212f1/rest/services/InlandWaters/i12_Salinity_Transects_SouthDelta/MapServer



QUESTIONS OR COMMENTS?

Raise your hand or type in the chat

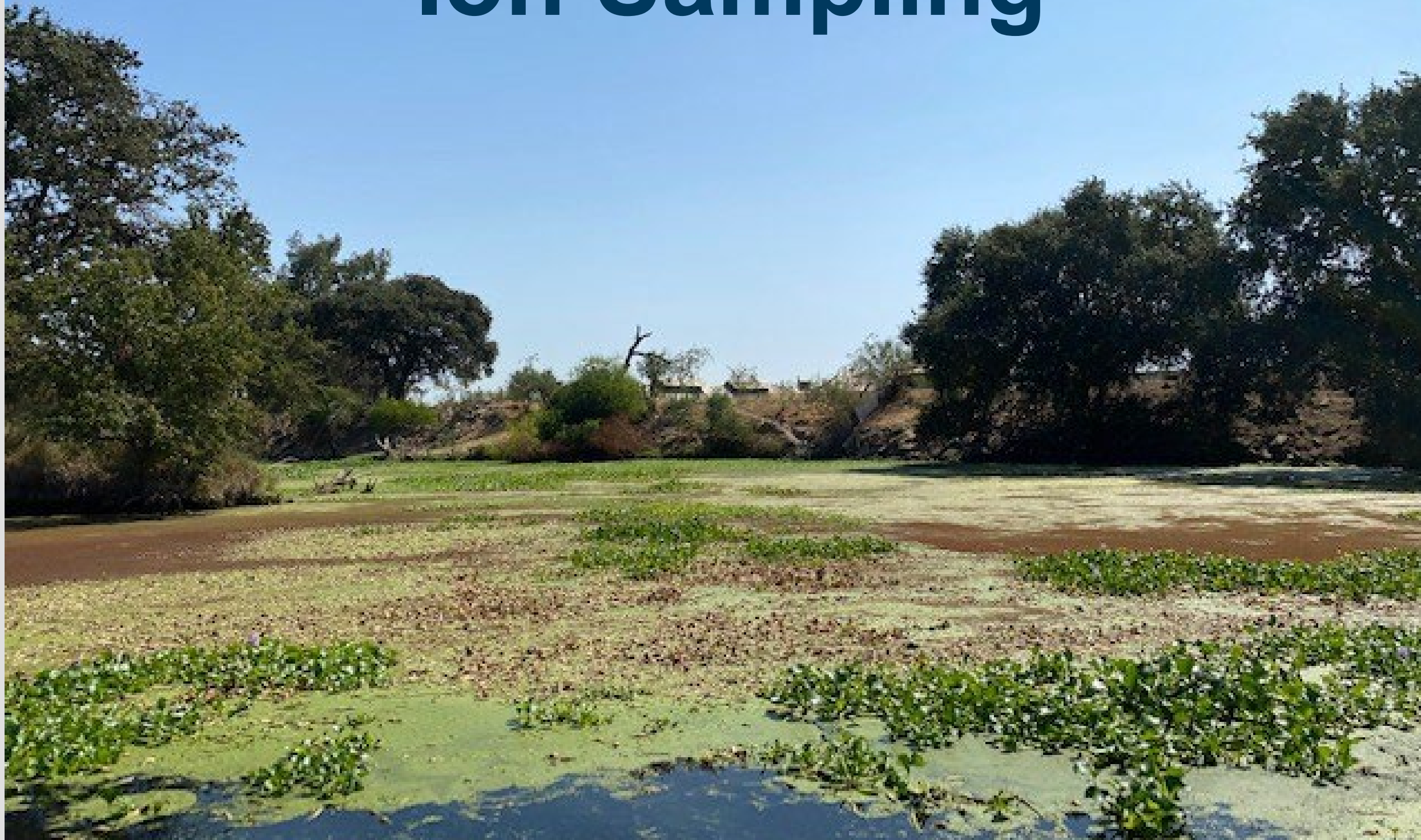
State your name and affiliation



Salinity Point-Source and Ion Sampling



Salinity Point-Source and Ion Sampling



MSS Point Source and Ion Sampling Technical Study 6-Month Update – Oct 2023 –Mar 2024

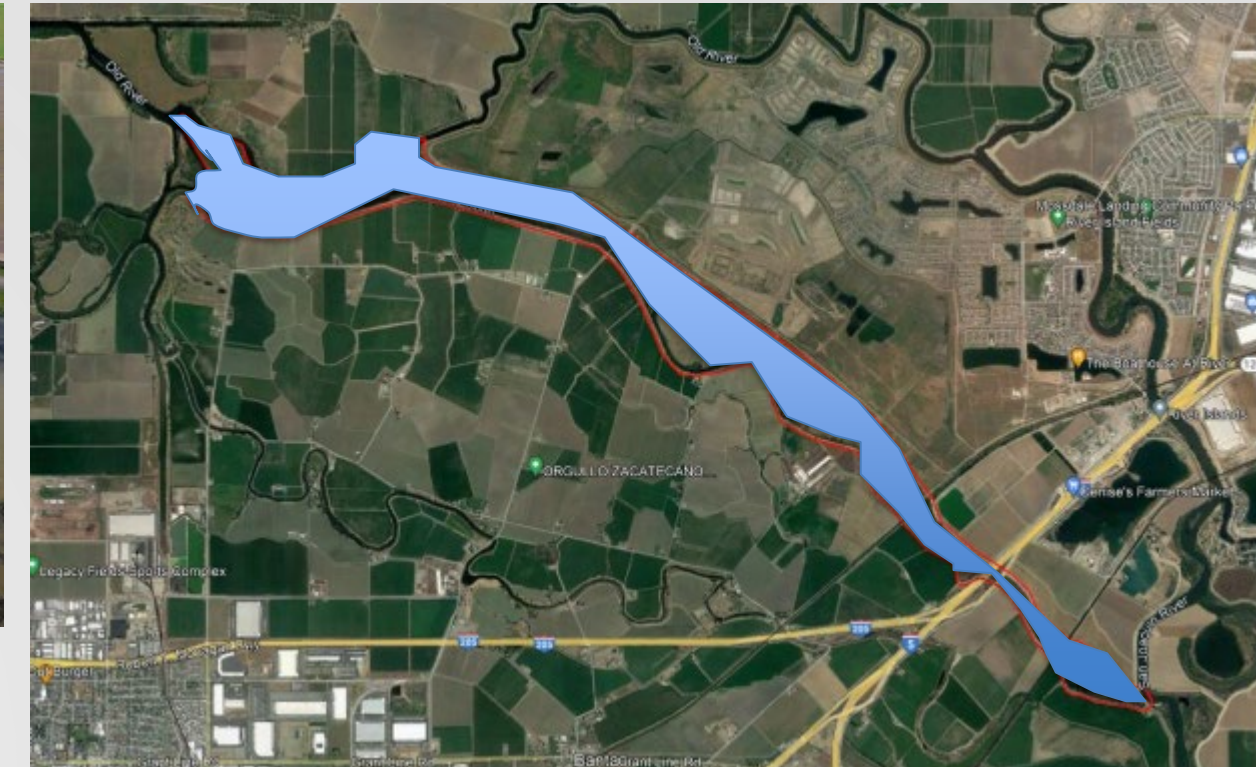
1. Field data collection related to drone imagery and ion sampling – finished December 2023
2. Reduced the MSS Temporary EC Monitoring network – based on Modeler input
3. Continued Data Review, Organization, and QA/QC
4. Data Published to the DWR Water Data Library for Public Access
5. Started Report Outlining, Figure Development, Analysis and Writing



Salinity Point Source and Ion Sampling

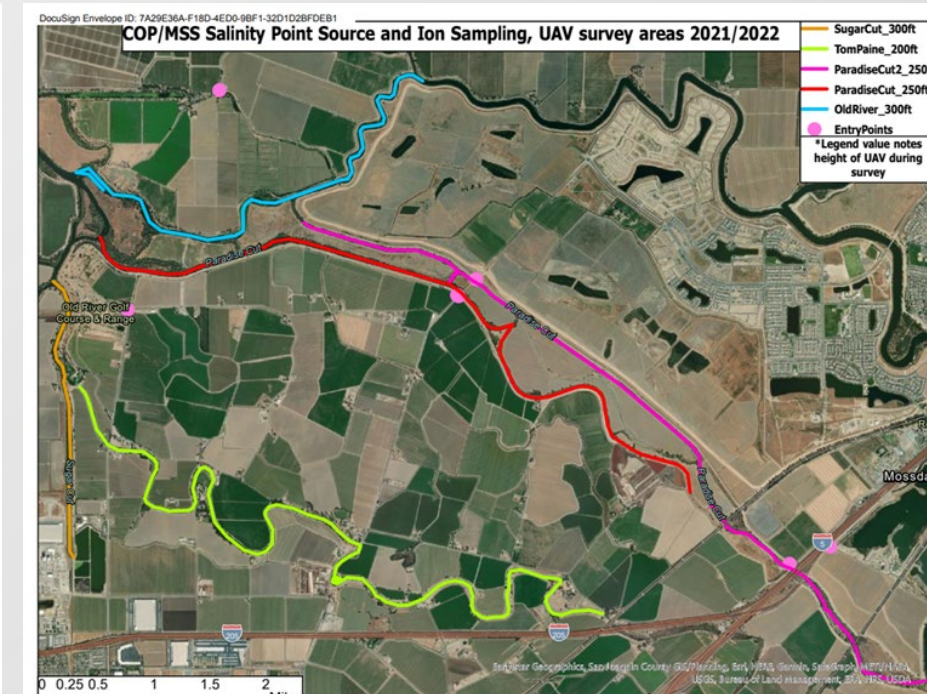
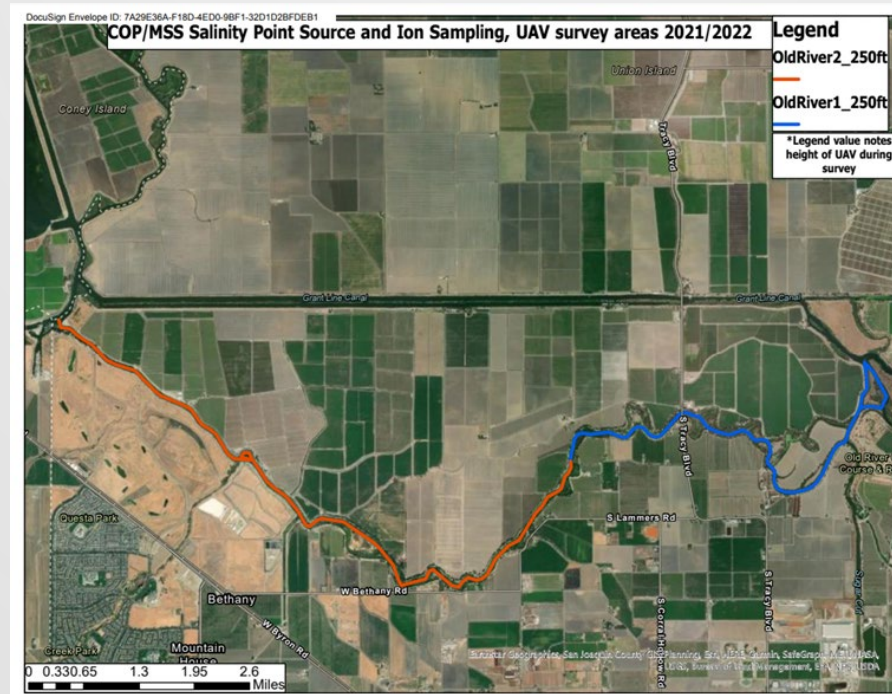
Study Plan Updates:

1. Drone Imagery



DWR – NCRO UAV (Drone) Videos YouTube Channel:
https://www.youtube.com/@NCRO_UAV/videos

- *Paradise Cut High-Water Drone mission for development of survey grade photogrammetric data, *imagery photomosaics, video, and Digital Elevation Model (DEM) data acquisition.*



	Drone Flights	Location	Conditions
1	11/17/2021	Paradise Cut	Temporary Barrier, High Vegetation, low water
2	11/22/2021	Upper Old River	
		Sugar Cut	
3	4/19/2022	Paradise Cut	Pre-Temporary Barrier, Low Vegetation
4	4/20/2022	Sugar Cut	
		Upper Old River	
5	5/5/2022	Lower Old River	Pre-Barrier
6	4/6/2022	Upper Paradise Cut Dye Study	
7	7/19/2022	Upper Paradise Cut Due Study	Temporary Barriers, Ag Season
8	8/30/2022	Lower Paradise Cut Dye Study	
9	3/8/2023	Middle River	Pre-Barrier
10	3/30/2023	Paradise Cut	
11	6/6-7/2023	Paradise Cut High-Water Event	Pre-Barrier, High-water, Weir Overtop
12	8/9-10/2023	Paradise Cut Post High-Water	Temporary Barriers, Low-water
13	12/5/2023	Paradise Cut	Temporary Barrier, High Vegetation, low water
14	12/5/2023	Upper Old River	
		Sugar Cut	
		Tom Paine Slough	
15	1/9/2024	Lower Old River	



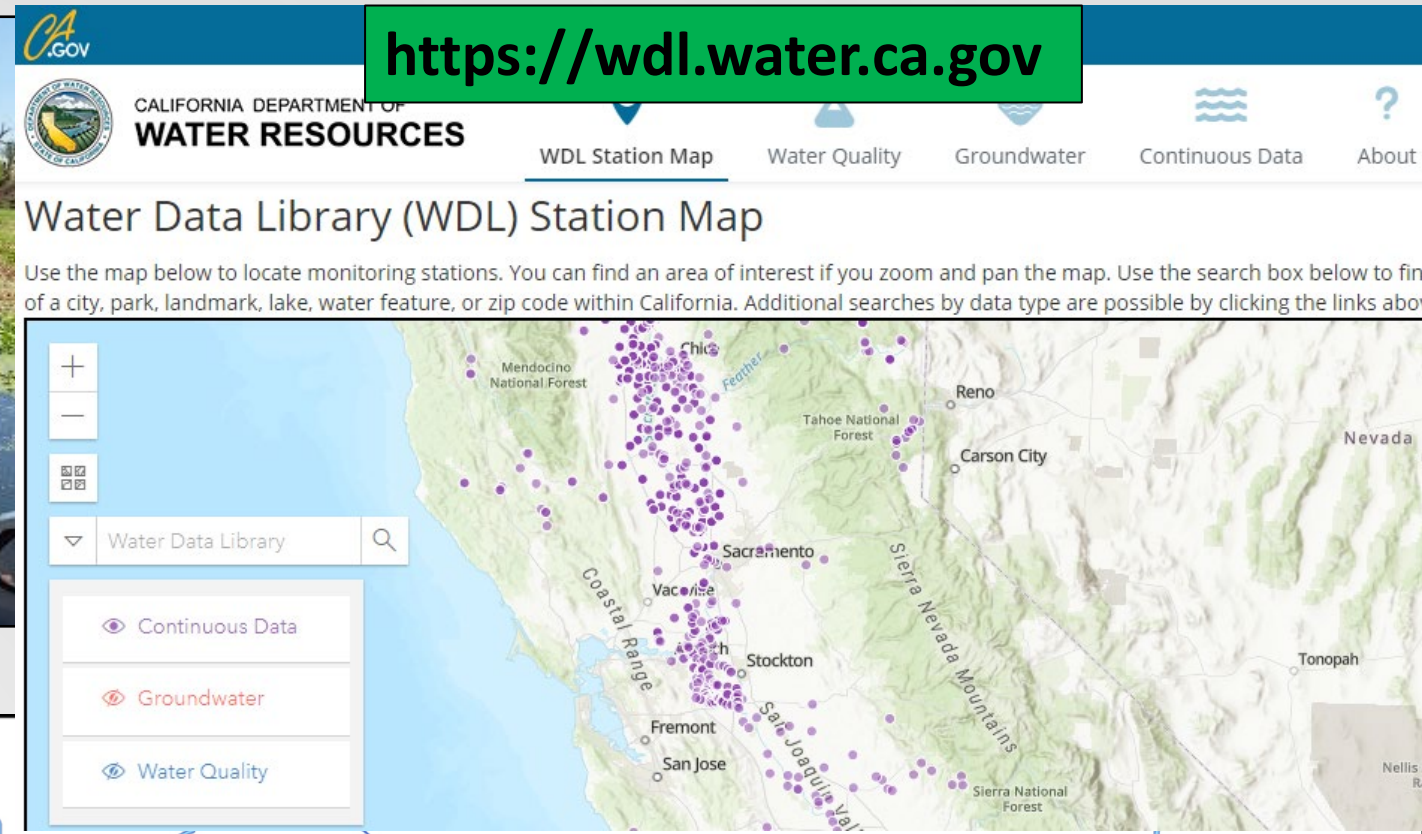
CALIFORNIA DEPARTMENT OF
WATER RESOURCES

Data Availability:
DWR Atlas Website

https://gis.water.ca.gov/arcgisimg/rest/services/Aerial_Photos

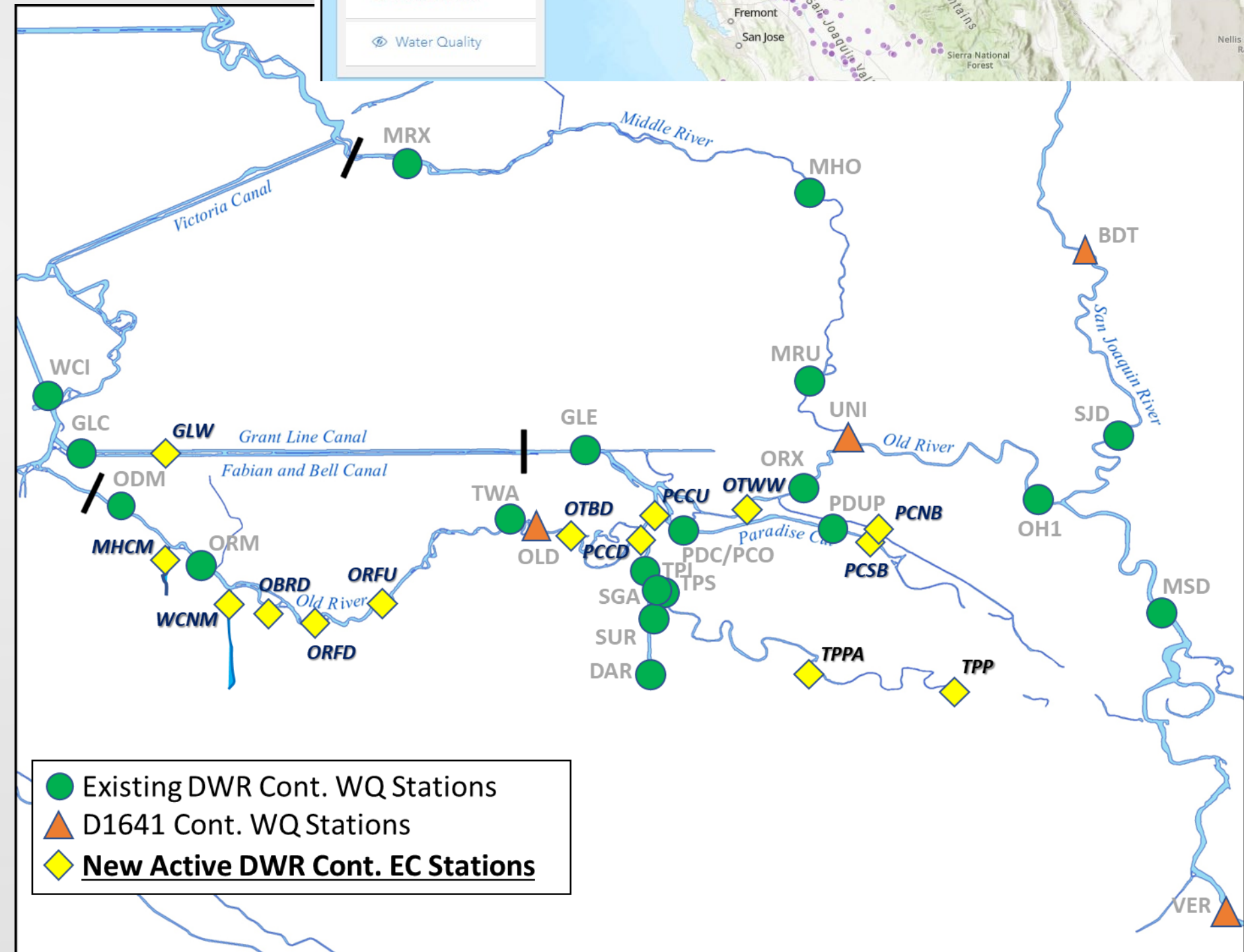
Study Plan Updates:

1. Drone Imagery
2. Continuous EC Monitoring



	Station Name	Station Code	Region	WDL Station Code	Data Record
1	Old River at Bethany Rd Drain (SOR24)	OBRD	Lower Old River	B9537400	9/17/2021 – 1/17/2024
2	Old River upstream of Tracy Blvd Drain (SOR16U)	OTBD		B9538100	12/16/2021 – 1/17/2024
3	Wicklund Cut near Mouth (SOR28)	WCNM		B9537100	12/16/2021 – 1/17/2024
4	Mountain House Creek (SOR31)	MHCM		B9536900	2/23/2022 – 1/17/2024
5	Old River Anchored at ADCP Downstream	OAAD		B9537500	6/15/2022 - Current
6	Old River Flux Station Upstream	ORFU		B9537600	6/15/2022 - Current
7	Old River downstream of Tracy WW outfall (SOR7)	OTWW	Upper Old River	B9538900	11/4/2021 - Current
8	Old River at Paradise Cut Confluence Downstream	PCCD	5-Point Confluence	B9538500	11/4/2021 - Current
9	Old River at Paradise Cut Confluence Upstream	PCCU		B9538600	11/4/2021 - Current
10	Paradise Cut Upstream at South Bridge	PCSB		B9541060	2/15/2023 - Current
11	Paradise Cut Upstream at North Bridge	PCNB	B9551070	2/15/2023 - Current	
12	Tom Paine Slough near Pescadero	TPP	Tom Paine Slough	B95425	1/13/2022 - Current
13	Tom Paine Slough at Paradise Ave	TPPA		B9542400	1/19/2022 – 1/8/2024
14	Grant Line Canal West	GLW	Grant Line Canal	B9529700	2/7/2023 - Current

****MSS temporary EC monitoring stations removed**



- Existing DWR Cont. WQ Stations
- ▲ D1641 Cont. WQ Stations
- ◆ New Active DWR Cont. EC Stations



CALIFORNIA DEPARTMENT OF WATER RESOURCES



Study Plan Updates:

1. Drone Imagery
2. Continuous EC Monitoring
3. **Ion Sampling**



<https://wdl.water.ca.gov>

CALIFORNIA DEPARTMENT OF WATER RESOURCES

WDL Station Map | Water Quality | Groundwater | Continuous Data | About

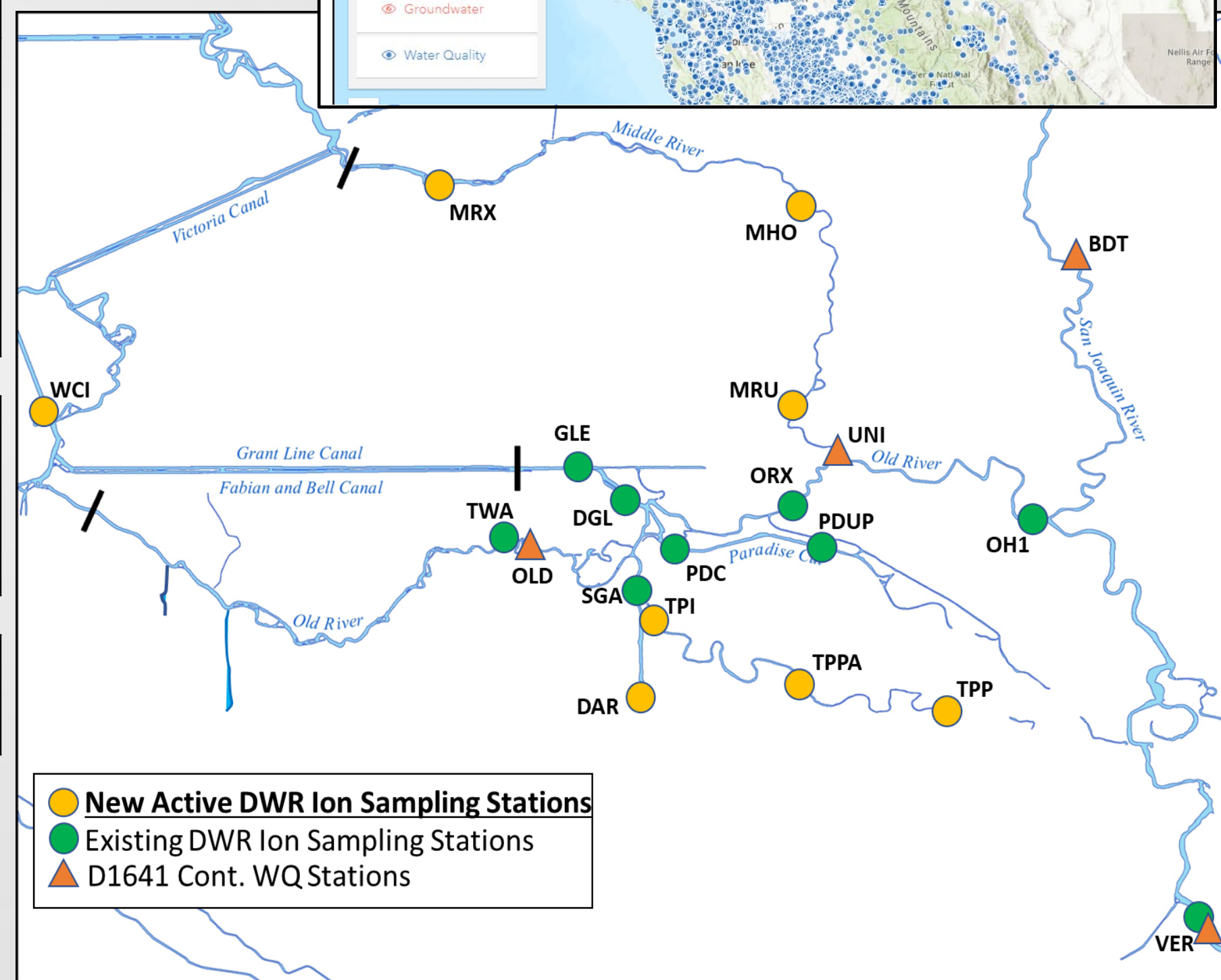
Water Data Library (WDL) Station Map

Use the map below to locate monitoring stations. You can find an area of interest if you zoom and pan the map. Use the search box below to find a city, park, landmark, lake, water feature, or zip code within California. Additional searches by data type are possible by clicking the links above.

Station Name	Station Code	WDL Station Code	Data Record	N
1 Paradise Cut Upstream	PDUP	B9D74811224	7/11/2018 - Current	60
2 Paradise Cut	PDC	B9D74811247	6/20/2018 - Current	61
3 Sugar Cut Downstream of Tom Paine Slough	SGA	B9D74761253	6/20/2018 - Current	61
4 Old River below Headwaters	OH1	B9D74851200	6/27/2018 - Current	64
5 Old River above Doughty Cut	ORX	B9D74871232	6/27/2018 - Current	69
6 Grant Line Canal East	GLE	B9D74921261	6/27/2018 - Current	65
7 Old River at Tracy Wildlife Association	TWA	B9D74821274	7/2/2018 - Current	73
8 C10A - San Joaquin River near Vernalis	VER	B9D74081159	4/1/2005 - Current	367

9 West Canal Above Clifton Court Intake	WCI	B9D74991332	11/18/2021 - Current	28
10 Tom Paine Slough near Pescadero	TPP	B9542500	1/19/2022 - Current	22
11 Tom Paine Slough at Paradise Ave	TPPA	B9542400	1/19/2022 - Current	22
12 Drainage at Arbor Road	DAR	B9542300	1/19/2022 - Current	22
13 Tom Paine Slough above Intake	TPI	B9542100	1/19/2022 - Current	21

14 Middle River near Tracy Road	MRX	B9D75291280	3/8/2023 - Current	11
15 Middle River at Howard Road	MHO	B9D75261229	3/8/2023 - Current	11
16 Middle River at Undine Road	MRU	B9D75011230	3/8/2023 - Current	11



- New Active DWR Ion Sampling Stations
- Existing DWR Ion Sampling Stations
- ▲ D1641 Cont. WQ Stations

****All ion sampling for the MSS ended December 2023**



CALIFORNIA DEPARTMENT OF WATER RESOURCES

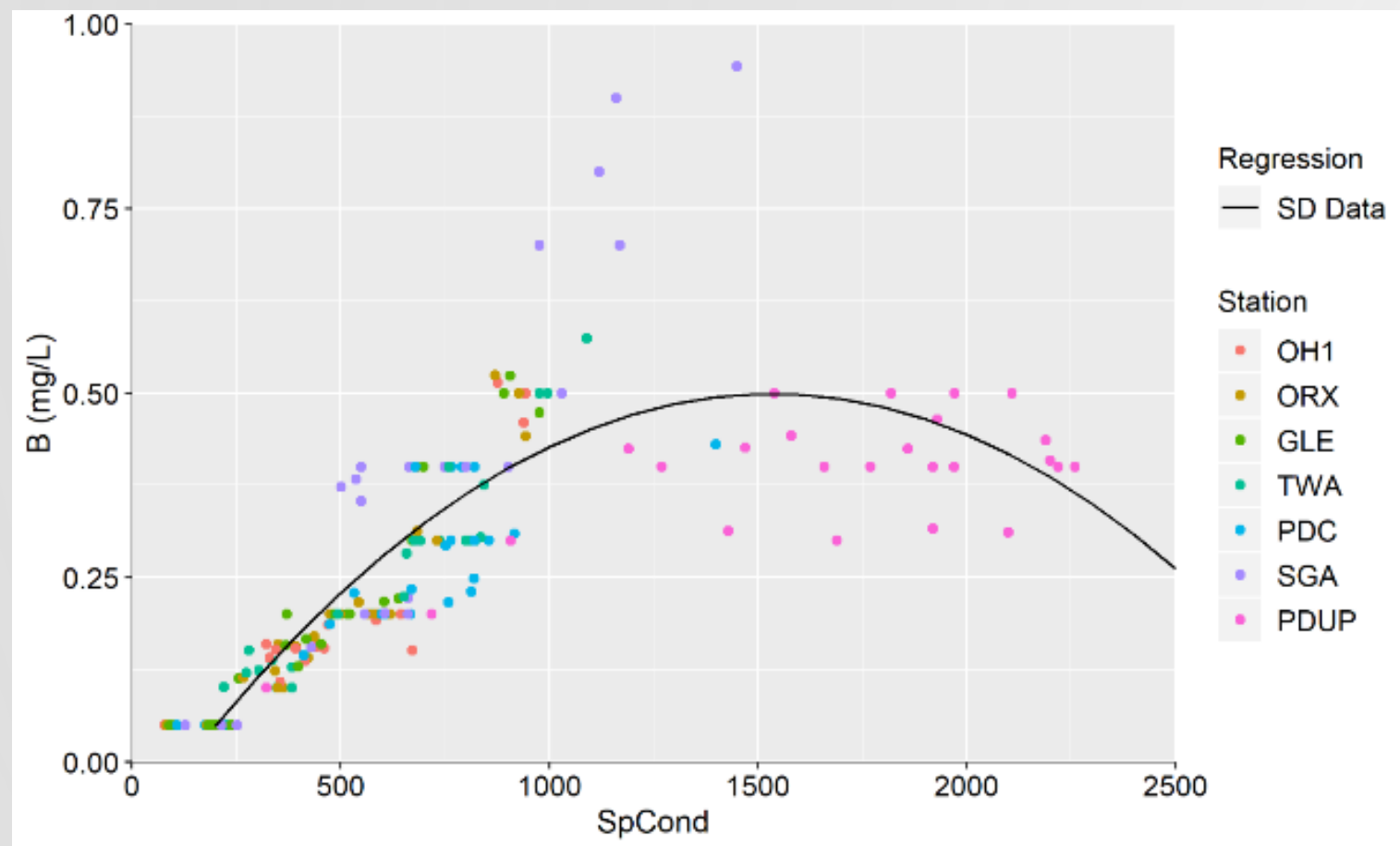
MSS Work Plan Goals and Reporting Objectives

1. Characterize the spatial and temporal distribution and associated dynamics of water level, flow, and salinity conditions in the southern Delta waterways.

Meeting Goal #1

Point Source and Ion Sampling

- Additional temporary EC stations will provide high-resolution data and improve understanding of temporal variation in salinity in areas known to have high EC concentrations.
- Collected ion samples will be analyzed to determine relationships between different interior southern Delta channels, providing context to salinity sources and improving the characterization of in-channel salinity.



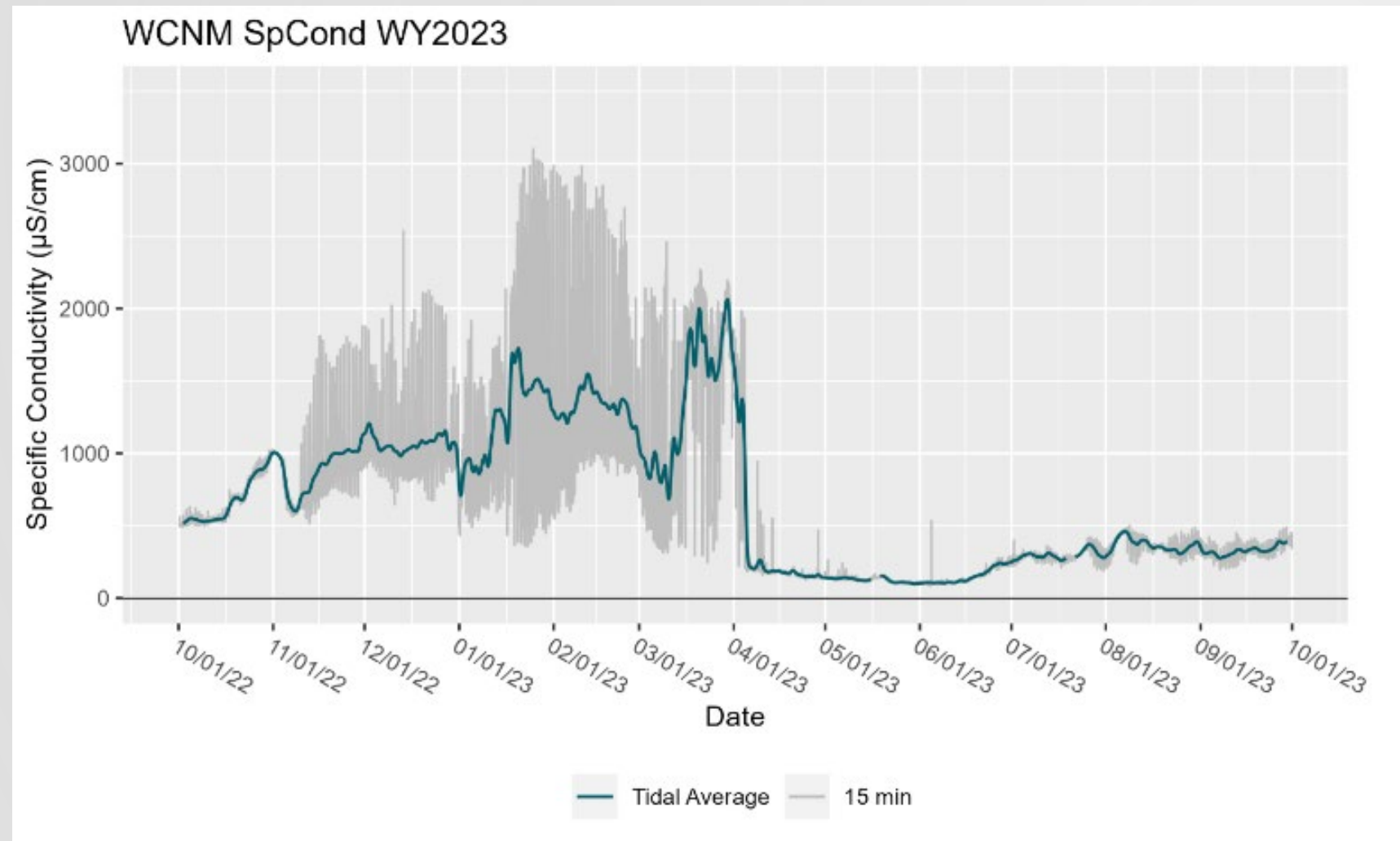
MSS Work Plan Goals and Reporting Objectives

2. *Identify the extent of low- or null flow conditions and any associated concentrations of local salt discharges.*

Meeting Goal #2

Point Source and Ion Sampling

- Supporting salinity discharge data will inform the effects of low- and null-flow zones on in-channel salinity conditions.



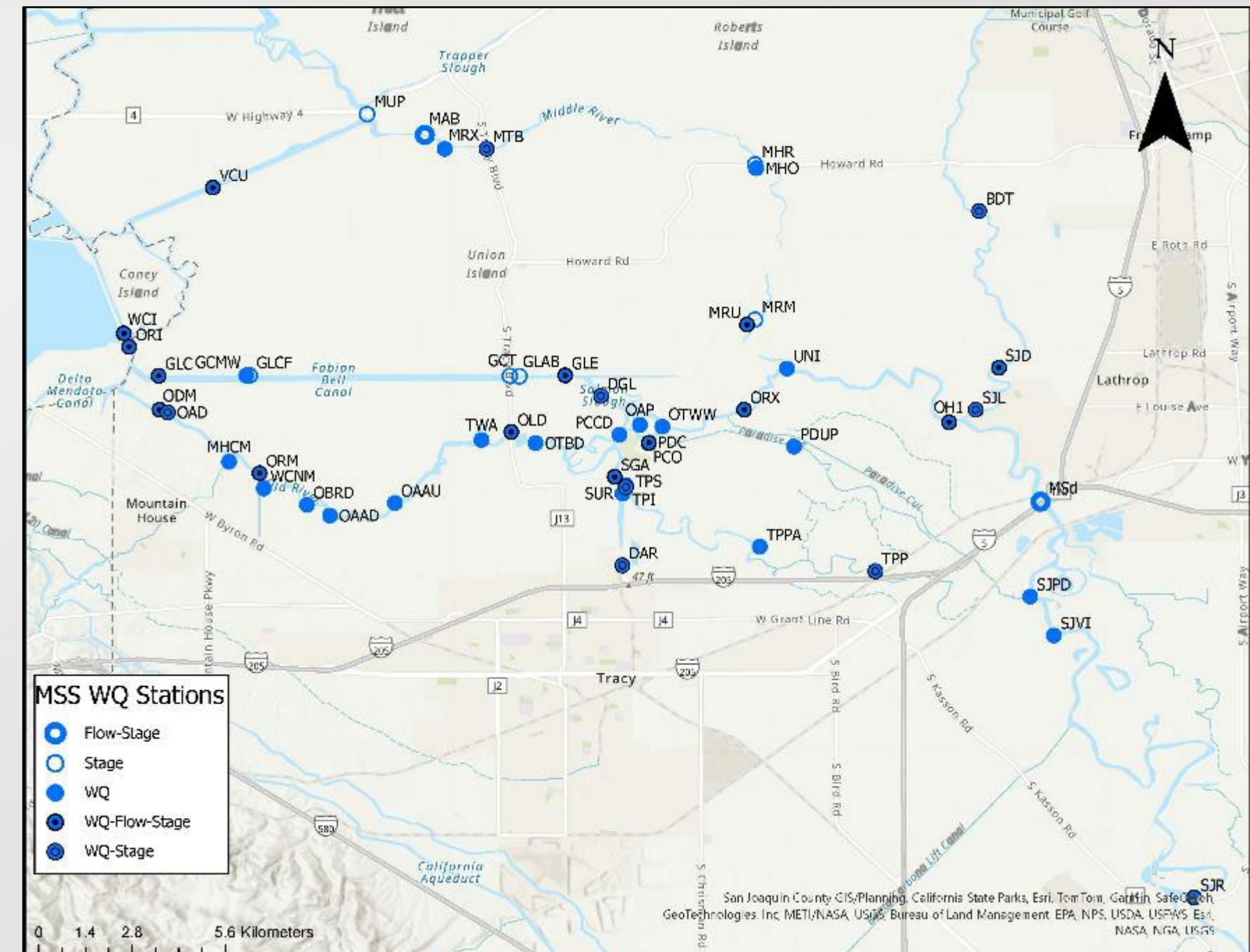
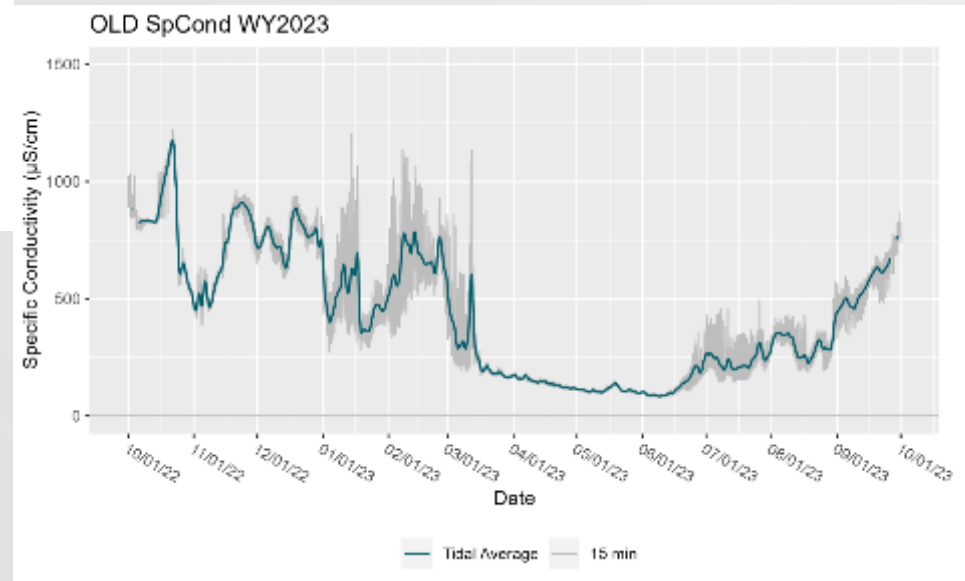
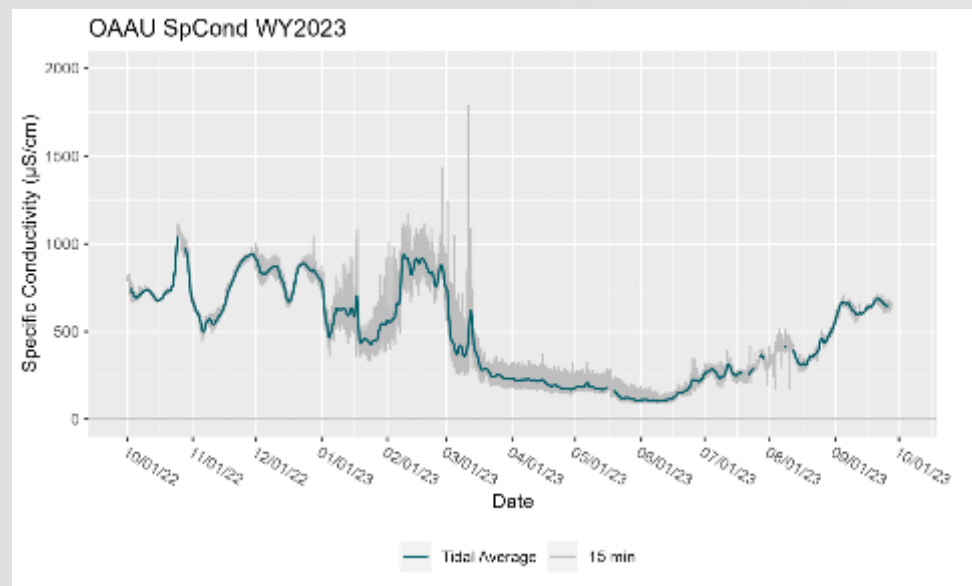
MSS Work Plan Goals and Reporting Objectives

3. Inform the development of a Long-Term Monitoring and Reporting Plan that will: 1) Assess attainment of the salinity objective in the interior southern Delta; and 2) Include long-term monitoring and reporting protocols, including specific compliance locations in, or monitoring protocols for, the three river segments that comprise the interior southern Delta salinity compliance locations

Meeting Goal #3

Point Source and Ion Sampling

- Additional EC monitoring locations will inform recommendations for movement of existing compliance locations and improve model outputs for establishing new monitoring protocols for salinity compliance.



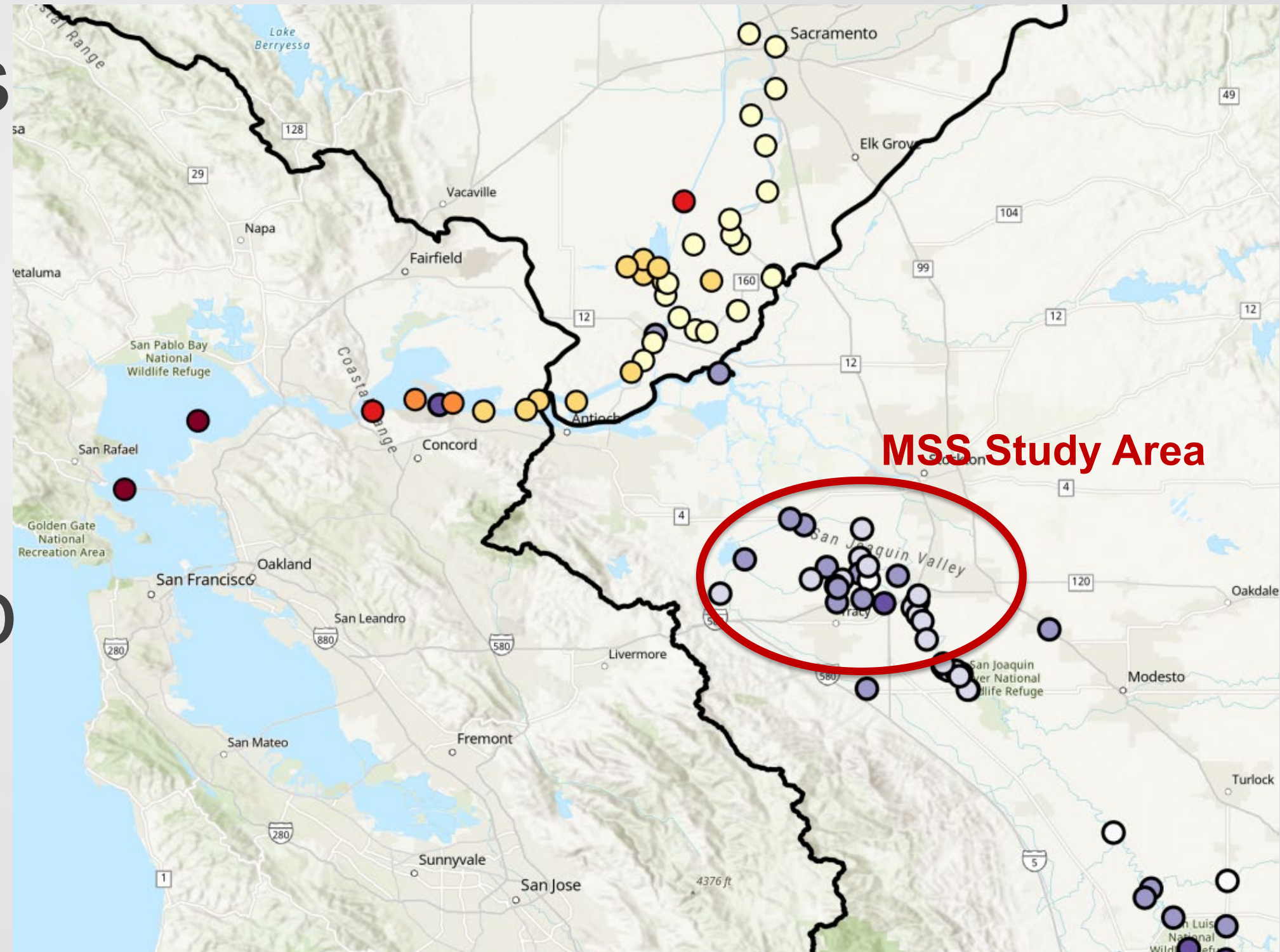
QUESTIONS OR COMMENTS?

Raise your hand or type in the chat

State your name and affiliation

Isotope Data Update

- Monthly samples from ion sampling locations
- Analysis framework in progress
- Awaiting full dataset
- Supplemental write up



QUESTIONS OR COMMENTS?

Raise your hand or type in the chat

State your name and affiliation

SCHISM 3D and Water Quality Data Integration



CALIFORNIA DEPARTMENT OF WATER RESOURCES

Modeling Progress Report

March 2024



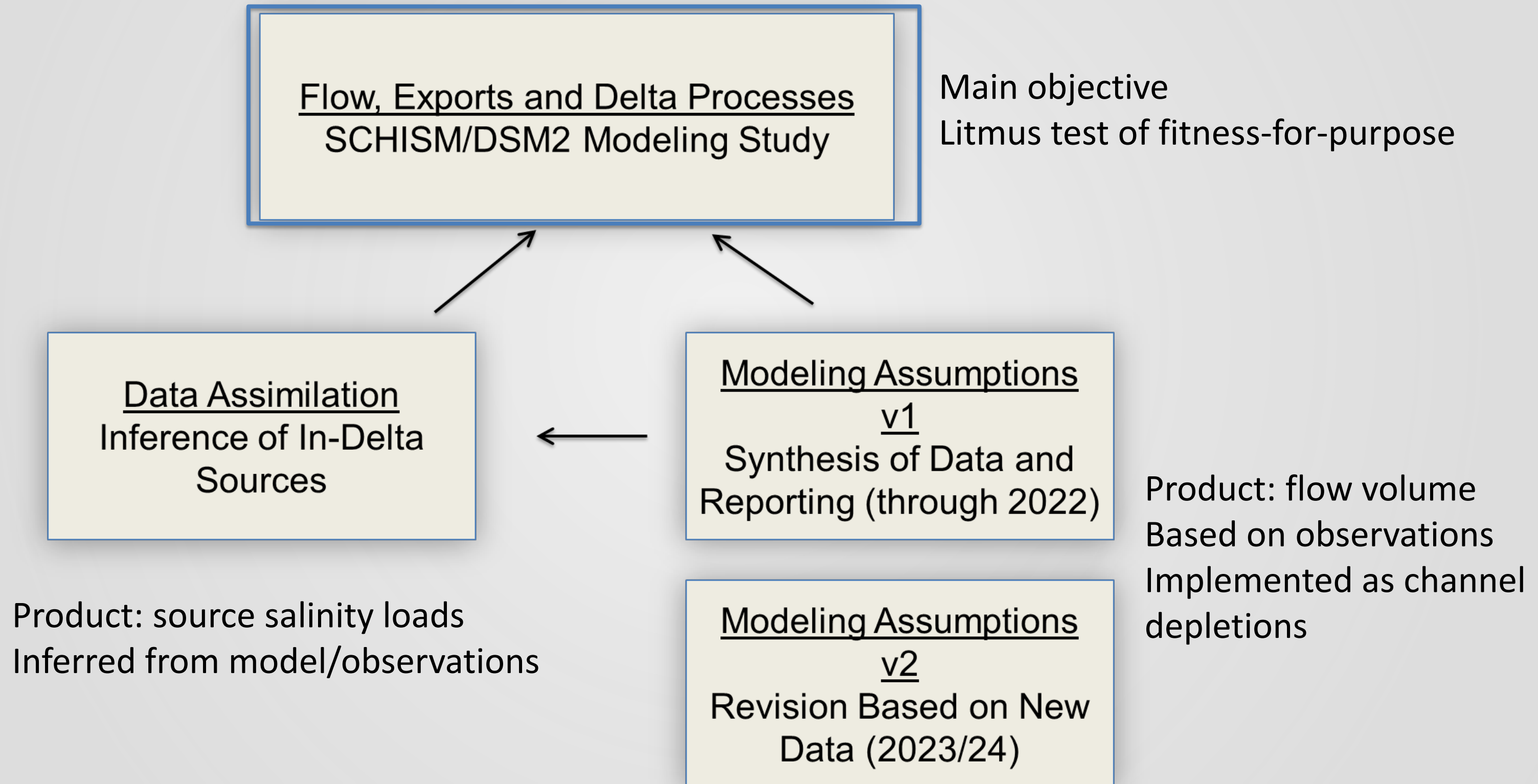
Eli Ateljevich and Zhenlin Zhang

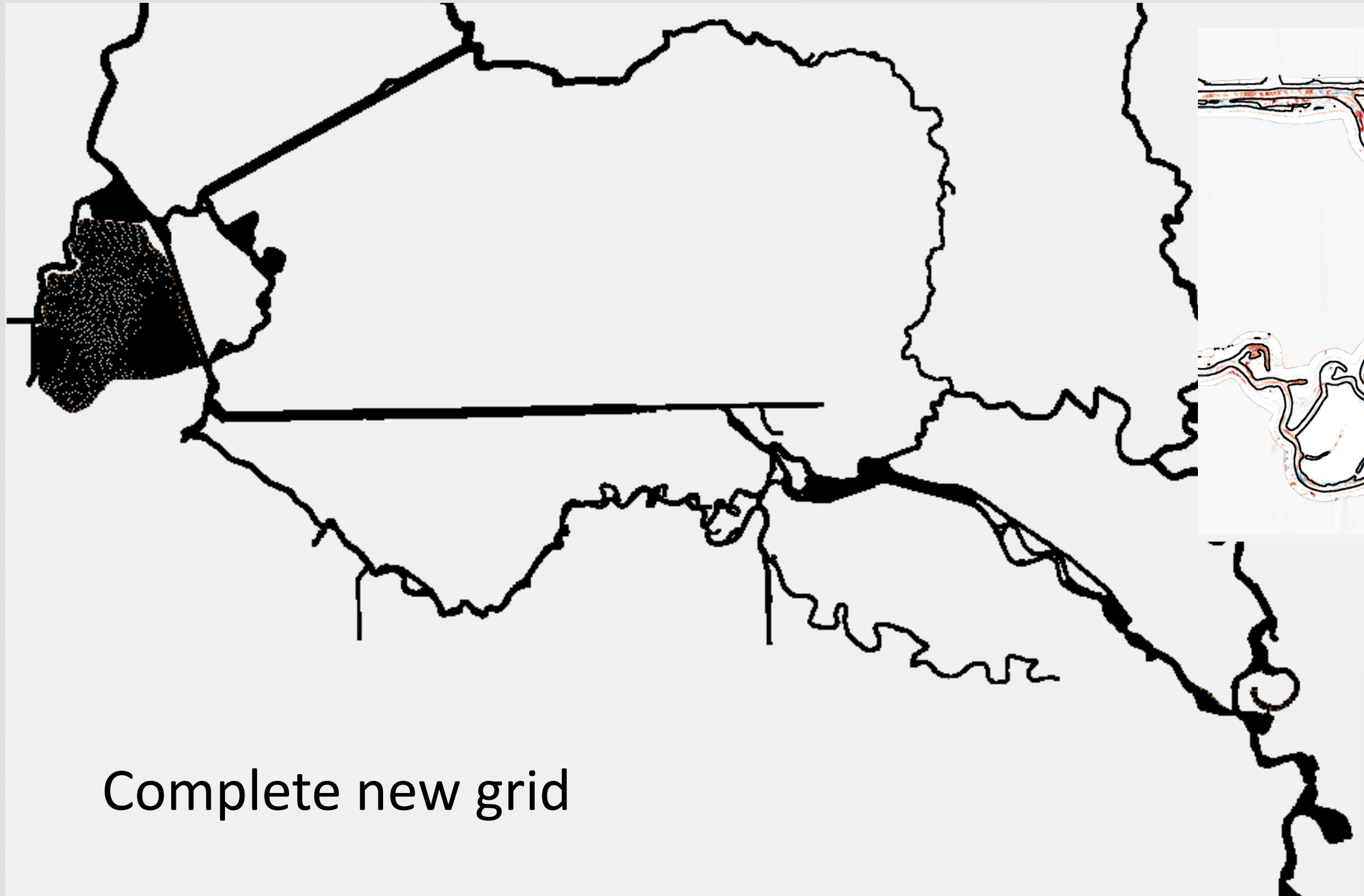
Major Modeling Activities

- December workshop on source inference
- February meetings/interviews on MSS Final Study design
- Completed DSM2 and SCHISM South Delta grids to conform to latest bathymetry
- Inferred source terms for modeling
- Main Study runs started



MSS Modeling Components

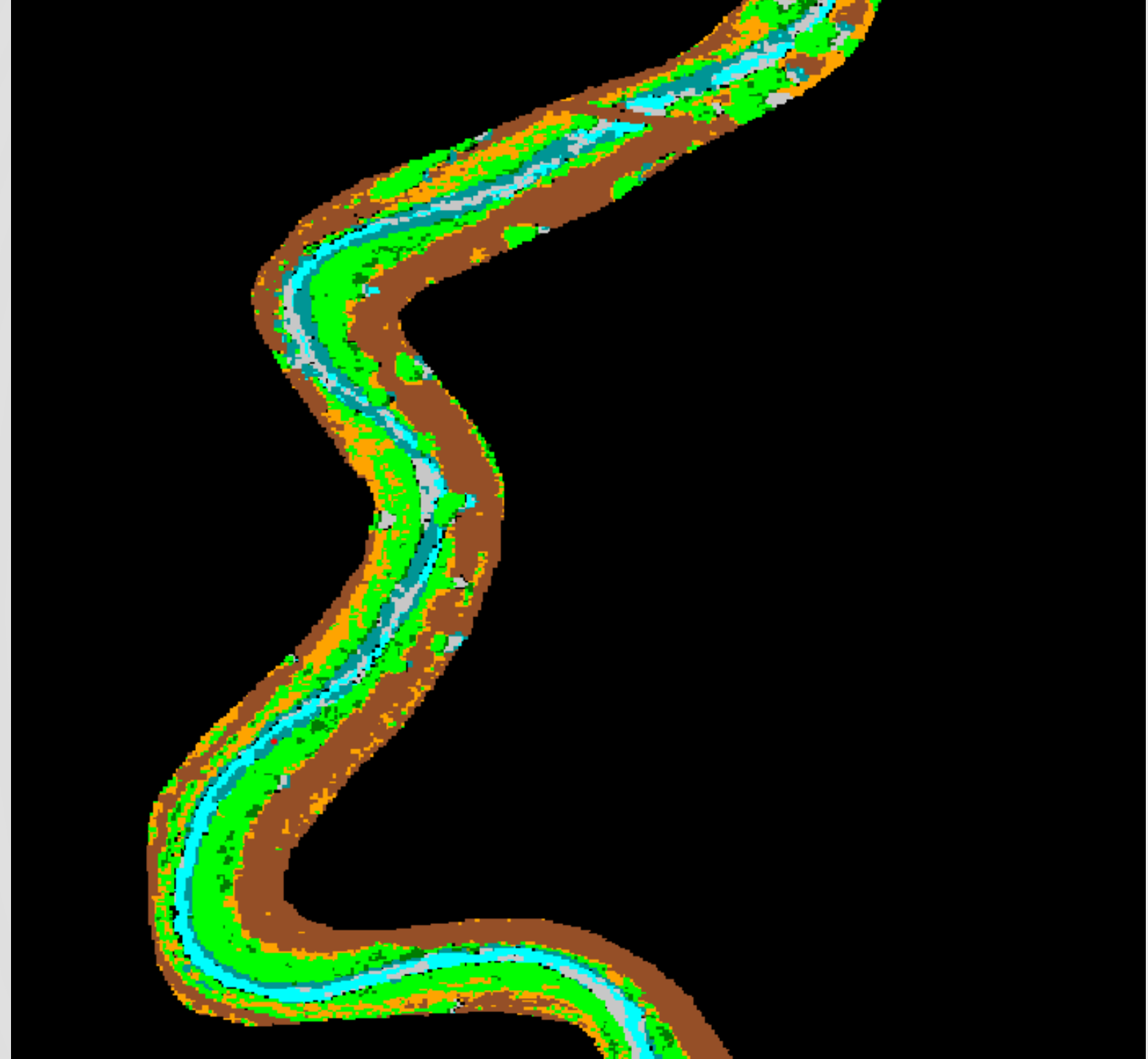
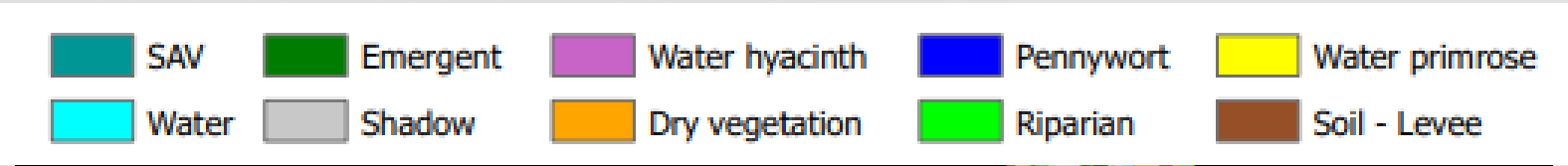




Complete new grid



Based on 2022
South Delta Bathymetry
Survey
(DWR/SDWA)

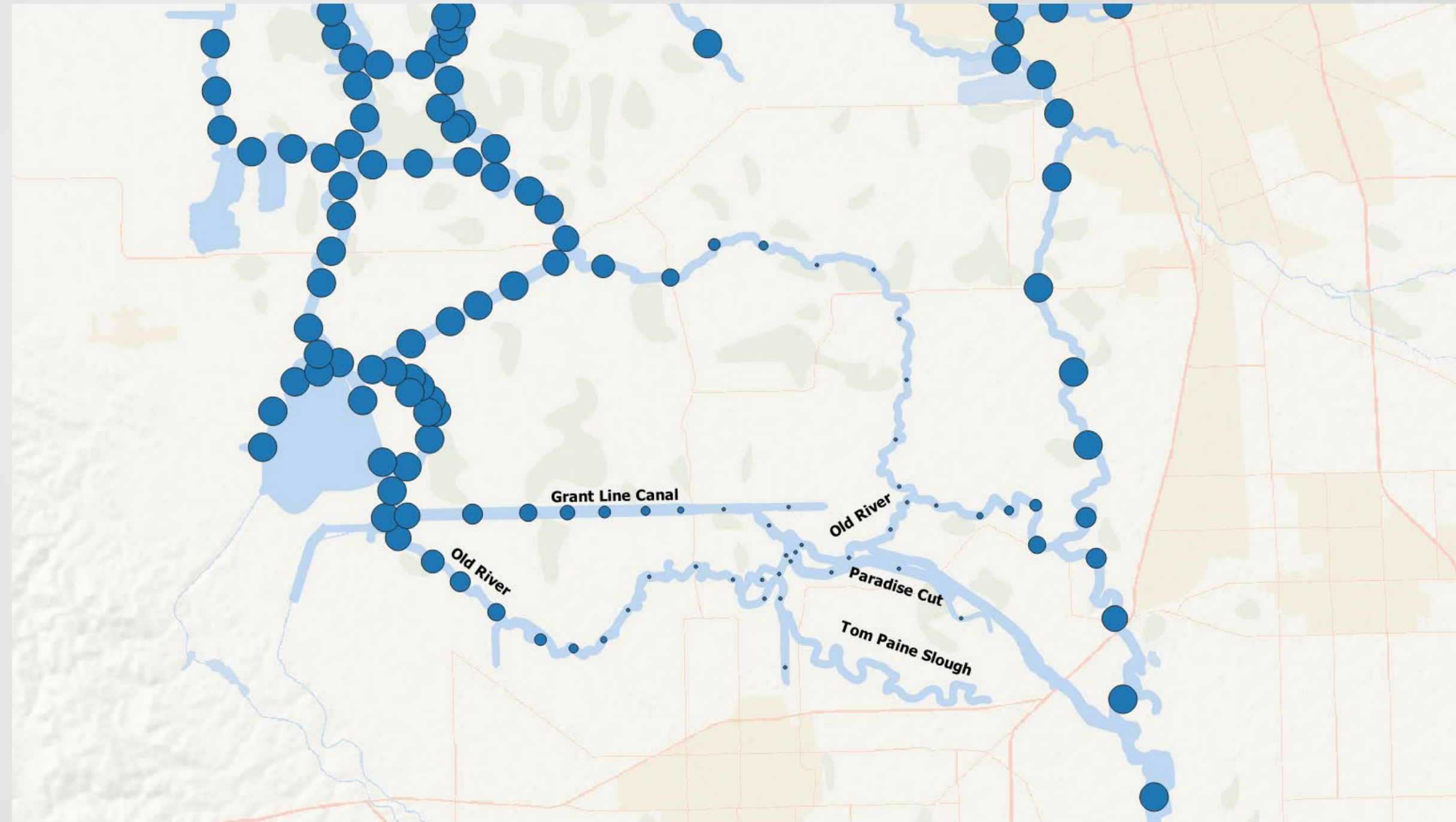


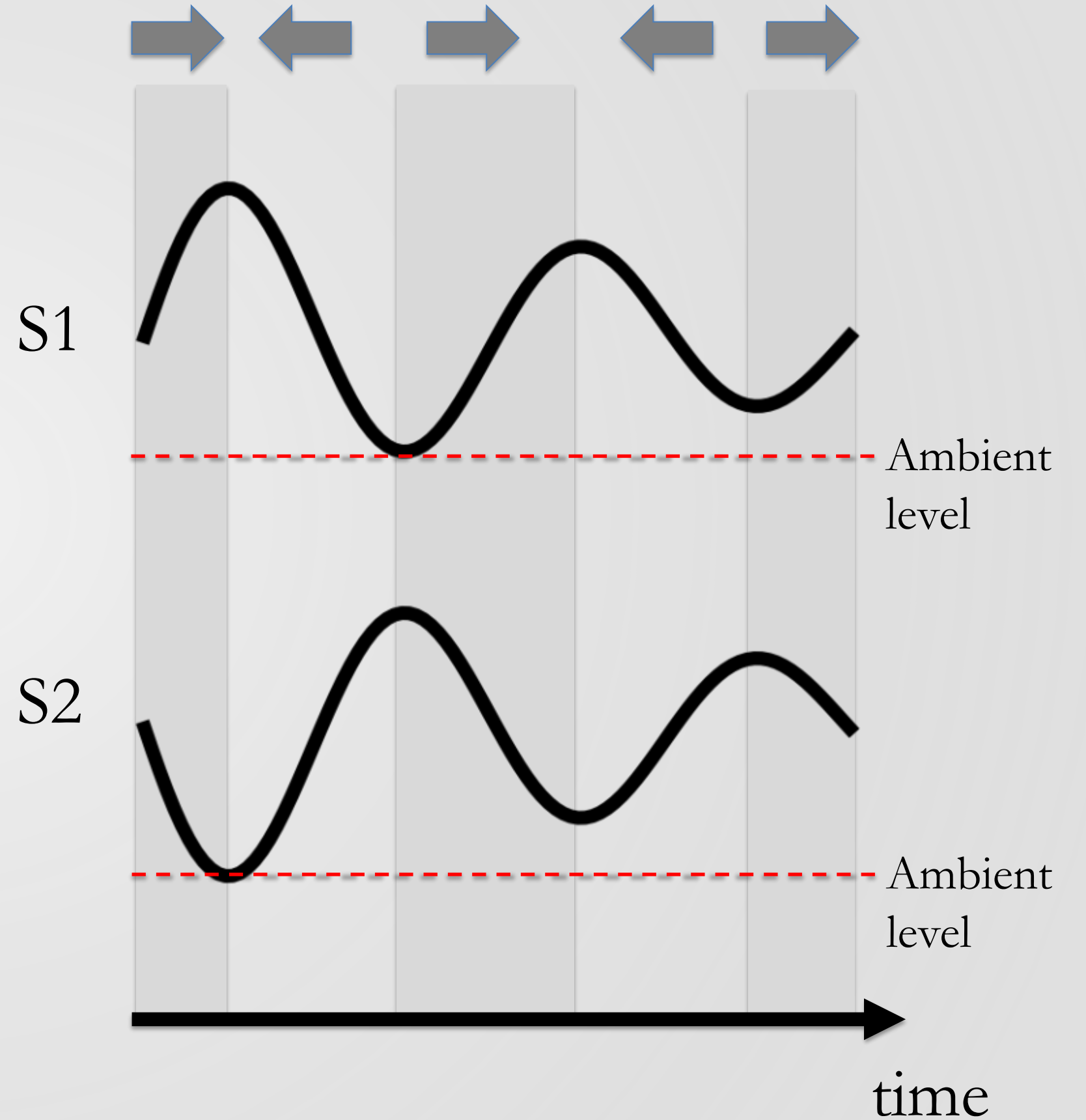
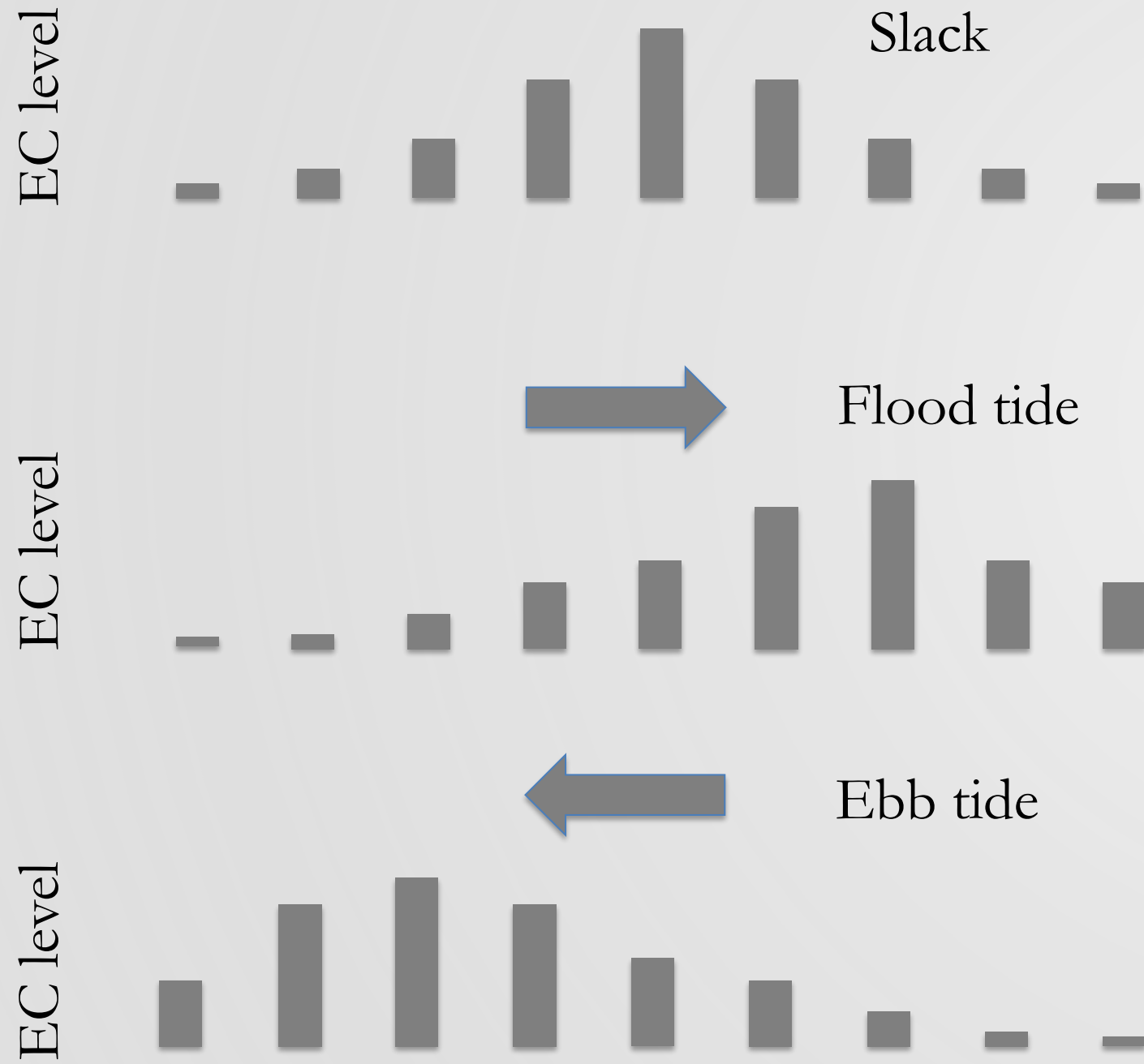
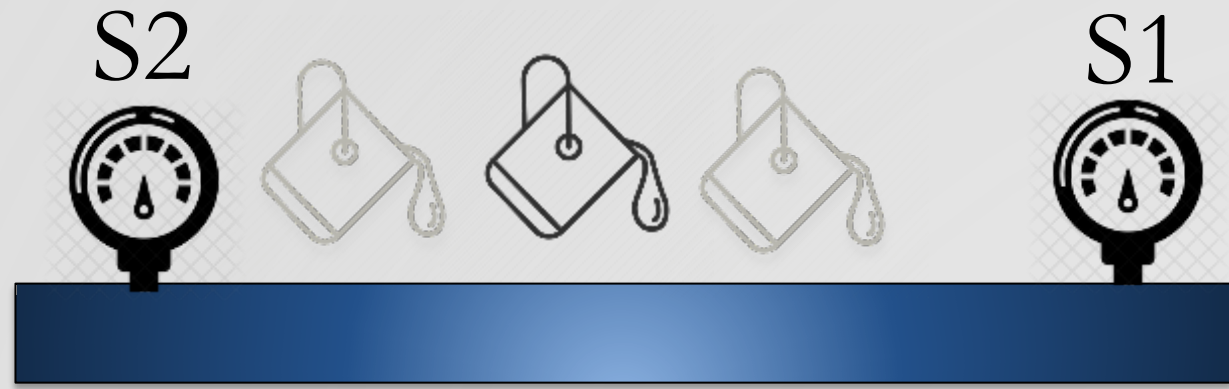
MSS monitoring team
Old River 2022 near ORX

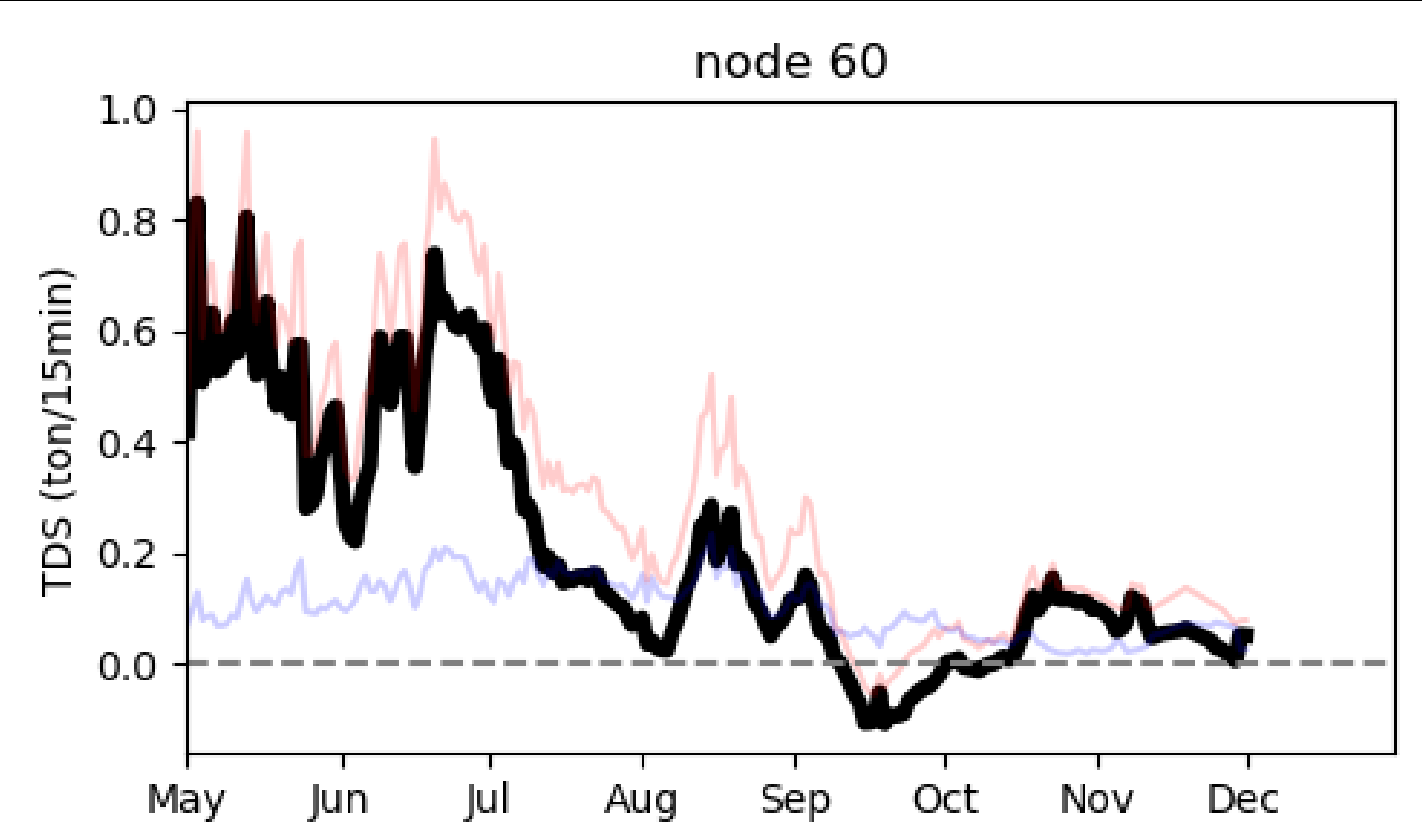
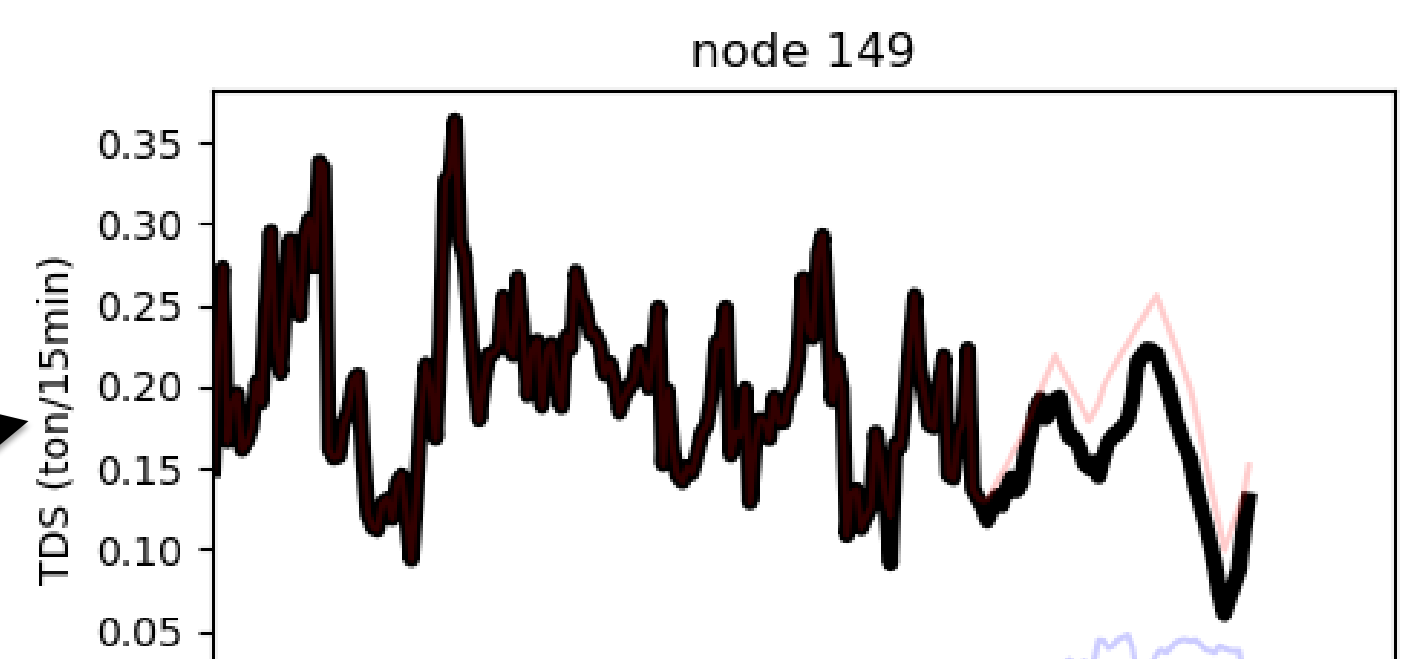
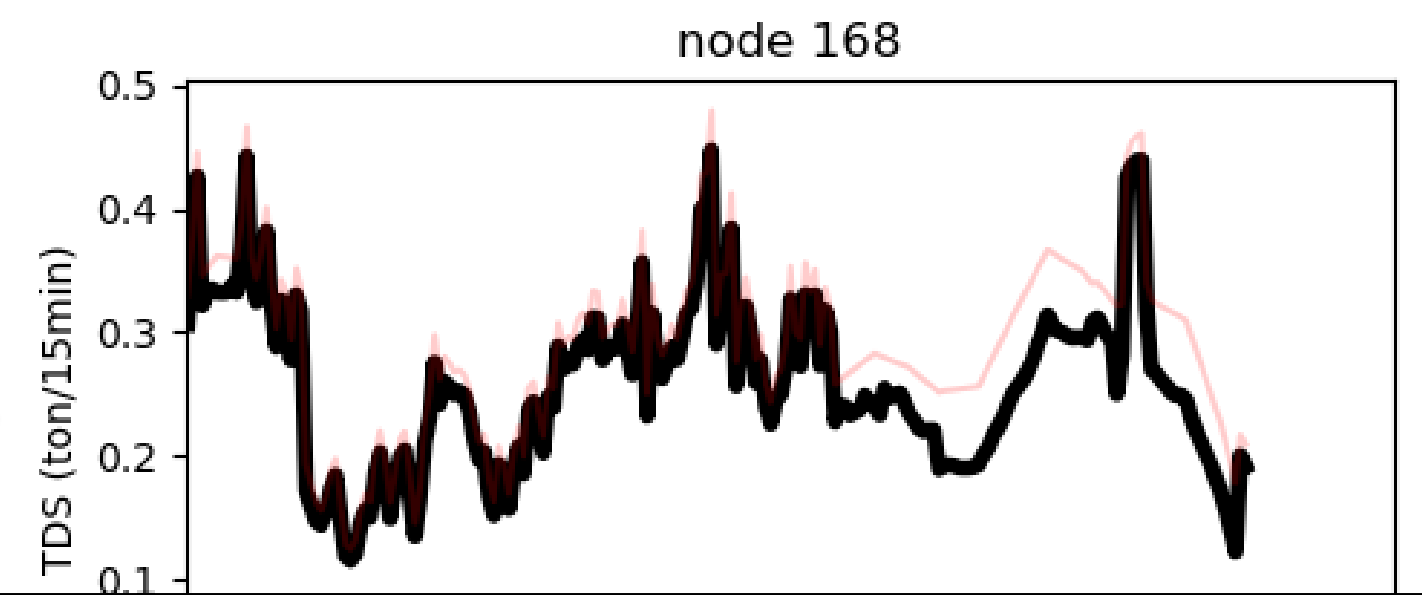
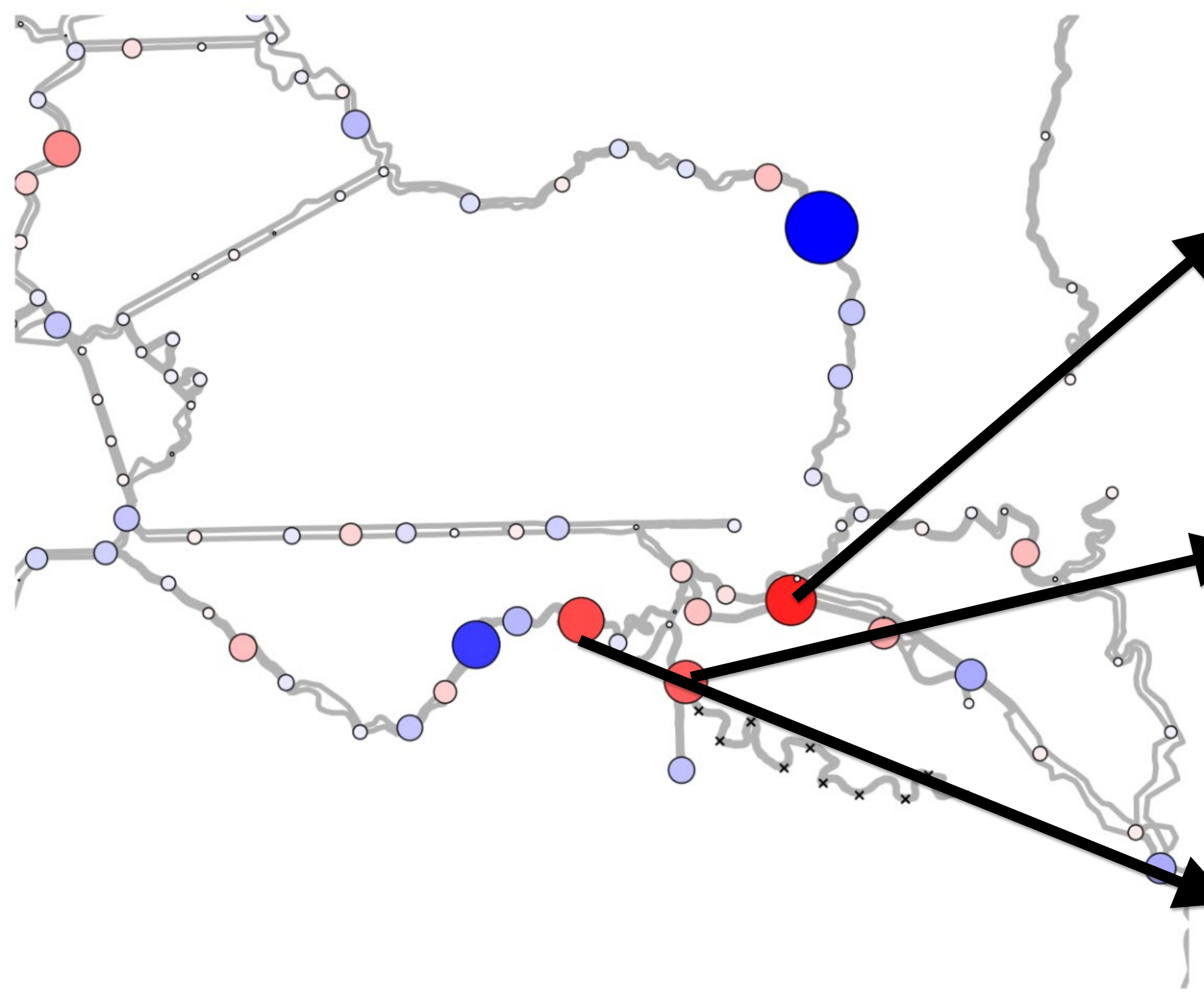
mNDVI Vegetation Remote Sensing Index
July 2021 and 2022 (Shruti Khanna/UCD Ustin Lab)

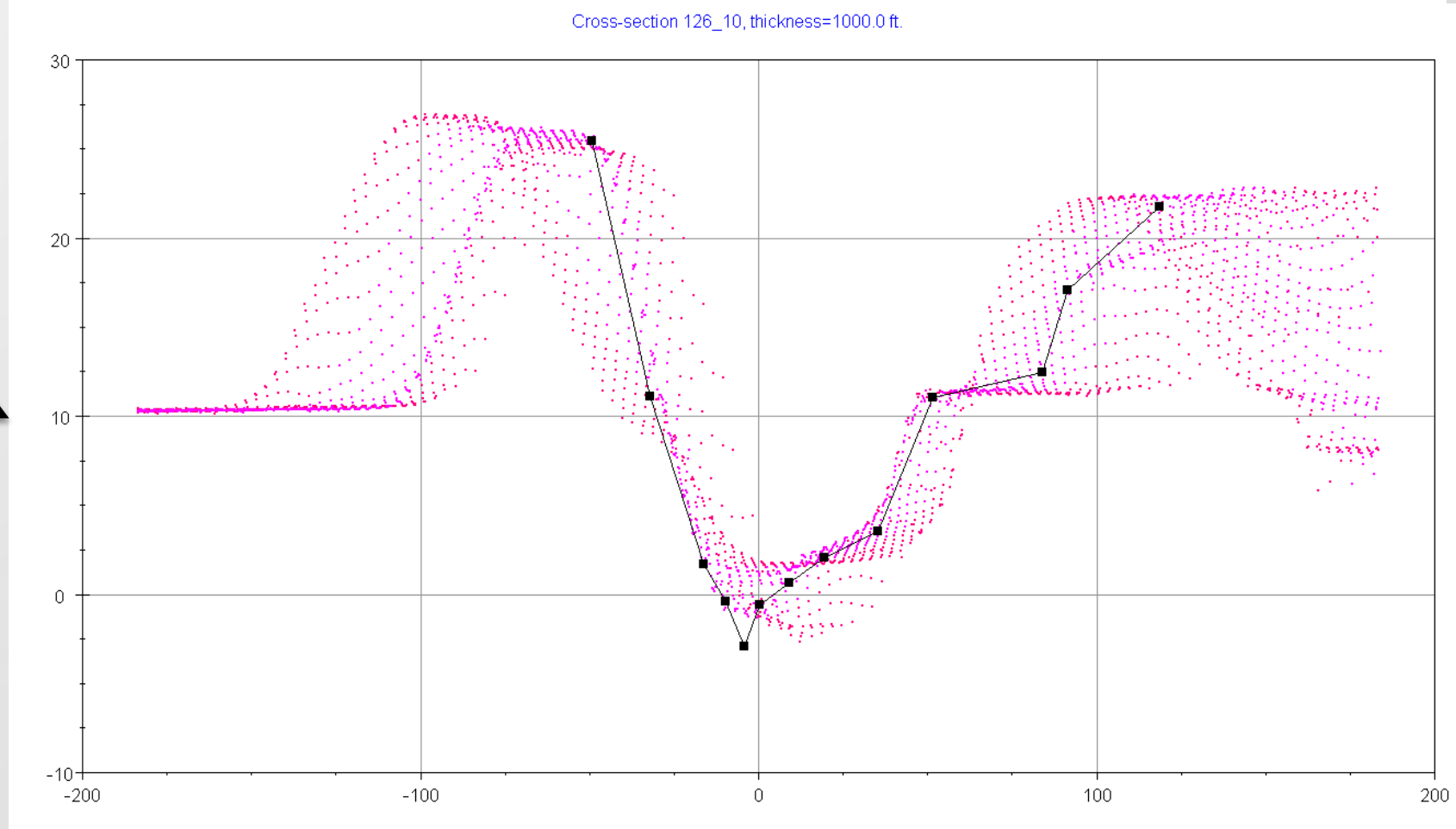
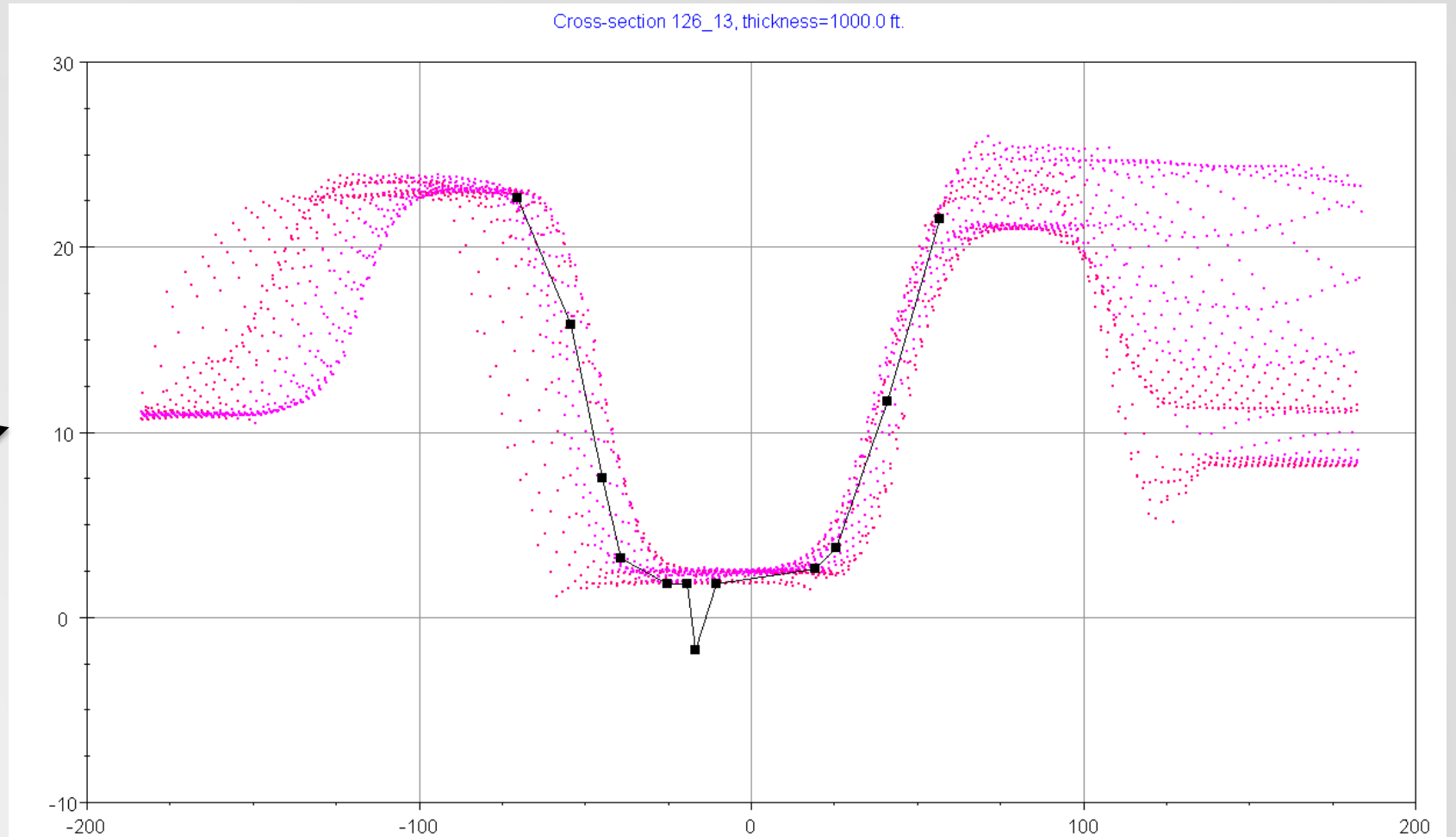
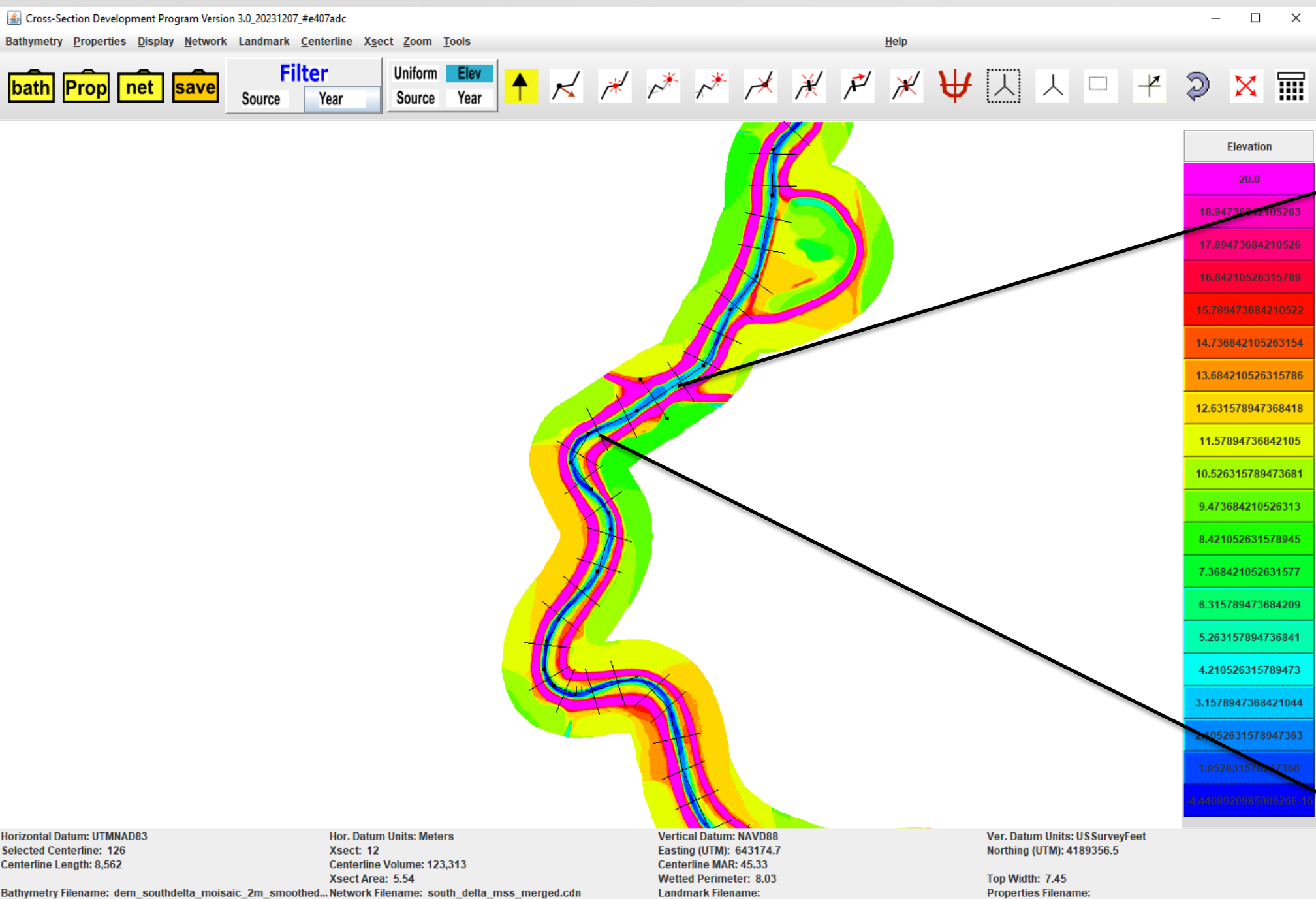
Progress update: data integration

- MSS Technical meeting for Data Assimilation.
- DSM2 new cross-sections:
 - new DEM (2022)
 - refined grid (many from 5000ft to 500ft)
- Martinez wind drag correction.

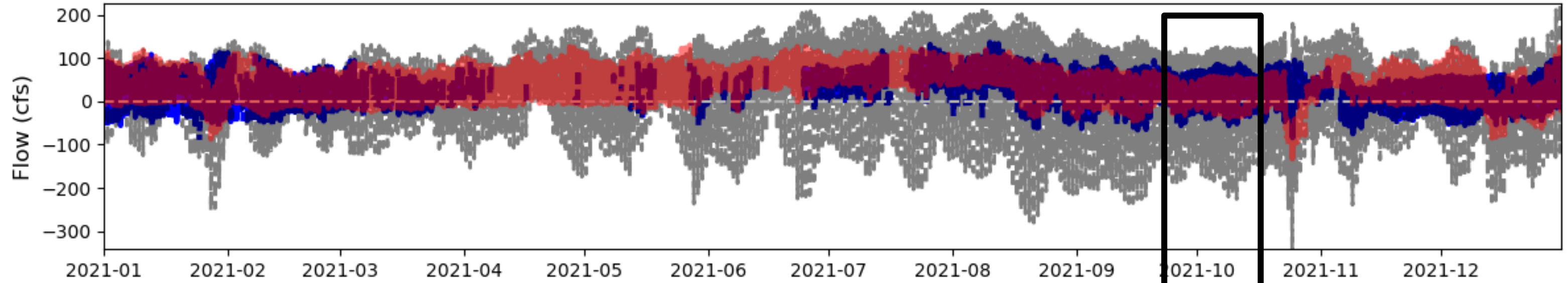




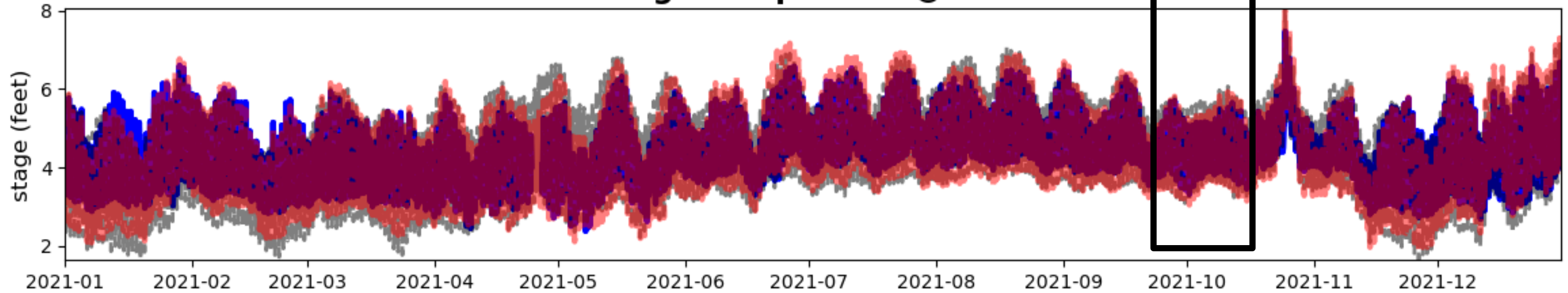




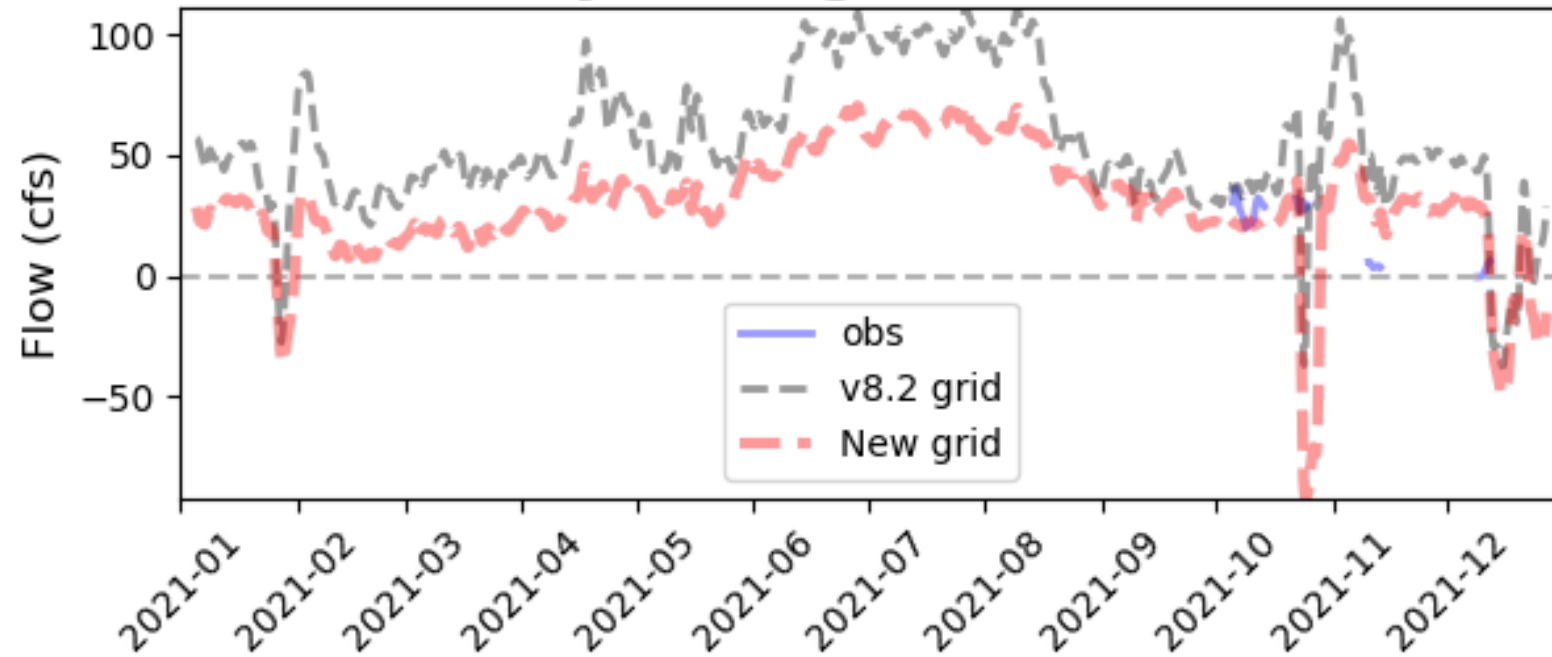
Flow comparison @ MRU



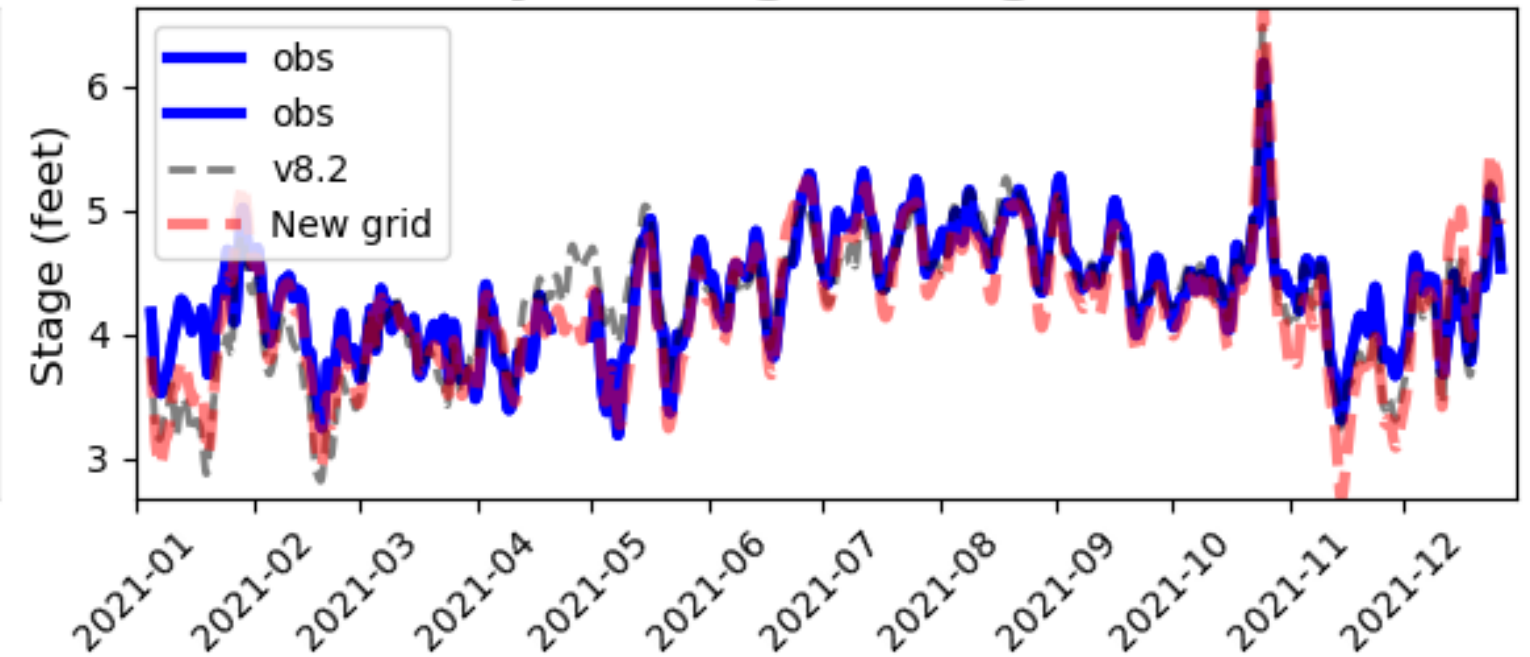
Stage comparison @ MRU



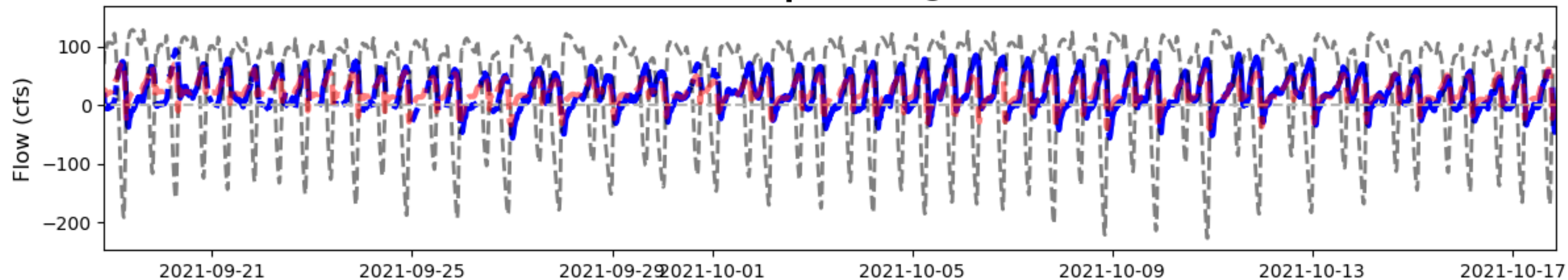
Tidally averaged flow @ MRU



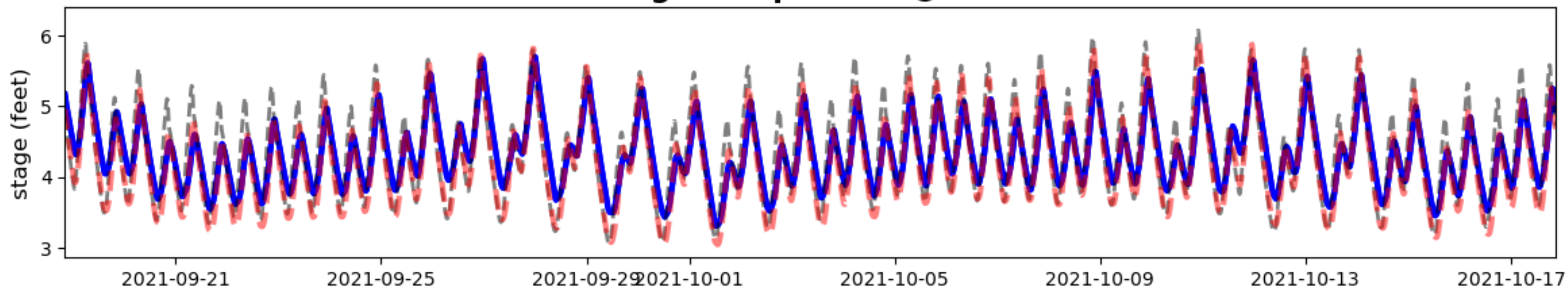
Tidally averaged stage @ MRU



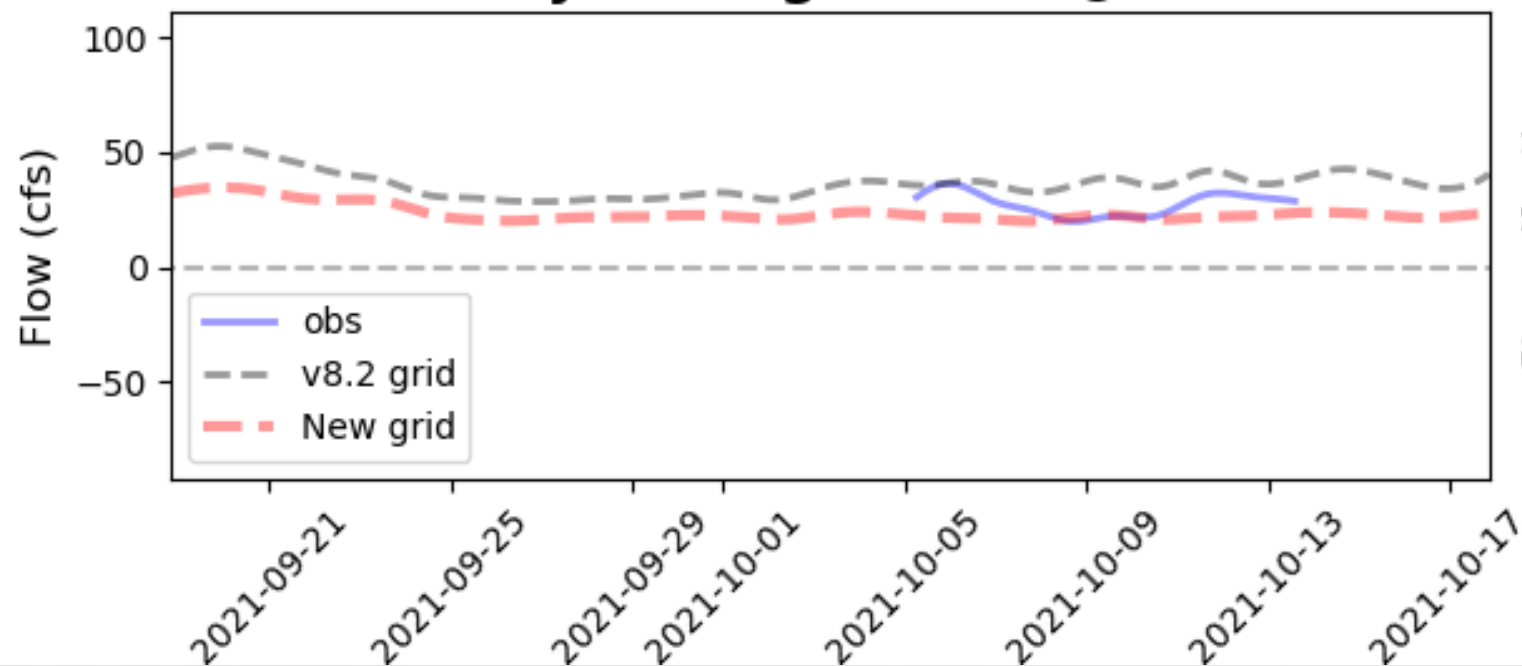
Flow comparison @ MRU



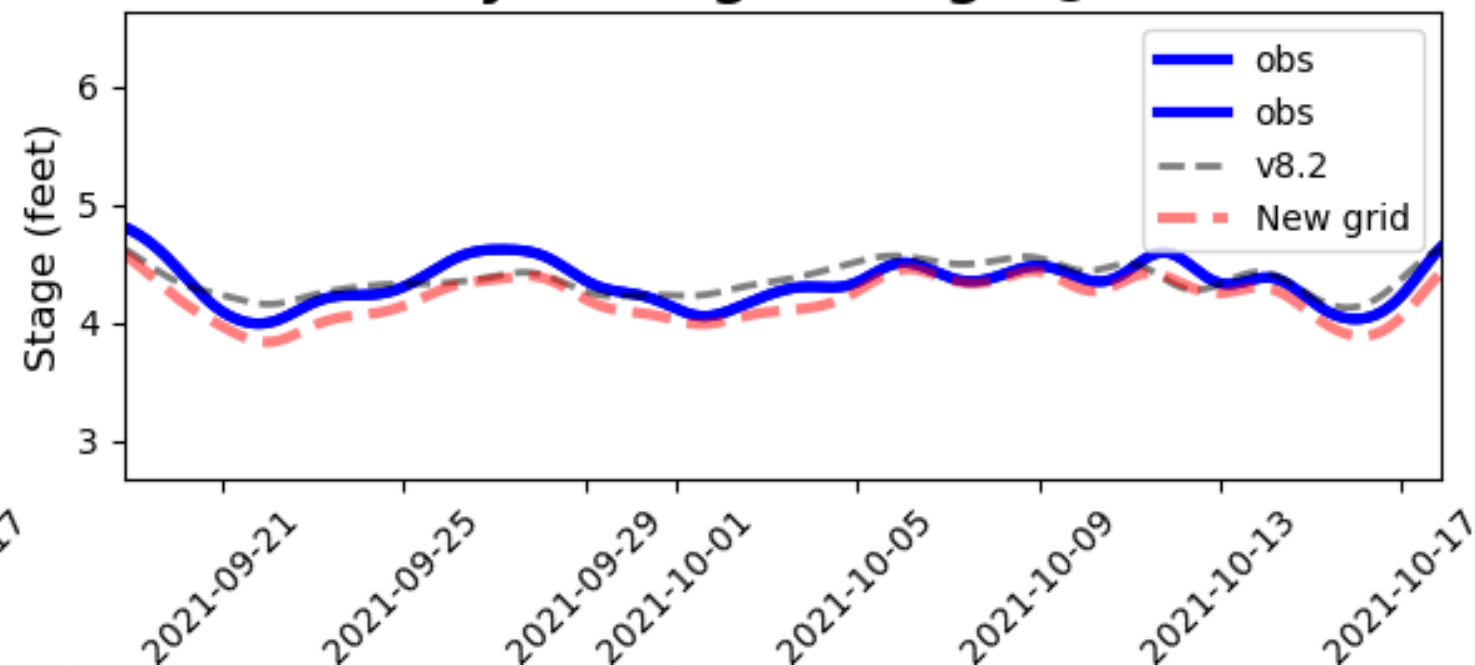
Stage comparison @ MRU



Tidally averaged flow @ MRU



Tidally averaged stage @ MRU



Five-Points Flux Study -

2024



QUESTIONS OR COMMENTS?

Raise your hand or type in the chat

State your name and affiliation

Closing & Next Steps

THANK YOU!!



CALIFORNIA DEPARTMENT OF
WATER RESOURCES

QUESTIONS OR COMMENTS?

Raise your hand or type in the chat

State your name and affiliation

Contacts

Bill McLaughlin, PE

Department of Water Resources

Division of Operations and Maintenance

Water Initiatives Planning and Management Branch

William.McLaughlin@water.ca.gov

Phone: (916) 873-5748

Grace Windler, PhD

U.S. Bureau of Reclamation

Regional Water Quality Coordinator

Interior Region 10 - California-Great Basin

Gwindler@usbr.gov

Phone: (916) 978-5088

Erika Britney, PMP

ICF

Erika.Britney@icf.com

Phone: (206) 801-2802

Website

<https://water.ca.gov/Programs/State-Water-Project/Operations-and-Maintenance/Monitoring-Special-Study>



Follow us on social media



CADWR



CA_DWR



calwater



cadepartmentofwaterresources

