CALIFORNIA DEPARTMENT OF WATER RESOURCES

Monitoring Special Study

MSS Report Updates, June 20, 2024



Bill McLaughlin, P.E., Supervising Engineer

Study 20, 2024



| Start time | Agenda Item |
|------------|---|
| 9:00 am | Welcome (2 minutes) |
| 9:05 am | Agenda & Logistics (3 minutes) |
| 9:30 am | General MSS Updates/Timeline and Q&A (5 minut |
| 9:40 am | Technical Presentations and Q&A (100 min) High-Speed Salinity Transect Mapping & Salin Isotopes Modeling: SCHISM 3D, Clifton Court Operatio Modeling, and Flow Monitoring Activities |
| 10:55 am | Closing & next steps (5 minutes) |
| 11:00 am | Meeting Adjourn |



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ity Point-Source and Ion Sampling

ns, Water Quality Data Integration

Ground Rules & Logistics

This meeting is focused on providing updates on the MSS report. 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' တိ (=) යා **On a Phone: More People Chat Reactions

Dial *9 to "Raise Hand"







Accessibility

This meeting is being transcribed in real time with closed captions

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General MSS Updates and Report Schedule

Study leads in process of writing their respective reports.

MSS Technical Working Group review anticipated to occur in late September/early October 2024.

Final MSS Report will be submitted to the SWRCB in December 2024 by DWR and USBR.



QUESTIONS OR COMMENTS?

Raise your hand or type in the chat State your name and affiliation

Salinity Point-Source and Ion Sampling

High-Speed Salinity Transect Mapping

MSS Point Source and Ion Sampling & High-Speed Salinity Transect Mapping Technical Study 3-Month **Update – April 2024-June 2024**

1. Finished Data Review, Organization, and QA/QC

2. Data Published to the DWR Water Data Library for Public Access

3.Report Writing, Figure Development, and Analysis



Salinity Point Source and Ion Sampling Technical Study Updates:

Reviewed and Publicly Available Data

Drone Imagery – 2021-2024 - 15 Flights completed 1.

- DWR GIS Atlas Website: https://gis.water.ca.gov/arcgisimg/rest/services/Aerial_Photography
- DWR NCRO UAV (Drone) Videos YouTube Channel: https://www.youtube.com/@NCRO_UAV/videos

2. Continuous EC Time Series Data – 2021-2023 - 14 Temporary Stations

- QA/QC and Public Data on DWR Water Data Library Website: <u>https://wdl.water.ca.gov</u>
- Data collection period Fall of 2021 to December 2024
- Continued data collection in 2024 at 9 of 14 temporary stations based on modelers and public coordination feedback

Ion Sampling Data – 2018-2023 - 16 Total Stations 3.

- QA/QC and Public Data on DWR Water Data Library Website: https://wdl.water.ca.gov
- 8 new sampling locations added for MSS that included sites in Tome Paine Slough, Sugar Cut, and Middle River •









High-Speed Salinity Transect Mapping Technical Study Updates:

Reviewed and Publicly Available Data

1. High-Speed Salinity Transects – 2021-2023 - 27 transects completed

- AGOL Link: <u>https://www.arcgis.com/home/item.html?id=c2b6fe1bd21d</u> <u>4a86b3052fac01b212f1</u>
- Direct Service URL (ArcGIS Pro): <u>https://utility.arcgis.com/usrsvcs/servers/c2b6fe1bd21d4a8</u> 6b3052fac01b212f1/rest/services/InlandWaters/i12_Salinit y_Transects_SouthDelta/MapServer





Salinity Point Source and Ion Sampling & High-Speed Salinity **Transect Mapping Technical Study Updates:**

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.

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

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

- Point Source & Ion Sampling fill data gaps, improve spatial and temporal coverage, improve modeling results, ulletrecommendations for new monitoring stations and assessment of existing compliance stations
- High-Speed Transects expand monitoring between fixed stations, targeted conditions, model validation, lacksquarecompare channel reach salinity conditions w/ compliance stations

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Salinity Point Source and Ion Sampling

Technical Study Updates:

Reporting Approaches to Meet Goals and Objectives 1-3

• Regional analysis approach: 1. San Joaquin River 2. Upper Old River 3. Lower Old River 4. Grant Line Canal 5. Paradise Cut 6. Sugar Cut 7. Tom Paine Slough 8. Middle River 9. OMR (Old and Middle River) CALIFORNIA DEPARTMENT OF

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High-Speed Salinity Transect Mapping

Technical Study Updates:

Reporting Approaches to Meet Goals and Objectives 1-3

• Regional analysis approach: 1. San Joaquin River 2. Old River (includes Upper and Lower) 3. Grant Line Canal 4. Paradise Cut 5. Sugar Cut 6. Middle River





Salinity Point Source and Ion Sampling & High-Speed Salinity Transect Mapping Technical Study Updates:

Reporting Approaches to Meet Goals and Objectives 1-3

- Defined 7 Primary Results and Discussion Topics:
 - 1. Historical Salinity Compliance (WY2016-2023)
 - 2. WY2021-23 Regional EC Spatial and Temporal Trends
 - 3. Historical Data Comparison
 - 4. Paradise Cut Salinity Tidal Dispersion
 - 5. Paradise Cut Flushing
 - 6. Pescadero Tract Circulation
 - 7. Lower Old River Null Zone



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Salinity Point Source and Ion Sampling

Technical Study Updates:

Reporting Approaches to Meet Goals and Objectives 1-3

• Data Analysis Examples:



Ion Sampling Data

High-Speed Salinity Transect Mapping Technical Study Updates:

Reporting Approaches to Meet Goals and Objectives 1-3







03/02/2022

QUESTIONS OR COMMENTS? Raise your hand or type in the chat State your name and affiliation



Isotopes



- Data from USGS, USEPA, academic sources
- Includes:
 - Precipitation
 - Surface Water
 - Groundwater
- > 2,000 datapoints since CY2000
 - Every CY, Every Month
- Well depths range 20-1,780 ft.





- **Blue Points: collected** monthly during MSS ion data collection (Feb 2023 – Jan 2024)
- **Red** outlines MSS • **Study Area**



Can the water isotope data help detect groundwater inputs?

- ¹⁸O and ²H vary systematically through water cycle
- **Deviations from a** "Meteoric Water Line" can indicate evaporation, water origin, etc.
- "d-excess"







Supplemental Isotope Work Can the water isotope data help detect groundwater inputs?



Can the water isotope data help detect groundwater inputs?



QUESTIONS OR COMMENTS?

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Modeling

i. SCHISM 3D **ii. Clifton Court Operations** iii. Water Quality Data Integration Modeling iv. Flow Monitoring Activities



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Modeling Progress Report

June 2024





Eli Ateljevich and Zhenlin Zhang

Major Modeling Activities

- CCF Gates Characterization and Analysis (Sophie)
- Source Inference for SCHISM (Zhenlin)
 - Draft of methodology to stakeholders in 1-2 weeks (avail to stakeholders)
 - Final draft of results: on schedule
- SCHISM and DSM2 Model Evaluations •
 - Writeup in progress, will be in appendix
 - See also Annual Report on DCP validation (example+downstream)
- Flow Exports and Delta Processes Study runs proceeding
 - End-of-July delivery of internal draft
- Visualization aids: transport in Five Points, particles in CCF area •









Conceptual Models

- Grantline as avenue of flushing
 - Grantline has mean flow "null", still tidally vigorous
 - Lateral tidal exchange (looking at sensitivity to bathymetry)
 - Same SJR flows (~1100cfs, subject to change) best for flushing and lateral tide exchange
 - Grantline barrier omission may affect water quality
- Old R. null zones trap/accumulate sources (harder to measure/model)
- Barriers help with water levels, complex effect on circulation
- Exports have minor influence on flow
 - CVP potentially can draw water across Old River













Placeholder for animation

Clifton Court Forebay – Priority System Goal and status

1. Characterize CCF

2. Study CCF operation effects

 \checkmark

Develop a realistic characterization of the CCF gates



Develop and run model experiments.

 \checkmark

Implement the "real time gate op" in the model. DSM2 great for operating rules.



Test accuracy and robustness.



Result analysis: water level.





Synthetize results and report



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3. SWP, CVP differences



Develop and run model experiment.

Result analysis: water level.

Result analysis: water quality (SCHISM).

Goal of the Study





Investigate the effect of manipulating the eligible priorities on water level and water quality in the South Delta



Gate Operation Characterization





DSM2 Historical: Fully open, actual timing. DSM2 Planning: Fully open, all eligible period.

What we want for planning: Realistic and <u>adaptive</u> gate opening times and heights for DSM2 and SCHISM.

Field Implementation



IRCES

- CCF water level is lower than outside water level. Hard to maintain.
- In the field operation shifted slightly. Compatible with Board suggestion
- Gate heights vary and utilized most of the eligible period



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Model Implementation



- water level.
- difference.



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Model able to maintain correct

 Emulate the change in gate height in response to head

Adaptative opening/closing.

Modeling Experiment

Historical hydrology (01/2020-2023/12) New adaptive gate representation Historical pumping at both SWP and CVP

Base case Scenario 1 Scenario 2 No Export – Priority 3 Priority 3-cut gate closed CALIFORNIA DEPARTMENT OF ATER RESOURCES



Scenario 3 Priority-shift







Monthly (1%) Stage - 2022







Preliminary Results on Priority Study

- At high export level:
 - Priority 3 is highly constrained, fully utilized.
 - Coincide with abundant inflows. Exceptions most common in fall.
- Benefit to the minimum water level is unclear or small compared to other drivers (SJR inflow, barriers, seasonal variations, export levels).
- HH exclusion already mostly implemented through a shift.
- Water quality still pending.



Preliminary Results on Facilities

- CVP drawdown at low tide is greater than SWP for the same pumping.
- SWP might have more drawdown during other part of the tide.
- CVP has more E-W mean flow on Old River. helpful for flushing.
 - Need to corroborate with observations.



Data Integration/Source Inference

- 1. Report Status
 - Independent hydrodynamic validation in appendix.
 - Early release write-up of inference methods.
 - Complete source inference document (final report).
- 2. Results

 - Explains 80+% of variance at continuous stations. - Explains 90+% of variance for spatial transects (vs. 50%) without inference).
 - Local issues and considerations.
- 3. Conclusions

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Meets original goals.

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- Stable and no spurious sources.





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Transect: 31March 2022



Model with source inference







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Model without source inference



QUESTIONS OR COMMENTS?

Raise your hand or type in the chat State your name and affiliation

Closing & Next Steps

THANK YOU!!



QUESTIONS OR COMMENTS?

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https://water.ca.gov/Programs/State-Water-Project/Operationsand-Maintenance/Monitoring-Special-Study

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