CALIFORNIA WATER FIX

South Delta Water Agency Parties
Part 2 Rebuttal Testimony

TESTIMONY OF TOM BURKE

Opinions

1. The CWF H3+ scenario will have significant impacts on the salinity in the south and central delta.

2. The dsm2 model does not accurately reflect the existing channel geometry for significant portions of the south delta channels. That error in geometry will result in gravely erroneous results

3. The most recent version of the DSM2 model should be used in the CWF analysis and evaluation.

4. The existing NAA does not comply with the d-1641 requirements at the “Old River at Tracy” compliance point. With an expected increase in salinity for CWF H3+ , the inability to comply with D-1641 at this compliance point is exacerbated.

Opinions (Continued)

- The project CFW H3+ scenario results in an increase in reverse flows for old and middle rivers.
- The cwf h3+ scenario results in a significant reduction in water levels in Old and Middle Rivers. This reduction severely impacts areas of those channels that are already much shallower than predicted in the DSM2 model.
- The DSM2 hydrodynamic model can be appropriately used to evaluate flow, stage, and water quality data on a time step as short as 15-minutes. Time steps shorter than 15 minutes were investigated by DWR, but they found that the 15-minute time step provided the best balance between accuracy and computational efficiency.
- There is evidence to indicate that the Sacramento river may not be in temperature equilibrium with the air temperature. This could impact the delta downstream of the NDD's.

Basis of Opinions

- Based on Analysis Performed in Part 1 and Part 2
- Conducted New Analyses on Existing Data.
- Evaluated Petitioners Model Output For The CWF H3+ Scenario

Analysis

- Evaluated the Change in Salinity from the CWF H3+ Scenario
- Evaluated the Difference Between the Channel Geometry in DSM2 and the Actual Channel Geometry.
- Use Of DSM2 To Predict Actual Values, Or Just Use in A Comparative Mode.

Analysis (continued)

- Evaluated D-1641 Compliance in The South Delta
- Evaluated The Increase in the Frequency of Reverse Flow in Old and Middle Rivers.
- Evaluated the Change in Water Level In The South Delta For B1, B2, and CWF H3+

Analysis (Continued)

- Evaluated the ability for the Sacramento River To Provide Cool Water To The Delta

Changes To Salinity From CWF H_3^+

Central Delta Site Map

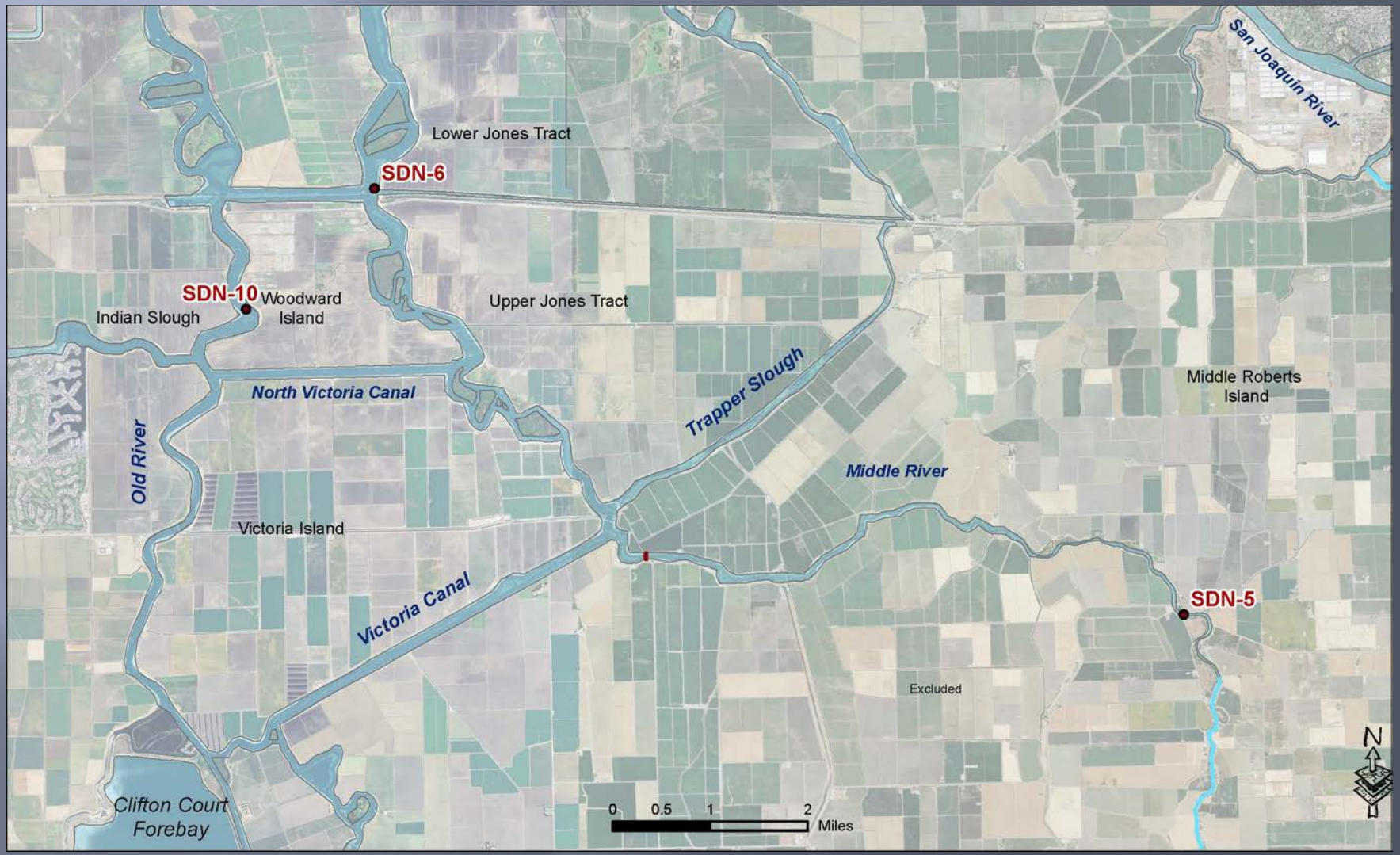
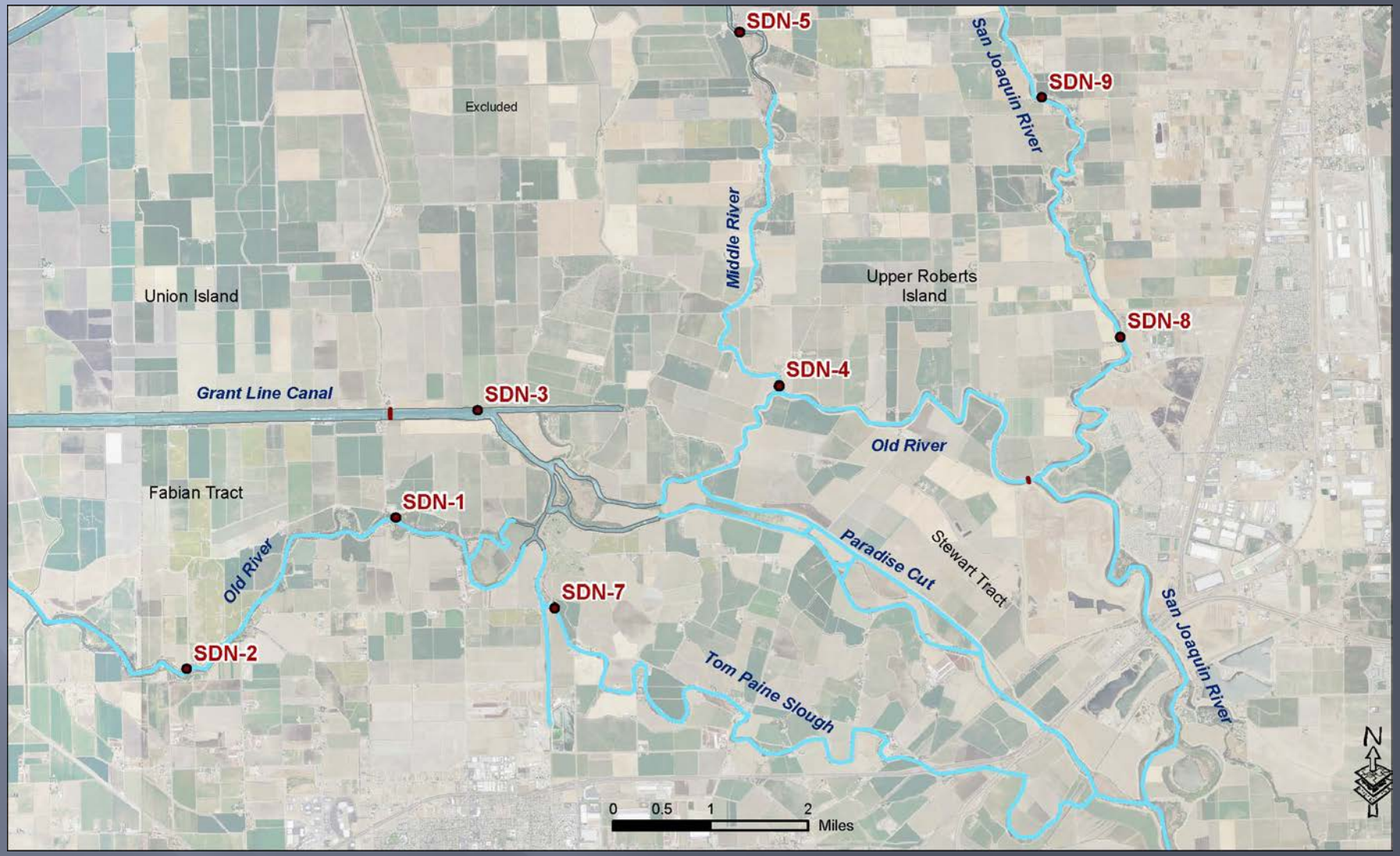


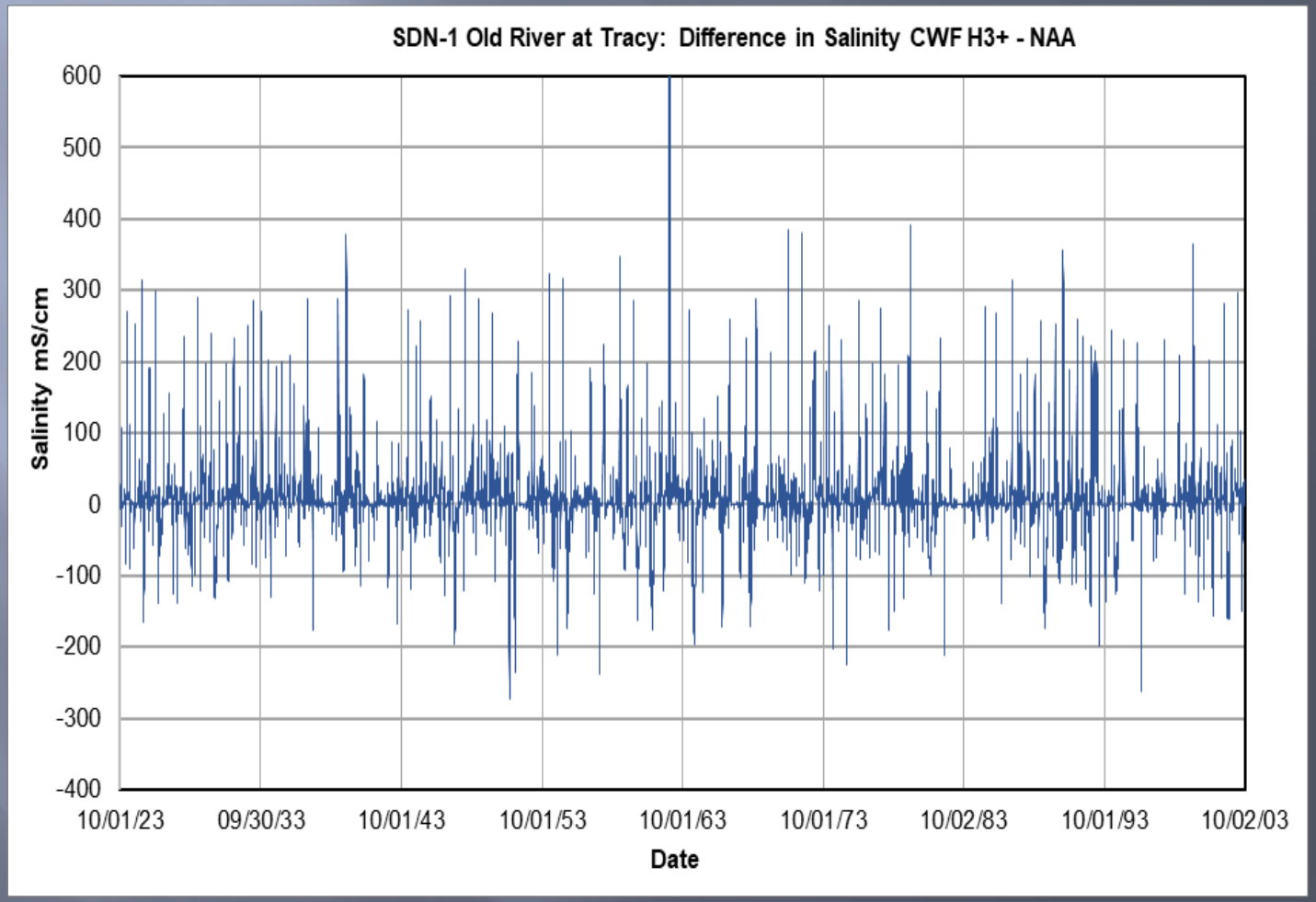
Exhibit SDWA 324 Revised

Errata 8-16-2018

South Delta Site Map



Old River – Salinity Change 1923–2003



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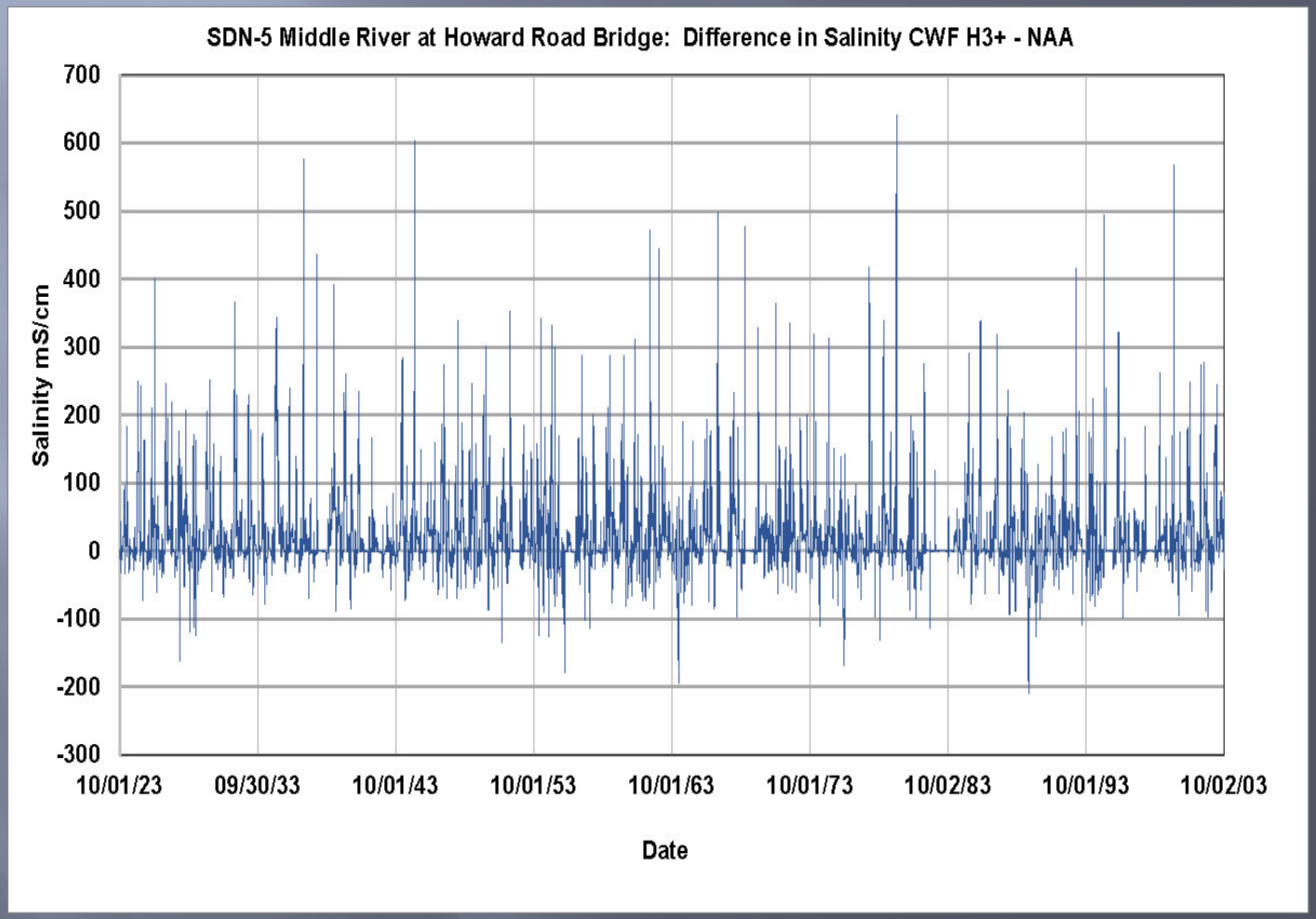
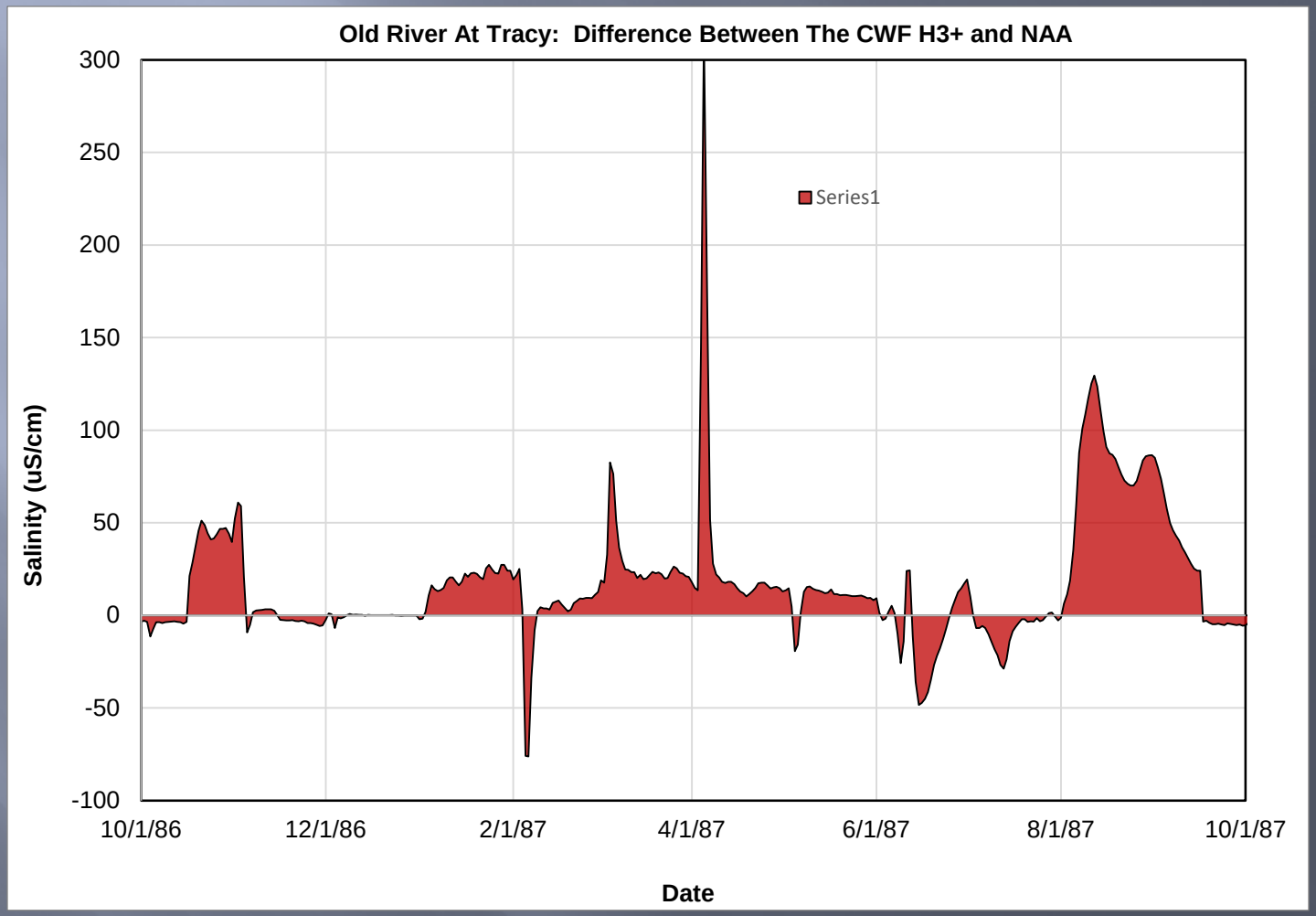
Middle River – Salinity Change 1923–2003



Old River – Critically Dry Water Year (1987)



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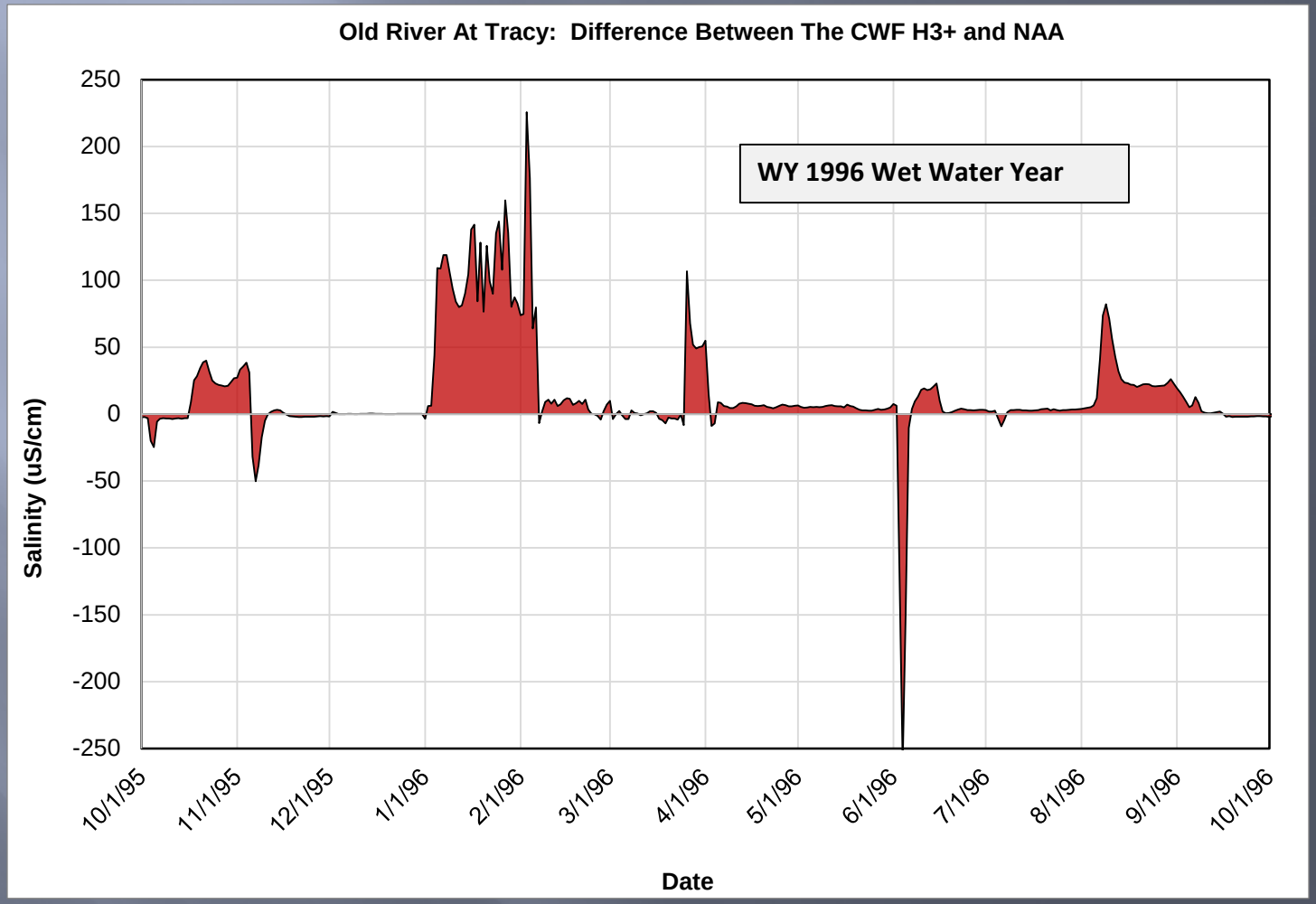
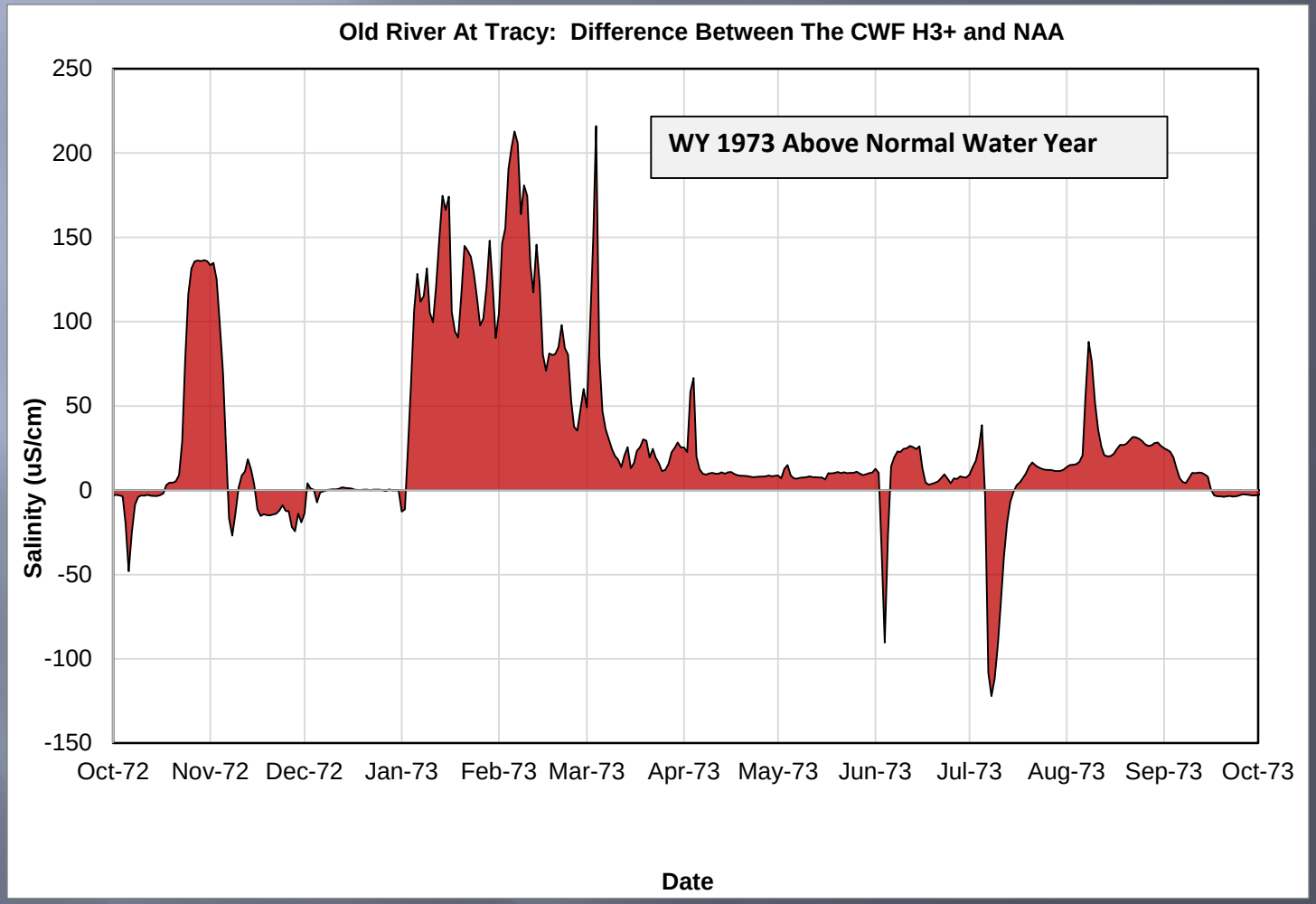
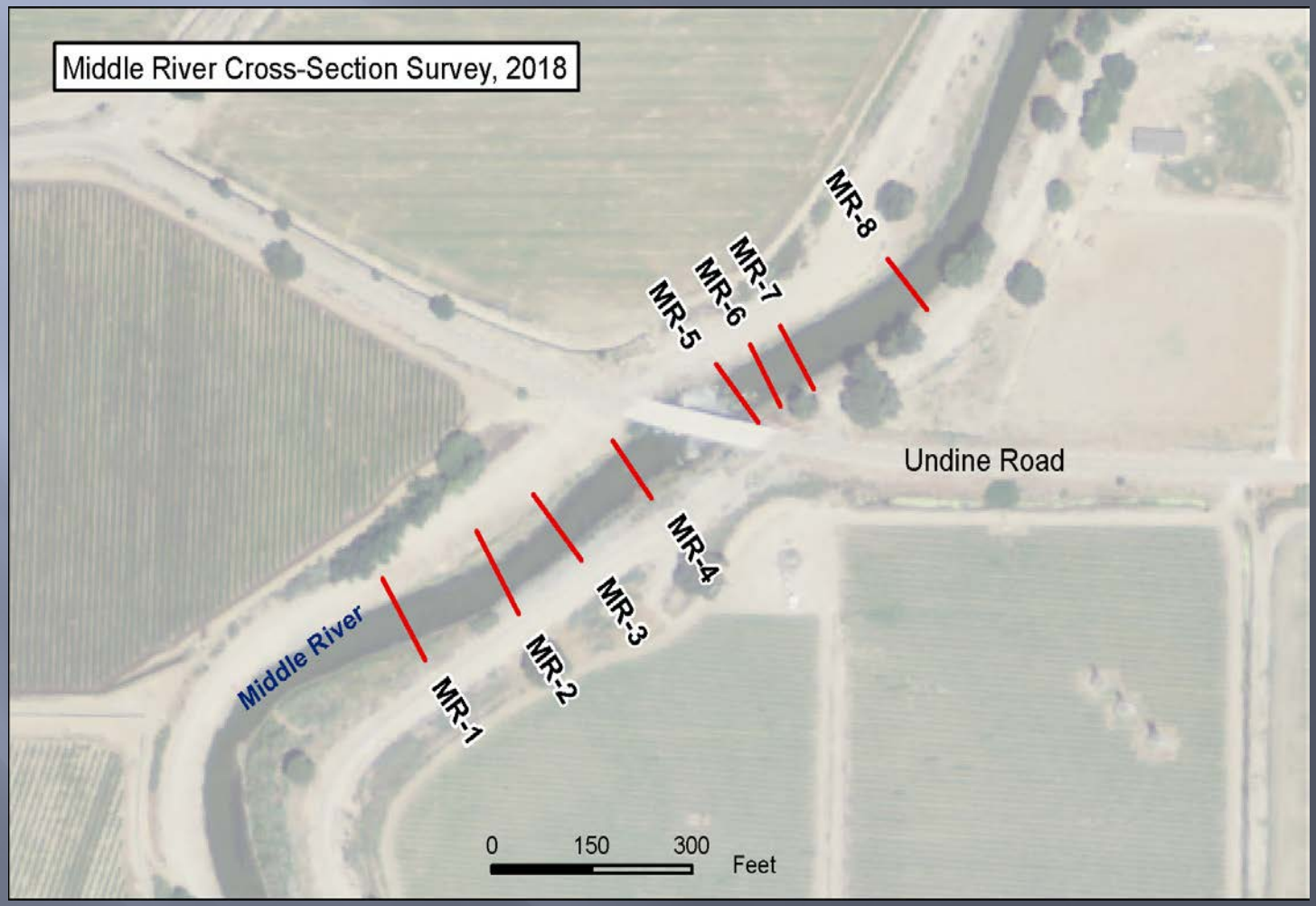
Old River – Wet Water Year (1996)



Old River – Above Normal Water Year (1973)



Evaluation Of Channel Geometry Differences Between DSM2 and Existing Channels



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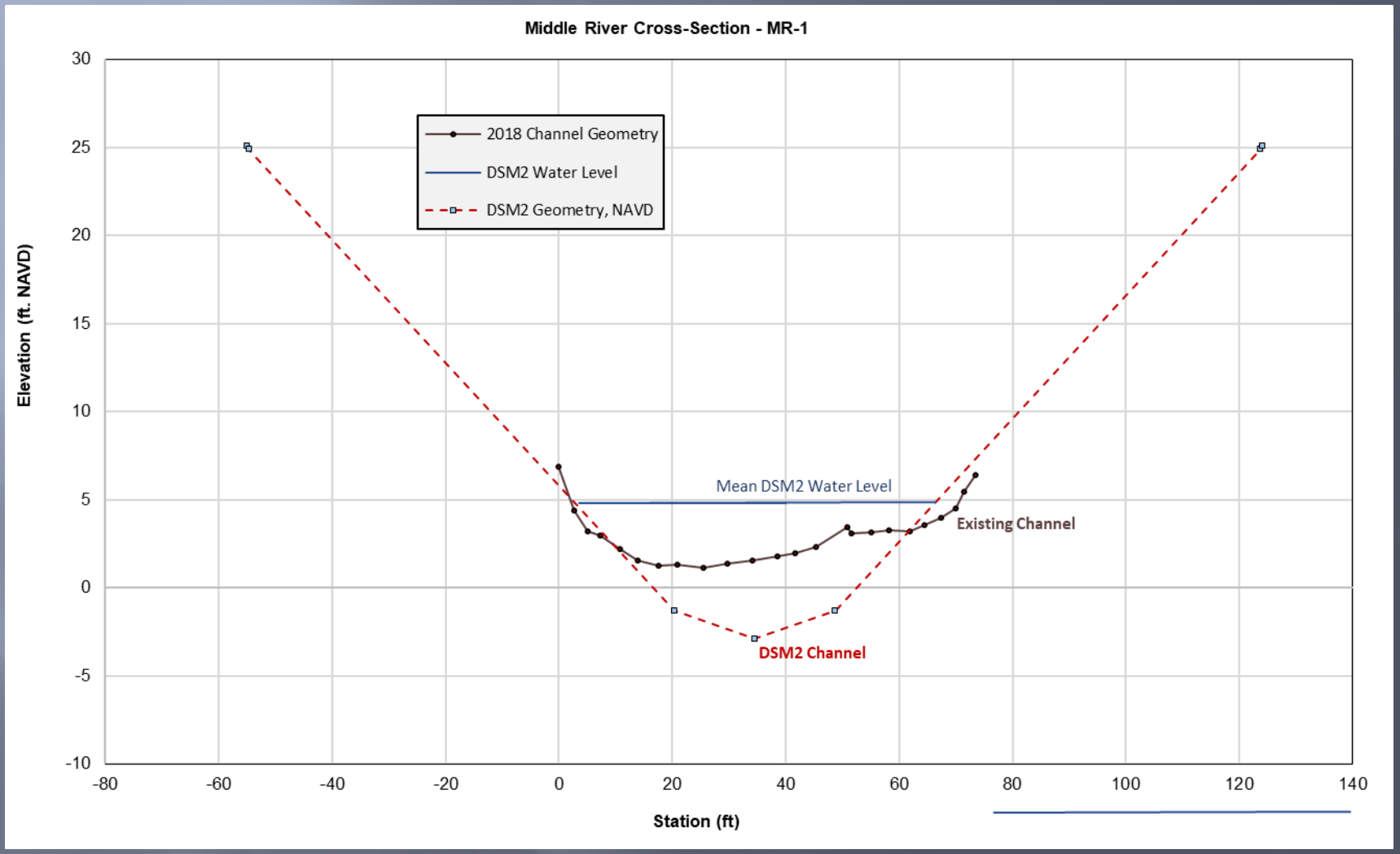
Middle River Cross-Sections



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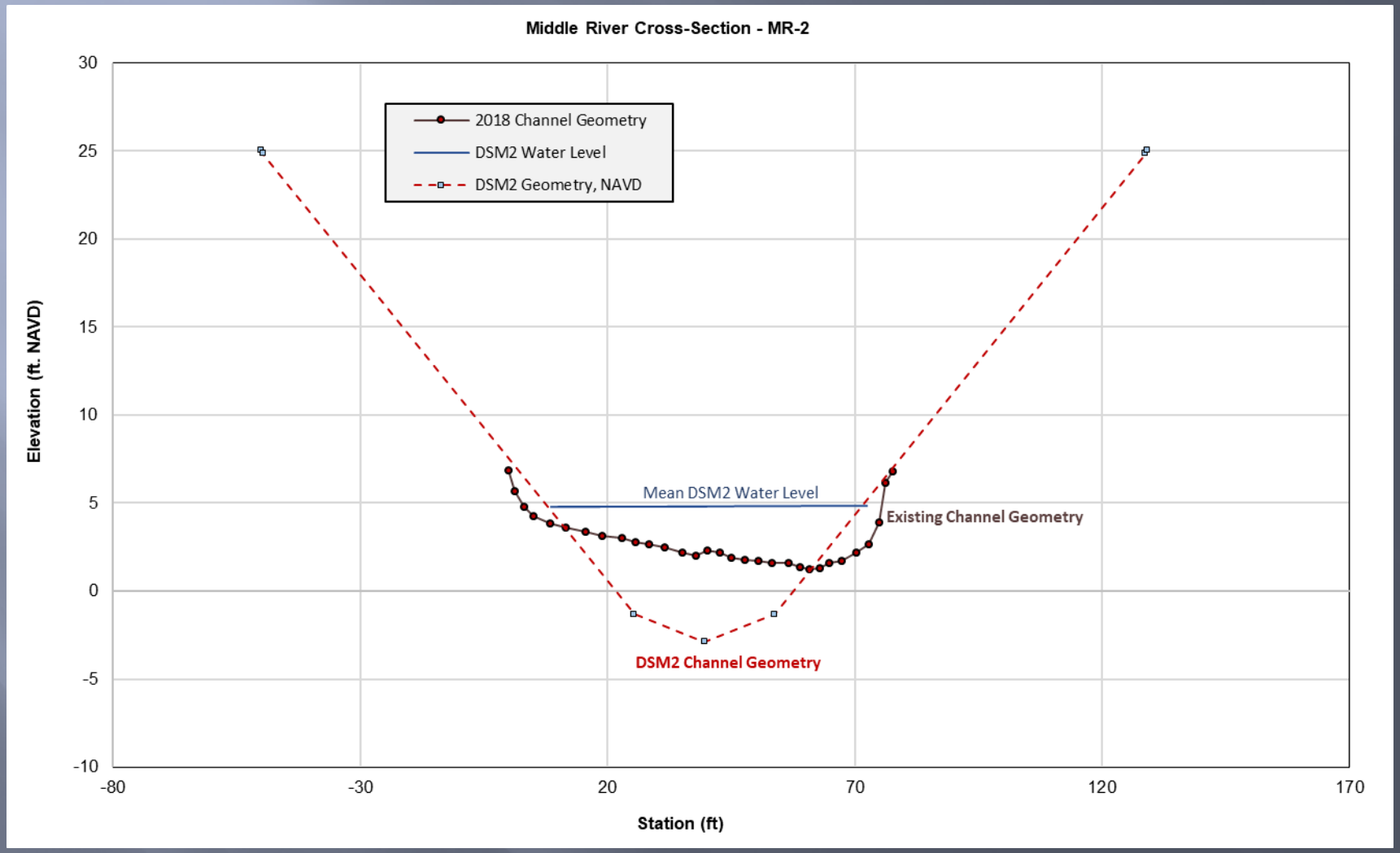

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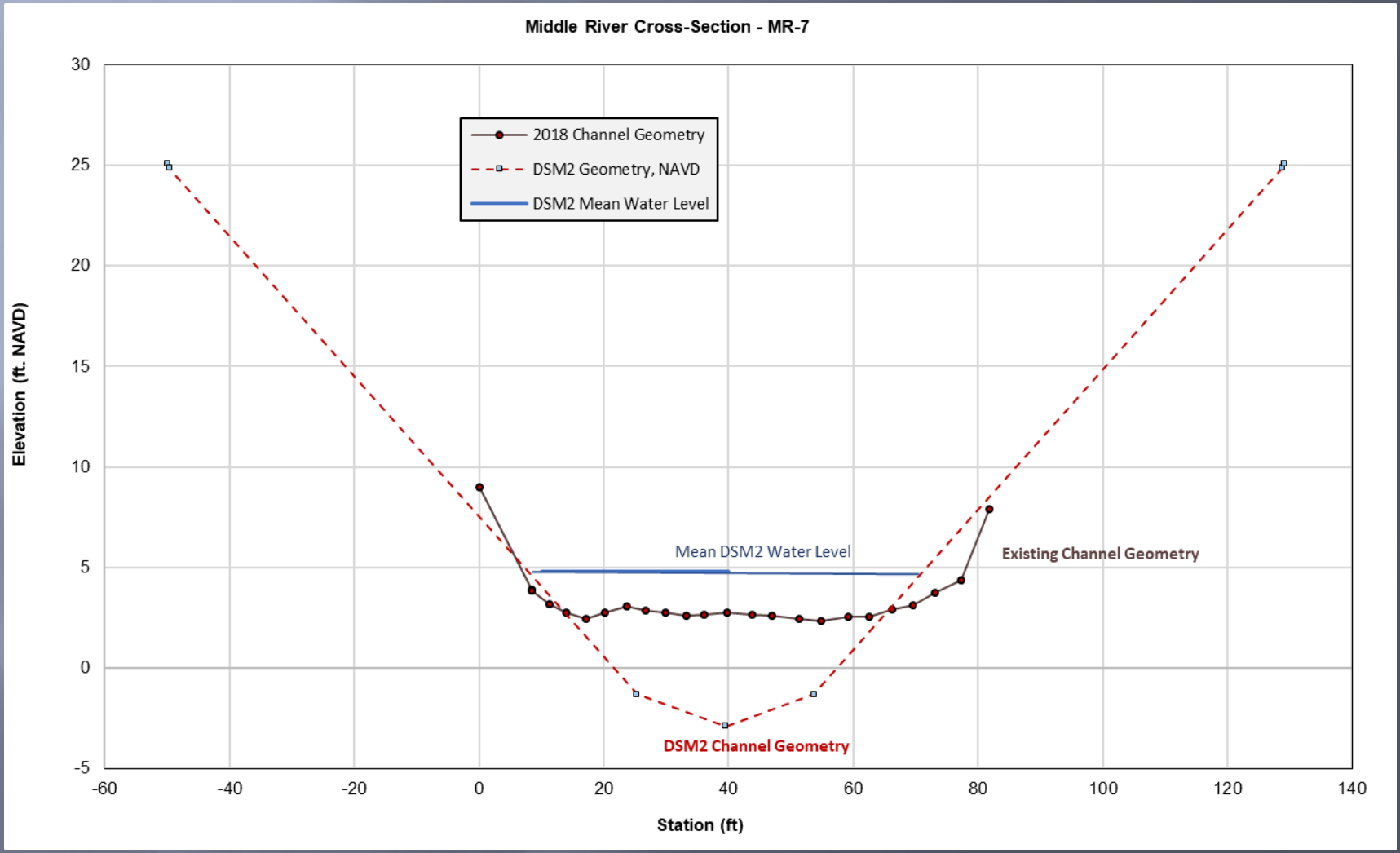
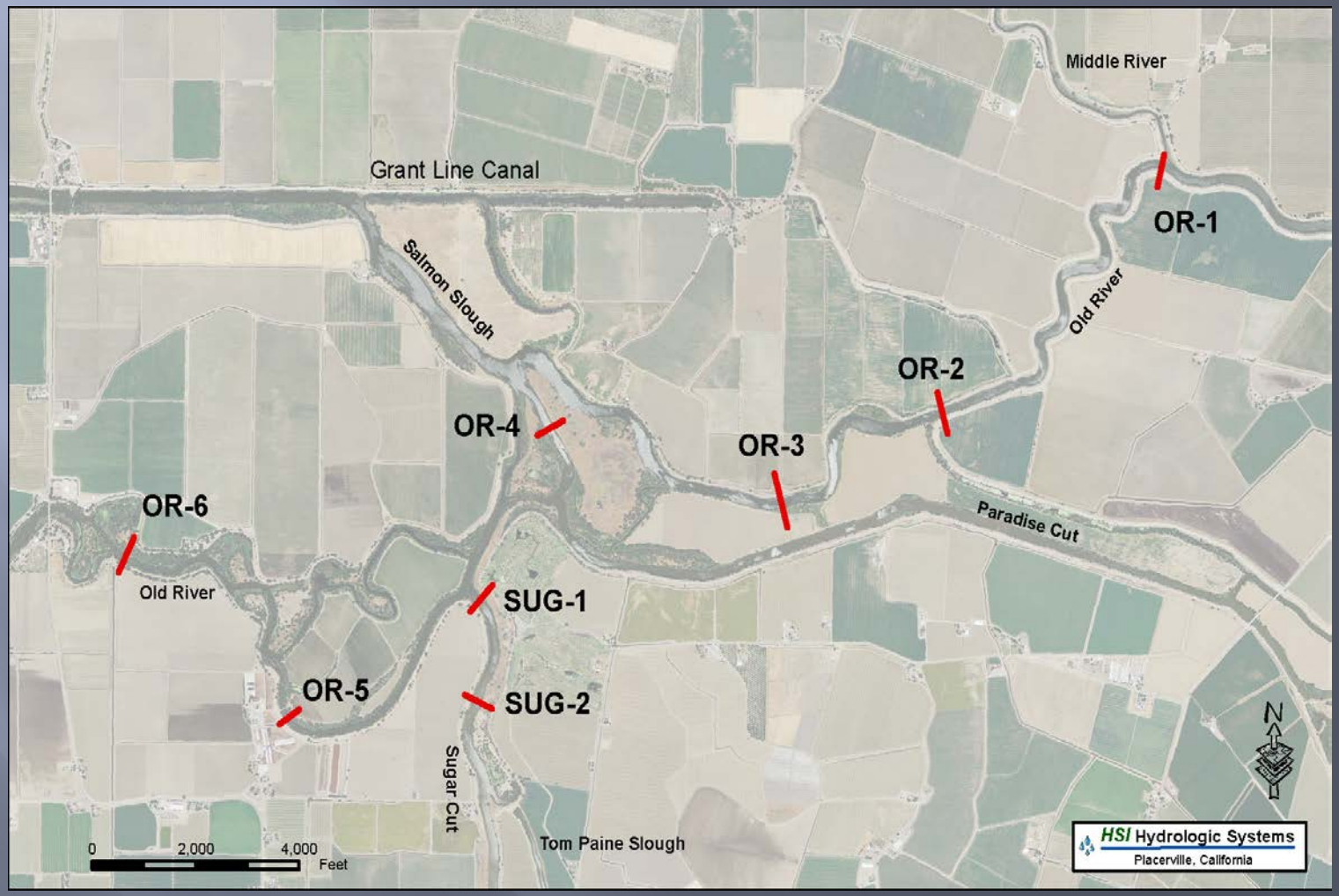


Middle River At Undine Bridge

Old River Cross-Sections



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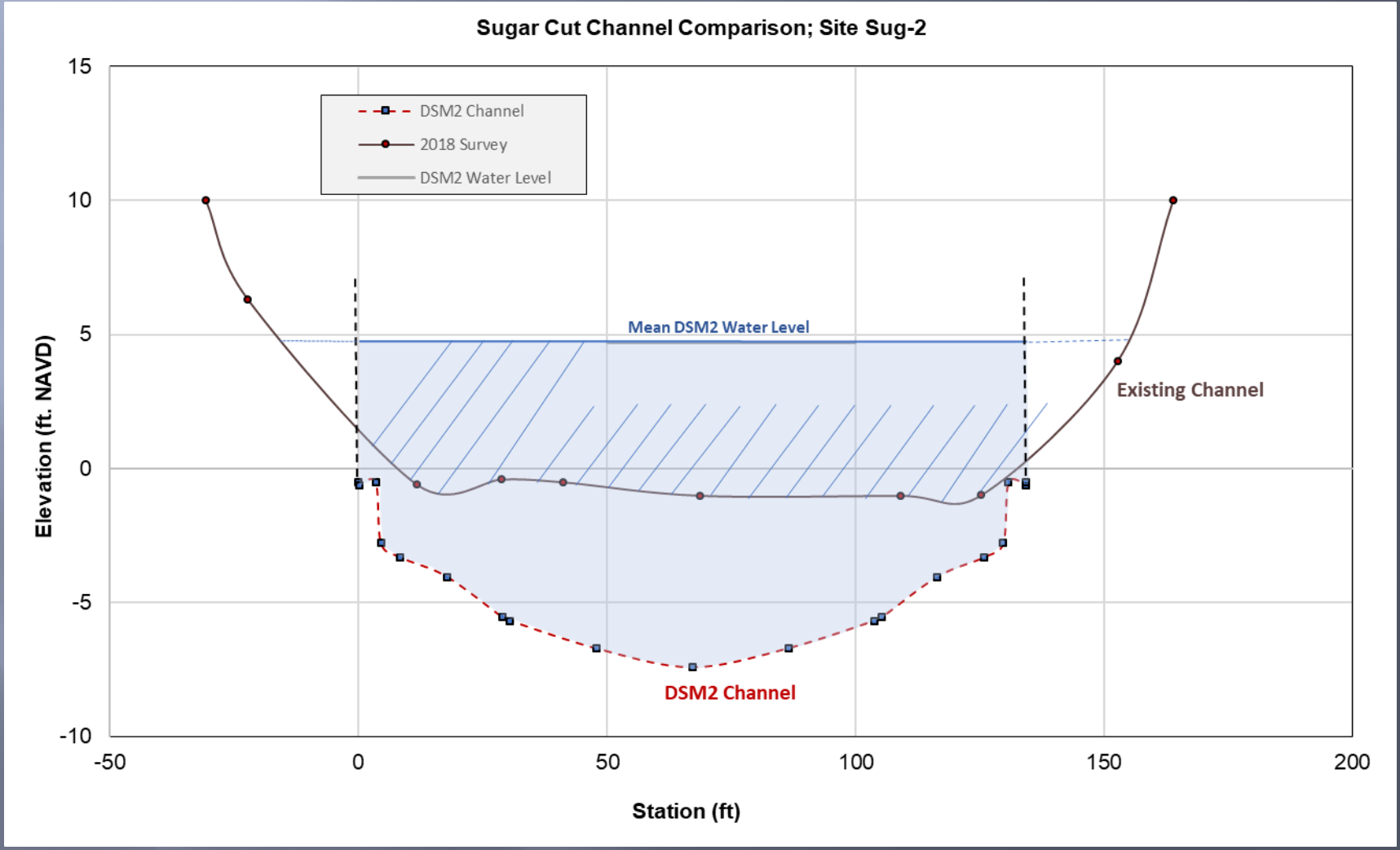
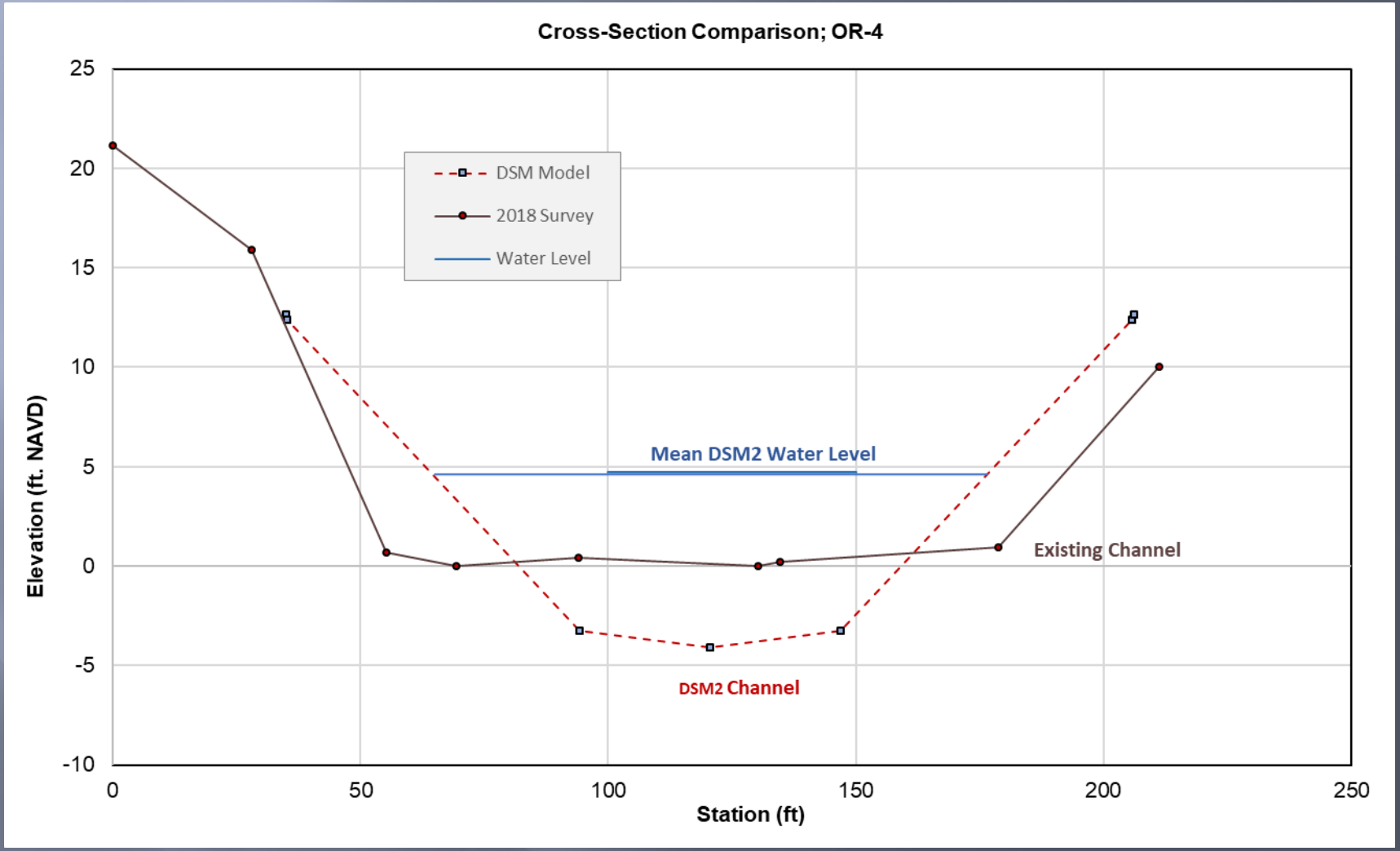
Old River Cross-Sections



Old River Cross-Sections



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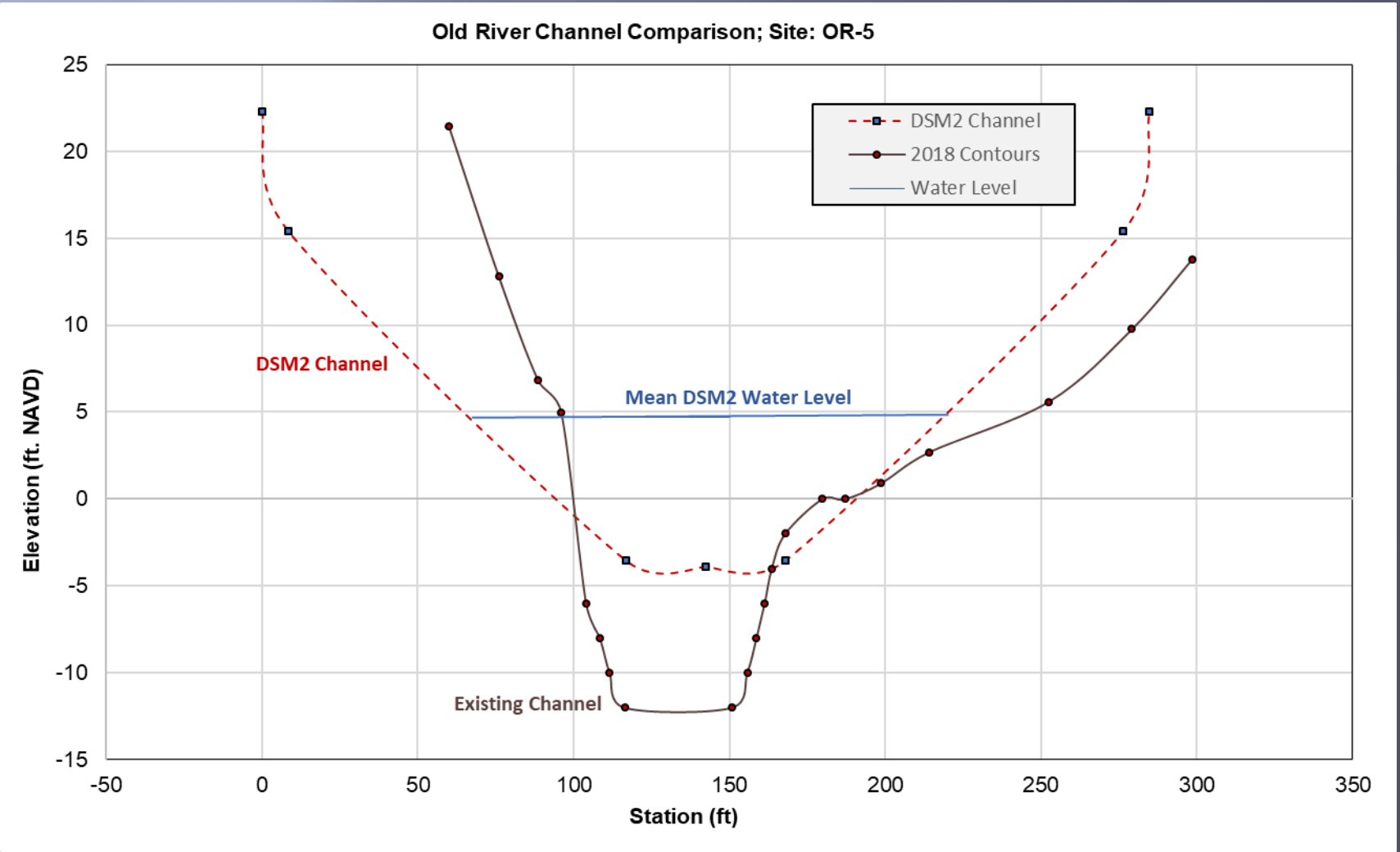
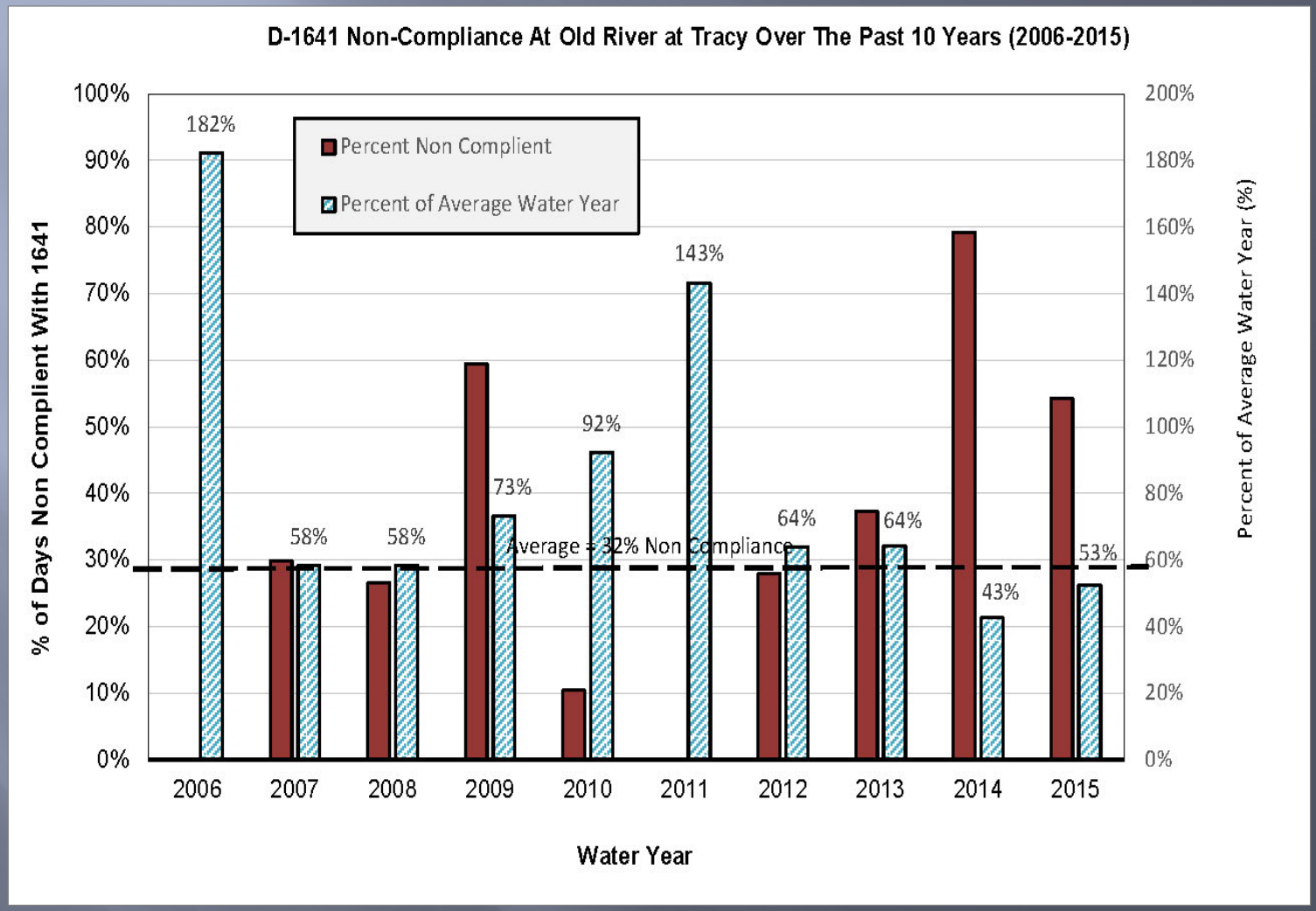

Old River Channel Comparison; Site: OR-5
DSM2 Channel
2018 Contours
Water Level
DSM2 Channel
Mean DSM2 Water Level
Existing Channel
Elevation (ft. NAVD)
Station (ft)
25
20
15
10
5
0
-5
-10
-15
-50
0
50
100
150
200
250
300
350

D-1641 Compliance



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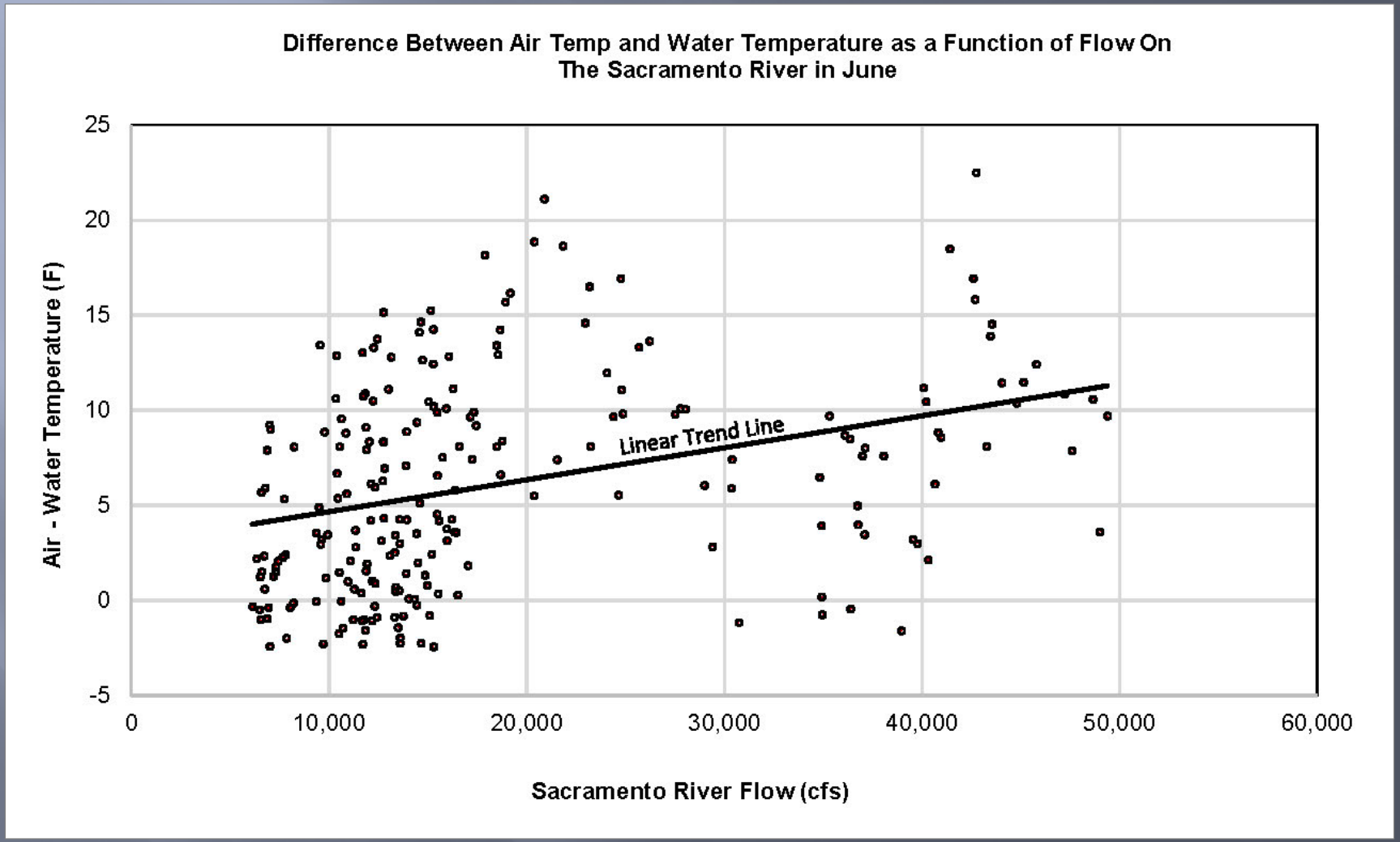
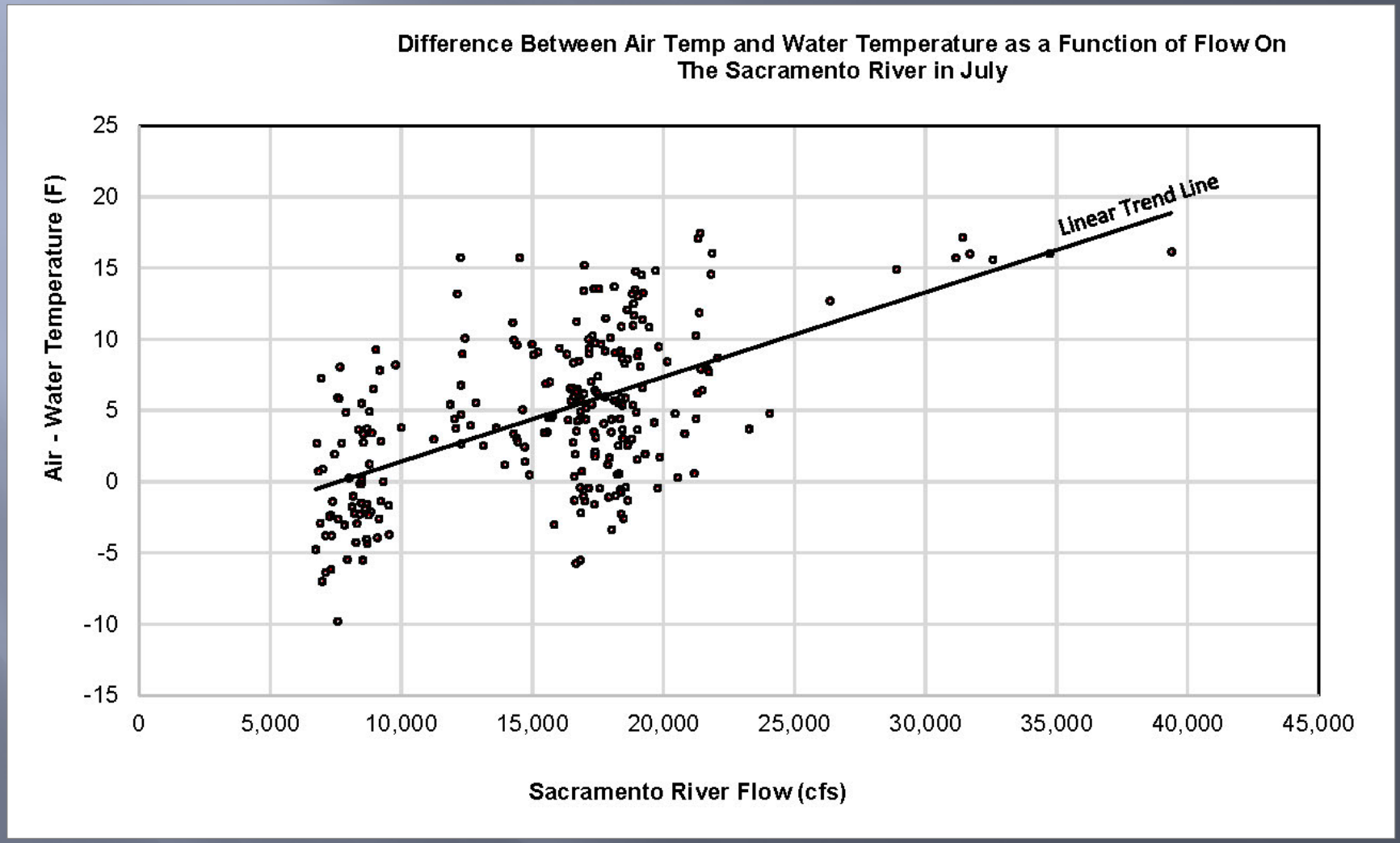
Sacramento River Temperature Assessment

- Evaluated Data At Freeport Gaging Station
  - Flow Data
  - Water Temperature
- Evaluated Air Temperature At Sacramento State University
- Assessed The Potential For Equilibrium Conditions To Exist

Air vs Water Temp – June



Air vs Water Temp – July



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Air vs Water Temp – August

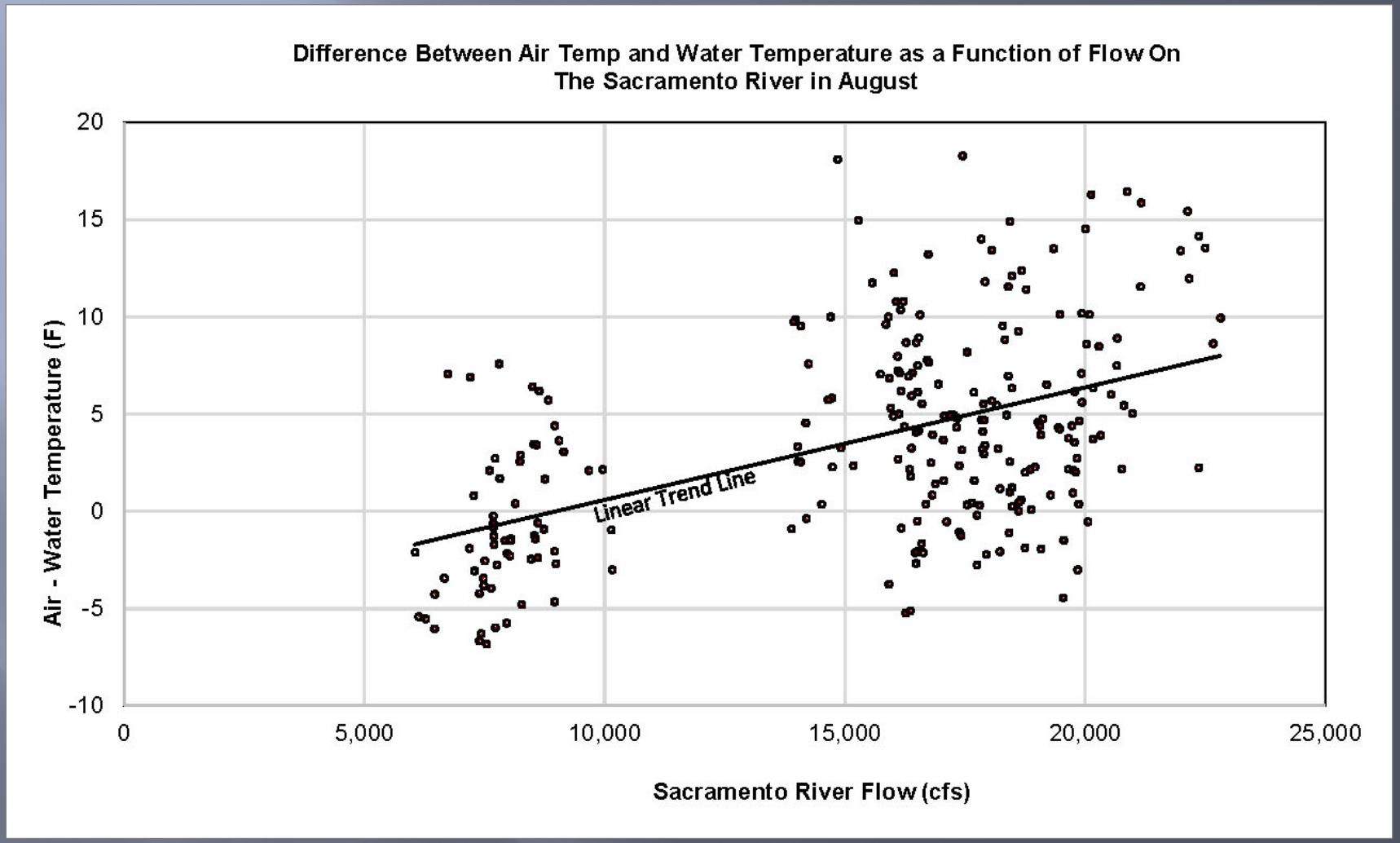

Exhibit SDWA 324 Revised

Conclusions

1. The CWF H3+ does not comply with the water quality objectives of D-1641 under CWF H3+, the project will be out of compliance more often, and to a greater degree.

2. The CWF H3+ will result in an increase in the number of reverse flows in Old and Middle River. Analysis of the petitioners DSM2 output shows a 22% increase in reverse flows on Old River at Tracy for the CWF H3+ over the NAA.

3. Based on the petitioners modeling, the CWF H3+ will result in an increase in salinity for all locations evaluated in the south delta, except for the San Joaquin River.

4. The DSM2 model has some very inaccurate representations of the channel geometry in the South Delta. The error in geometry is so bad in the middle river as to render any modeling results completely inaccurate.

Conclusions (Continued)

5. The CWF H3+ will result in significant reductions in water level in rivers in the South Delta. This reduction in water level can impact habitat, ability to irrigate, and water quality.

6. Using the DSM2 model to evaluate different scenarios on a 15-minute time step, is not only appropriate, but is using the DSM2 model the way it was designed to be used. This 15-minute data can be averaged over longer periods, but the longer the period that that you use to average the data, the more detail you lose in the model response.

7. The assumption that the Sacramento River is in thermal equilibrium with the air temperature may not be correct. Thus, removing this cooler water through the NDD's may have downstream impacts.