City of Antioch Testimony Bay-Delta Workshop 3 – Analytical Tools for Evaluating Water Supply, Hydrodynamic, and Hydropower Effects

Presented by
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Recommendations to Board: outline

- Operations modeling should be validated by extending model to recent years
- Source of water in the Delta should be modeled and considered in establishing standards
- Simulations should rigorously evaluate impacts of sea level rise and new habitat
- Antioch reiterates prior specific requests with respect to Bay-Delta Plan

Recommendation 1: Model recent years

- Most model studies re-operate historical hydrology – e.g., BDCP uses CALSIM II to simulate 1922-2003
- But significant changes have occurred 2007-present
  - Changes to amount of flow exported
  - Flow requirements internal to Delta (e.g., OMR)
- *Period of 2007-present should be simulated (e.g., using CALSIM II and DSM2) to establish that models accurately simulate conditions under current operational rules*

Recommendation 2: Evaluate source of water

- Source is important factor in evaluating water quality
- Antioch is located on the San Joaquin River, but intake captures mostly Sacramento River water
- Models can simulate source and residence time

Recommendation 2: Source fingerprinting

- Study used geochemical “fingerprints” of water from Sacramento River, San Joaquin River, and Bay (at Martinez)
- Source of water was calculated on a daily basis at Clifton Court Forebay and Bethel Island in 1996-1997
- Very little San Joaquin River water reaches the Bay

Three Mile Slough
Emmaton
Bethel Island
Antioch's Intake
Clifton Court Forebay
Google Earth

Figure 1a: Source fractions determined at Clifton Court Forebay using source "fingerprints"

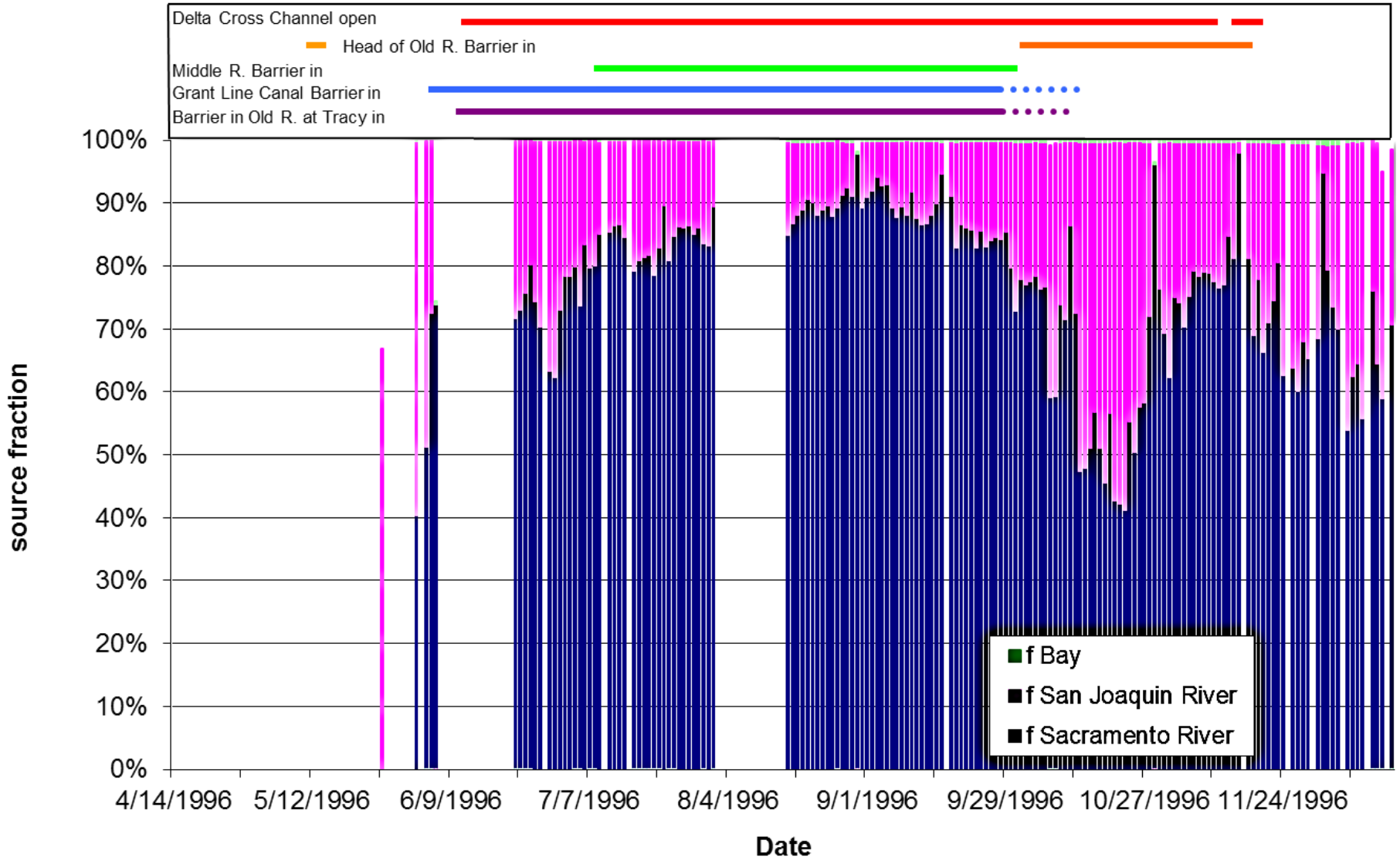
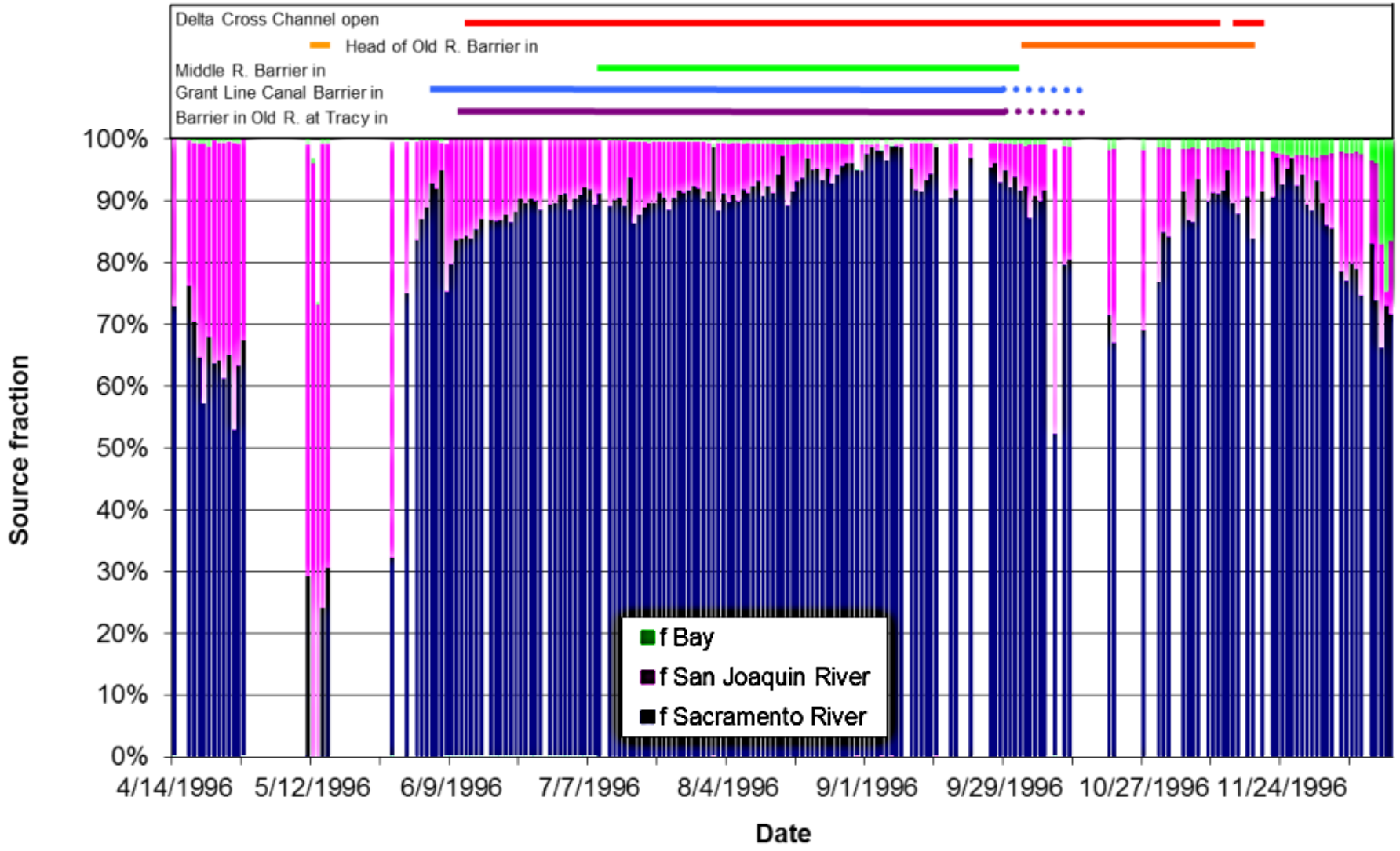


Figure 1b: Source fractions determined at Bethel Island using chemical "fingerprints"



Recommendation 2: Source is important to quality

- Source fingerprints used to assess source of salinity (sodium as a surrogate)
- San Joaquin River is a significant source of salinity (and other constituents, like selenium and pesticides)

Figure 2a: Sources and concentration of sodium at Clifton Court Forebay

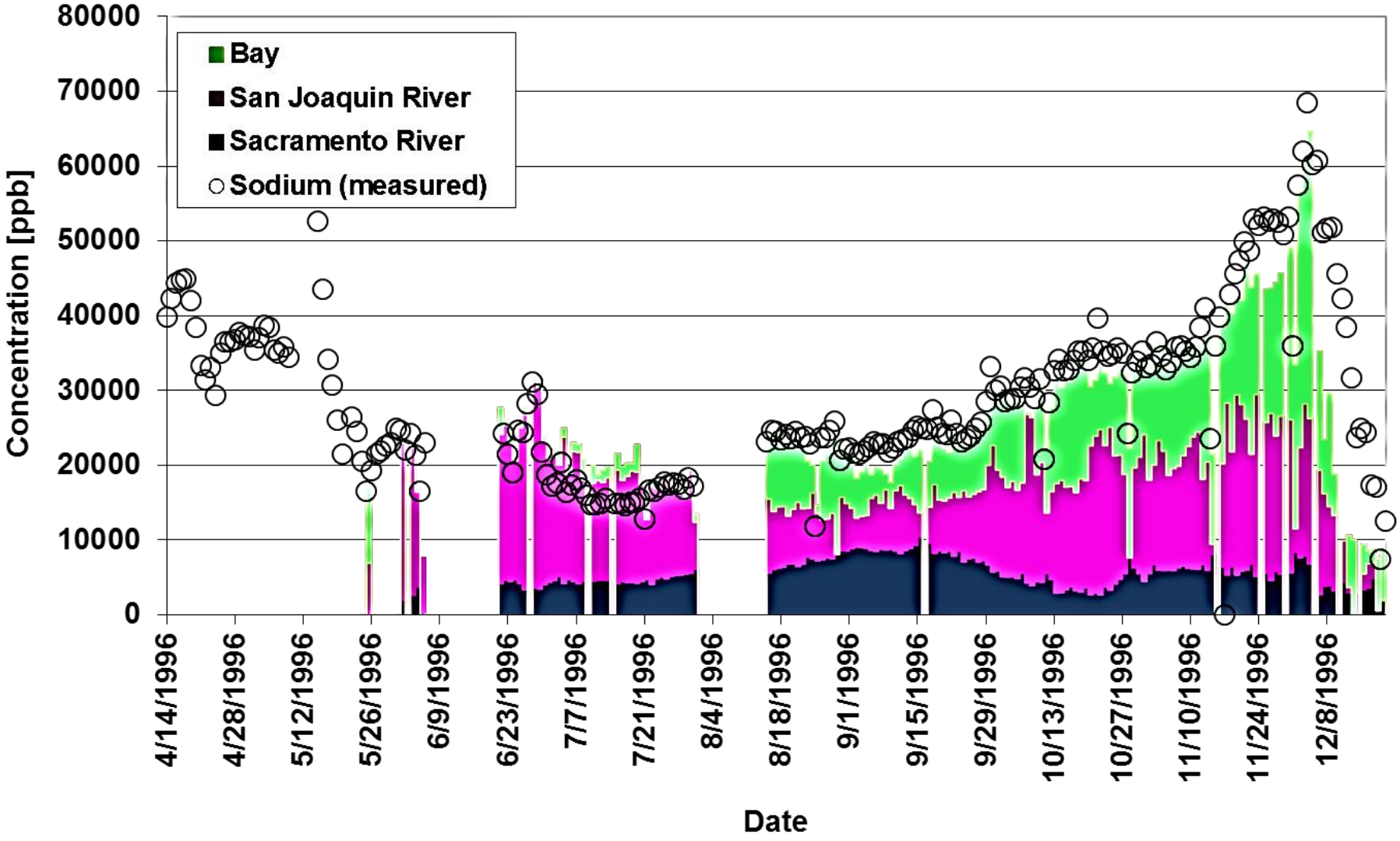
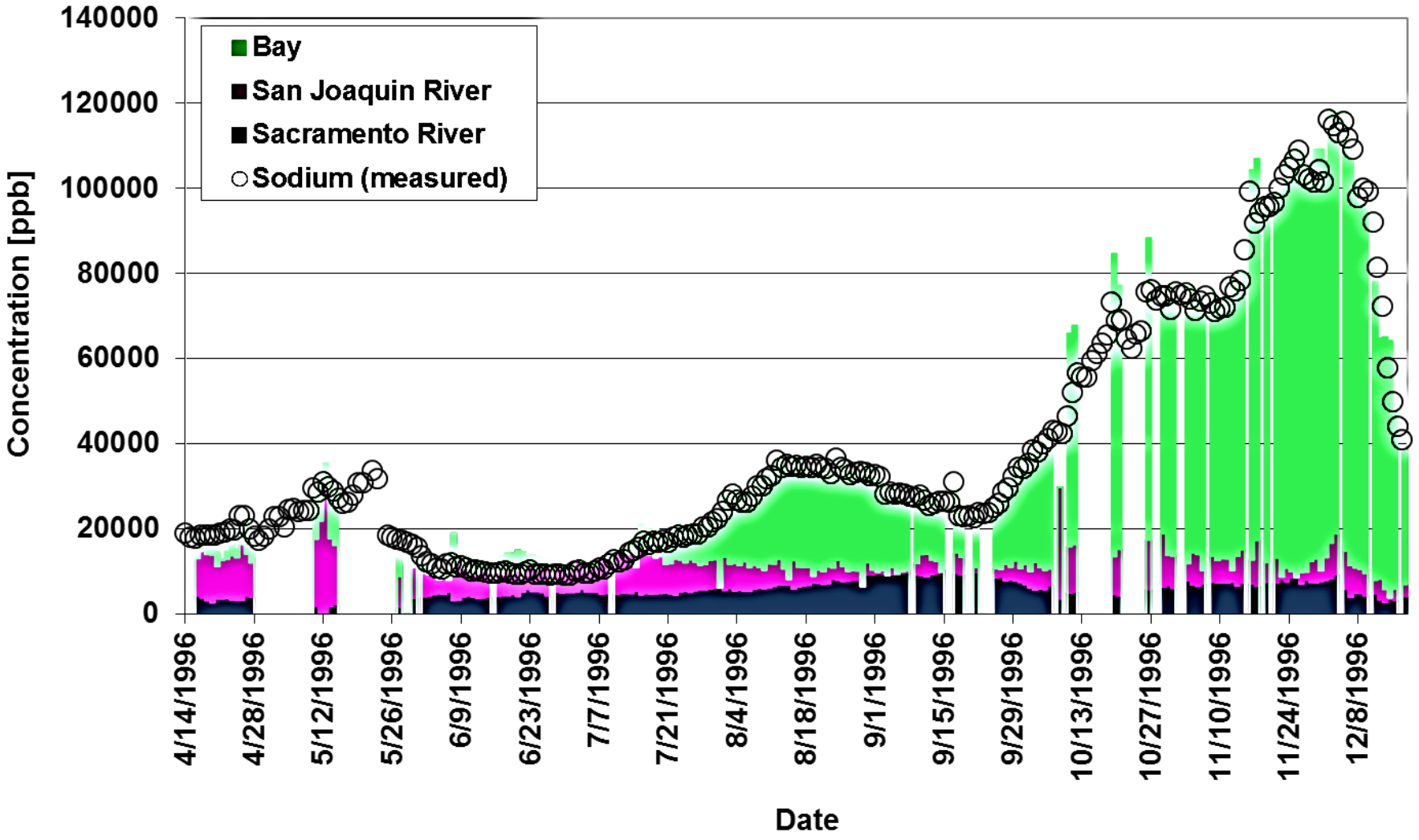


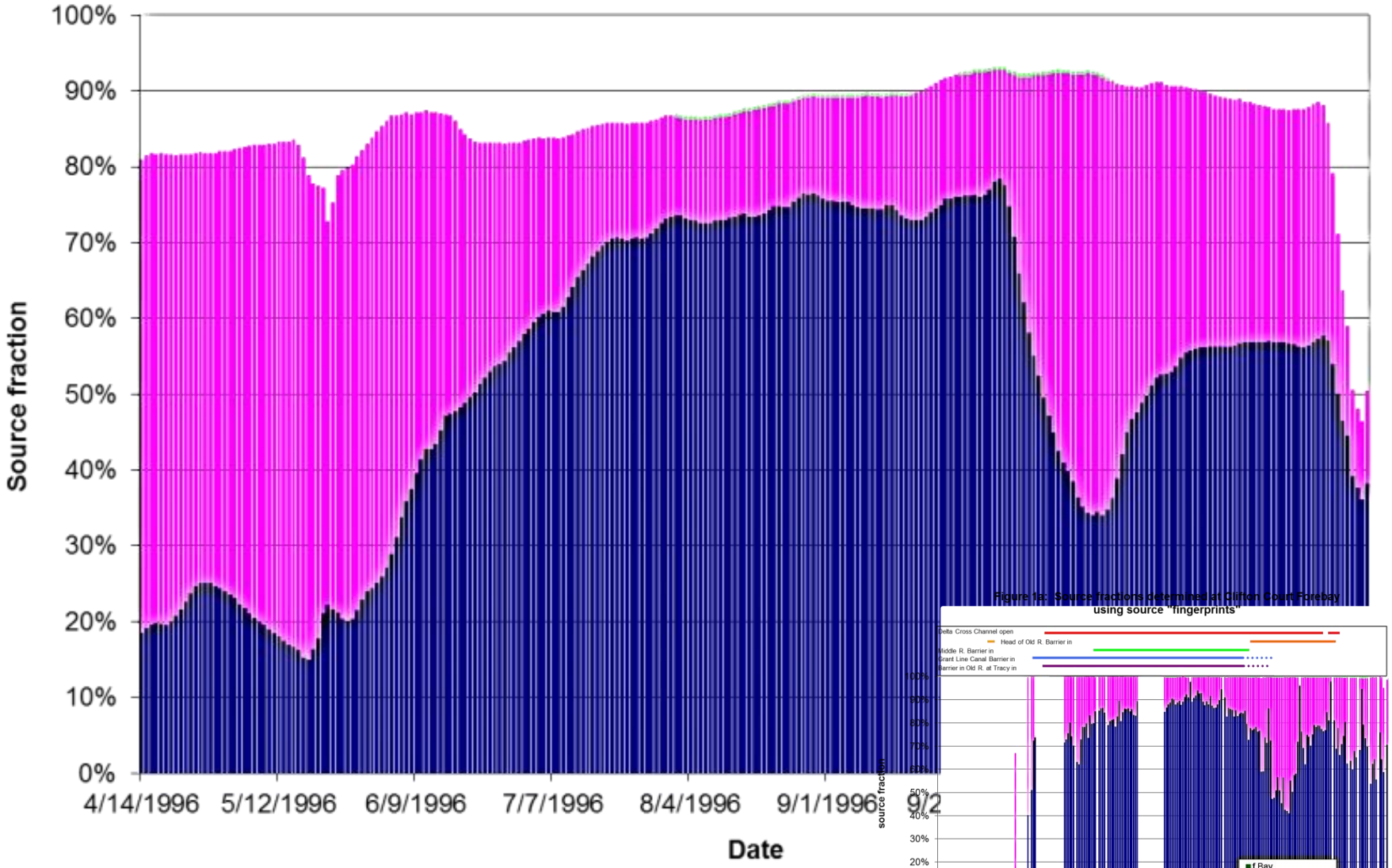
Figure 2b: Source and concentration of sodium (salinity) at Bethel Island



Recommendation 2: Models can simulate water source

- Chemical fingerprints have been used to validate Delta water quality model results
- Models also simulate residence time – increased residence time can lead to higher temperatures and algae levels, lower DO
- Results shown for Fischer Delta Model (FDM) – DSM2 results are similar

Figure 3a: Source fractions simulated at Clifton Court Forebay using the Fischer Delta Model (FDM)



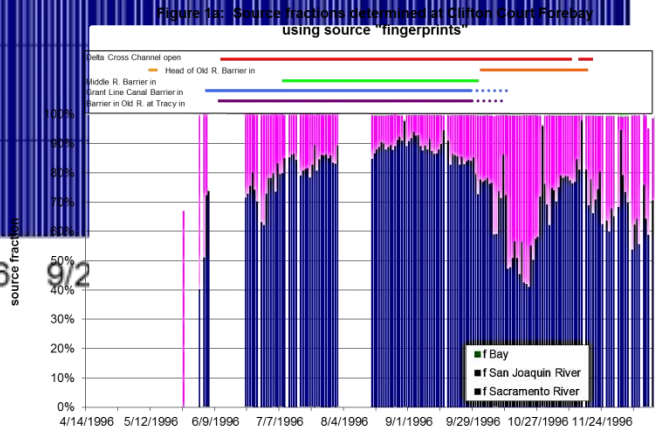
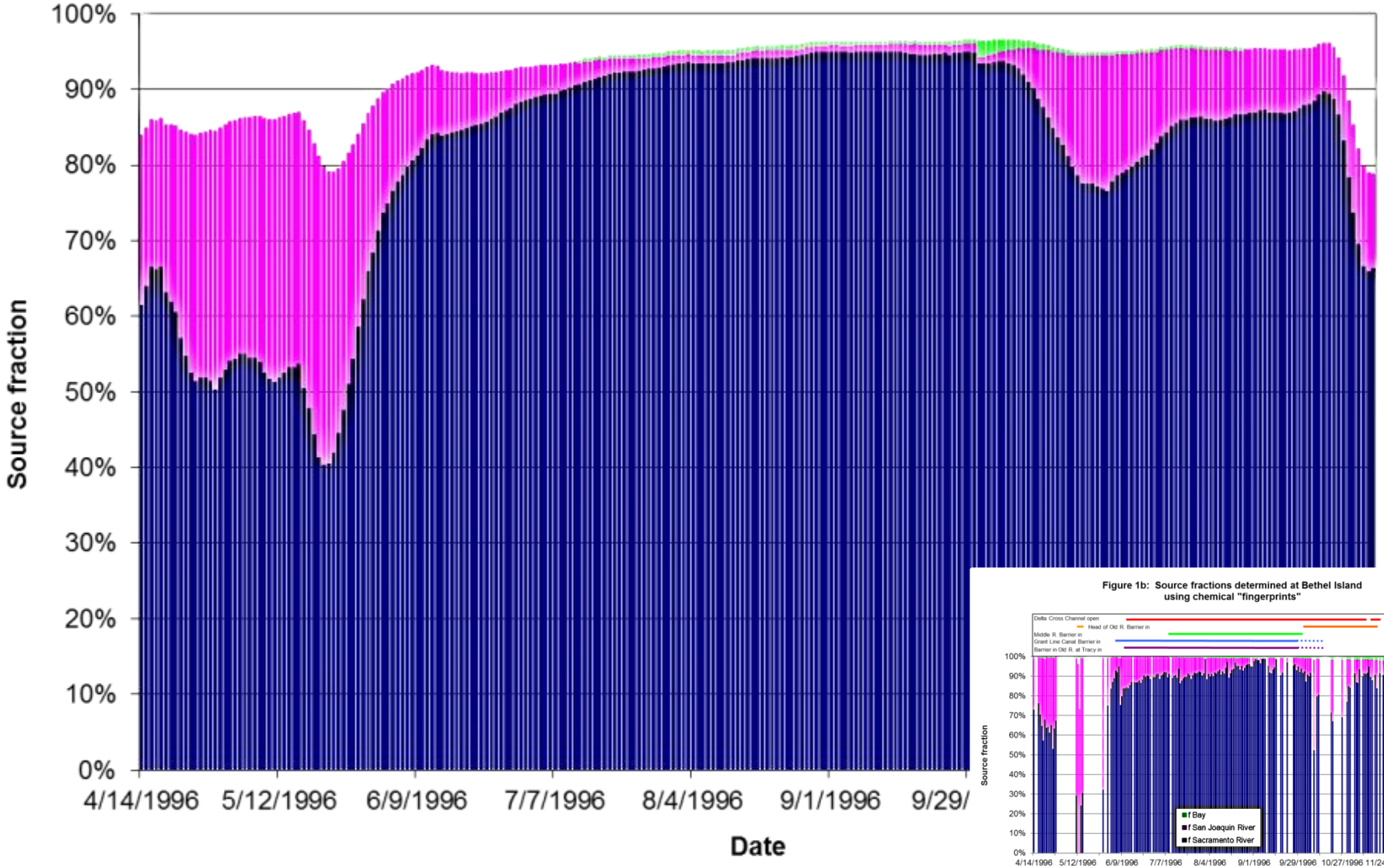


Figure 3b: Source fractions simulated at Bethel Island using the Fischer Delta Model (FDM)



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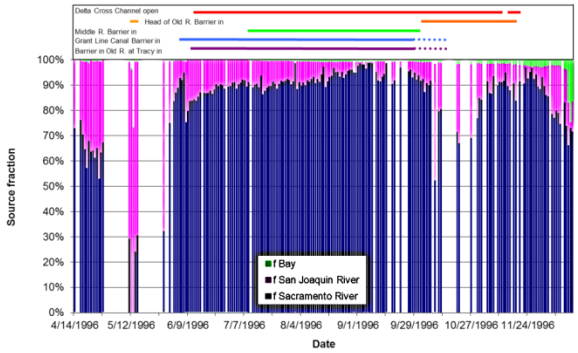

Recommendation 2: Evaluate effects of future changes

- BDCP would divert Sacramento River water, reducing the amount that reaches the south, central, and western Delta
- BDCP is expected to increase salinity at Antioch's intake (more important than sea level rise in wet and above normal years)
- BDCP is expected to worsen water quality
- *Source of water, water quality impacts, and changes in residence time should be evaluated*

Recommendation 3: Evaluate effects of new habitat

- Depending on location and design, habitat can increase salinity in western Delta
- Water quality models typically retain current geometry, and may not accurately simulate flooded shallow habitat (e.g., flooding of salt ponds)
- Habitat will likely result in changes to erosion/deposition patterns
- *Models should be adjusted as necessary to evaluate habitat impacts over life of BDCP*

Antioch's requests

- Salinity should not be allowed to rise (nor outflows decline) beyond current D-1641 and X2 operations criteria.
- Compliance points (e.g., Emmaton) should not be moved landward (as proposed by BDCP).
- Consider using gauging station at Antioch as point of interest for salinity (and flow) in western Delta.
- Ensure that mitigation is provided for impacts to beneficial uses that occur as a result of BDCP.