MODELING OF BDCP IMPACTS ON FRWA's and EBMUD's OPERATIONS

Meeting Minutes

Date: May 26, 2009
Time: 1:30pm-3:00pm
Location: DWR Offices, Bonderson Building, Sacramento, CA

Attendees:
Parviz Nader, Ming-Yen Tu, and Michelle Wang - DWR
Mark Bluestein, Garth Hall, Joe Miyamoto and Raffi Moughamian - EBMUD
Forrest Williams - Sacramento County Water Agency (SCWA)

I. FRWA's and EBMUD's issues requiring analysis

- Garth Hall explained the roles of EBMUD and SCWA as JPA members of the Freeport Regional Water Authority (FRWA) and as owners/operators of the Freeport Regional Water Project. He identified that some of the issues requiring analysis are of concern to FRWA and others are of concern to EBMUD alone. Garth distributed and reviewed the meeting handout (attached) highlighting FRWA's and EBMUD's concerns about the impact of BDCP operations. The handout noted the following potential issues:
    - FRWA: potential increased frequency and duration of reverse flow near the Freeport intake
    - FRWA: potential sedimentation/scouring near the Freeport intake
    - EBMUD: Mokelumne fisheries impacts.

II. Reverse Flow at the Freeport Project Intake

- Parviz stated that the BDCP operations might limit or stop diversions at low river flow rates to meet maximum fish exposure time criteria at the fish screens. If implemented, this would likely reduce or even eliminate the reverse flow impacts on the Freeport intake.
- Forrest explained the operating rules and criteria developed, with California Department of Public Health concurrence, for curtailment of Freeport pumping during reverse flow events. He said these rules are incorporated into an agreement between FRWA and the Sacramento Regional County Sanitation District (SRCSD).
- Parviz said that DWR will consider using a "fingerprint" analysis using the DSM2 model to examine the reverse flow issue. The "fingerprint" analysis could determine the percent volume of the wastewater effluent at any specific location.
- Parviz stressed the importance of using the best possible flow and water quality data on the SRCSD outfall. He also requested information on representative operations scenarios for the Freeport project during low flow/reverse flow conditions.

III. Sedimentation/Scouring at the Freeport Project Intake

- Mark explained that hydrodynamic studies undertaken in planning and design of the Freeport intake involved 1-D and 2-D modeling of velocity and water surface elevation.
- DWR and FRWA representatives discussed an approach whereby (1) a recognized industry expert on river sediment dynamics could be consulted to indicate whether there was any likelihood of an impact on the Freeport Intake based on a proposed location of the upstream BDCP intake and, if an impact appeared to be possible, (2) further analysis would be undertaken.

IV. Impacts on Mokelumne Fisheries

- Parviz suggested that fish movement be initially examined with the particle tracking module of DSM, particularly for smolt out-migration.
- Parviz said that currently DWR is not capable of modeling fish behavior. He said that DWR previously tried to add some level of behavior to particles in a particle-tracking analysis but he could not recall if it was successful and whether the modeled species was delta smelt or salmon.
- Garth and Joe suggested that particle tracking results could be enhanced with post-processing using empirical data on fish behavior. Garth suggested that bubble/acoustic barrier effectiveness could be replicated by introduction of a "filter" into the model code.
- EBMUD and DWR discussed the possibility that once the initial particle tracking simulations are complete, EBMUD and DWR could explore the benefits of integrating fish behavior.

V. Current DWR BDCP Modeling

- Parviz said that CH2MHill is conducting the computer simulations for the draft EIR.
- CH2MHill is using CALSIM II for monthly time-step storage & flow simulation and DSM2 for Delta hydrodynamics and water quality simulation.
- DSM2 is currently being re-calibrated to include the impacts of Liberty Island. This should be completed in 2-3 weeks.
- The CALSIM team is conducting new a benchmark study which should be completed within 1 to 2 months.
- Parviz was unable to disclose a schedule for the BDCP modeling analysis due to DWR's internal confidentiality requirements.

VI. Next Steps/Action Items

1. Raffi: Provide Freeport intake and SRCSD outfall operation representative operating assumptions for use by DWR staff to model reverse flow impacts. Values should be consistent with 2030 level of development. This information should be delivered in preliminary form to DWR within three weeks. The results of the final CALSIM II benchmark study may require revision to the Freeport operating assumptions.
2. Parviz and Raffi: Schedule a meeting to discuss and review assumptions and modeling techniques for simulating the reverse flow and sedimentation/scouring issues in the vicinity of the Freeport intake. This meeting should occur within two months.
3. Parviz and Raffi: Schedule a half-day workshop, with EBMUD, DWR and CH2MHill to define the scenarios for the particle tracking model simulations. This would include defining flow rate, locations of particle injections, duration of simulations, and number of scenarios. This meeting should occur within two months.
4. Parviz: Notify EBMUD/SCWA when the updated CALSIM benchmark study is available.
5. Parviz: Notify EBMUD/SCWA when the recalibrated DSM2 model is available.

East Bay Municipal Utility District

Modeling of BDCP Impacts on EBMUD's Operations

EBMUD and DWR Meeting

Bonderson Building, Sacramento

May 26, 2009

EBMUD Attendees

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Joe Miyamoto: miyamoto@ebmud.com 510-287-2021
Raffi Moughamian: rmougham@ebmud.com 510-287- 0203

*** Primary ongoing contact on BDCP modeling engagement**

Agenda Overview

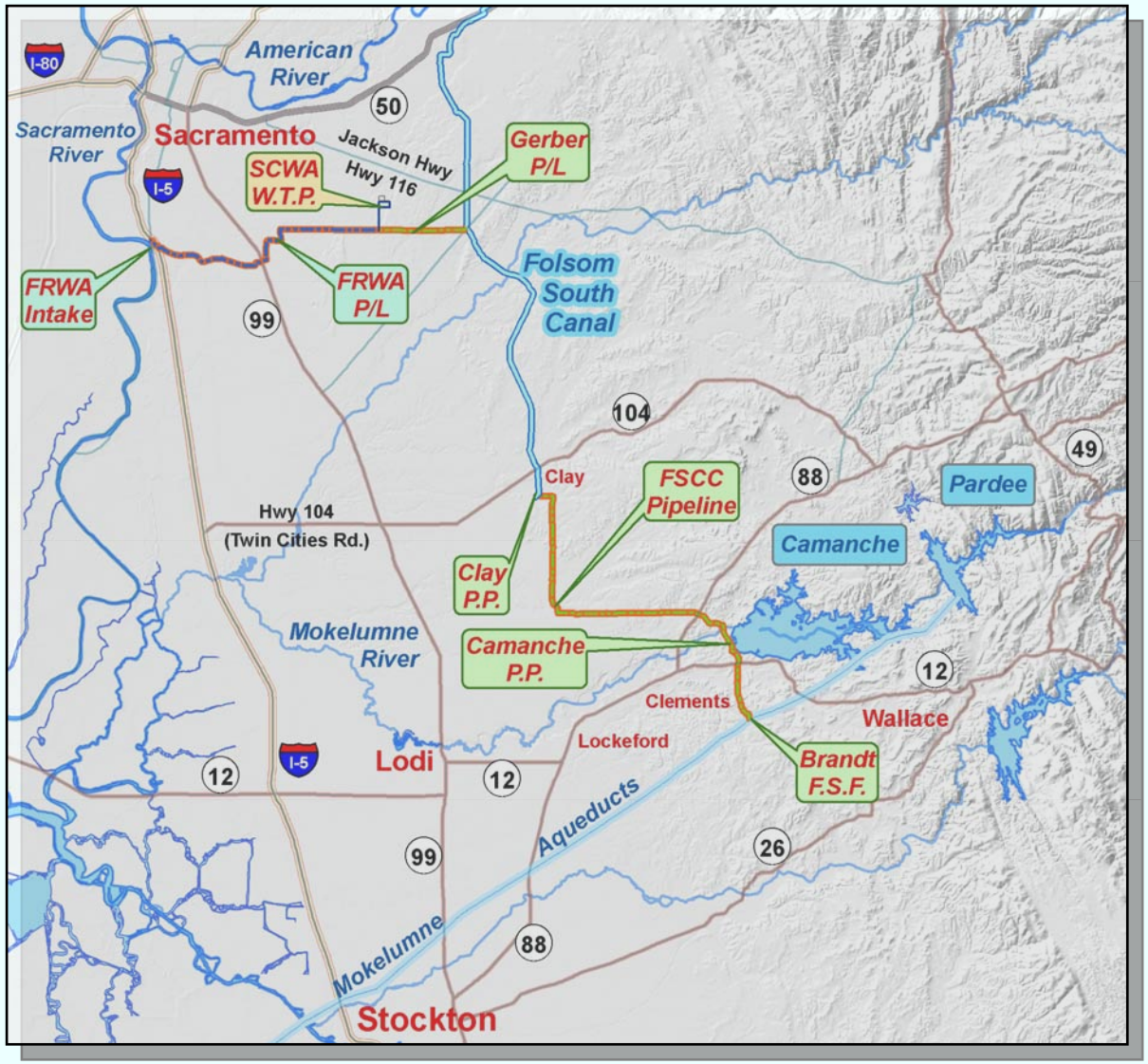
- Impacts on Freeport Intake (Isolated Facility)
- Impacts on Mokelumne Salmonids
- Next Steps

Freeport Regional Water Project

Freeport Project Overview

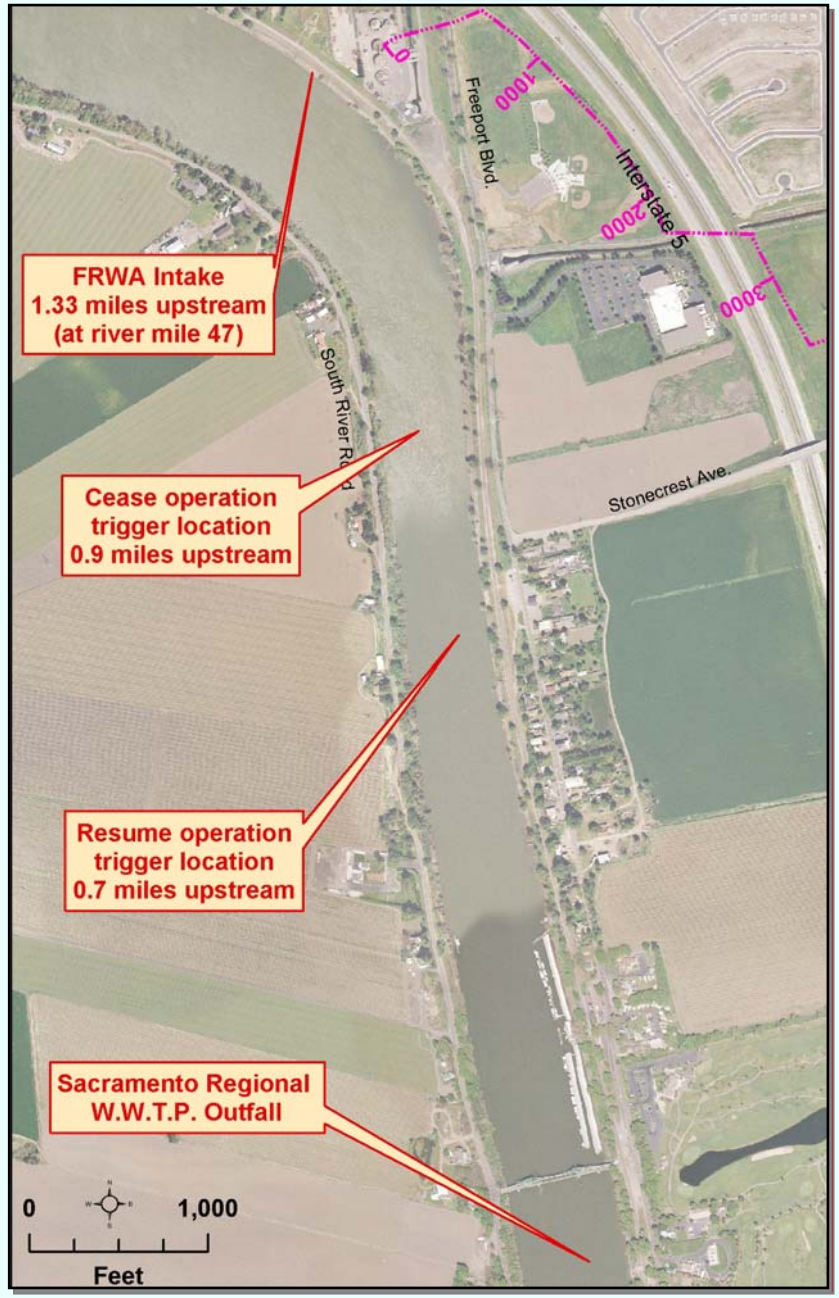
- **Purpose**
  - EBMUD: Supplemental dry-year supply
  - Sacramento County Water Agency: Additional surface supply to complement groundwater
  - Joint effort under JPA
- **Intake Location**
  - Sacramento River at Freeport Bend

Freeport: Joint & Individual Facilities



Freeport Operations

- 185 MGD Intake Capacity
- SCWA operates all years
- EBMUD utilizes in dry years
- Restricted operations during reverse flow events



Potential BDCP Impacts on Freeport Intake

- **Reverse Flow**
  - Sacramento Regional County Sanitation District outfall
  - Anticipate increased frequency and duration of reverse flow conditions with BDCP upstream intake
- **Potential Sedimentation/Scouring**
  - Possible increased sediment deposit and/or scouring near Freeport intake

Freeport Modeling To Date

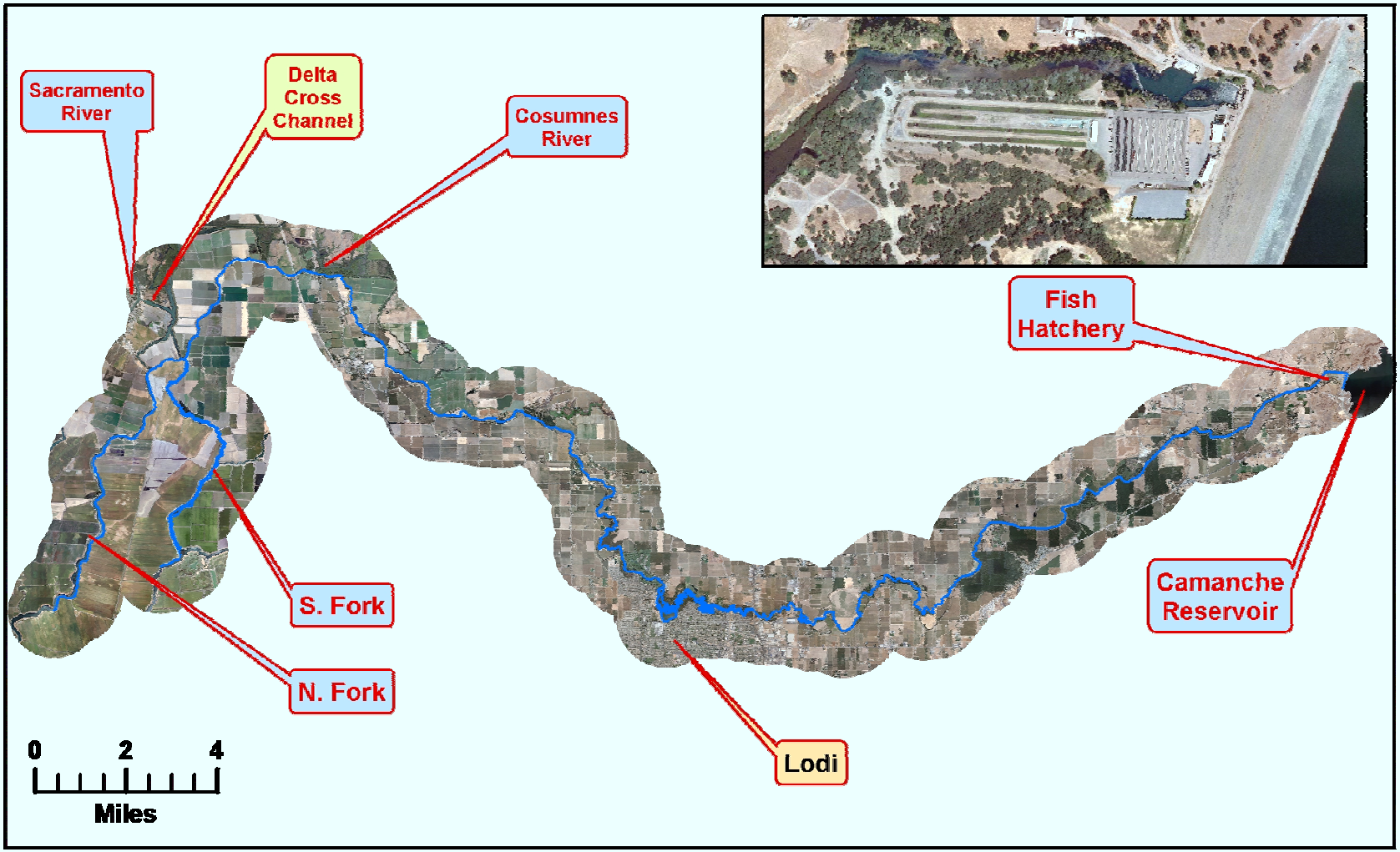
- CALSIM II
  - To assess river flow impacts
- Fisher Delta Model and DSM2
  - To assess Delta water quality impacts
- Longitudinal Dispersion
  - To develop reverse flow operational criteria
- 2-D Hydrodynamics
  - To simulate low-flow localized current patterns

Addressing Freeport Impacts

- **Modeling of reverse flow impacts and mitigation measures with upstream BDCP intake**
  - Review Flow Sciences approach in 2003 EIS/EIR
  - Hourly time-step simulation incorporating tidal dynamics
- **Modeling scouring and sedimentation near Freeport Intake due to upstream BDCP intake**
  - A function of proximity of BDCP intake
  - If impacts are likely, model mitigation measures

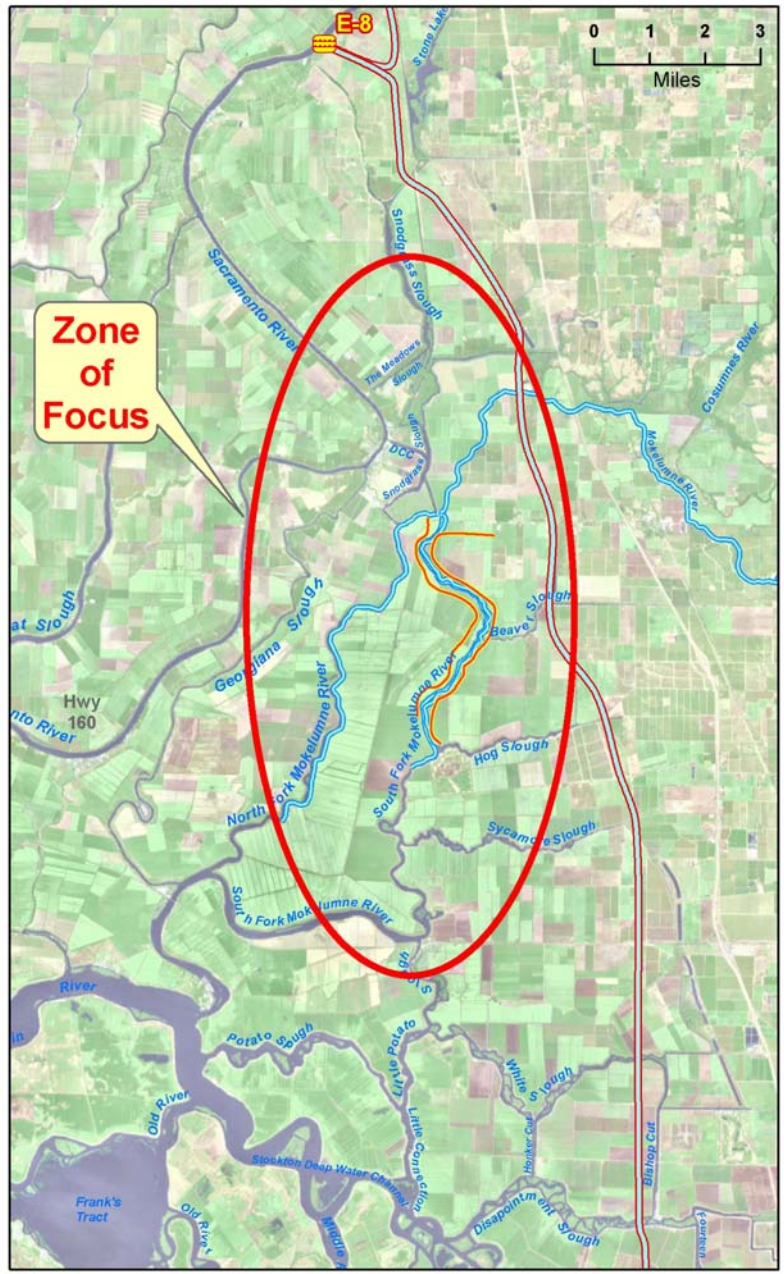
Mokelumne Fisheries

EBMUD's Fisheries Program



Potential BDCP Impacts on Mokelumne Fish

- **Isolated Facility**
  - Re-operation effects of Delta Cross Channel (DCC)
- **Dual Conveyance Facilities**
  - Increased fish entrainment
  - Decreased out-migration into the Delta
  - Attraction of Mokelumne fish into the conveyance corridor
  - Decreased return of Mokelumne fish to the Mokelumne river



Addressing Mokelumne Fisheries Impacts

- Particle tracking modeling
- Analyze results from regional acoustic telemetry study
- “Enhanced” particle tracking modeling
  - Inclusion of fish behavior
  - Using other empirical data

Next Steps

- Schedule Follow-Up Meeting on Modeling Approach
- Schedule Review of Key Modeling Assumptions
- Schedule Briefing on Model Results

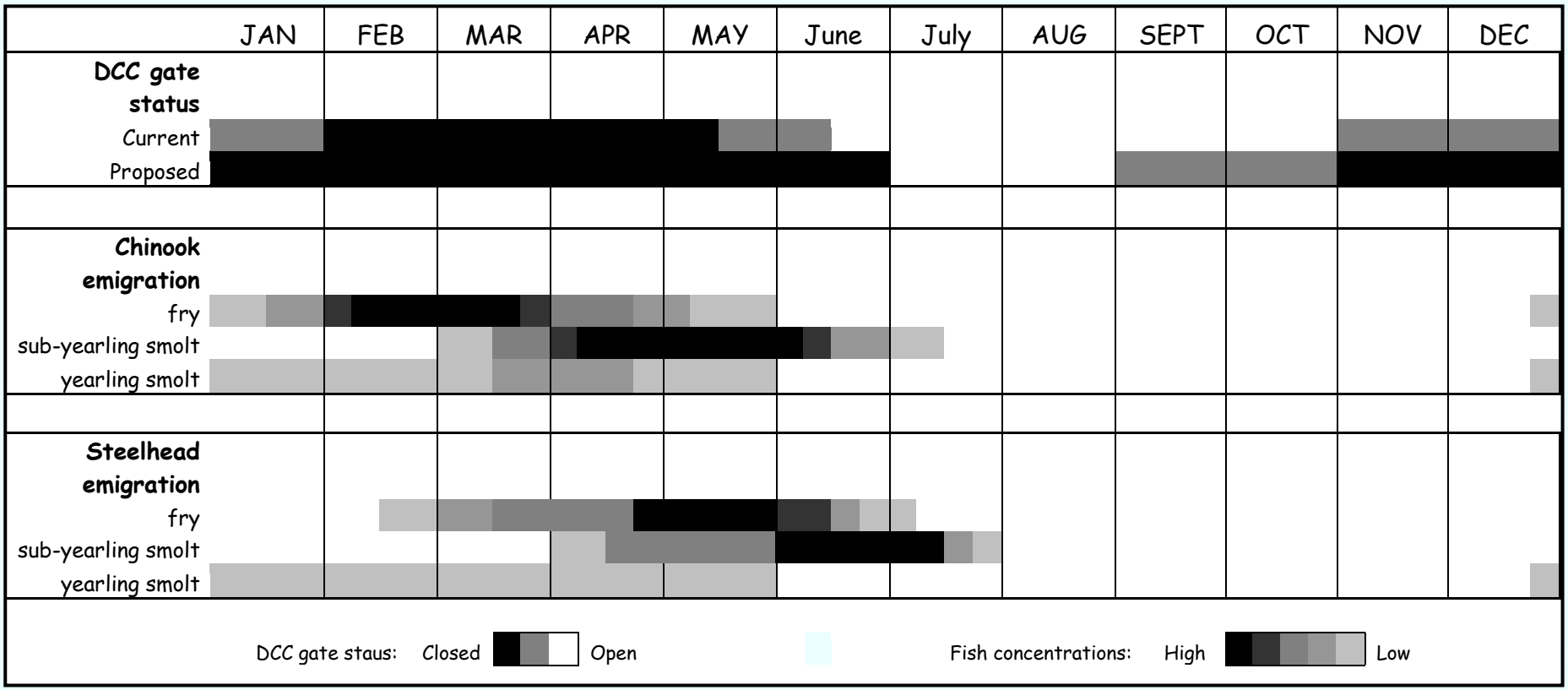
Mokelumne Fisheries: More Specifics

Isolated Facility Impacts: DCC Re-Operation

- **Issues**
  - Lower survival of out-migrating Mokelumne salmonids during extended closures of DCC
  - Fall transfer of water through DCC causes in-migrating Mokelumne salmonids to stray into the Sacramento River (reduced spawning)
- **Action: Examine impacts of re-operation of DCC on Mokelumne salmonids**

DCC Re-Operation Effects

Proposed DCC Re-operation from BDCP Operation Technical Team Meetings

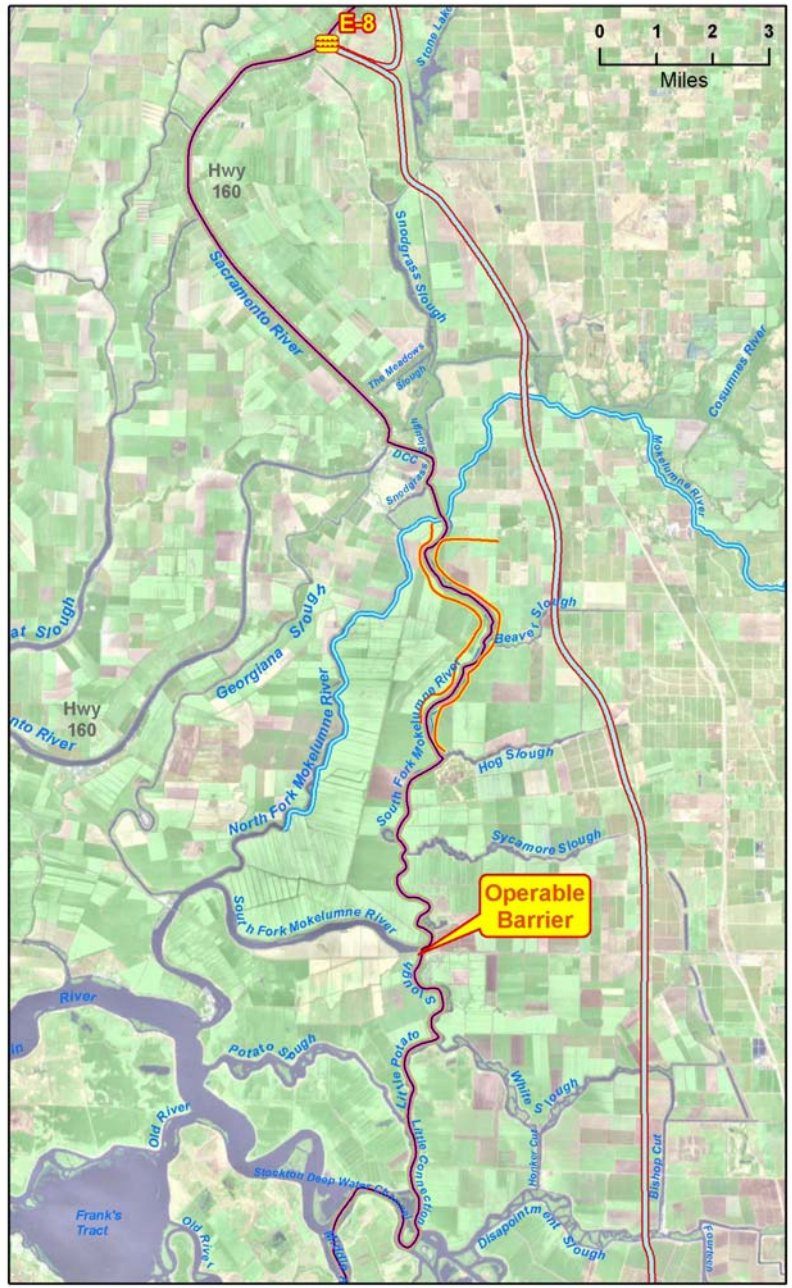


Dual Conveyance: Potential Mitigation Measures to Study

- Operable Barrier 1 (near Terminous Tract)
- Operable Barrier 2 (at N-S Fork split)
- Mokelumne Flow into Sacramento
- Flow Tie-In at Beaver Slough

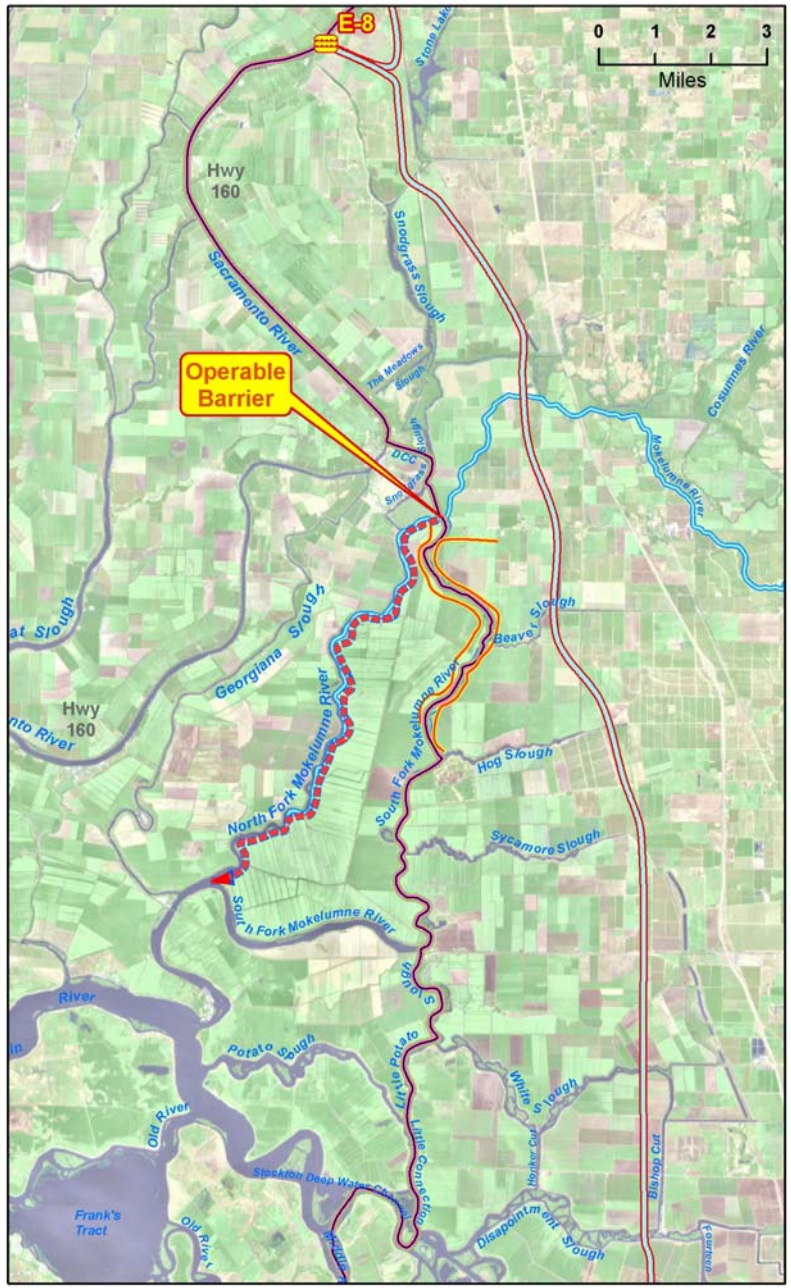
Operable Barrier 1

- Issue to be Addressed
  - Out-migrating Mokelumne fish entrainment and attraction to conveyance corridor
- Possible Solution
  - Install operable barrier along South Fork Mokelumne near Terminous Tract
  - Prevents Mokelumne fish from entering Little Potato Slough and the delta conveyance corridor during fall and spring. Reduces fish entrainment



Operable Barrier 2

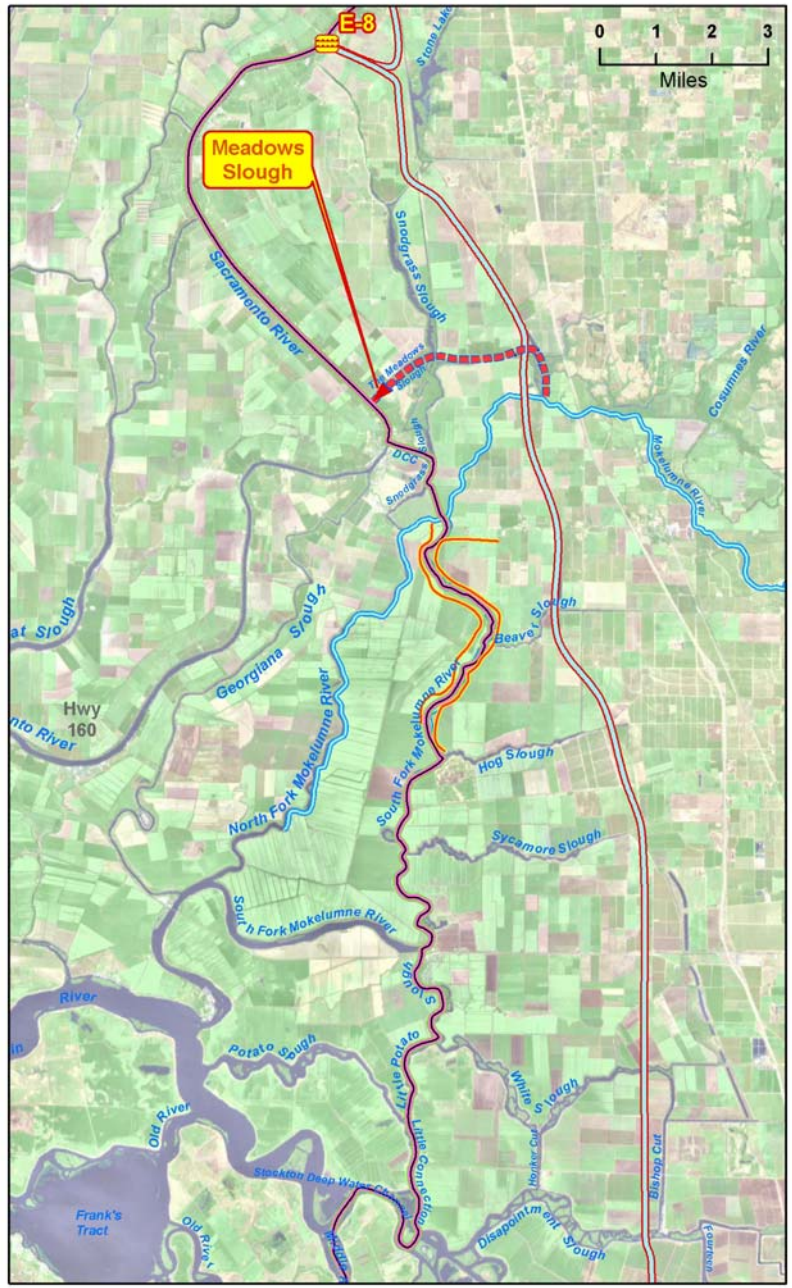
- Issue to be Addressed
  - Out-migrating Mokelumne fish entrainment and attraction to conveyance corridor
- Possible Solution
  - Install operable barrier to ensure that Mokelumne flows enter the North Fork instead of the dual conveyance corridor



Mokelumne flow into Sacramento River

- Issue to be Addressed
  - Mokelumne fish entrainment from dual conveyance, effects out-migration
- Possible Solution
  - Redirect the Mokelumne flow into the Sacramento upstream of the Delta Cross Channel, via Meadows Slough*
  - Consider DCC operation in conjunction

* **From the Delta Corridor Project Proposal by Russ Brown, Jones and Stokes**



Flow Tie-In at Beaver Slough

- Issue to be Addressed
  - Prevent out-migrating Mokelumne fish from entering conveyance corridor
- Possible Solution
  - Route conveyance from Sacramento River into the South Fork Mokelumne at Beaver Slough*
  - Create reverse flow in South Fork Mokelumne upstream of Beaver Slough

*** As proposed by CALFED**