CALFED Science Program Workshop

Issues Related to Through-Delta Options

Through-Delta Conveyance Options

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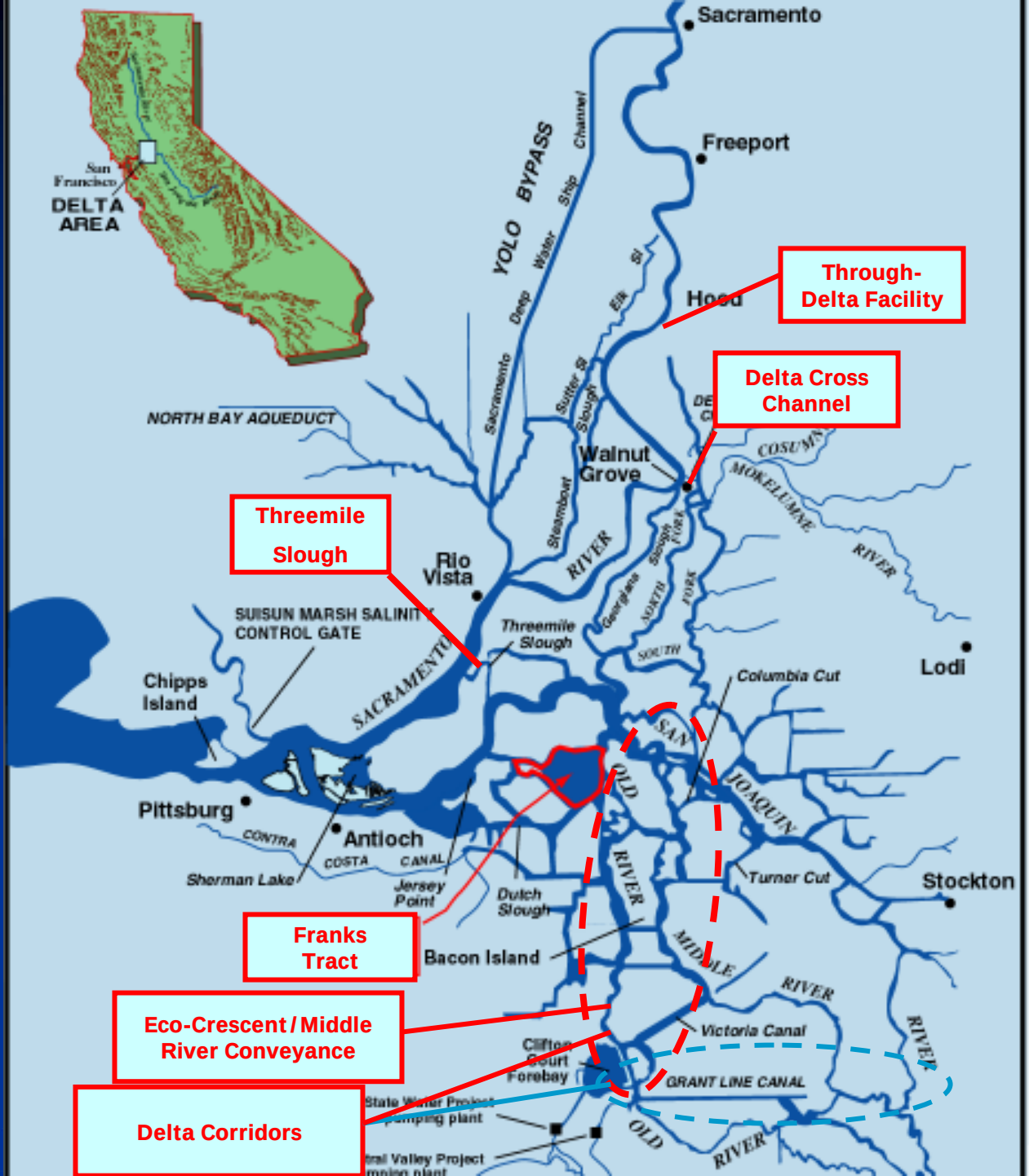
September 11th, 2007

Through-Delta Options - 2000 and Beyond

- Delta Cross Channel (DCC)
- Through Delta Facility (TDF)
- Franks Tract (FT)
- Three Mile Slough
- Eco-Crescent/Middle River Conveyance
- Delta Corridors


Sacramento
Freeport
Hood
Through-Delta Facility
Delta Cross Channel
Walnut Grove
Threemile Slough
Rio Vista
Lodi
Stockton
Chipps Island
Pittsburg
Antioch
Sherman Lake
Jersey Point
Dutch Slough
Franks Tract
Bacon Island
Columbia Cut
Turner Cut
Victoria Canal
GRANT LINE CANAL
Eco-Crescent / Middle River Conveyance
Delta Corridors
NORTH BAY AQUEDUCT
SUISUN MARSH SALINITY CONTROL GATE
YOLO BYPASS
SACRAMENTO RIVER
SAN JOAQUIN RIVER
OLD RIVER
MIDDLE RIVER
CONTRA COSTA CANAL
MOKELUMNE RIVER
DELTA AREA
San Francisco

Project Objectives

Delta Cross Channel Reoperation

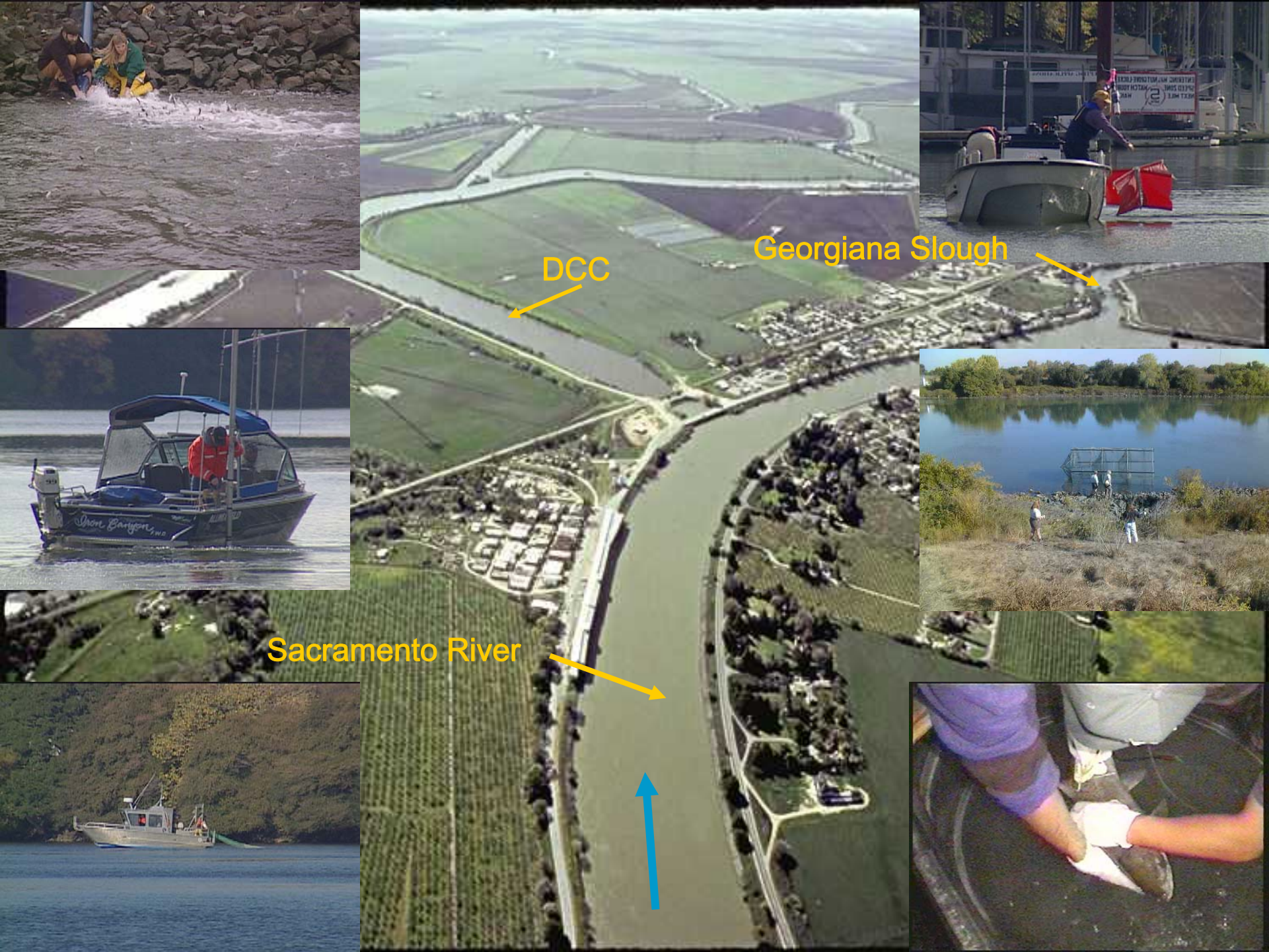
- Improve water quality at the Exports
- Resolve fishery concerns

Through Delta Facility

- Evaluate technical viability of a 4,000 cfs thorough-Delta diversion facility to compliment the operations of the DCC Re-operation
- Resolve fishery concerns

Franks Tract Project

- Improve the water quality of export water
- Possibly benefit fisheries


DCC
Georgiana Slough
Sacramento River

Adult Salmon Findings

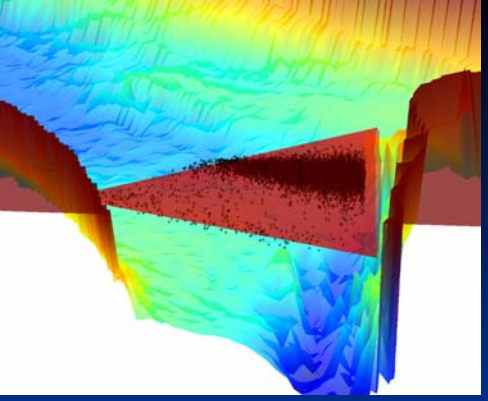
- The DCC is an important migratory pathway for adult Chinook salmon.
- Salmon move through the DCC in both directions.
- Gate operations at the DCC did not appear to
- attract more salmon into the San Joaquin system.
- Transit times in the Delta varied.
- Salmon migration is not always a direct path.

Juvenile Salmon Findings

- Recapture very low during day
- Recapture very low in DCC
- Timing of capture of fish coincided with arrival of drifters
- Location of capture reflects hydrodynamics
- Fish go with the highest velocity flows
- Day night differences significant

Pierce, USFWS

Bell, USBR,2003



Entrainment at Junctions

- Universal Rates of Predation changes the impact of different management Options
- Combinations of simple linear system can have complex, non-linear responses
- The assumption that the number of Fish being entrained in junction is proportional to the percentage of flow entering a junction is not always valid:
  - Fish are not evenly distributed within the water section
  - Water velocities are not evenly distributed in the river cross section
  - Fish distribution should change as water velocities changes, and/or behavior Eco-Crescent/Middle River Conveyance

Water Quality Findings

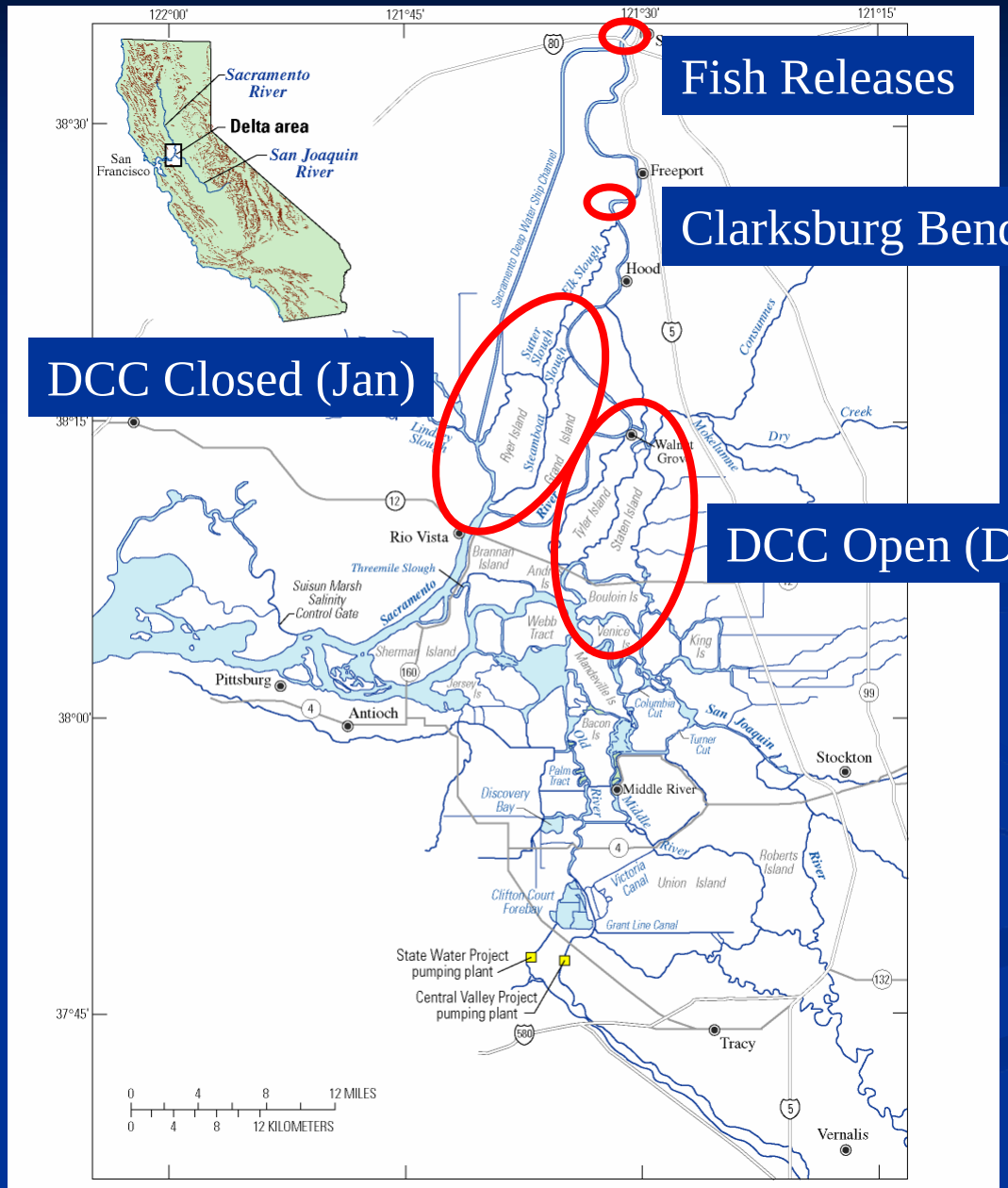
- Clear response to DCC closures in central Delta (as measured in lower Mokelumne River)
- Advective flux dominates lower Mokelumne – changes in mean flow will change salinity transport there
- Dispersive and advective flux are indicators of distinct and important transport mechanisms in western Delta – either can dominate transport, depending on conditions
- Impact of gates on western Delta salinity may have been offset by export cuts during same period

Briggs, CCWD

Unaddressed Issues

- Delta smelt upmigration
- Organic carbon (or other food) diversion
- Steelhead effects
- Mokelumne salmon effects
- Accumulative effects of out migrants exposure to large fish screens in a tidal area
- Attraction/Straying issues of Sacramento River Water being discharged into the Mokelumne System

Pilot Study @ Clarksburg

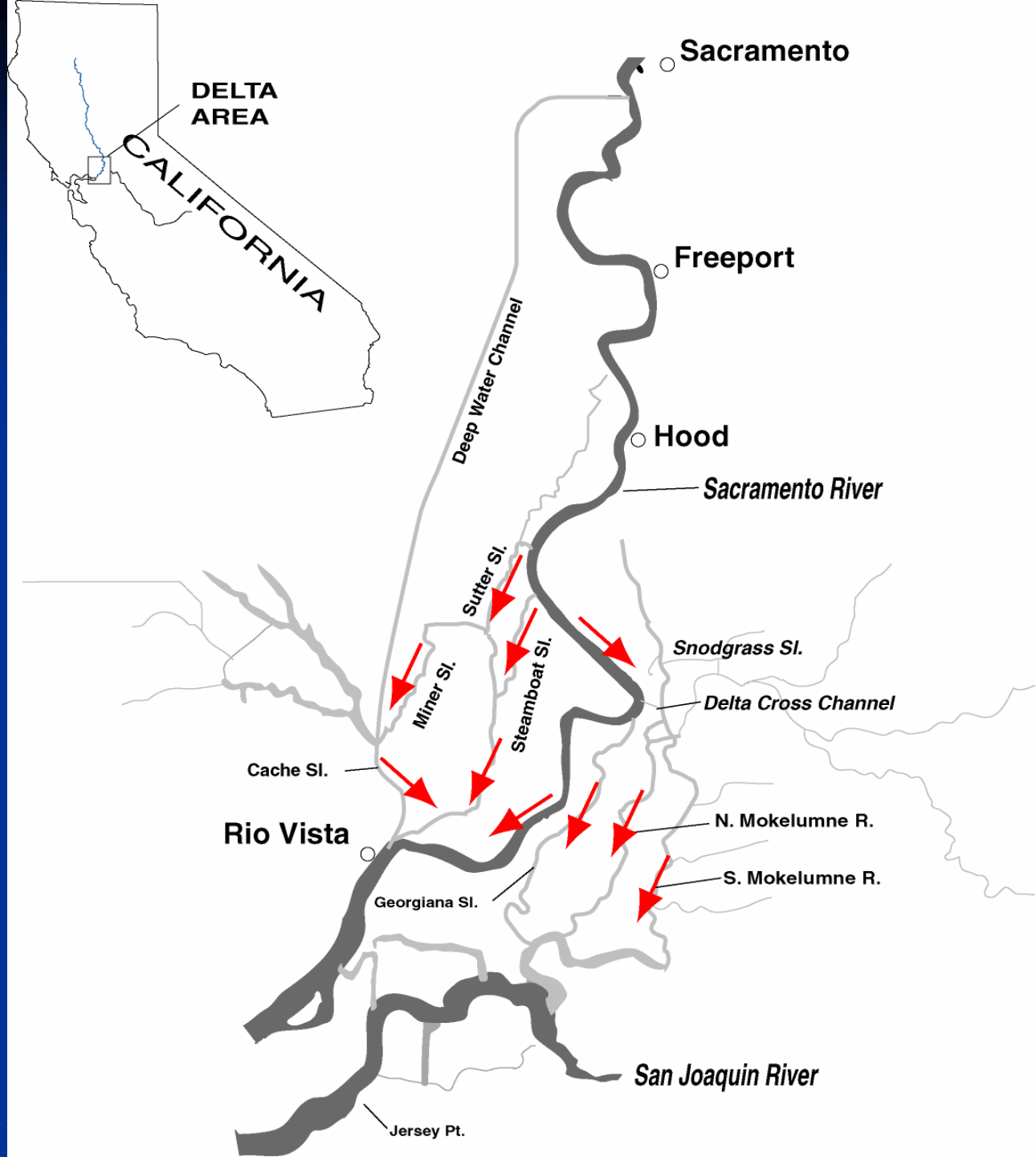


Location of flow station sites in the Delta Area of California.

Delta Cross Channel

- DCC operations have regional affects
- Circulation patterns at bends in rivers affect fish behavior
- Fish move in the water column - day and night conditions
- Reconfiguration of slough entrances may reduce fish entrainment

Channels Affected by DCC & TDF Operations



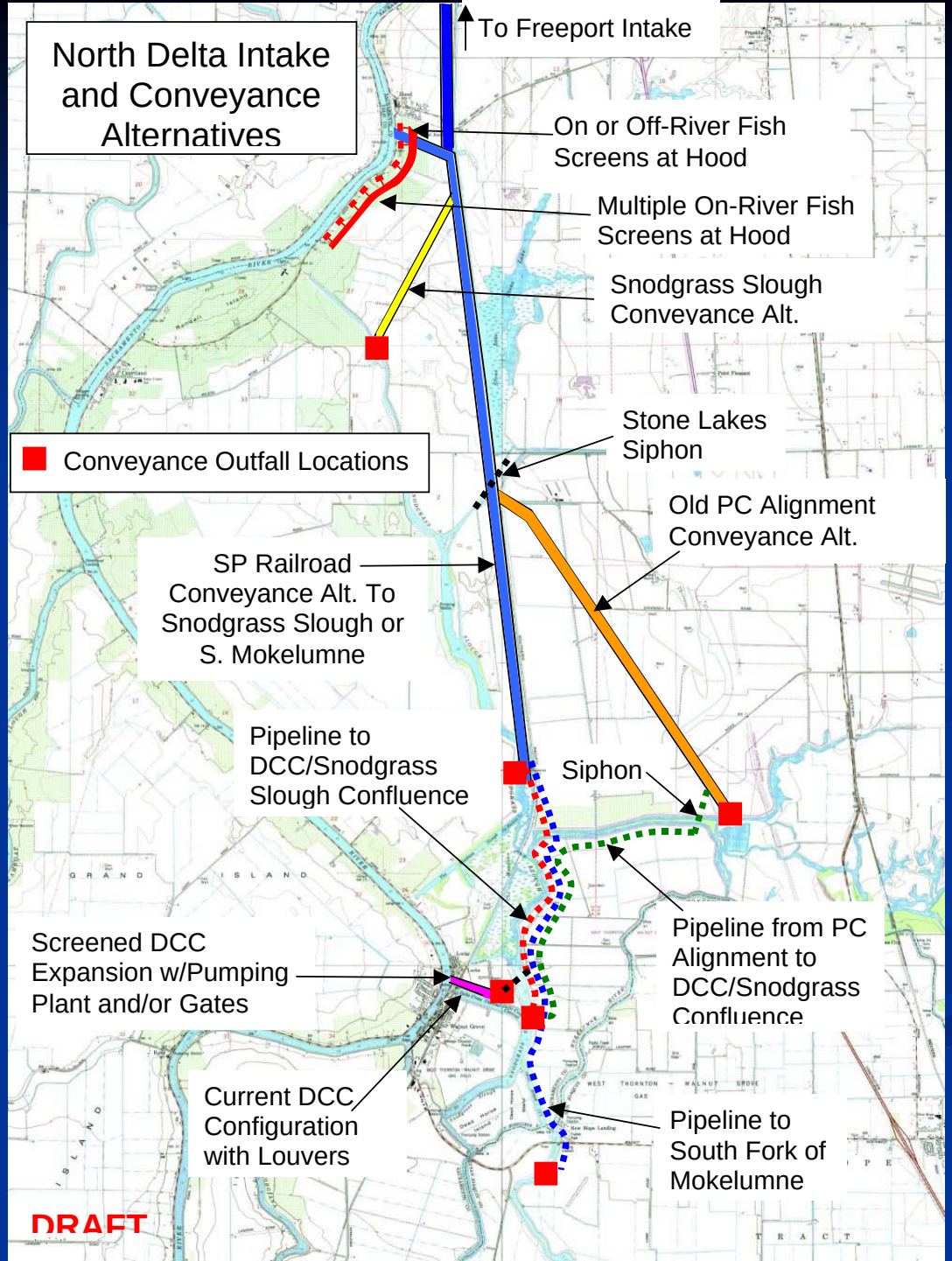
Future Experiment Focus

Salmon smolt experiments will likely focus on:
(1) Velocity/smolt position interactions
(2) Channel-segment-wise mortality

Adult salmon experiments will likely focus on:
Channel junction decision-making

Water quality experiments will likely focus on:
Gate operation effects on Central Delta flows and SC's

TDF Options


North Delta Intake and Conveyance Alternatives
To Freeport Intake
On or Off-River Fish Screens at Hood
Multiple On-River Fish Screens at Hood
Snodgrass Slough Conveyance Alt.
Conveyance Outfall Locations
Stone Lakes Siphon
Old PC Alignment Conveyance Alt.
SP Railroad Conveyance Alt. To Snodgrass Slough or S. Mokelumne
Pipeline to DCC/Snodgrass Slough Confluence
Siphon
Pipeline from PC Alignment to DCC/Snodgrass Confluence
Screened DCC Expansion w/Pumping Plant and/or Gates
Current DCC Configuration with Louvers
Pipeline to South Fork of Mokelumne
DRAFT

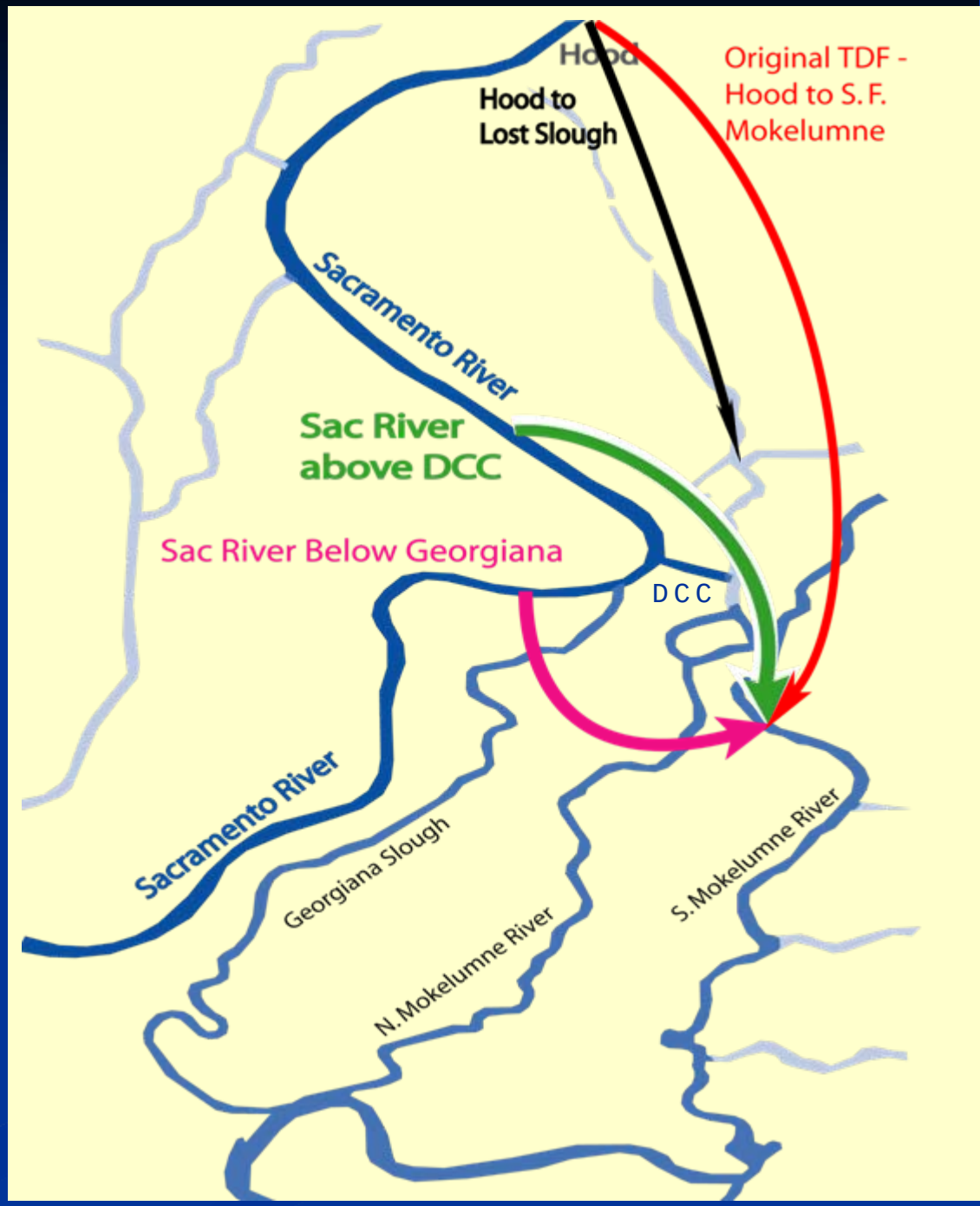
DSM2 – TDF Configuration Alternatives

Original TDF Alignment

Hood to Lost Slough

Upstream of DCC to S. Moke.

Downstream of Georgiana Slough to S. Mokelumne R.

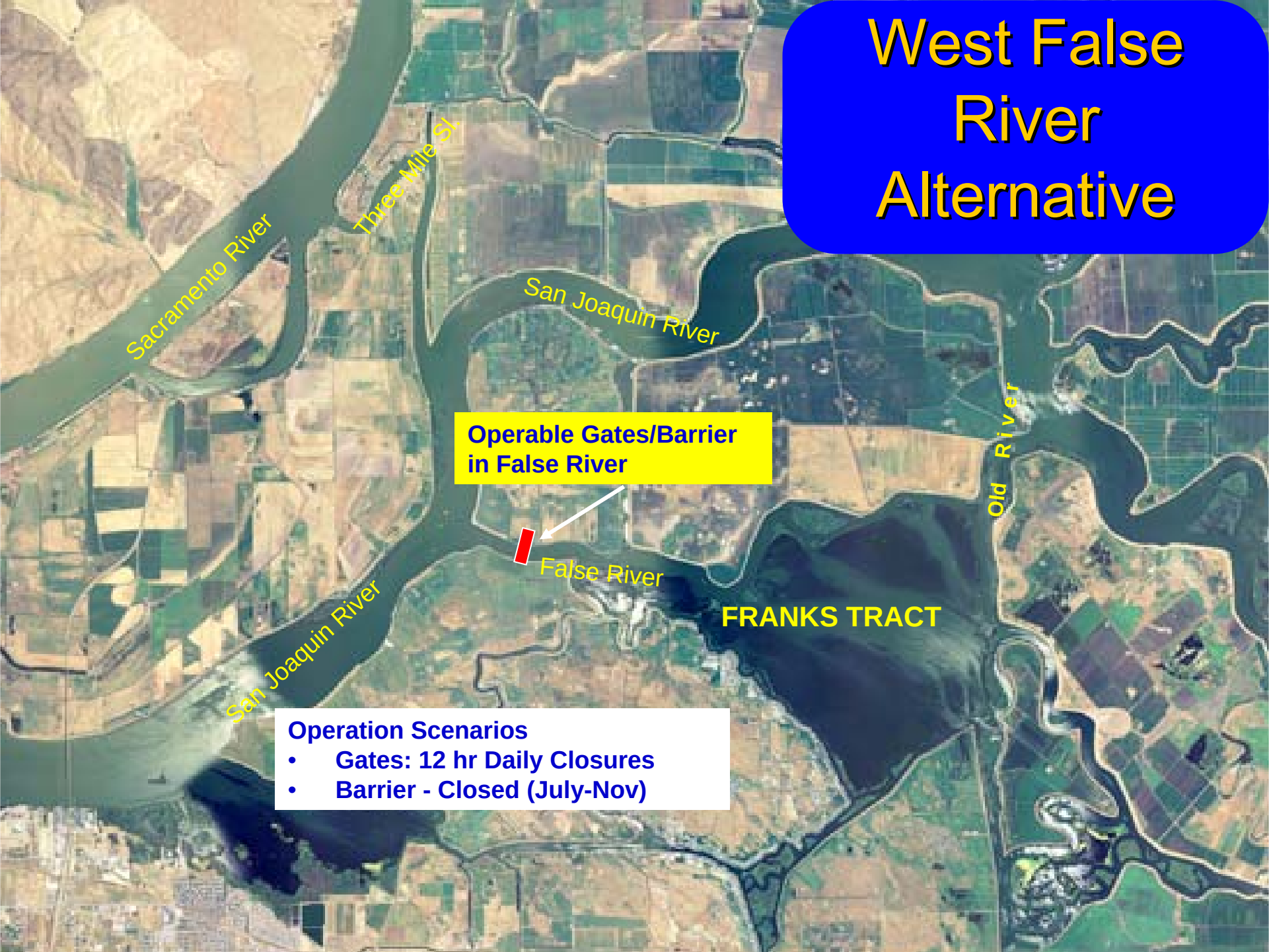


Franks Tract Alterative Gate Locations

Franks Tract Project

- Converged to two alternatives:
  - West False River
  - Three Mile Slough
- Initiating EIR/EIS
  - (Consultant Contract negotiations in process)

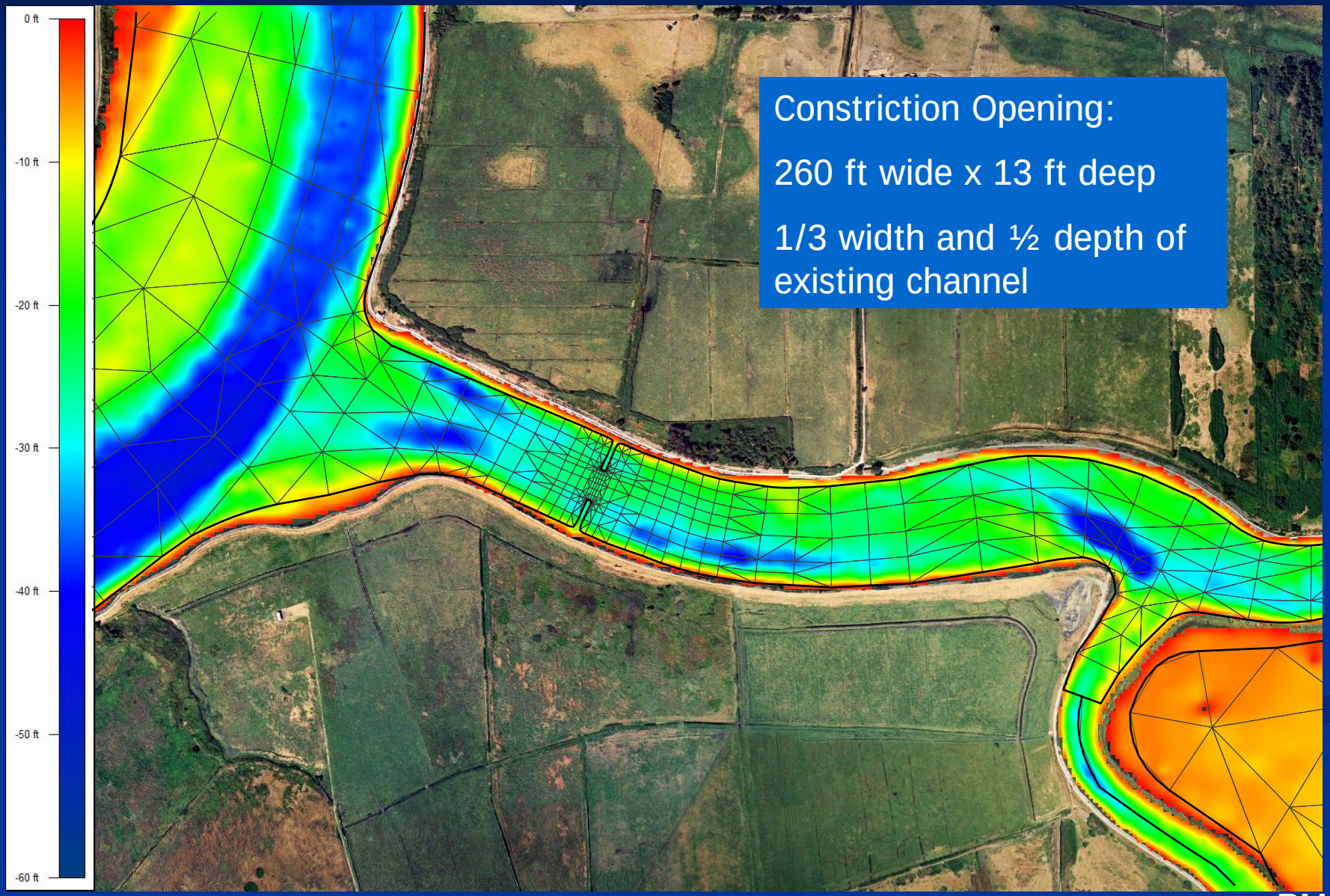
West False River Alternative



Operation Scenarios

- **Gates: 12 hr Daily Closures**
- **Barrier - Closed (July-Nov)**

Constriction Geometry as Modeled



Constriction Opening:

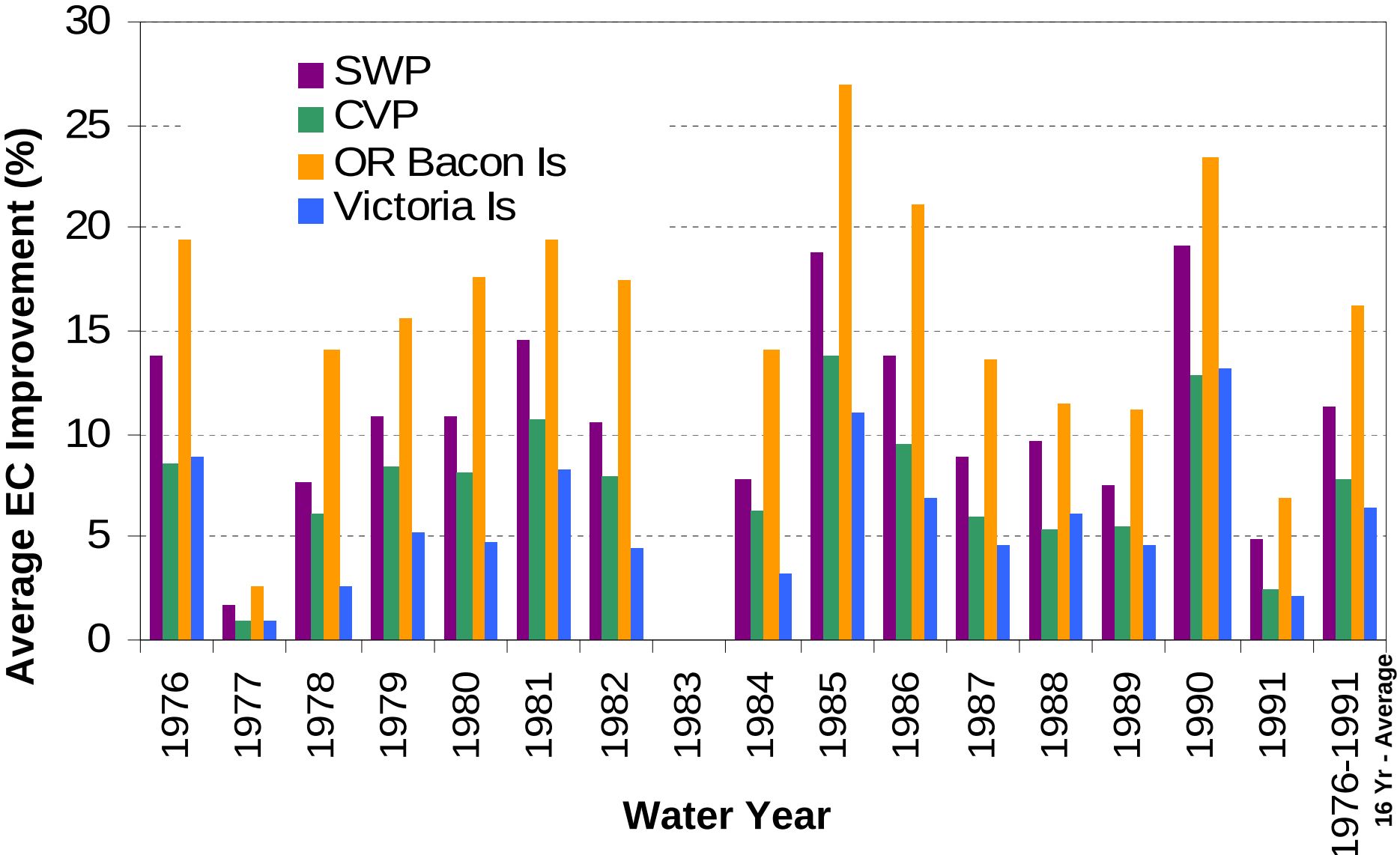
260 ft wide x 13 ft deep

1/3 width and ½ depth of existing channel

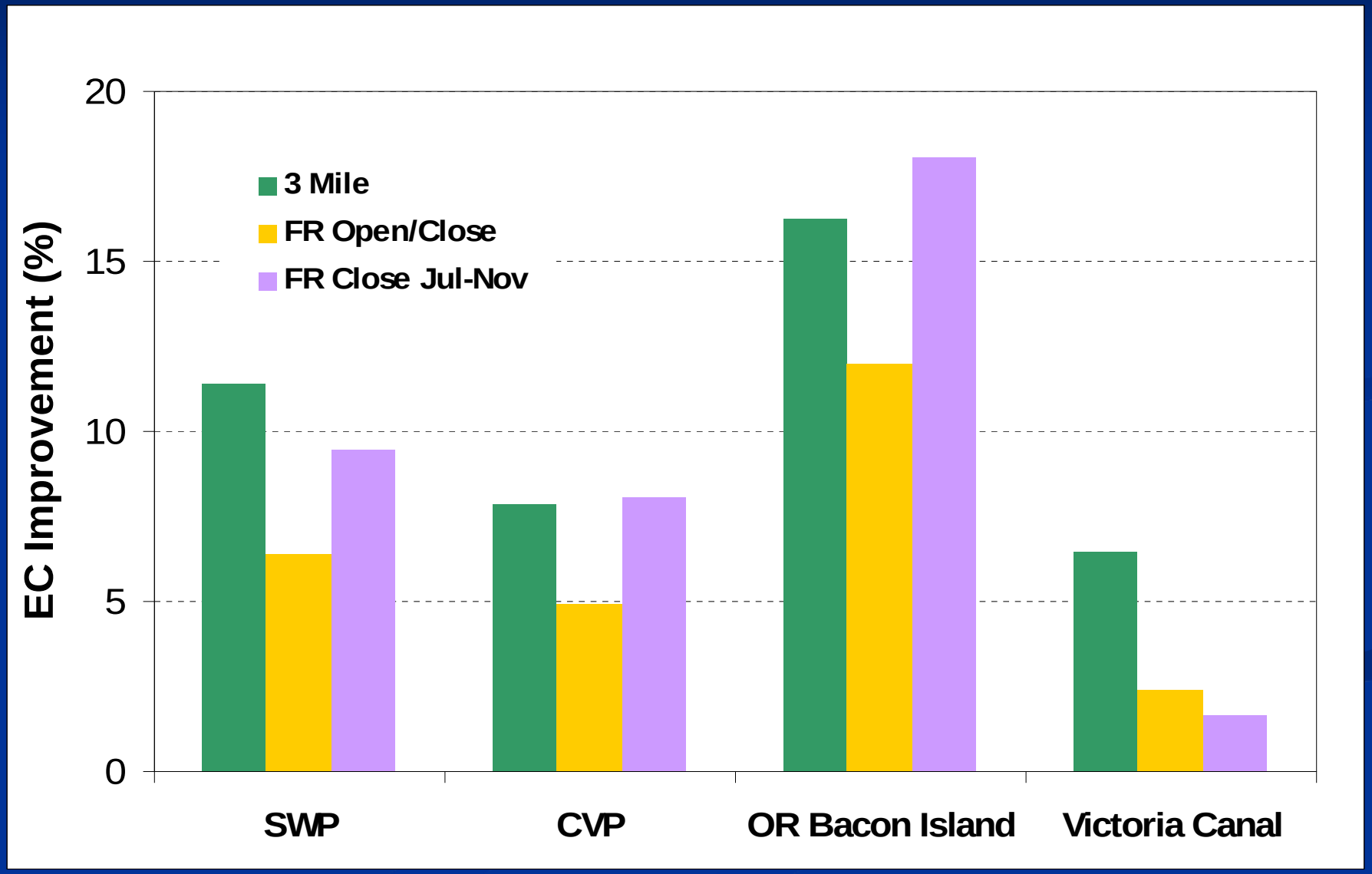
RMA

Operable Gates in
Three Mile Slough
Sacramento River
San Joaquin River
Operation:
Close 2-6 hrs Daily During Ebb Tide
Old River
False River
FRANKS TRACT
San Joaquin River
Three Mile
Slough
Alternative

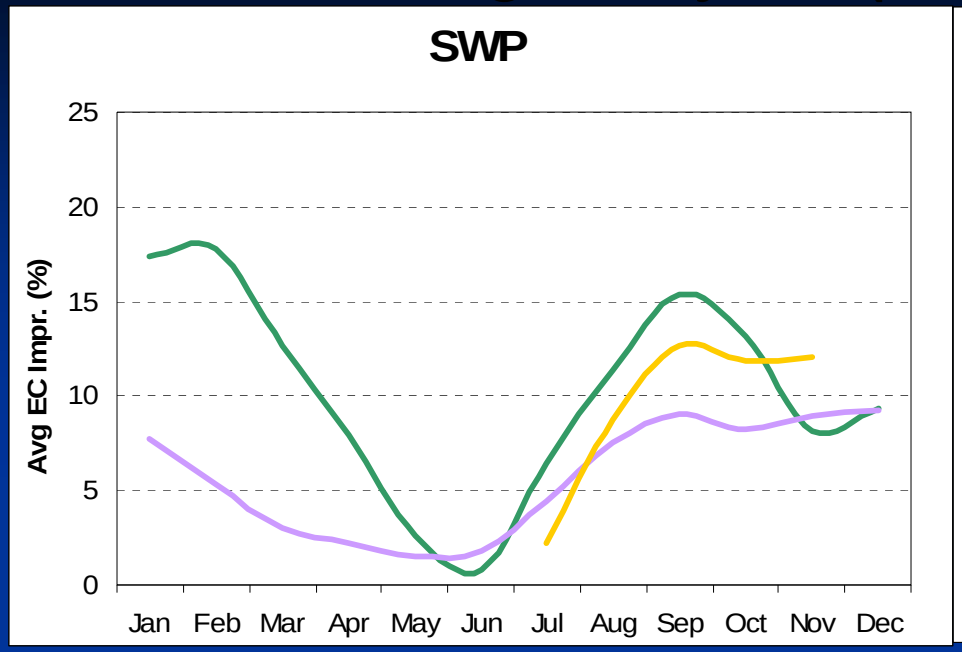
Three Mile Slough Alternative
Operation – 2 to 6 hr Daily Closures

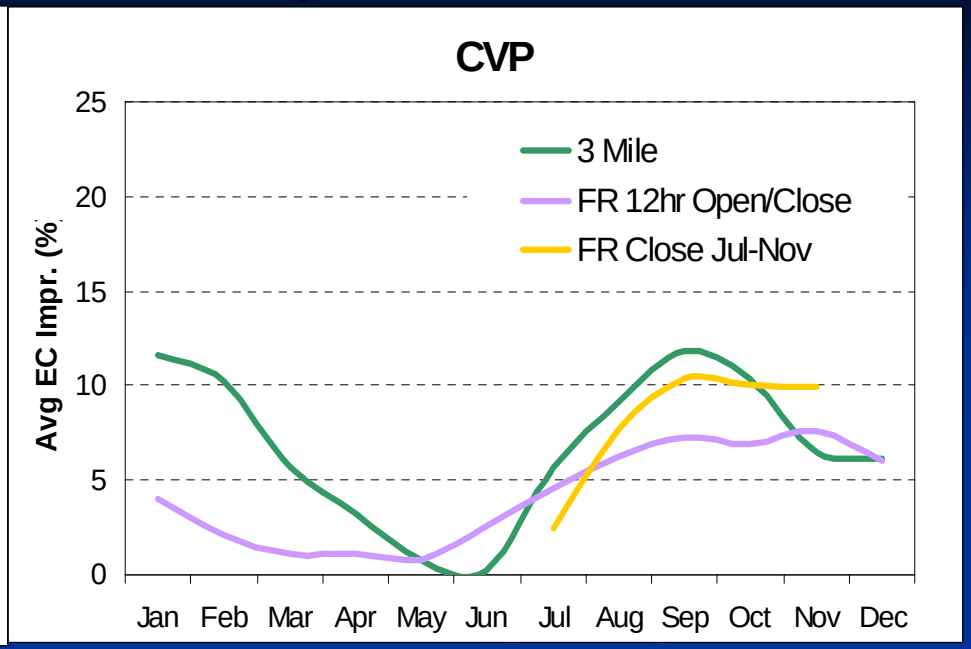


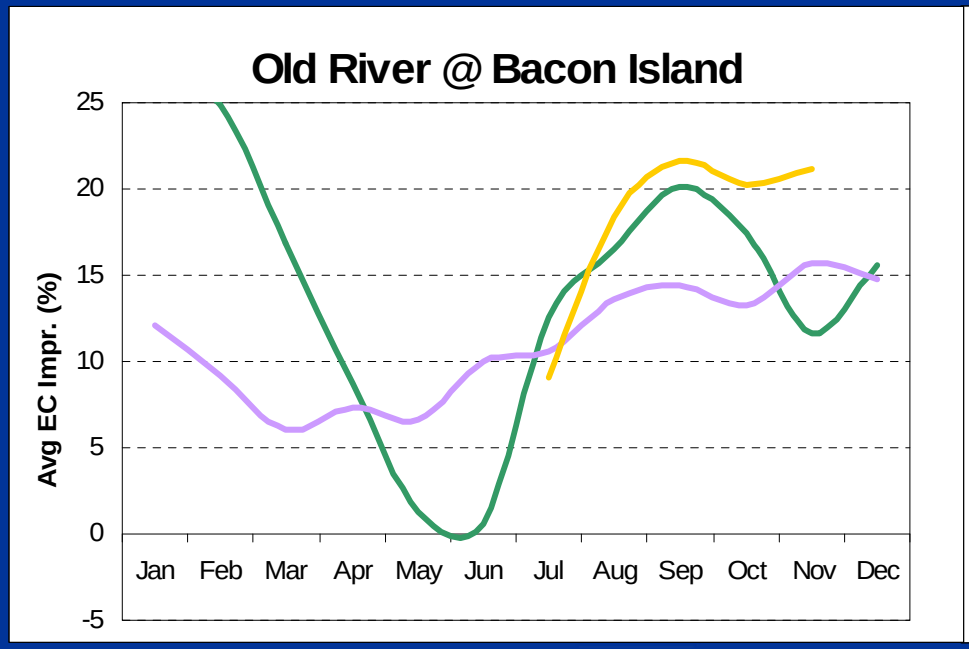
Comparison of Alternatives
Operation: July – November (1976-91)

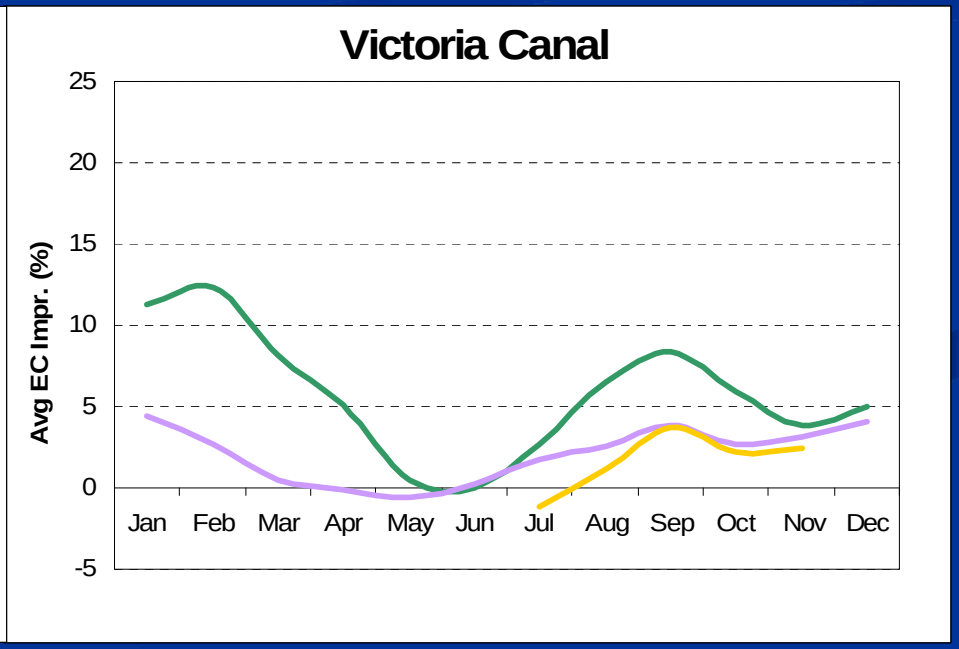


Average 16 year (1976-1991) Performance

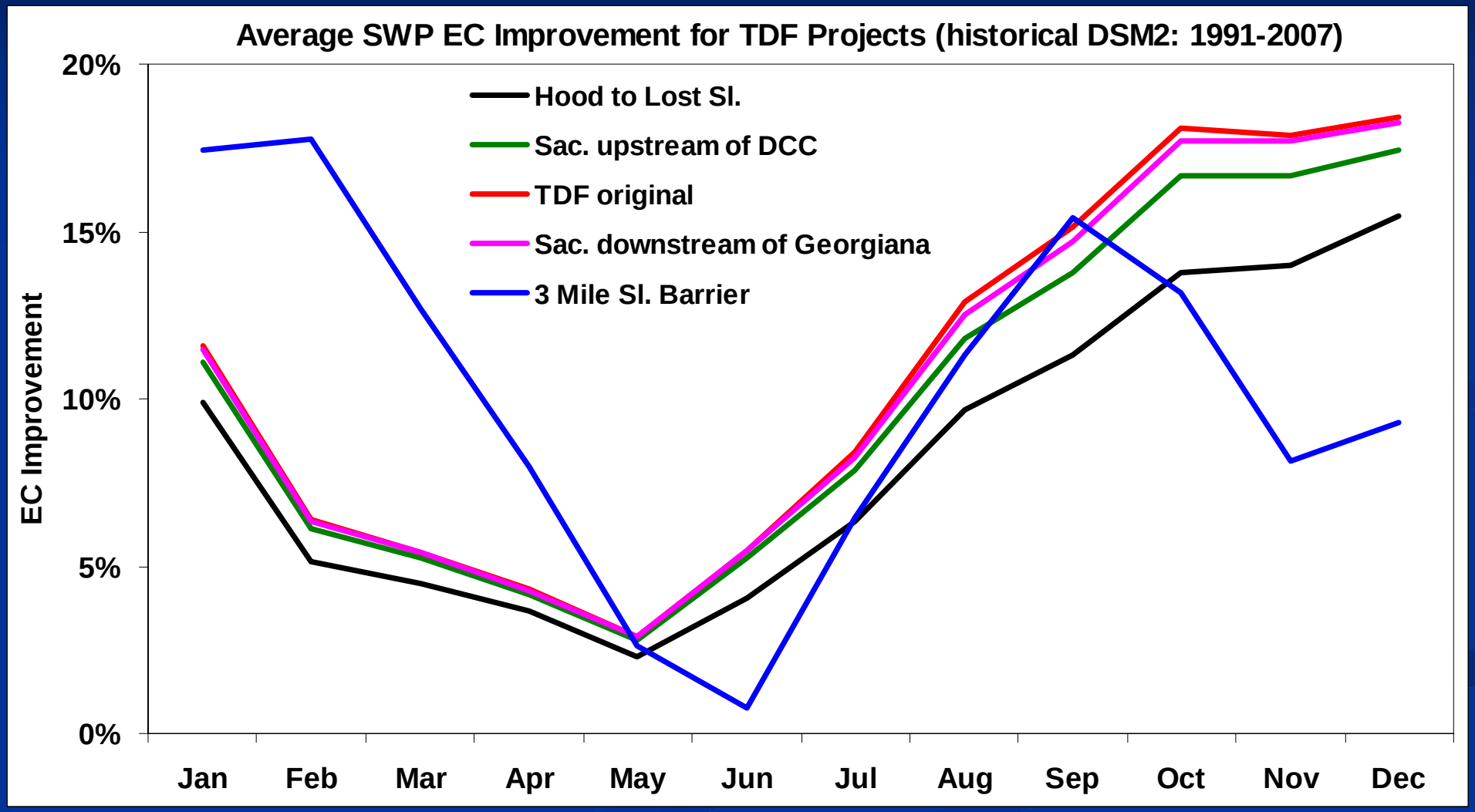




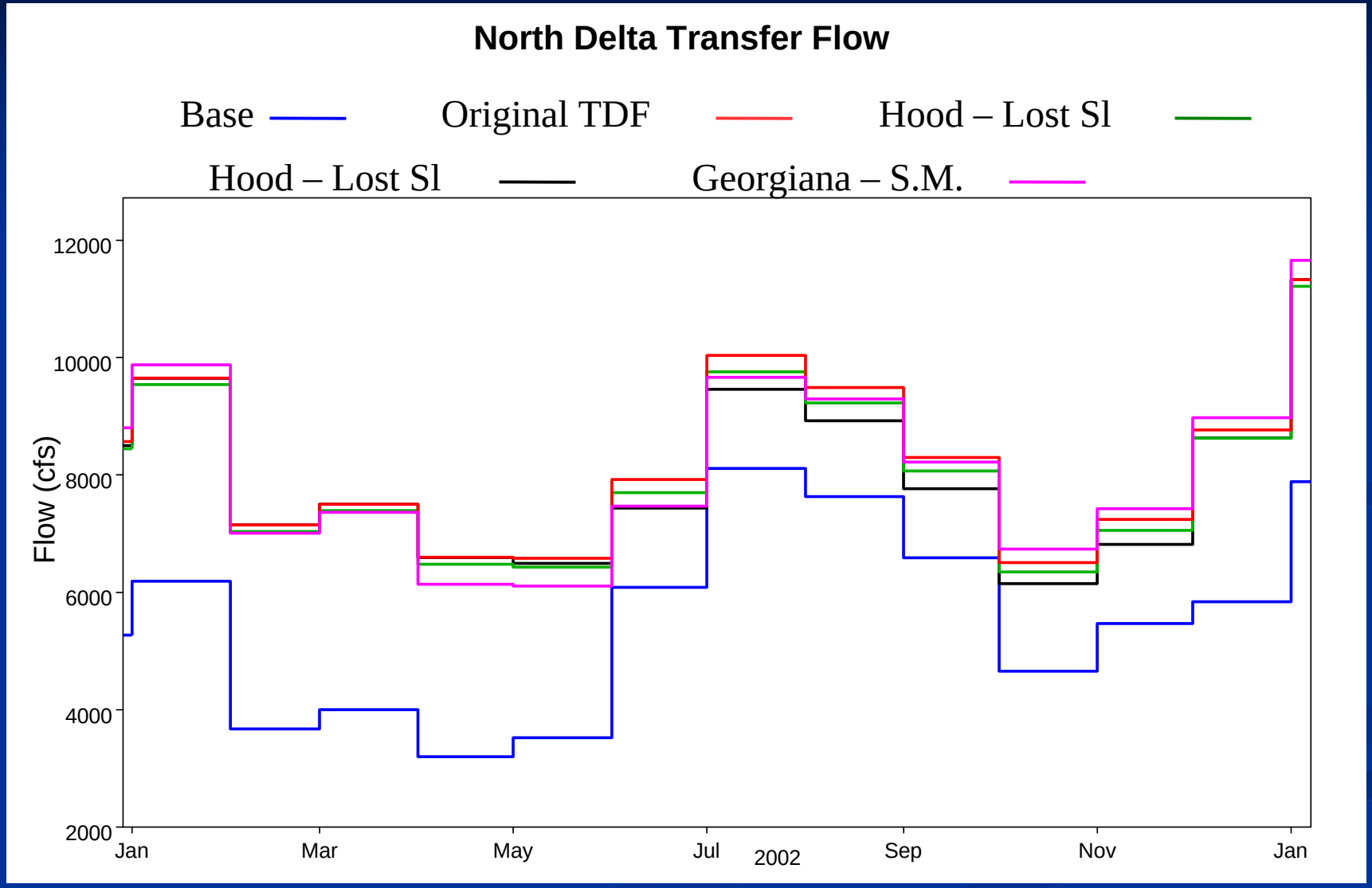




Average Salinity Improvement at SWP for the TDF Alternatives

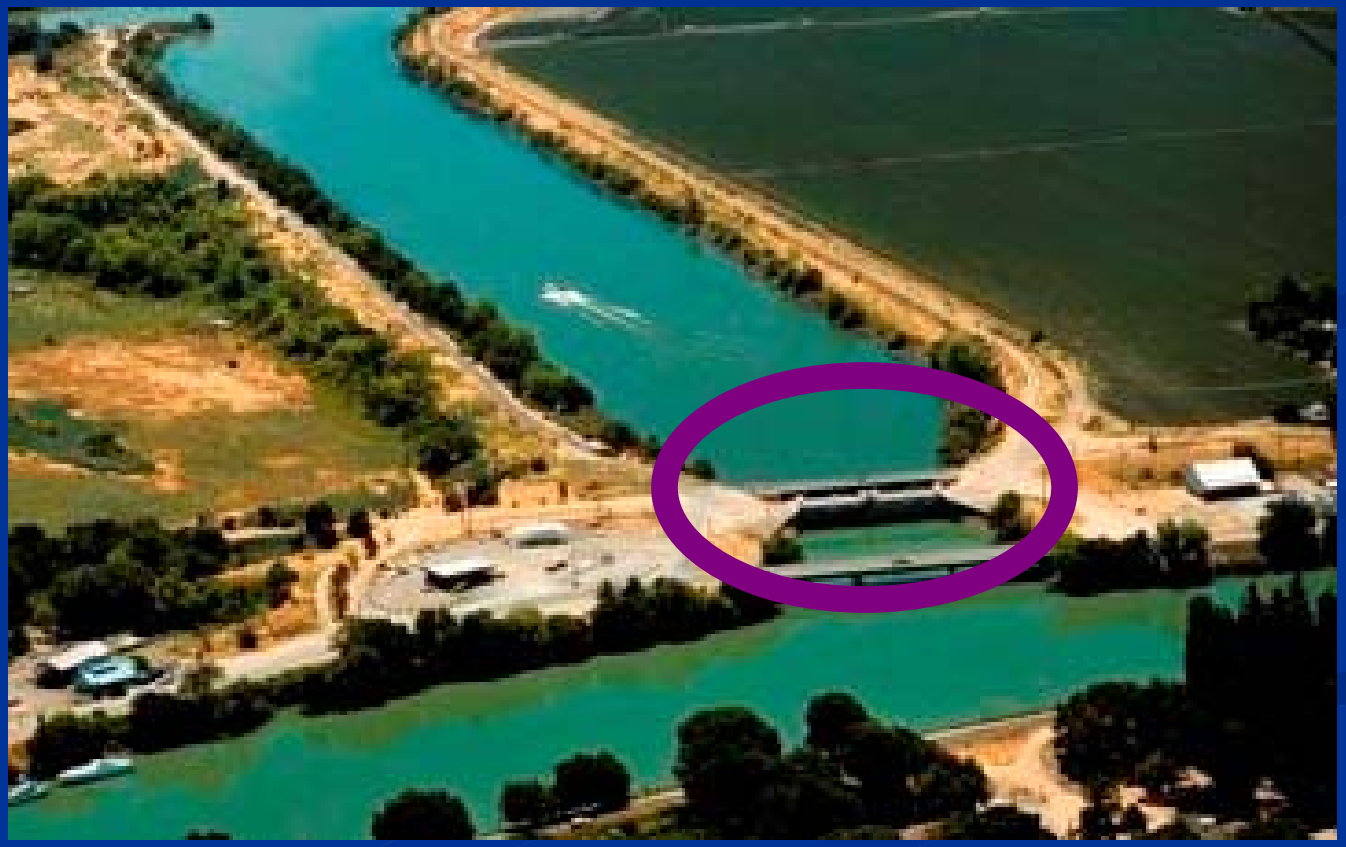


Monthly Average North Delta Transfer Flow (DCC + Georgiana Sl + TDF)



DSM2 – Additional DCC Gate

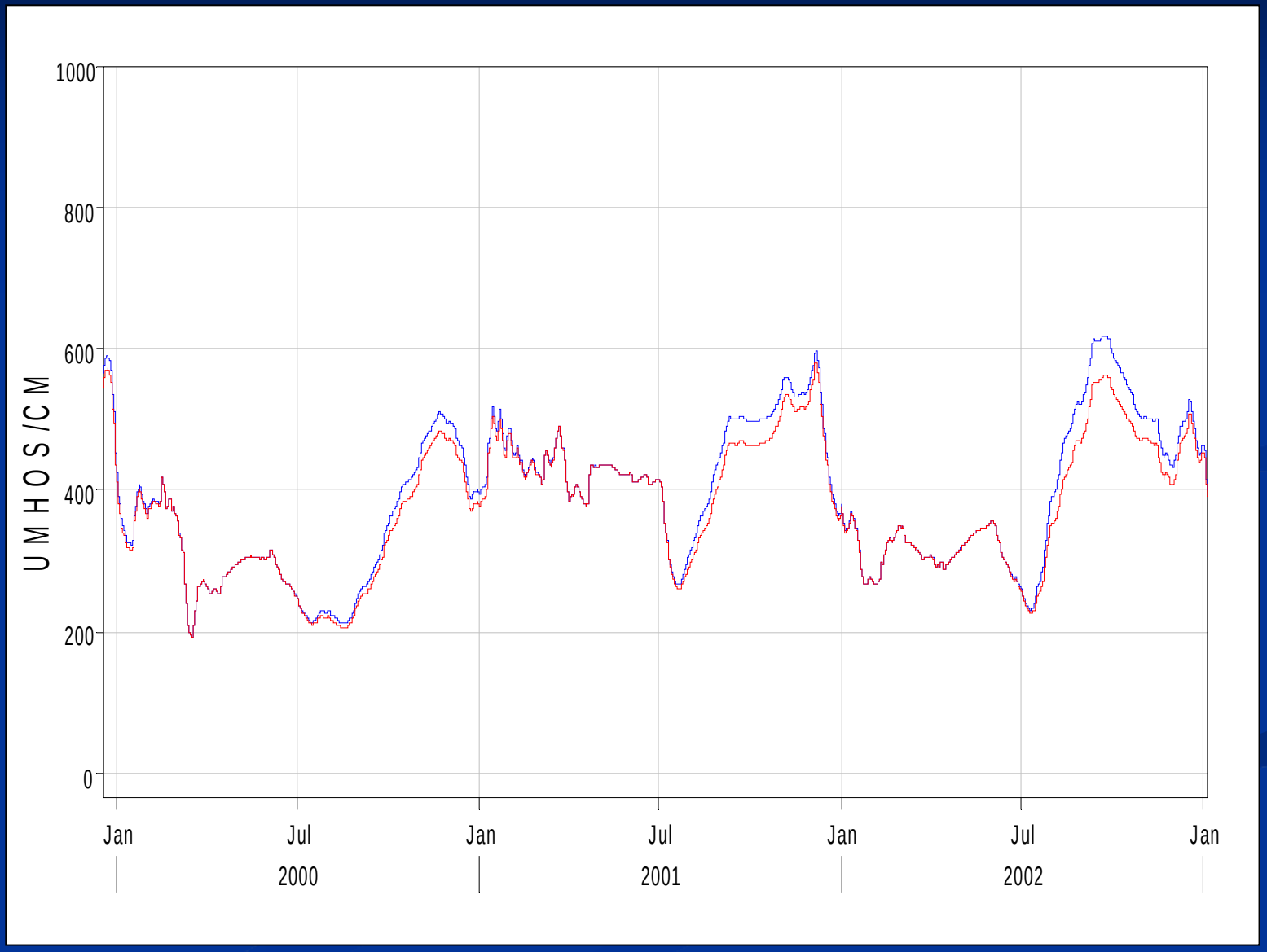
- Increase width of the DCC structure from 120’ to 180’



SWP
(Clifton Court)

Base

Additional DCC gate



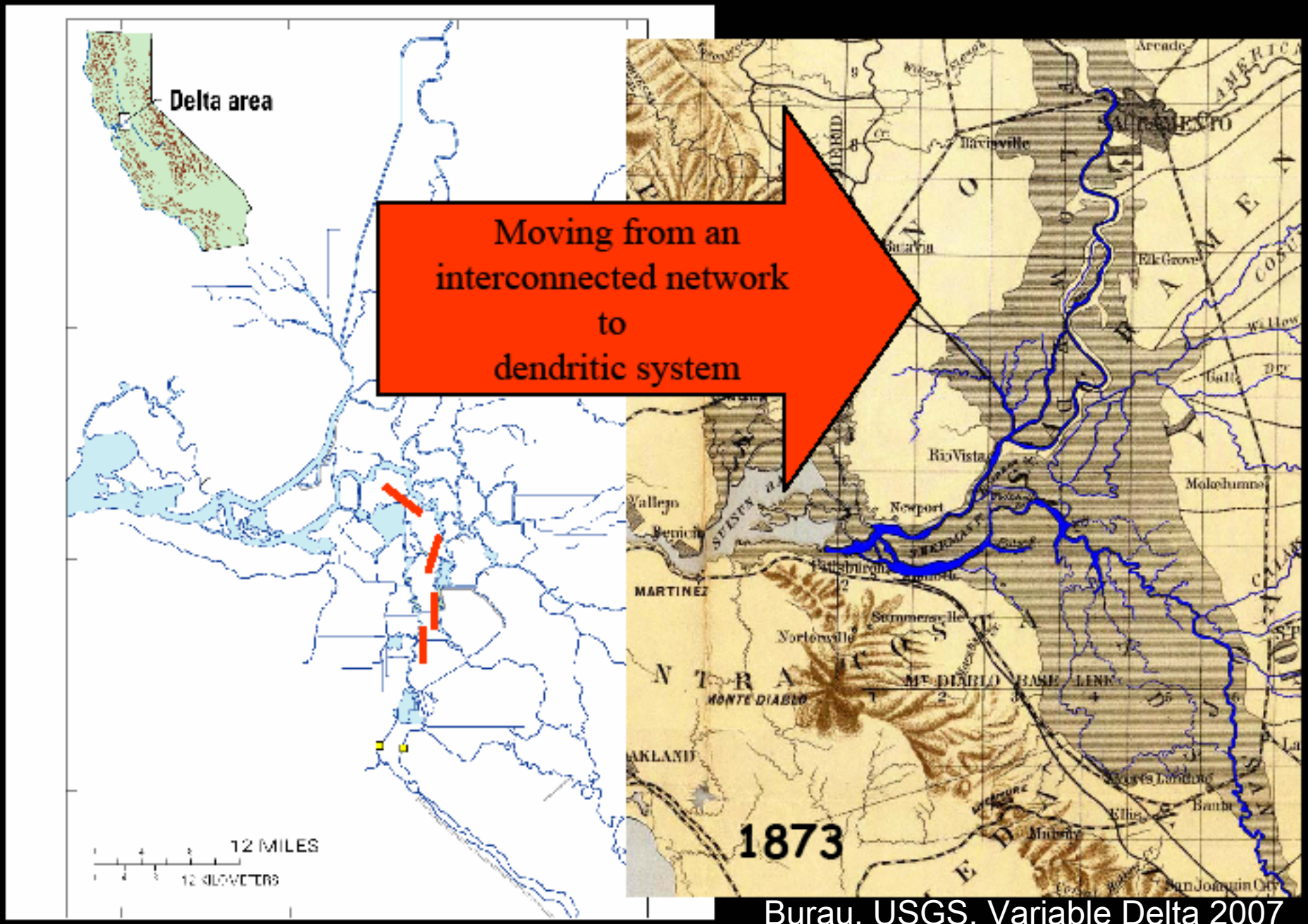
Eco-crescent / Middle River Conveyance

Majors, MWDSC, 2007

"Eco Crescent"

Burau, USGS, Variable Delta 2007

Evolution back to natural (historical) geometric form



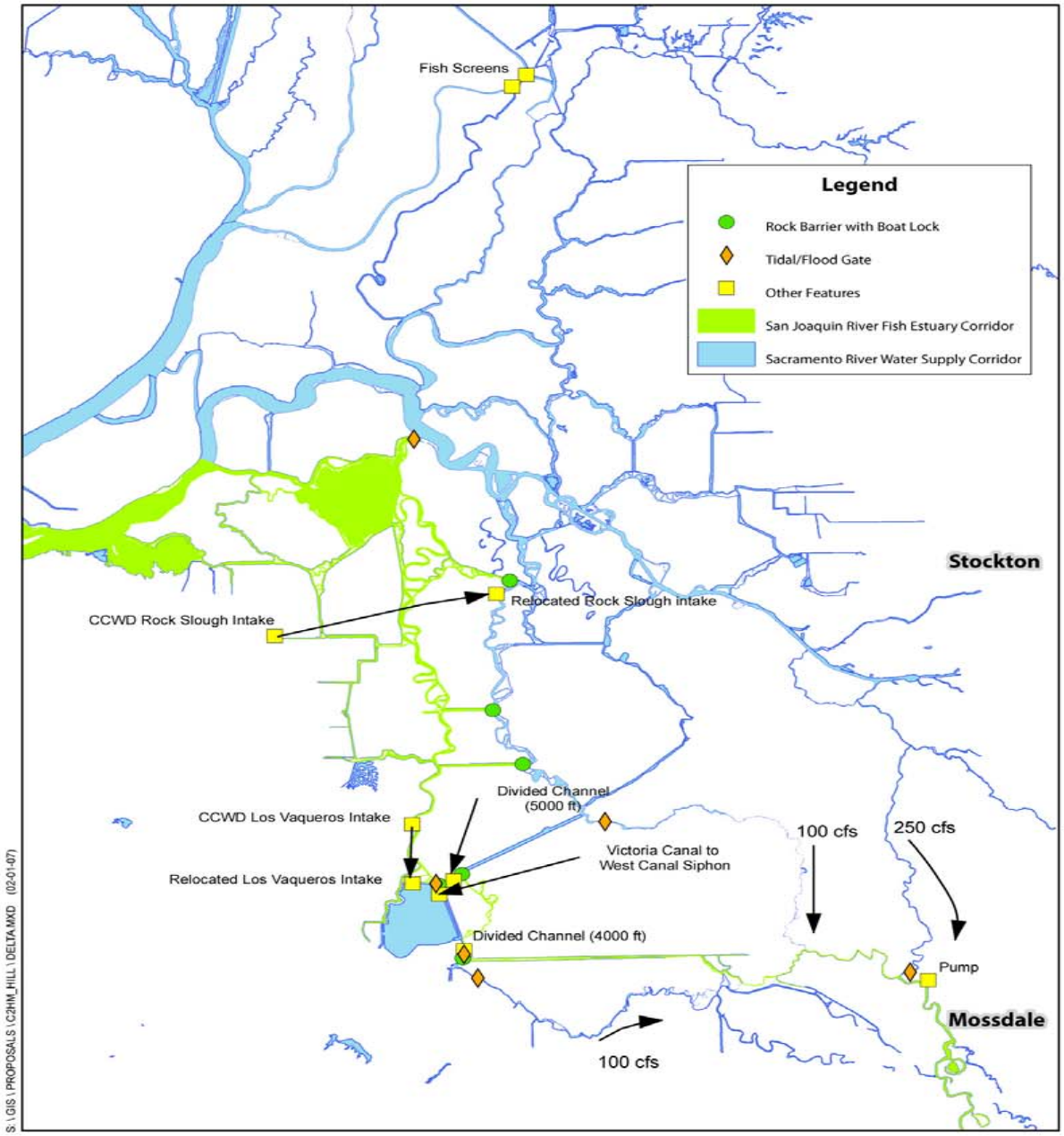
Burau, USGS, Variable Delta 2007

Delta Corridors:

1) Re-connect SJR to the estuary with a barrier below the head of Old River and a “river bridge” at Victoria Canal

2) Screen Georgiana Slough and opened DCC to allow the water supply to be diverted at Walnut Grove

3) Separate Old and Middle River channels from Bradford to Victoria to reduce salinity risks from levee failure



Delta Corridors Project Components

Brown JSA