

Protecting Delta Water Quality with Less 2015 False River Salinity Barrier

Drought and the Delta Conference

Water Education Foundation

October 25, 2016



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DWR Bay-Delta Office

False River Salinity Barrier

- Planning and Permitting
- Installation
- Effectiveness
- Removal
- 2018 and Beyond

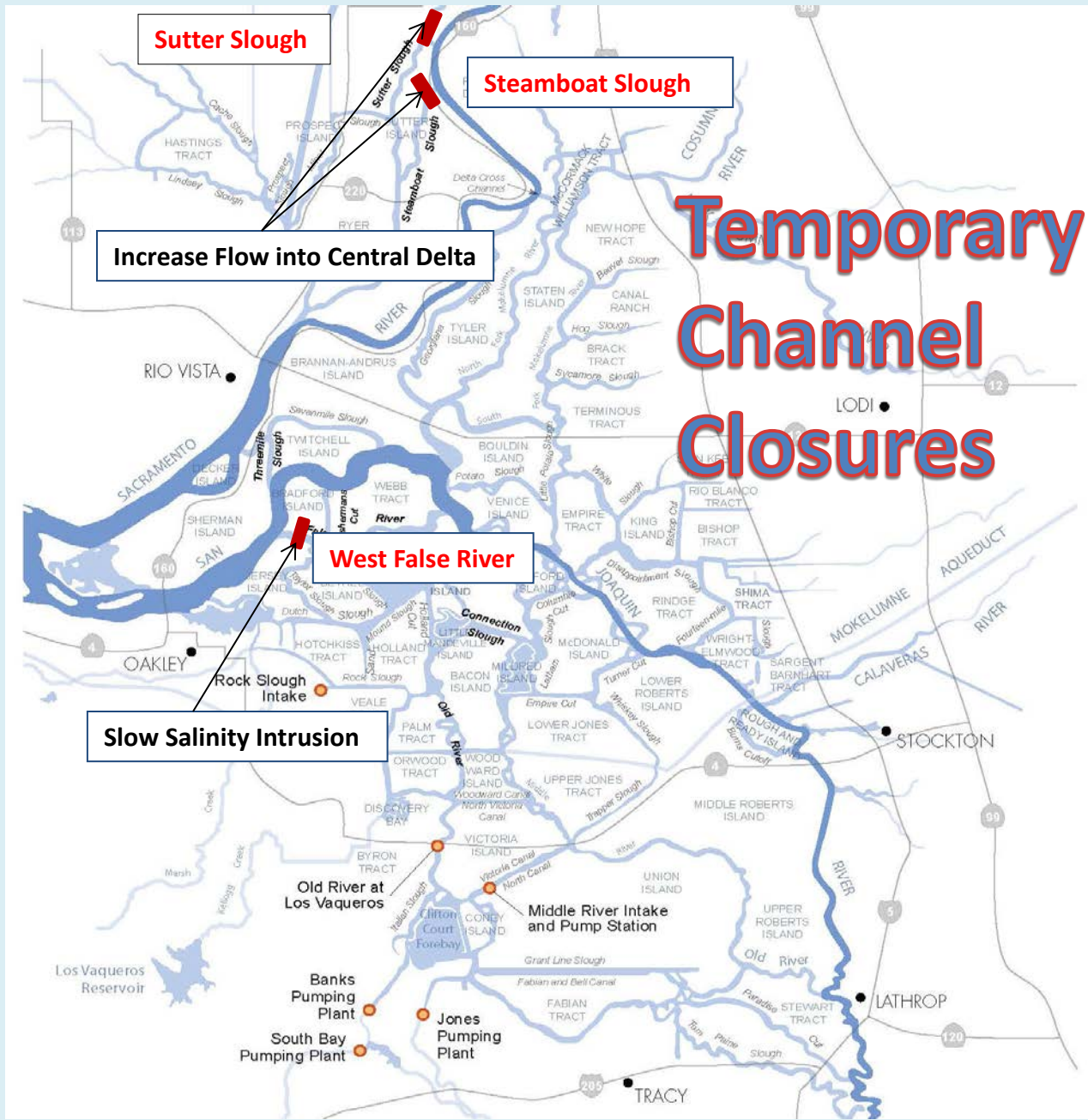


Necessity and Lead up

- Severe Drought 2013, 2014, 2015
- Drastic Measures Required to Control Delta Salinity (storage low)
 - Need to protect Central Delta water quality
 - Need cold water storage for fall
- BDO Modeling Determined Optimal Barrier Locations



Folsom Lake - January 16, 2014



Sutter Slough

Steamboat Slough

Increase Flow into Central Delta

West False River

Slow Salinity Intrusion

Temporary Channel Closures

Los Vaqueros Reservoir

Old River at Los Vaqueros

Banks Pumping Plant

South Bay Pumping Plant

Jones Pumping Plant

Middle River Intake and Pump Station

TRACY

STOCKTON

LODI

RIO VISTA

OAKLEY

SAN JOAQUIN

SACRAMENTO

205

120

5

99

4

12

115

221

160

99

Hoping for the Best/Planning for the Worst

- 3 Barriers
- Expedited Planning and Engineering
- Expedited Standard Permitting
 - 404, 401, LSAA, ITP, and 408
- CEQA ISMND
- Real Estate
- Temporary Urgency Change Petition (SWRCB)

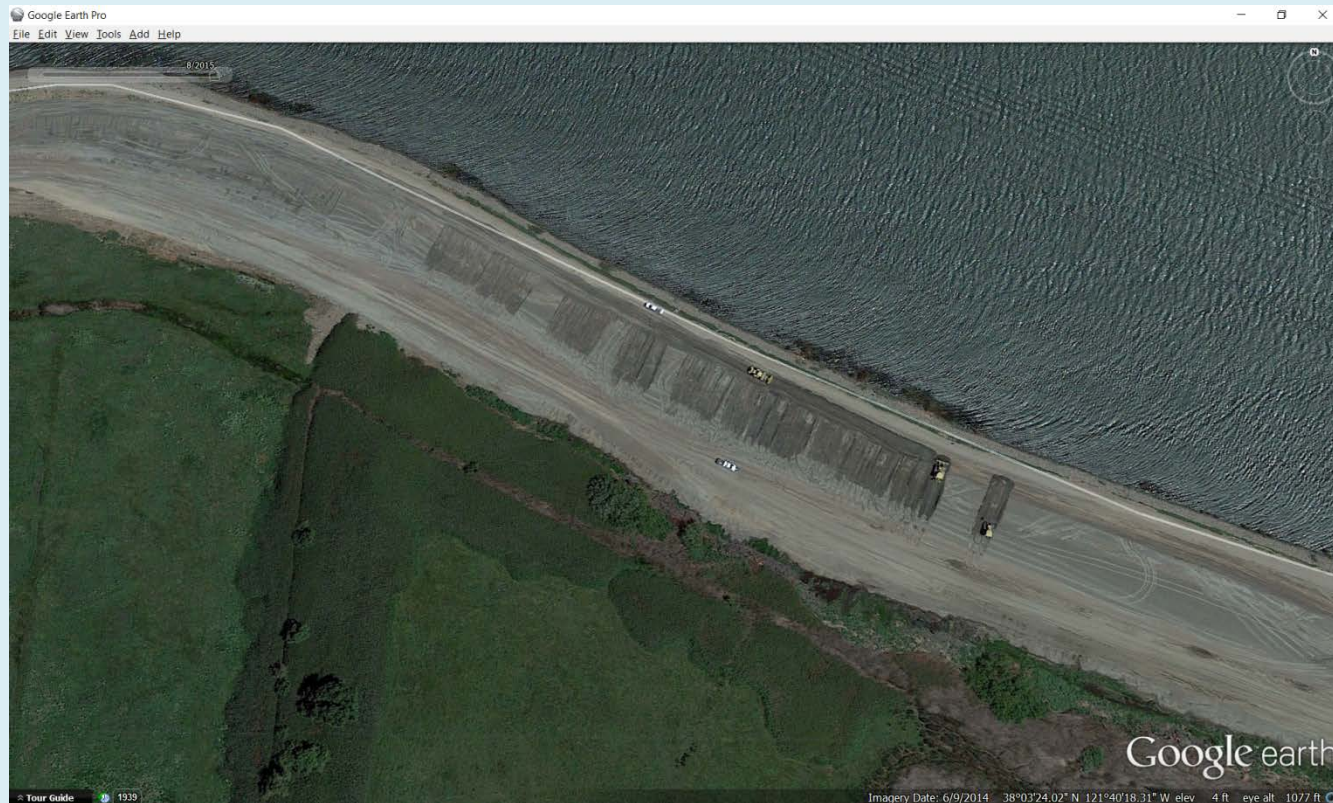
Obstacles Removed

- Governor's Executive Order
 - CEQA Exempted, No CVFPB
- Completed 2014 Expedited Levee Improvements to Bradford and Jersey Islands in Anticipation of Barrier
- Temporary Urgency Change Petition to Lower Delta Outflow



No Barriers Needed in 2014

(Reservoir Storage Further Depleted to Meet Reduced Delta Outflow Requirements)



Jersey Island Stability Berm in Construction 2014

Project Reformulation

- Multi-year Permits (i.e. 1 in 5)
- Environmental and agriculture concerns over northern barriers
- Northern barriers relocated to reduce environmental and landowner impacts
- Extensive collaboration with Permit and Resource Agencies (Delta Smelt and Salmonid Concerns)
- Reduced to single 2015 installation at VFR

W. False River Barrier Construction

- Corps 404 Emergency Procedures Authorized
- USFWS and NMFS Provide Recommendations to Reduce Impacts via 404
- State Permits Issued (401, ITP, LSAA)
- Expedited Contracting and Award to Dutra
- Construction Starts on May 4, 2015







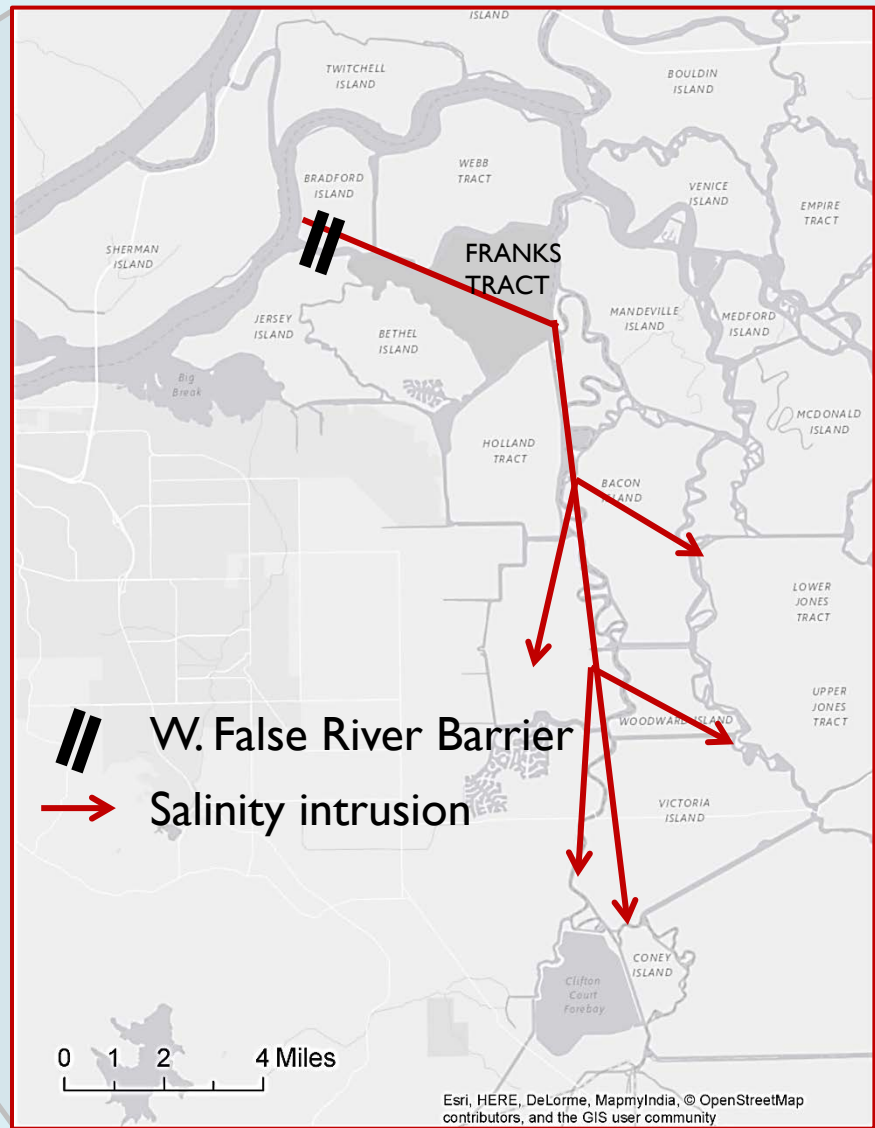
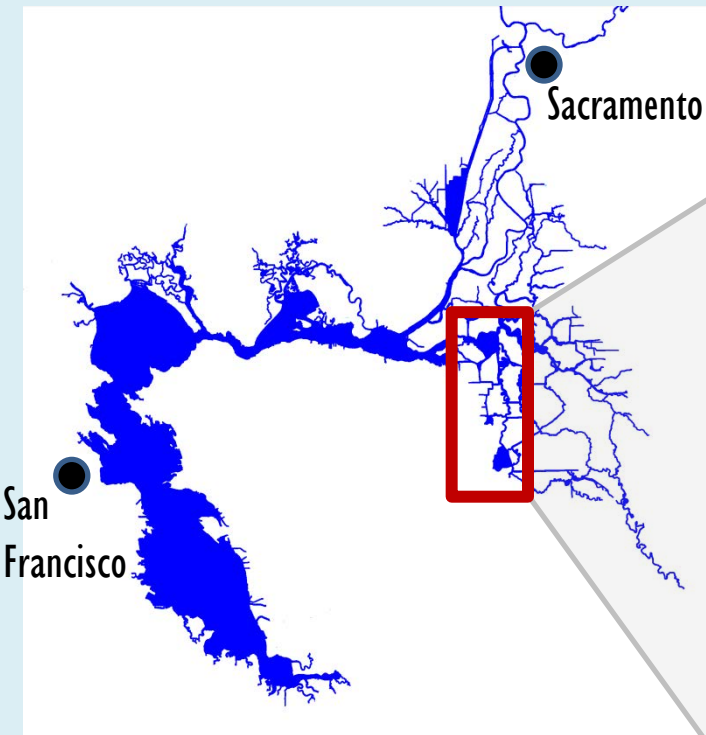


The Barrier

- ~750 feet with 12' Crown
- Steel Abutment Structures
- ~150,000 tons of Rock
- Buttress Rock Placed First
- Levee Sheet Piles Installed
- Barrier Closed May 28, 2015



How Did the Barrier Work?



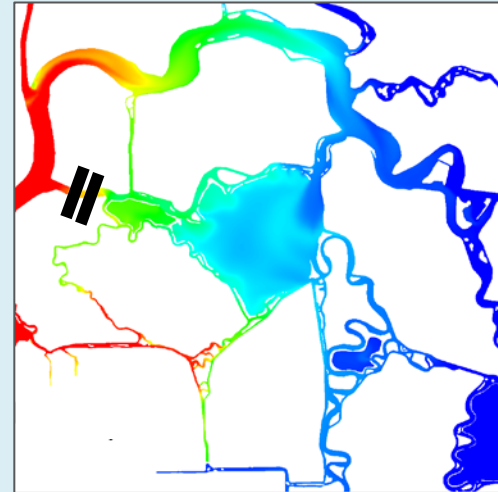
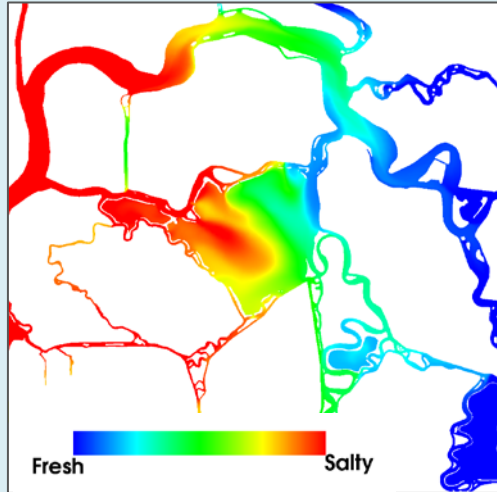
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Tidal Pumping

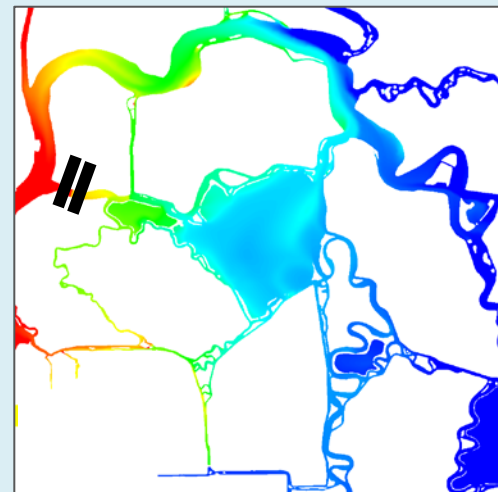
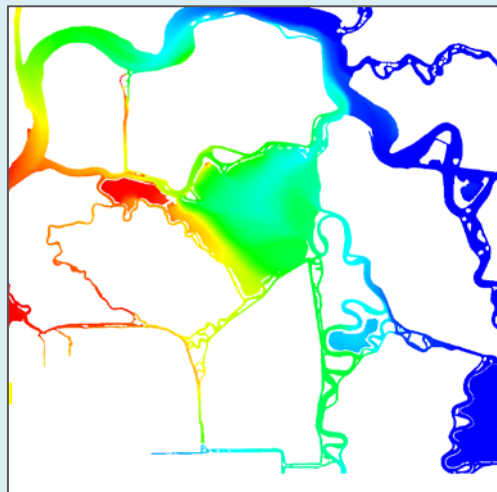
No Barrier

Barrier

Flood

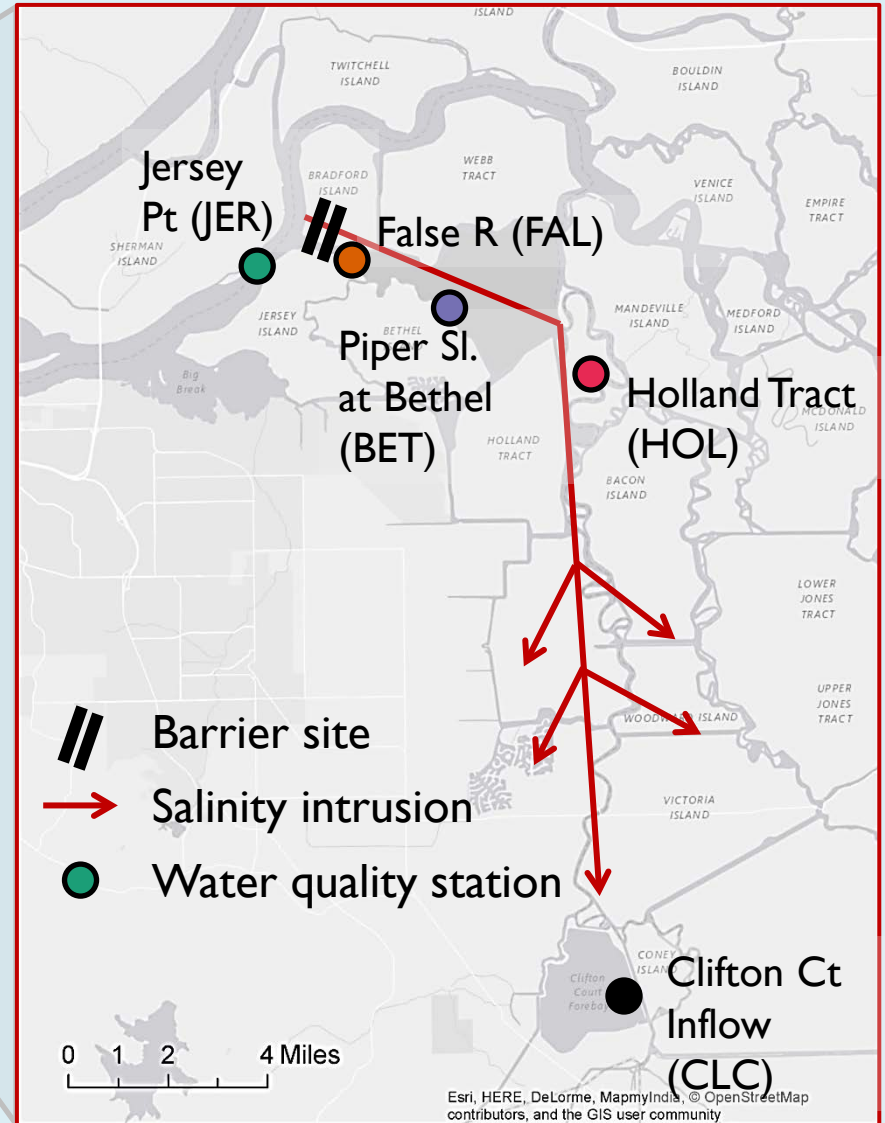
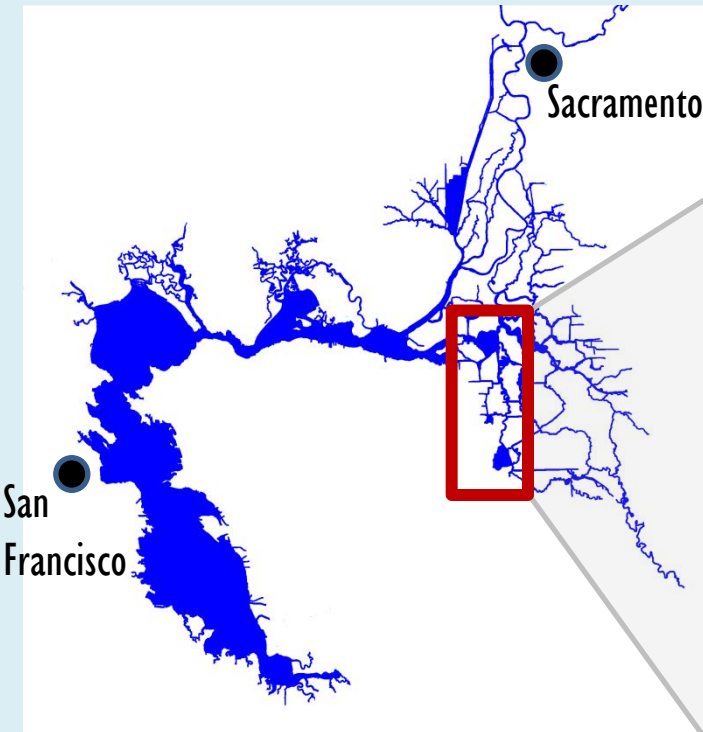


Ebb

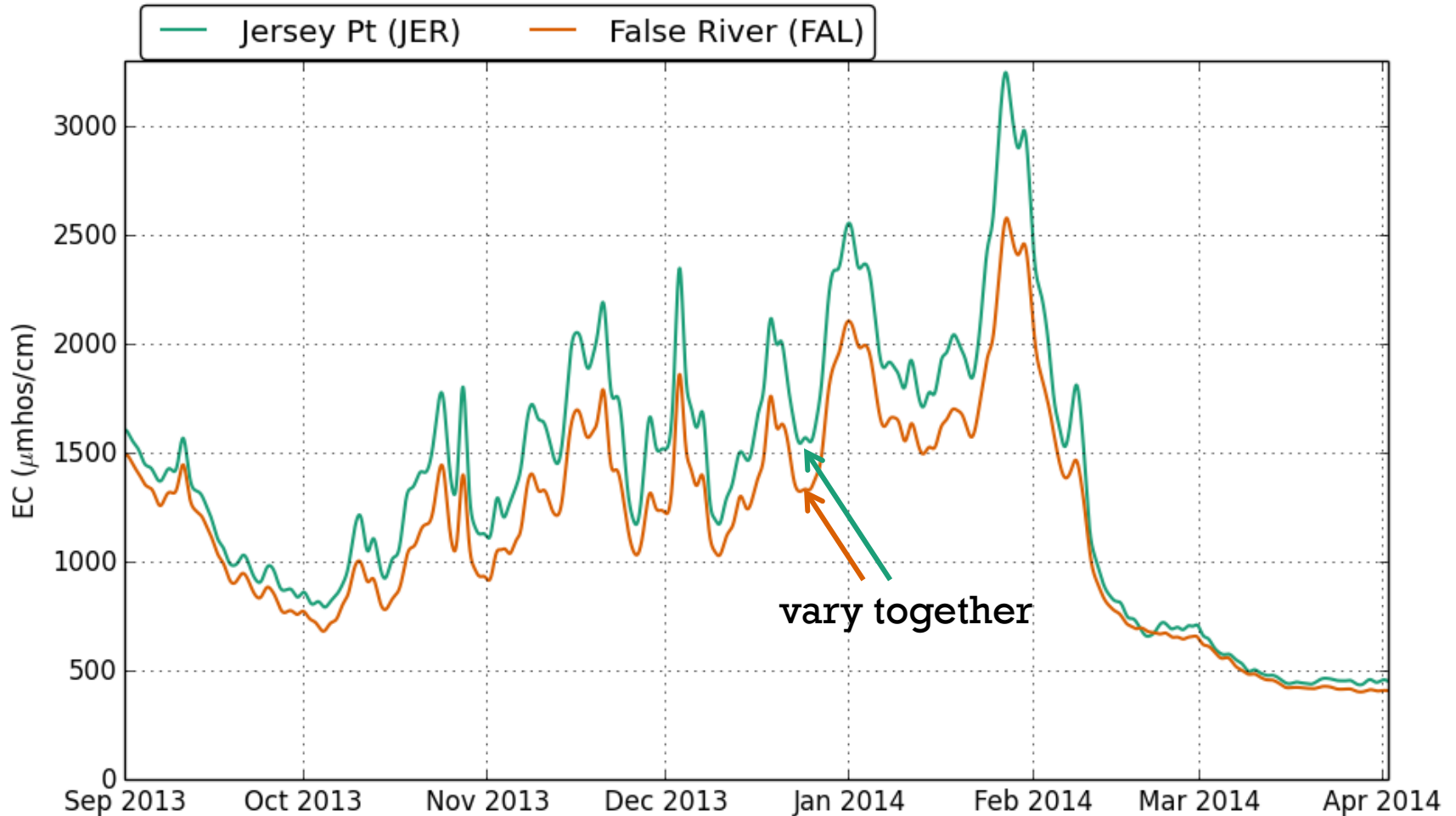


How Did the Barrier Perform?

Salinity Propagation

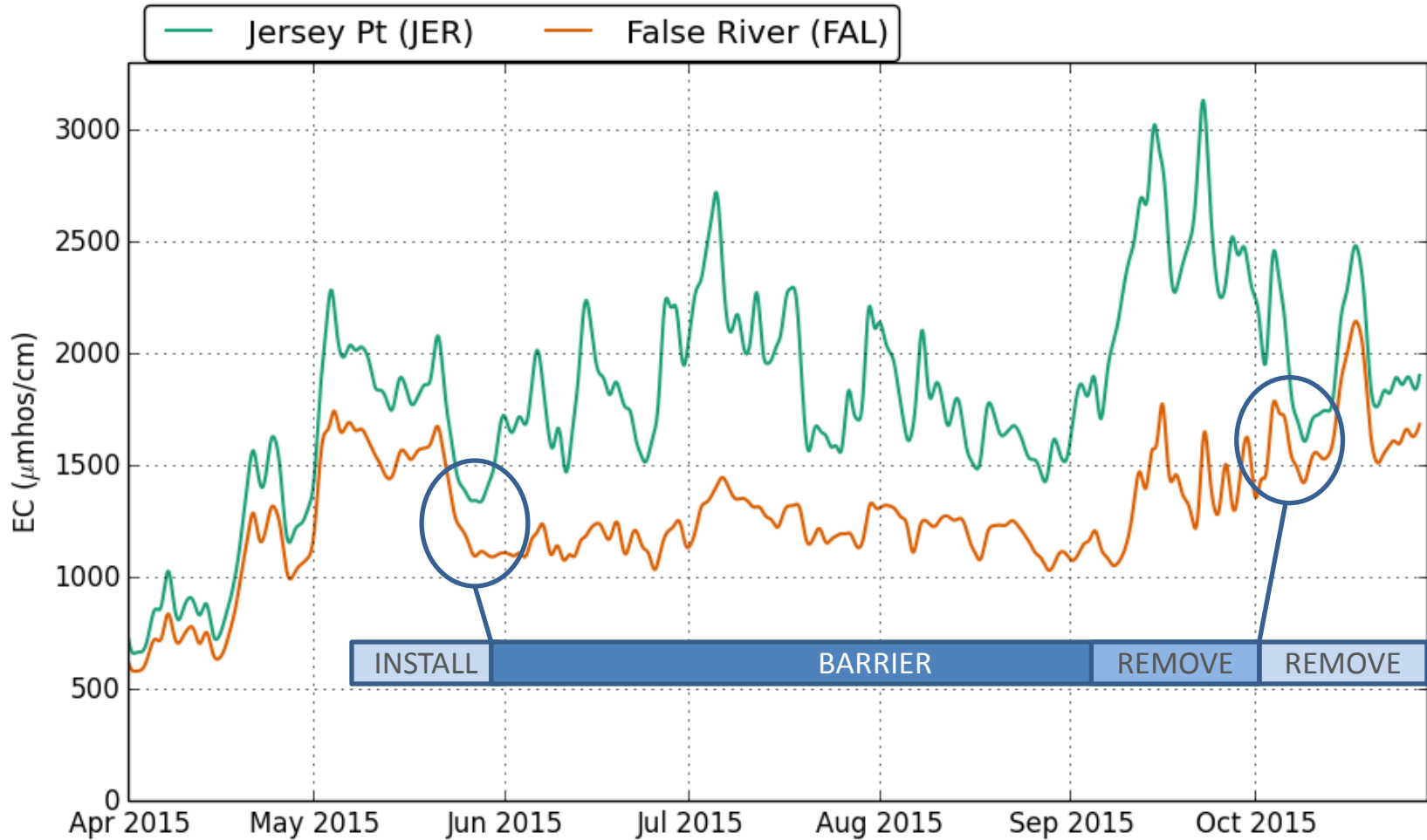


Salinity Intrusion 2014 (no barrier)



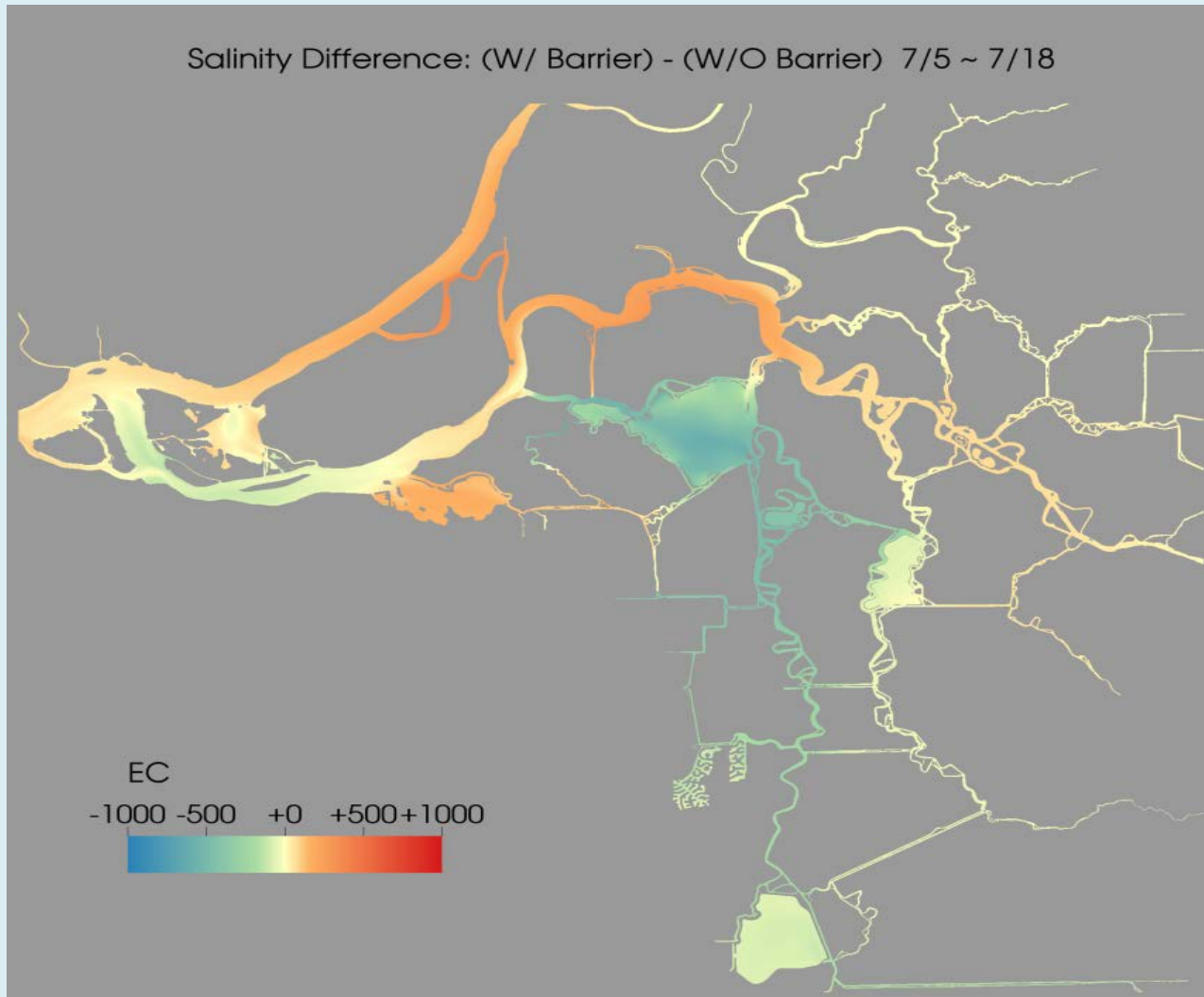
All values are tidally averaged (not 14-day)

Salinity Intrusion 2015 (barrier)



All values are tidally averaged

Barriers Changes in Salinity



Three Critical Years

	2013	2014	2015
Jul-Aug NDOI (cfs)	5,225	3,145	3,230
Jul-Aug Sac+SJR Inflow (cfs)	17,800	8,900	7,700
Jul-Aug SWP+CVP Exports (cfs)	9,190	1,900	900
Sac Ag Compliance	Emmaton	Emmaton*	Threemile*

*Standard moved to Threemile

Summary

- In 2015, salinity advanced up Sacramento R.
 - 1000 cfs less pumping/inflow than 2014
 - TUCP allows less outflow (Storage saved for people and the environment or nonexistent)
- Barrier: Effectively controls salt at Franks Tract
 - Based on similar events: 250-500 μ S/cm lower
- Mid-Delta salinity protected

Barrier Removal

- Started September 8, 2015
- 24x7 Work Necessary (not every day)
- Completed November 15, 2015
(The last day of permitted in-water work!)





Removal...

- Slow going
- Not precise/dynamic changing channel bottom
- Channel geometry/capacity restored
- Abutments cut-off per USFWS/NMFS Requirement

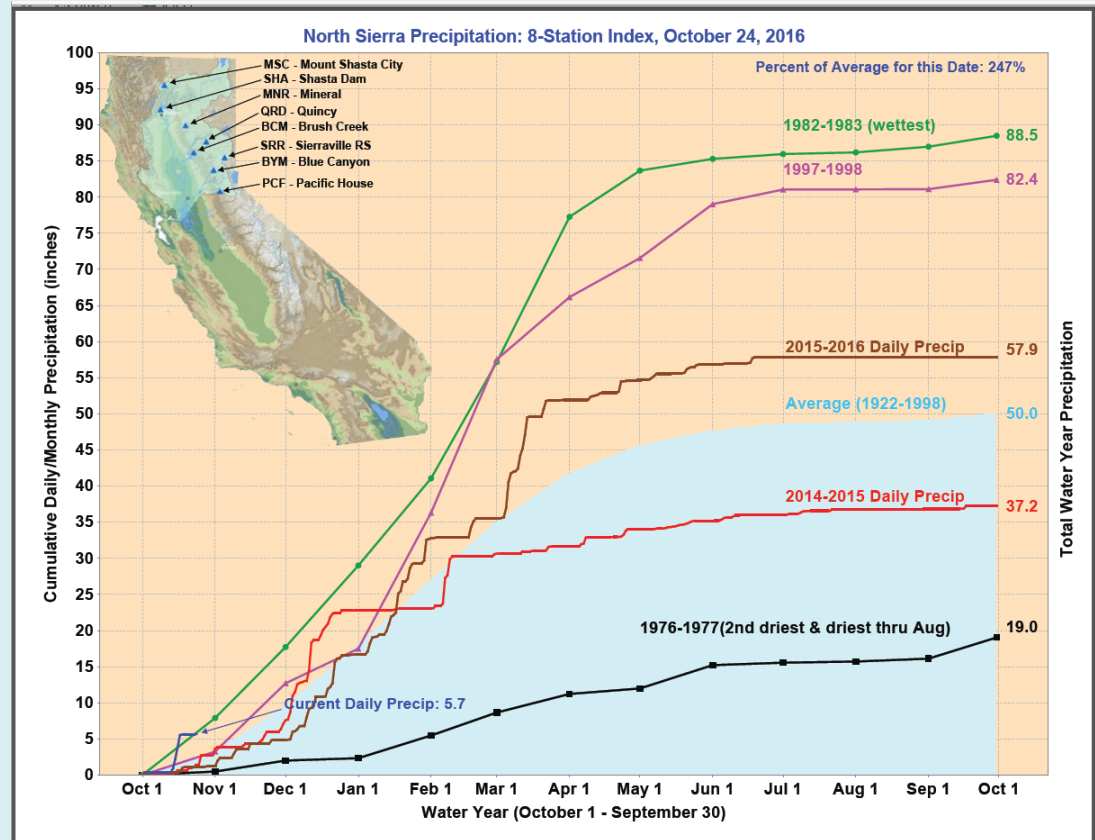
Lasting Benefits

- Permanent Levee Improvements
 - Buttress Rock
 - Levee Sheet-piles
- 10 New CDEC Stations
- Rio Vista Emergency Rock Stockpile



Future Drought Barrier(s)?

- Design Changes?
- When?
- Emergency?



2018 WFRSB Design



No Steel Abutments
for Future Barrier

- Geotechnical explorations and analysis completed
- Steel abutments not needed (good for fish too)

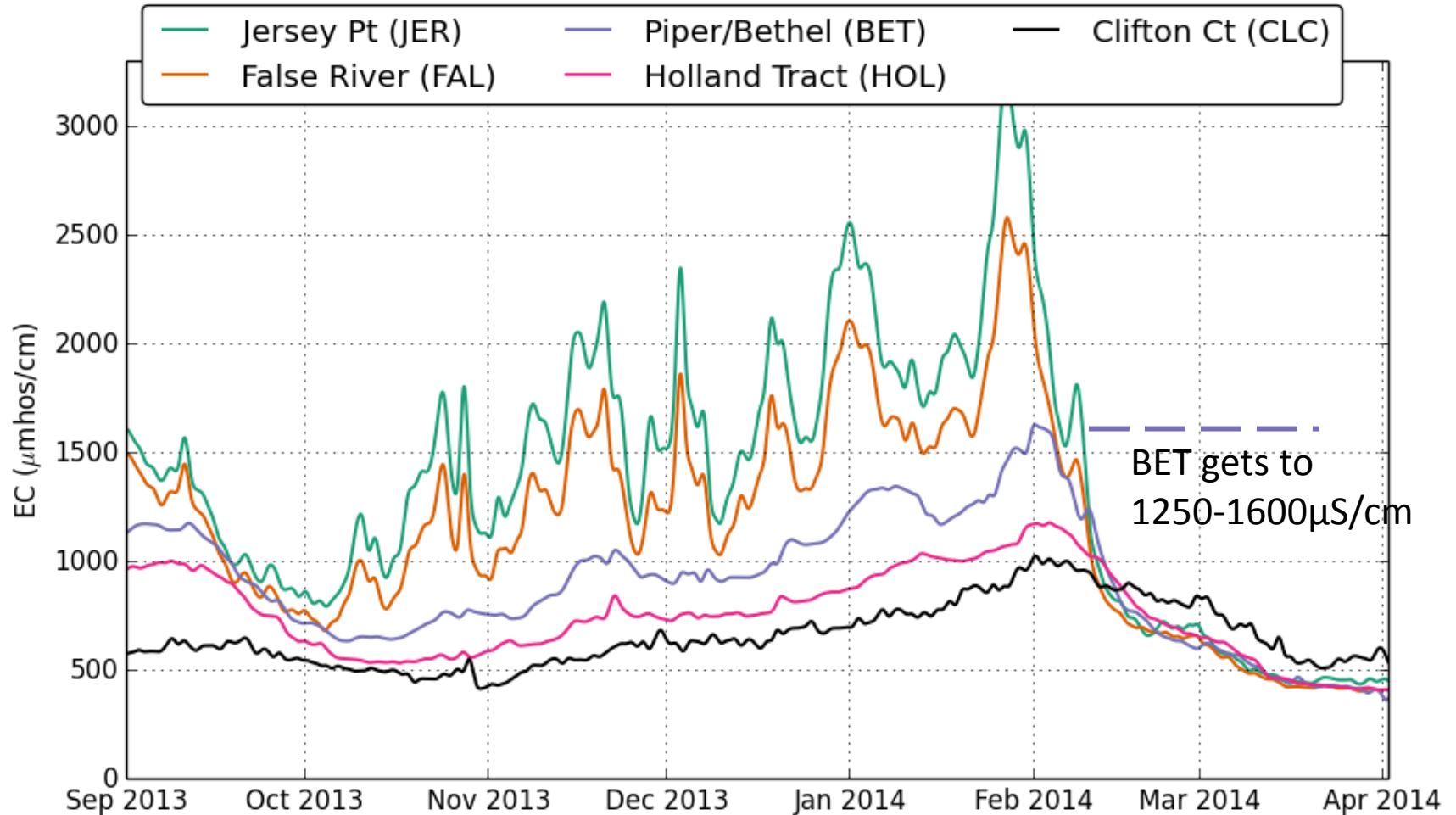


Questions?

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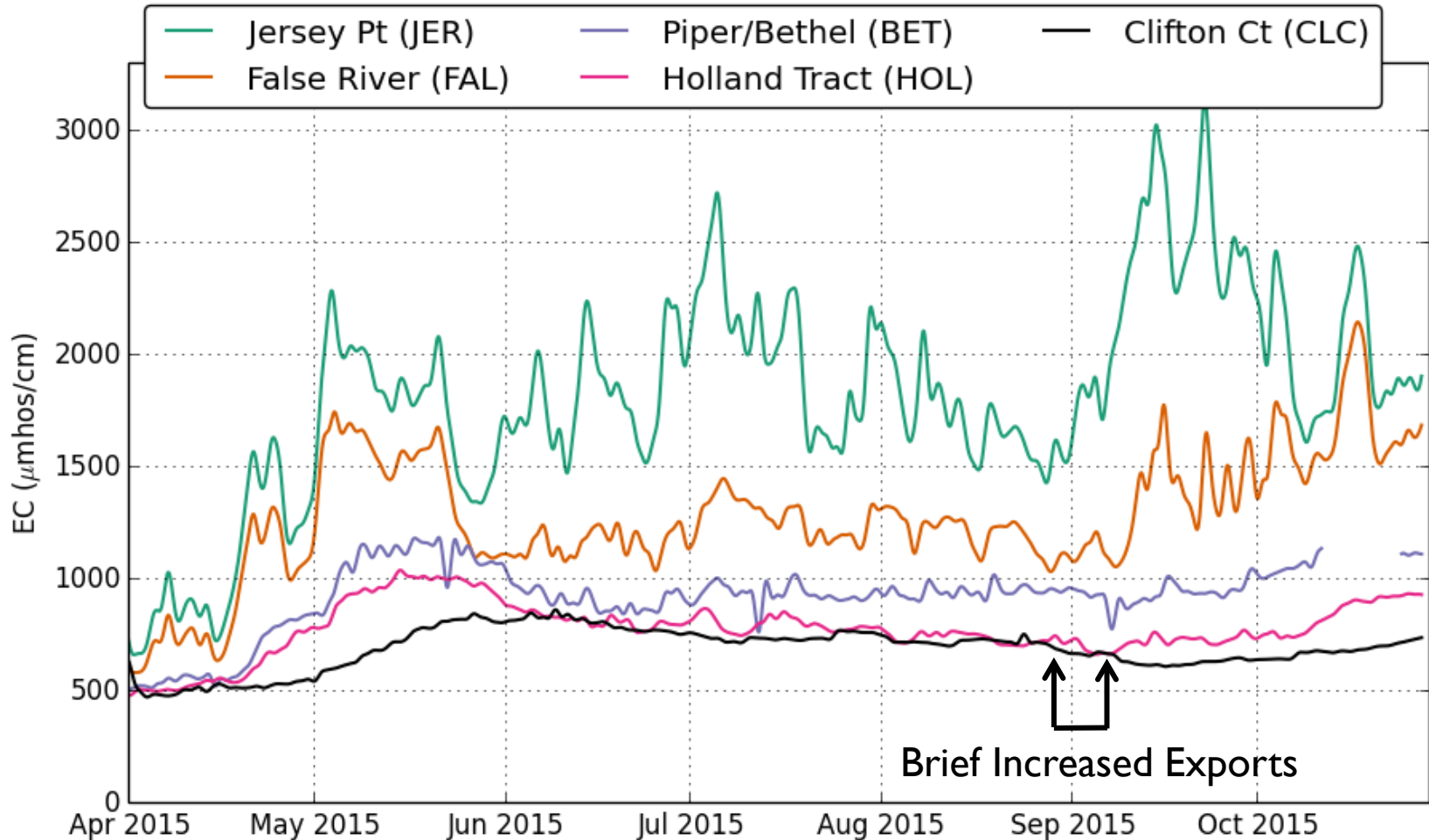
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Salinity Intrusion 2014 (no barrier)



All values are tidally averaged

Salinity Intrusion 2015 (barrier)



All values are tidally averaged

Fisherman's Cut on CDEC

CALIFORNIA DATA EXCHANGE CENTER

DWR California

HOME QUERY TOOLS PRECIPITATION RIVER FORECAST RIVER STAGES RESERVOIRS SNOW STATIONS WEATHER

FISHERMANS CUT

Map of surrounding area

Station ID	FCT	Elevation	4 ft
River Basin	SAN JOAQUIN R	County	SAN JOAQUIN
Hydrologic Area	SAN JOAQUIN RIVER	Nearby City	ANTIOCH
Latitude	38.067822	Longitude	-121.648838
Operator	CA Dept of Water Resources/NCRO	Data Collection	DATA.XCHG-DWR.NCRO

The following data types are available online. Select one of the links below to retrieve recent data.

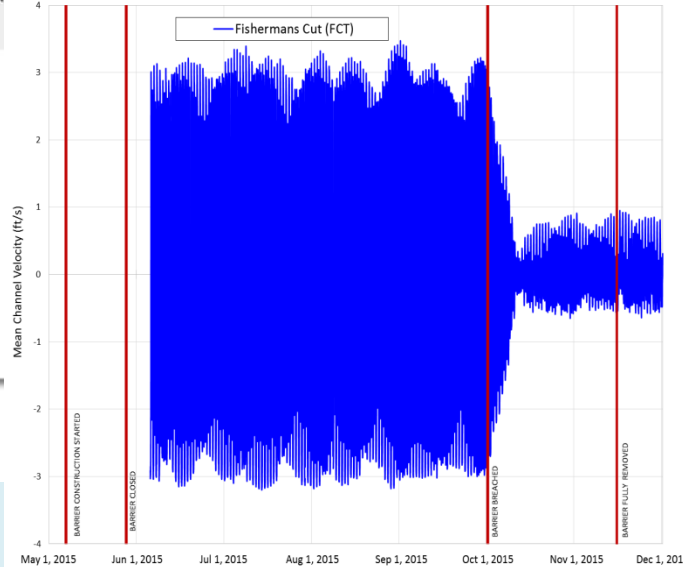
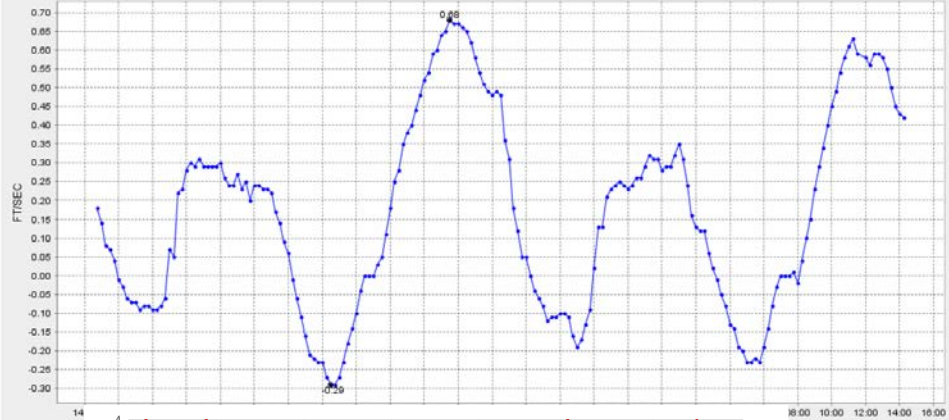
Sensor Description	Sensor Number	Duration	Plot	Data Collection	Data Availa
ELECTRICAL CONDUCTIVITY MICRO S, us/cm	100	(daily)	(EL COND)	COMPUTED	04/20/2015 to present.
MAX ELEC CONDUCTIVITY MICRO S, us/cm	224	(daily)	(EC MAX)	COMPUTED	04/20/2015 to present.
MEDIAN E CONDUCTIVITY MICRO S, us/cm	222	(daily)	(EC MDN)	COMPUTED	04/20/2015 to present.
MIN ELEC CONDUCTIVITY MICRO S, us/cm	223	(daily)	(EC MIN)	COMPUTED	04/20/2015 to present.
TEMPERATURE, WATER, deg f	25	(daily)	(TEMP W)	COMPUTED	04/20/2015 to present.
TEMPERATURE, WATER MAXIMUM, deg f	227	(daily)	(TMPW MAX)	COMPUTED	04/20/2015 to present.
TEMPERATURE, WATER MEDIAN, deg f	225	(daily)	(TMPW MDN)	COMPUTED	04/20/2015 to present.
TEMPERATURE, WATER MINIMUM, deg f	226	(daily)	(TMPW MIN)	COMPUTED	04/20/2015 to present.
WATER, DISSOLVED OXYGEN, mg/l	61	(daily)	(DIS OXY)	COMPUTED	04/20/2015 to present.
WATER, DISSOLVED OXYGEN MAX, mg/l	230	(daily)	(DO MAX)	COMPUTED	04/20/2015 to present.
WATER, DISSOLVED OXYGEN MEDIAN, mg/l	228	(daily)	(DO MDN)	COMPUTED	04/20/2015 to present.
WATER, DISSOLVED OXYGEN MIN, mg/l	229	(daily)	(DO MIN)	COMPUTED	04/20/2015 to present.
ELECTRICAL CONDUCTIVITY MICRO S, us/cm	100	(event)	(EL COND)	DATA XCHG-DWR NCRO	04/20/2015 to present.
FLOW, RIVER DISCHARGE, cfs	20	(event)	(FLOW)	DATA XCHG-DWR NCRO	06/26/2015 to present.
TEMPERATURE, WATER, deg f	25	(event)	(TEMP W)	DATA XCHG-DWR NCRO	04/20/2015 to present.
WATER, DISSOLVED OXYGEN, mg/l	61	(event)	(DIS OXY)	DATA XCHG-DWR NCRO	04/30/2015 to present.
WATER, TURBIDITY, ntu	27	(event)	(TURB W)	DATA XCHG-DWR NCRO	04/20/2015 to present.
WATER, VELOCITY, ft/sec	21	(event)	(VLOCITY)	DATA XCHG-DWR NCRO	06/26/2015 to present.



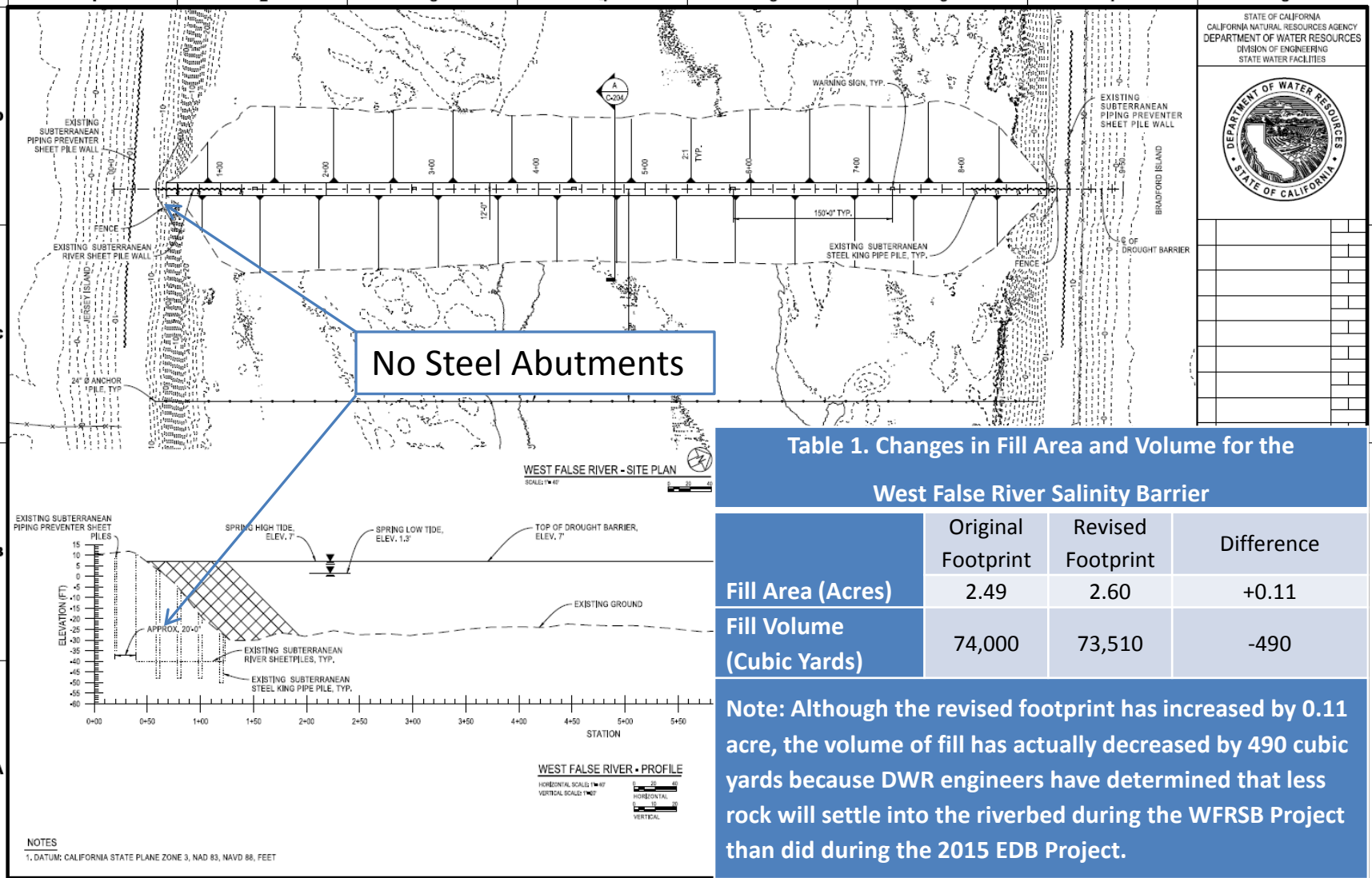
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FISHERMANS CUT (FCT)

Date from 07/18/2016 14:39 through 07/20/2016 14:39 Duration : 2 days
Max of period : (07/19/2016 11:30, 0.68) Min of period : (07/19/2016 04:30, -0.29)



2018 WFRSB Design



No Steel Abutments

Table 1. Changes in Fill Area and Volume for the West False River Salinity Barrier

	Original Footprint	Revised Footprint	Difference
Fill Area (Acres)	2.49	2.60	+0.11
Fill Volume (Cubic Yards)	74,000	73,510	-490

Note: Although the revised footprint has increased by 0.11 acre, the volume of fill has actually decreased by 490 cubic yards because DWR engineers have determined that less rock will settle into the riverbed during the WFRSB Project than did during the 2015 EDB Project.

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CALIFORNIA NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
DIVISION OF ENGINEERING
STATE WATER FACILITIES

