

**Analysis of Old River Corridor in
Conjunction with the BDCP
Proposed Project**

BDCP Steering Committee

August 26th, 2010

Separate Analyses

- Separate analyses designed to provide information to Steering Committee
- Separate Analyses (* = completed)
 - *North delta intake and conveyance sizing sensitivity analysis
 - *North delta intake location sensitivity analysis
 - *Delta levee failure and sea level rise
 - *North delta alternative fish pathways analysis
 - *San Joaquin River inflow sensitivity
 - ***Isolated Old River corridor analysis**

Objectives

- Understand the sensitivity of the current BDCP Proposed Project with the integration of an Isolated Old River Corridor concept in south Delta
- Evaluate sensitivity in terms of:
 - South delta flows
 - Change in tidal stage range
 - Delta water quality
 - Particle tracking
- High level, preliminary analysis to provide information to Steering Committee

Methodology & Assumptions

- Isolated OR Corridor configuration selected that “best” fits with the Proposed Project (i.e. reduced south Delta pumping needs)
- DSM2 studies with OR Corridor configuration and for 16-years of hydrology
- River flows and exports are all maintained per BDCP Proposed Operations (no re-operation performed for new configuration)
- Assume no issues conveying exports from Victoria Canal to Clifton Court Forebay through siphon
- Particle tracking performed for 24 distinct periods covering broad range of flow/operating conditions
- All simulations should be considered approximate

Description of the Old River Corridor Scenario

- BDCP Proposed Project at starting point
- Barriers in Connection Slough, Railroad Cut, and Woodward Cut
- Barriers in Middle River upstream of Victoria Canal and at head of Old River (with 250 cfs pumps for Delta Ag demand)
- Barriers at Mouth of Old River and Fishermans Cut
- All barriers removed and low head pumps idled when San Joaquin inflow exceeds 10,000 cfs
- Improvements in Clifton Court Forebay

 Barrier

 Barrier with Low-head Pump

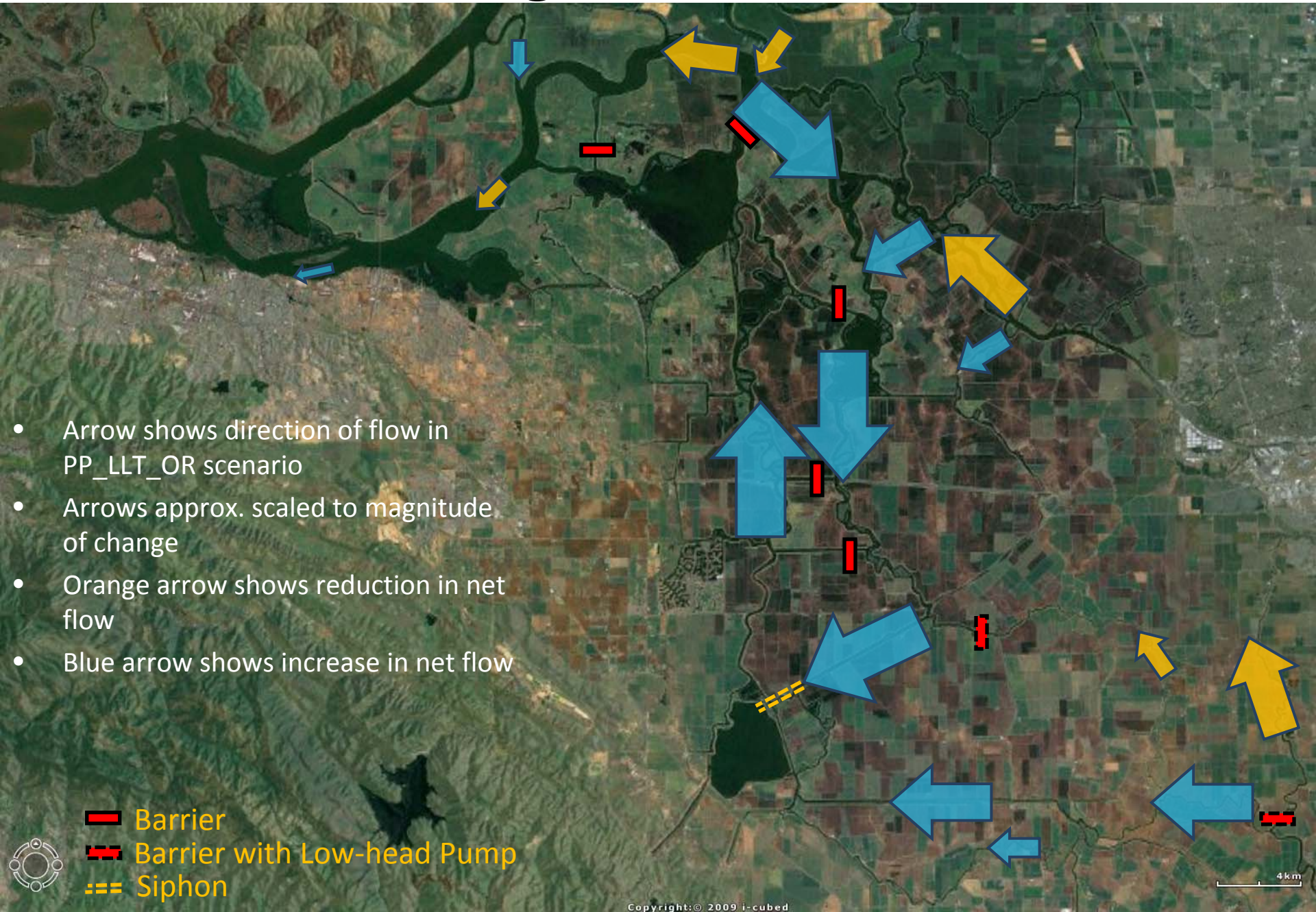
 Siphon

 Dredged Channels



South Delta Flows and Stage

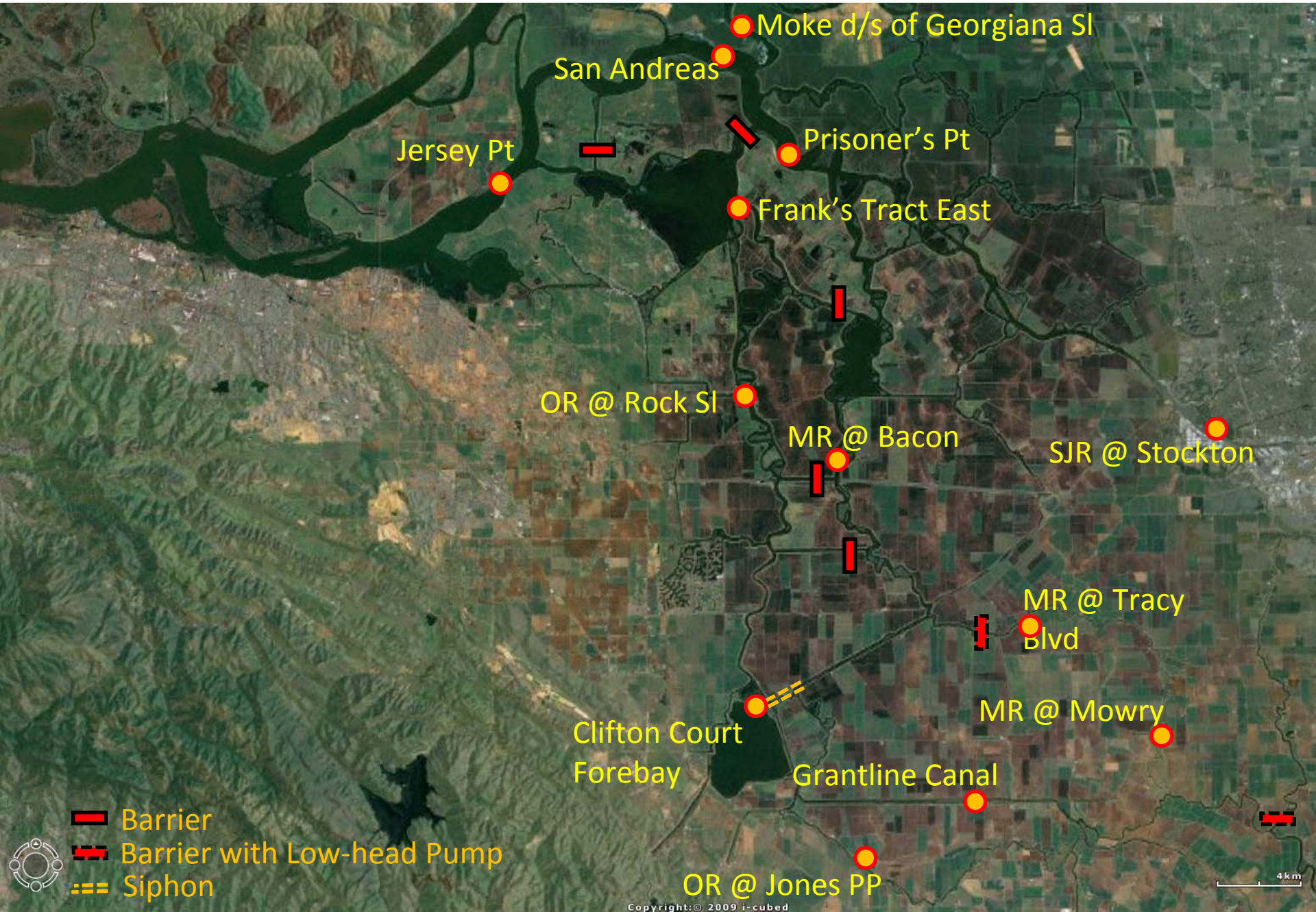
Change in Net Flow



- Arrow shows direction of flow in PP_LL_T_OR scenario
- Arrows approx. scaled to magnitude of change
- Orange arrow shows reduction in net flow
- Blue arrow shows increase in net flow

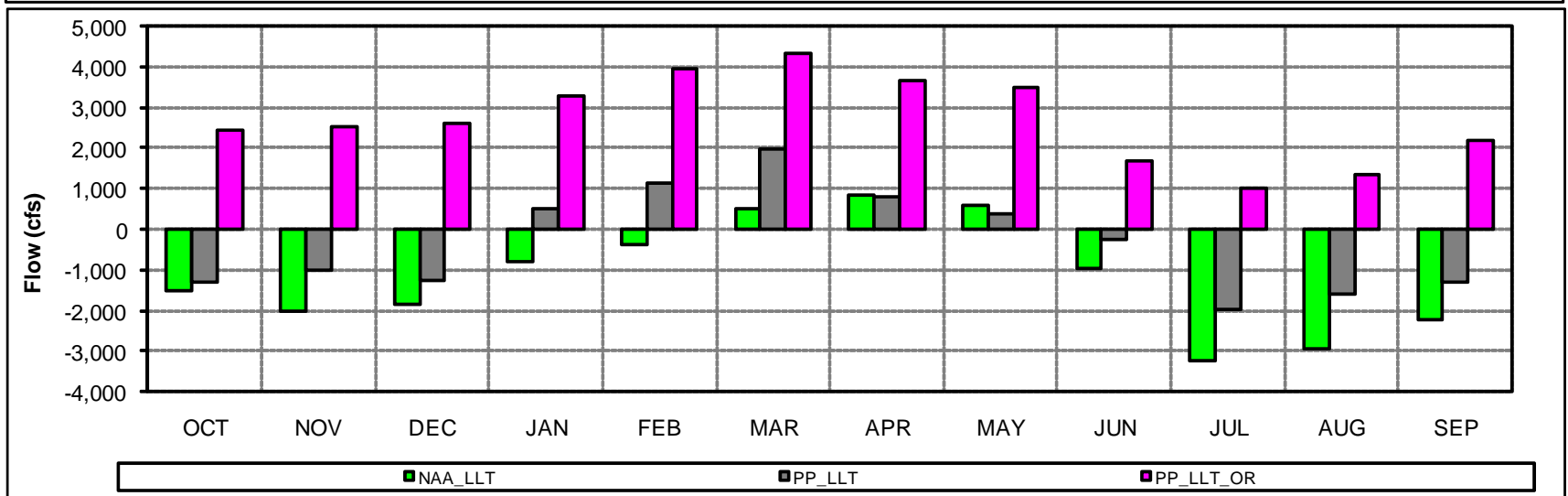
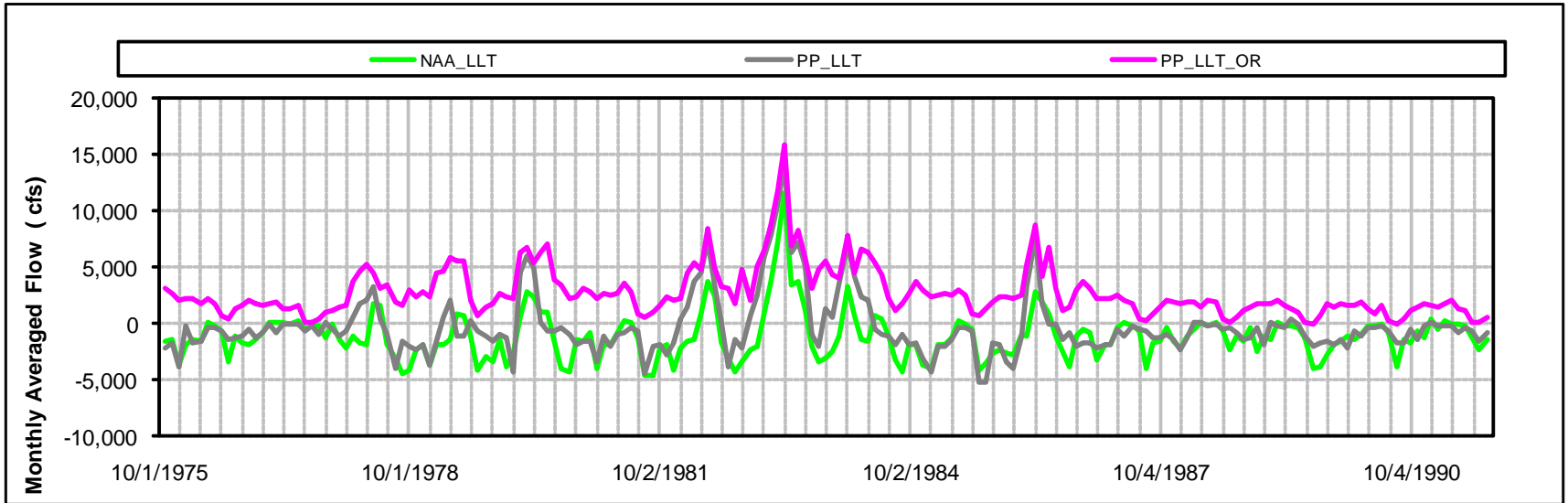
 Barrier
 Barrier with Low-head Pump
 Siphon

General Location of South Delta Points Discussed



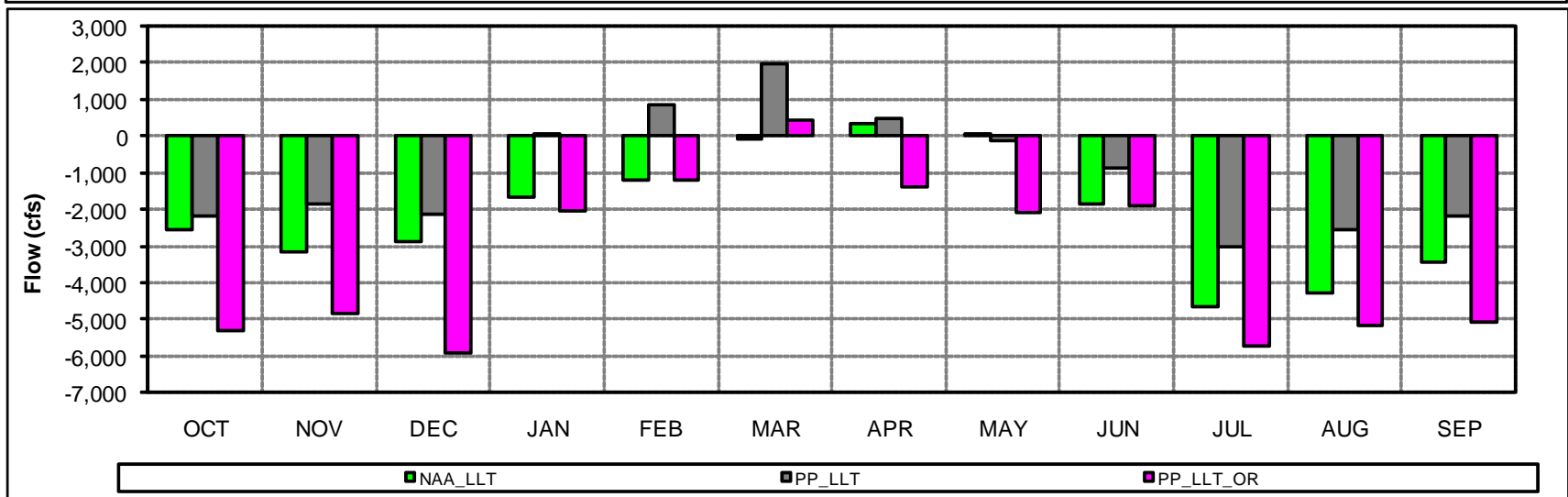
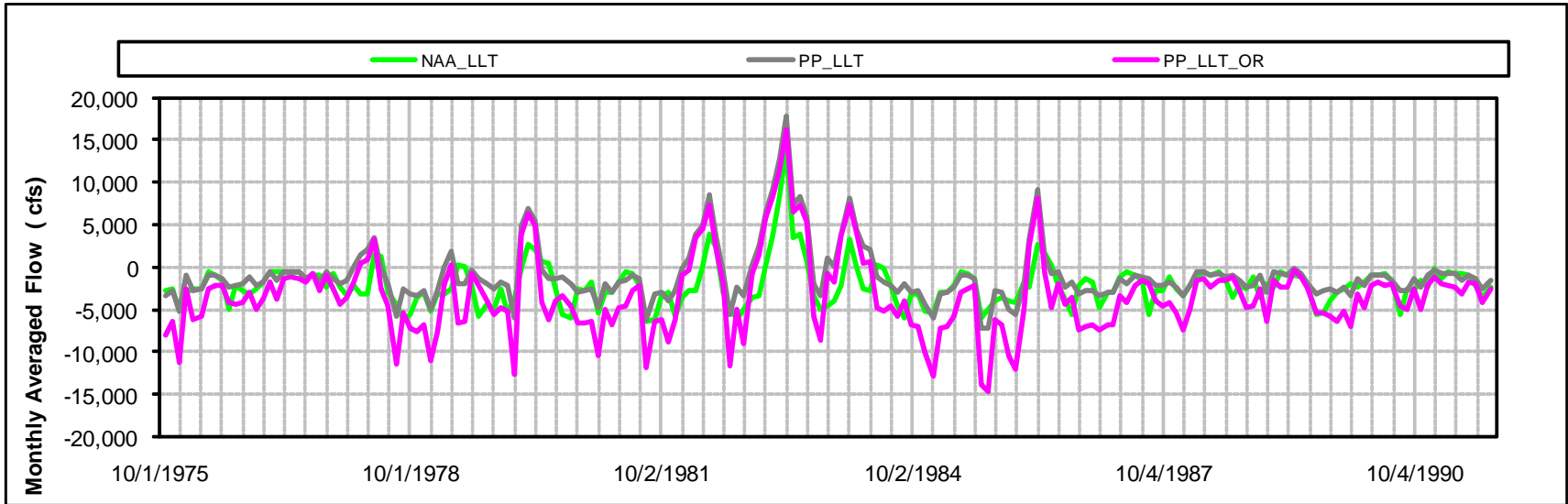
Monthly Flow: Old River at Rock Slough

Isolated OR Corridor maintains positive downstream flow in Old River



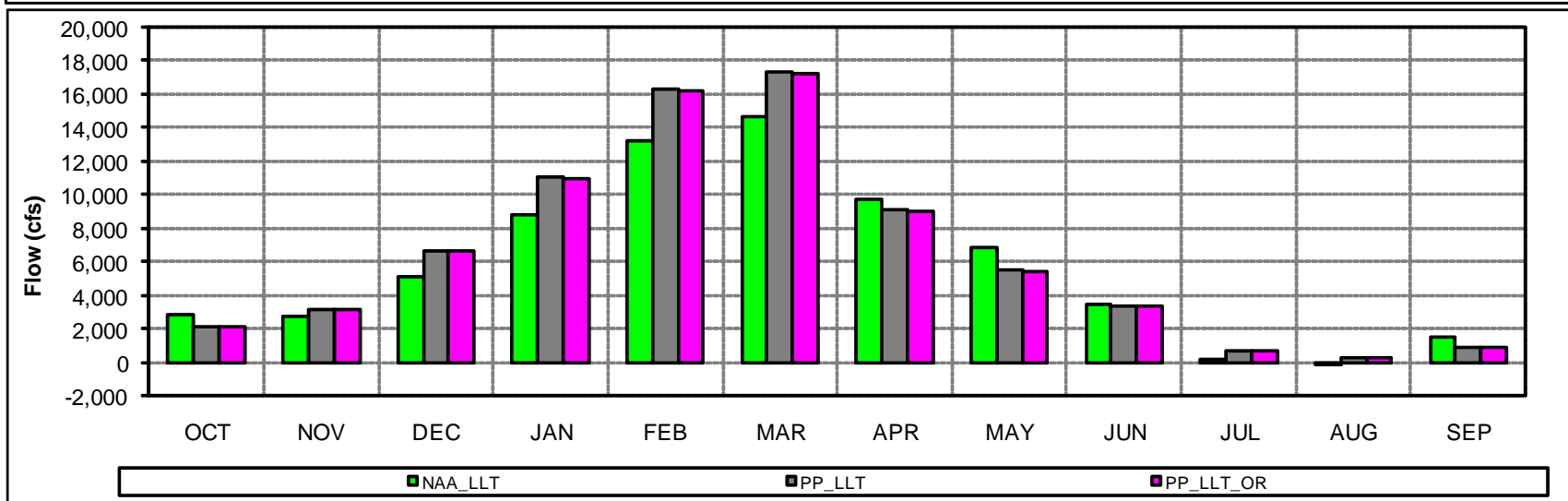
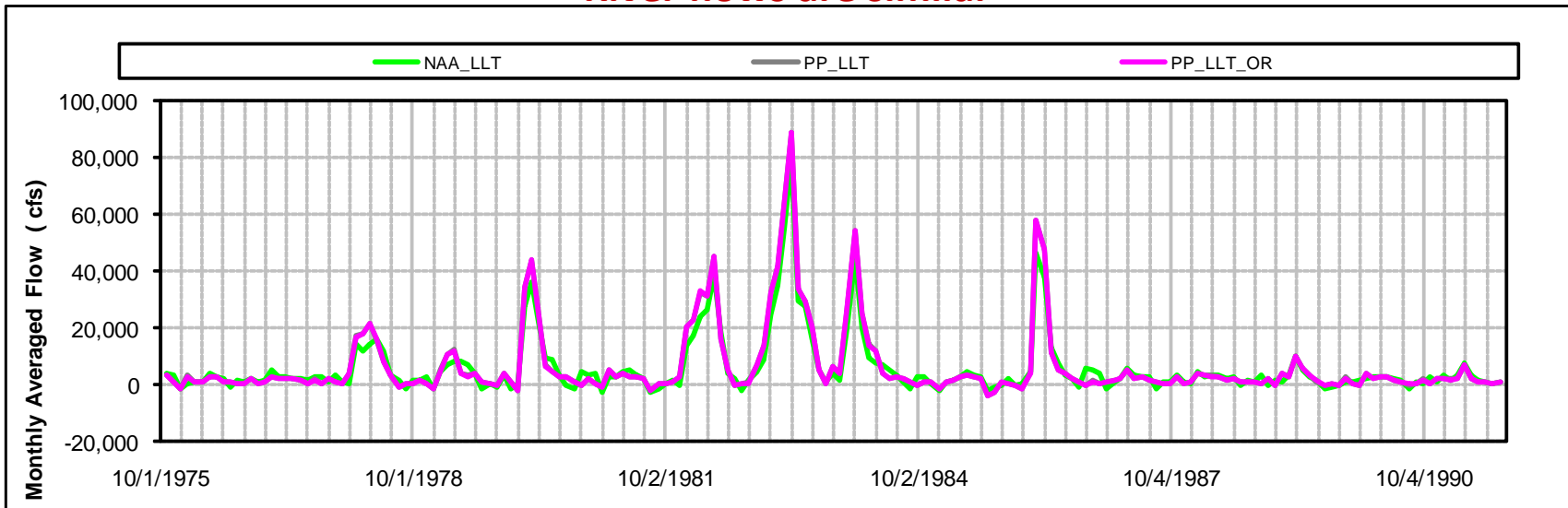
Monthly Flow: Middle River at Bacon Island

Middle River is sole south Delta export pathway in Isolated OR Corridor; more negative flows than Proposed Project



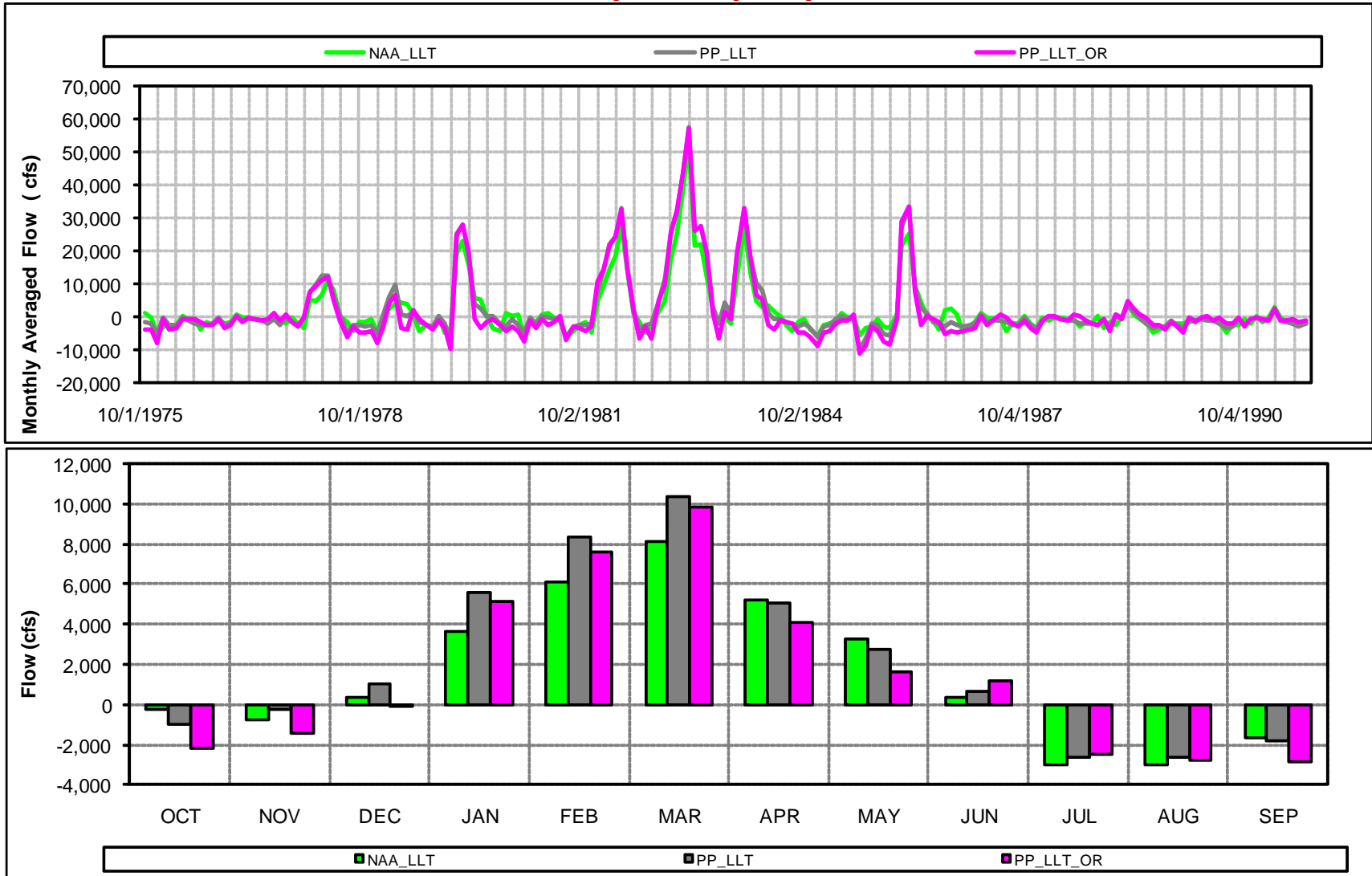
San Joaquin River at Jersey Point

Flow changes are primarily isolated to south and central delta; west of False River flows are similar



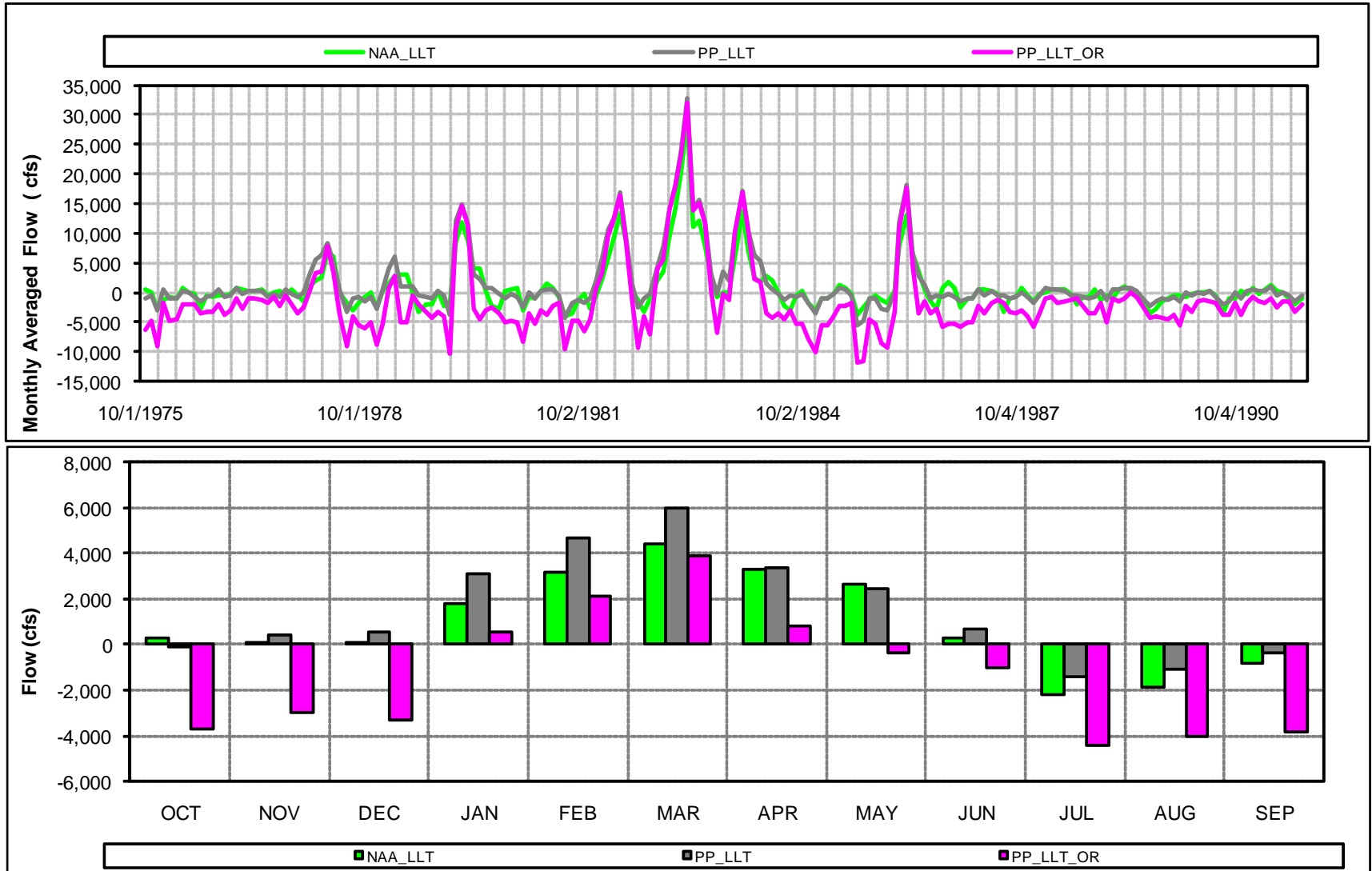
San Joaquin River at San Andreas

Positive SJR @ San Andreas is a critical point of control for Threemile Slough transport to pumps



San Joaquin River at Prisoners Point

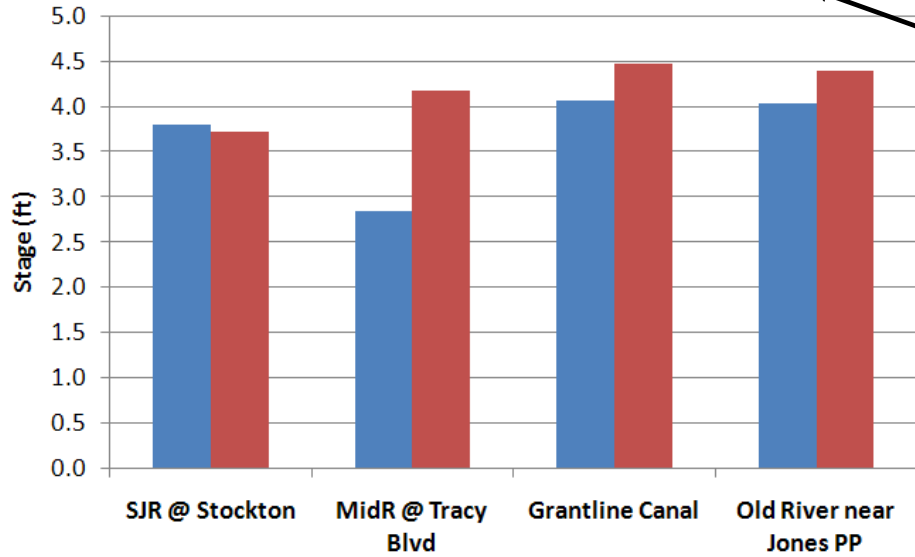
Middle River export pathway reverses SJR in region between mouth of OR and mouth of MR



Water Level Changes in South Delta

Median Daily Maximum Water Level in South Delta

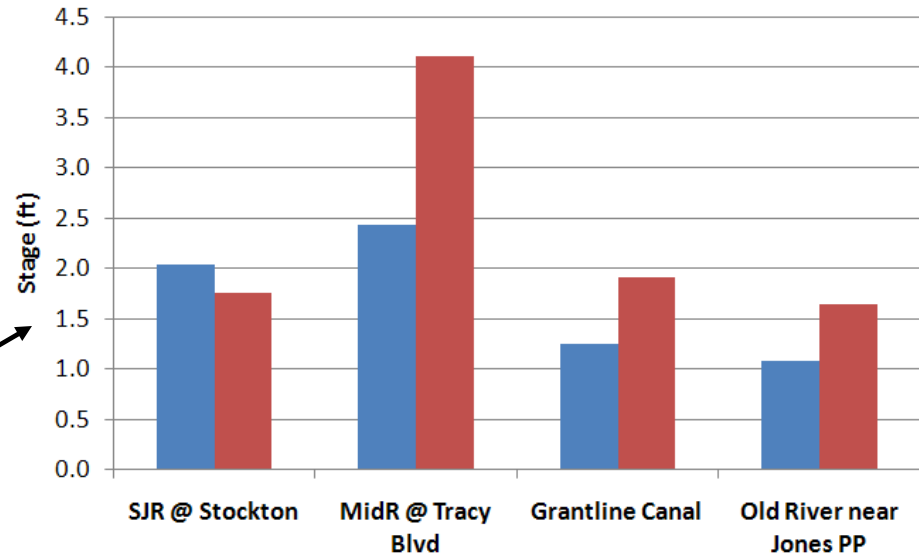
■ PP_LLT ■ PP_LLT_OR



High water level increasing in Middle River, Old River, and Grantline; slight reduction in SJR at Stockton

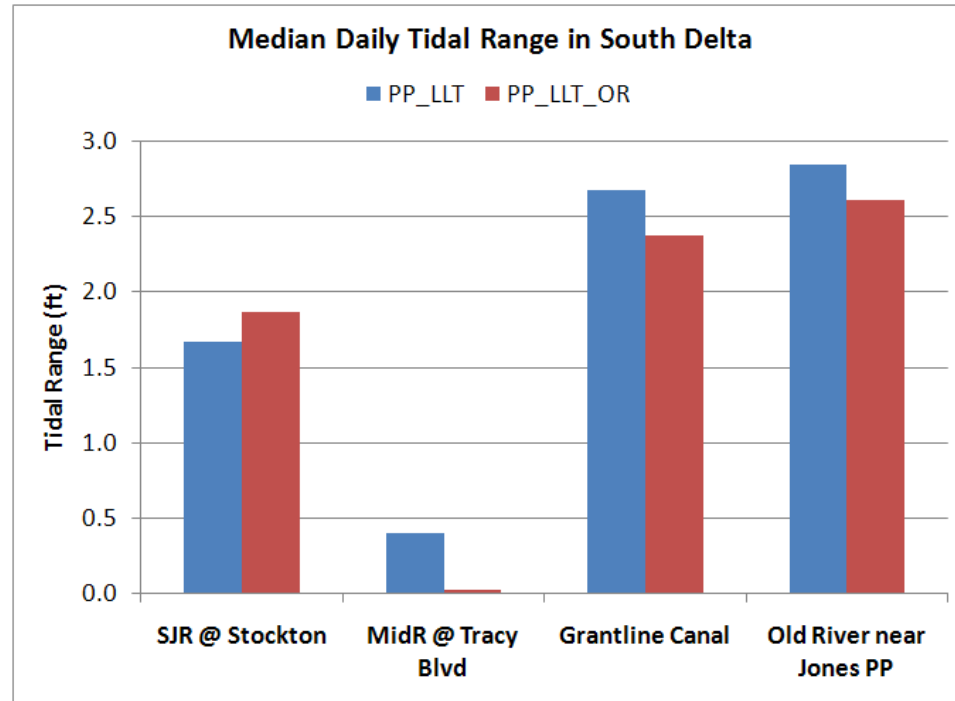
Median Daily Minimum Water Level in South Delta

■ PP_LLT ■ PP_LLT_OR



Low water level increasing in Middle River, Old River, and Grantline; reduction in SJR at Stockton

Tidal Range Changes in South Delta

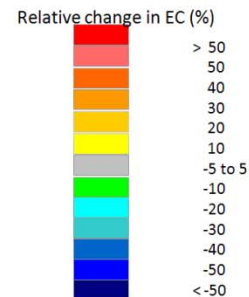


Reduction in the tidal range in Old River, Middle River and Grantline Canal;
Increased range in SJR at Stockton

Water Quality

Seasonal Change in EC

(PP_LL_T_OR minus PP_LL_T)



At Jersey Point, salinity increases on average by 10% with the addition of the Old River Corridor

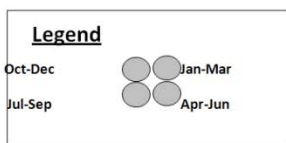
Prisoner's Point salinity increases in summer and fall seasons and minor reduction in the winter and spring

Middle River salinity is reduced in the winter and spring, but increases in the summer and fall

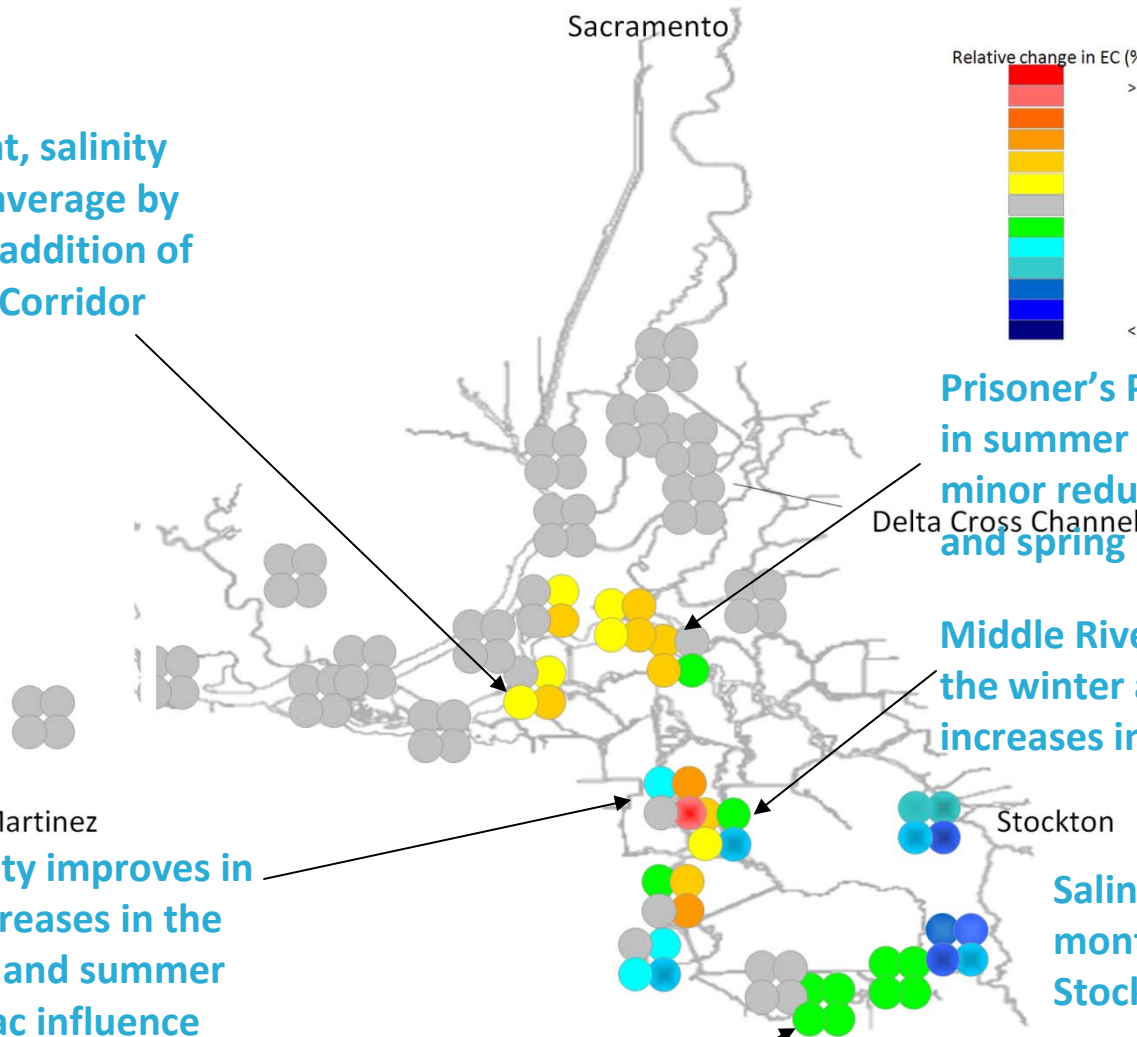
Old River salinity improves in the fall and increases in the winter, spring, and summer likely by less Sac influence

Salinity decreased in all months in SJR upstream of Stockton

Salinity decreased in all months in Old River upstream of Victoria Canal and Clifton Court

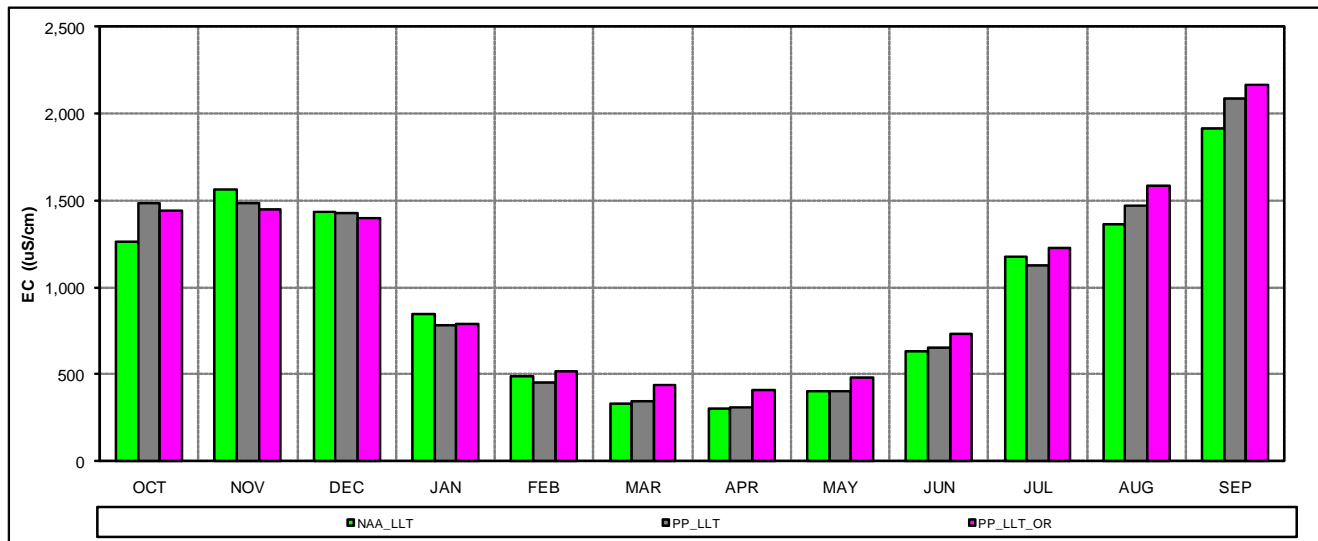
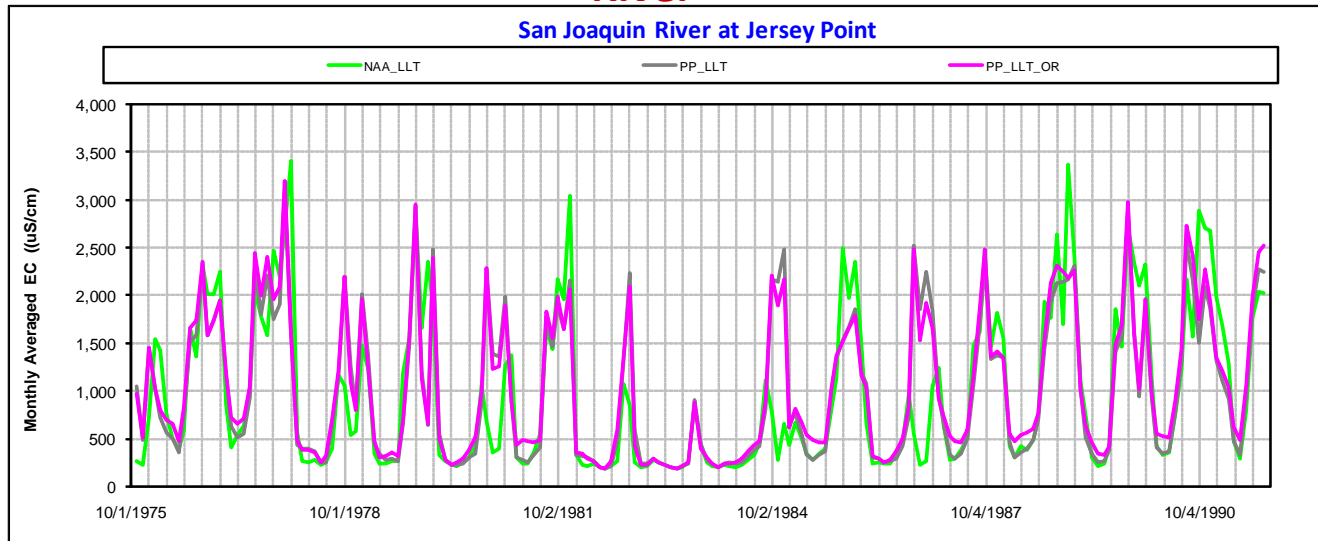


Water Year/Period : ALL WATER YEARS



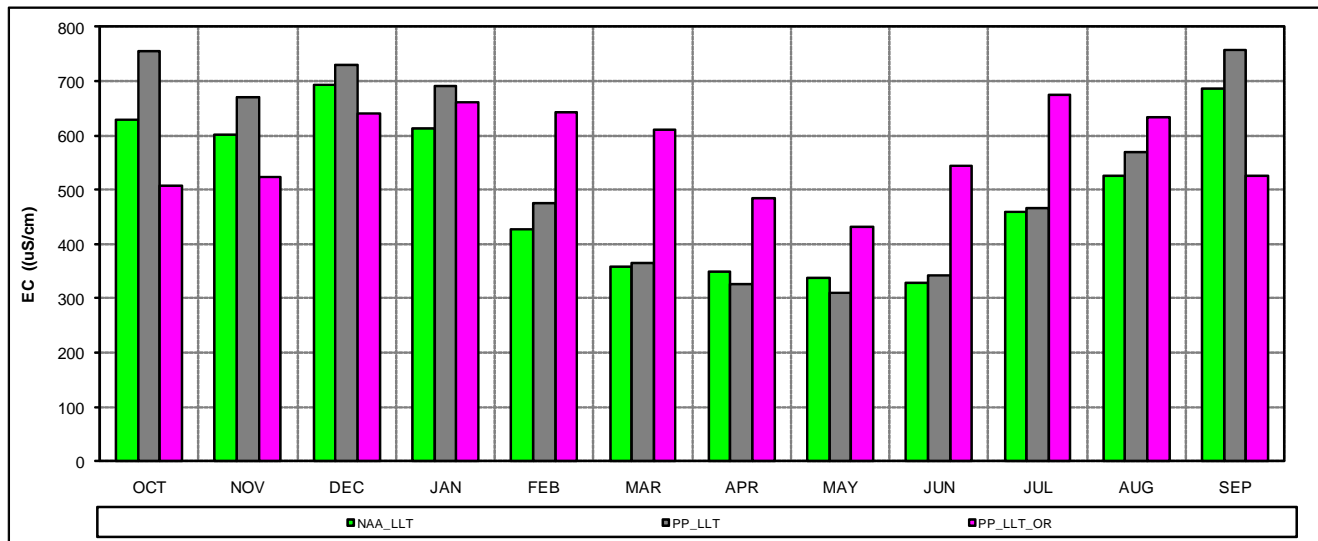
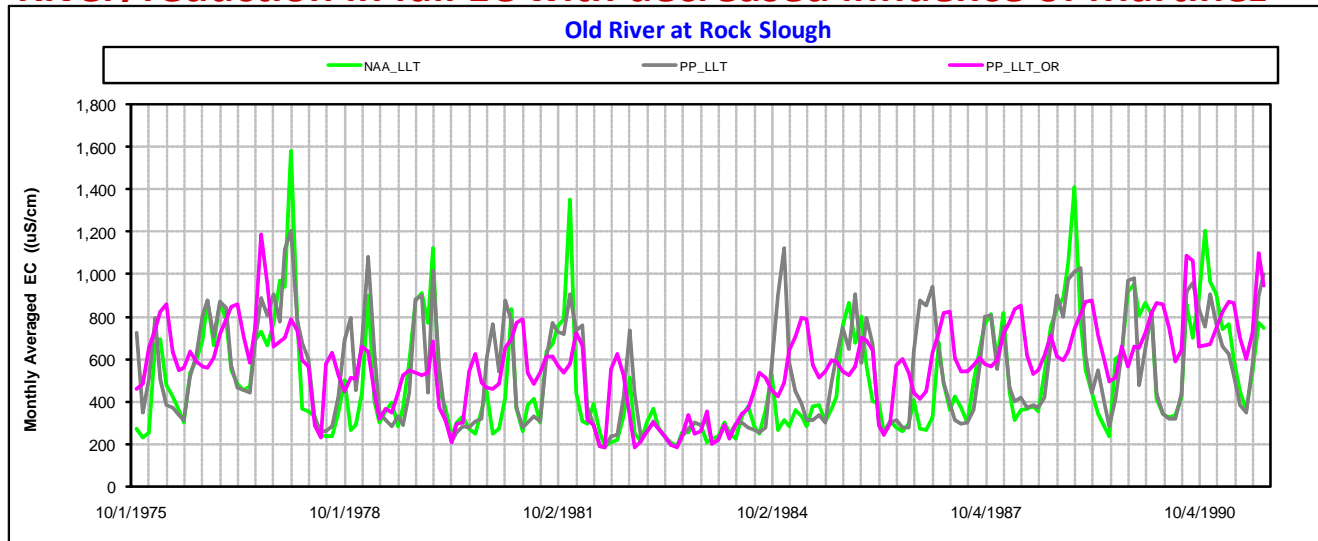
Salinity at San Joaquin at Jersey Point

General increase in salinity with increased influence of San Joaquin River via Old River



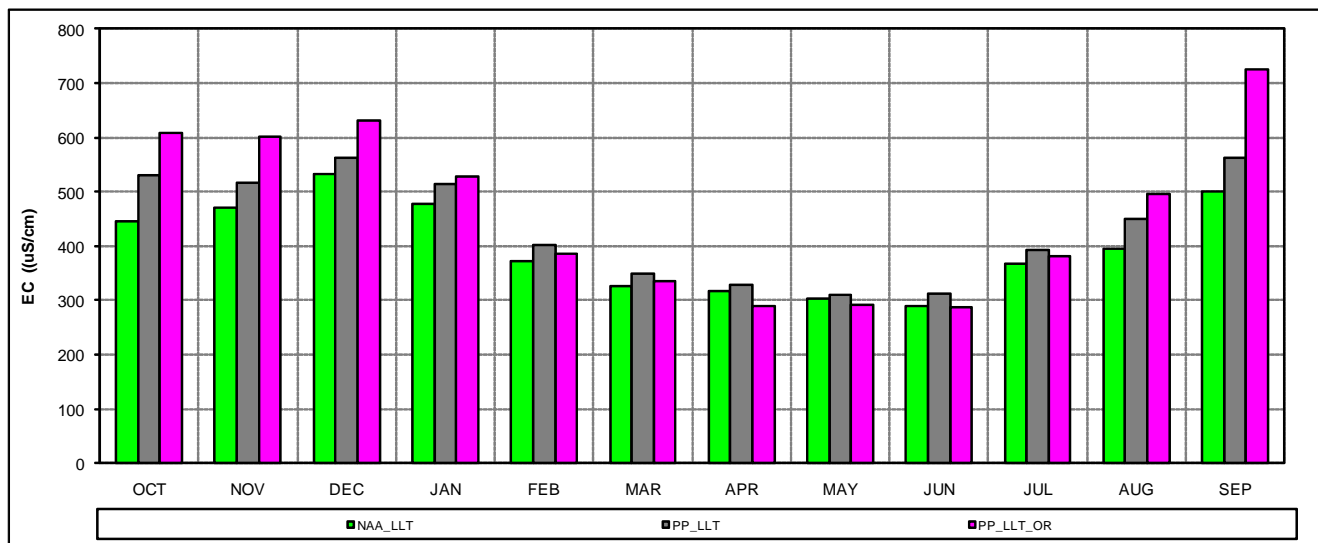
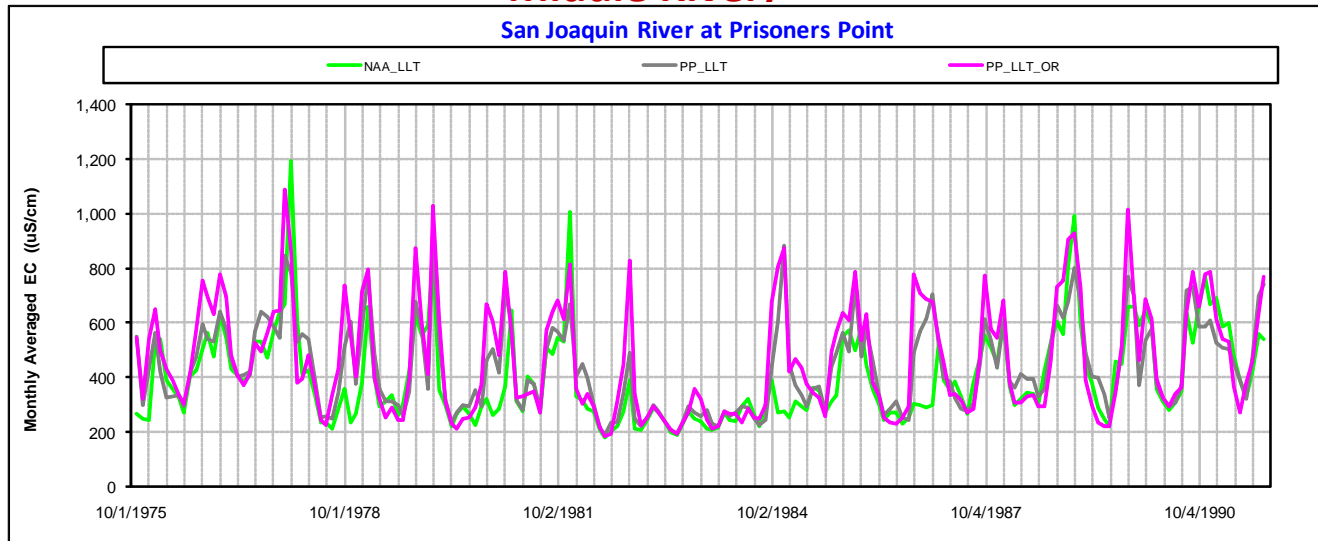
Salinity at Old River at Rock Slough

General increase in salinity with increased influence of San Joaquin River via Old River, reduction in fall EC with decreased influence of Martinez



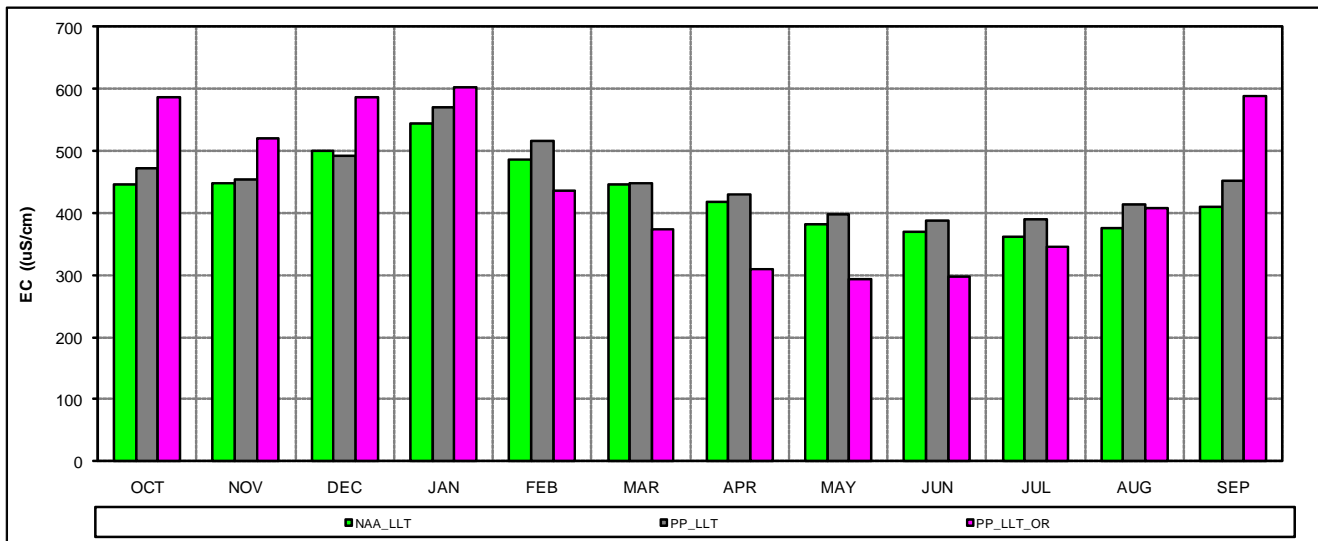
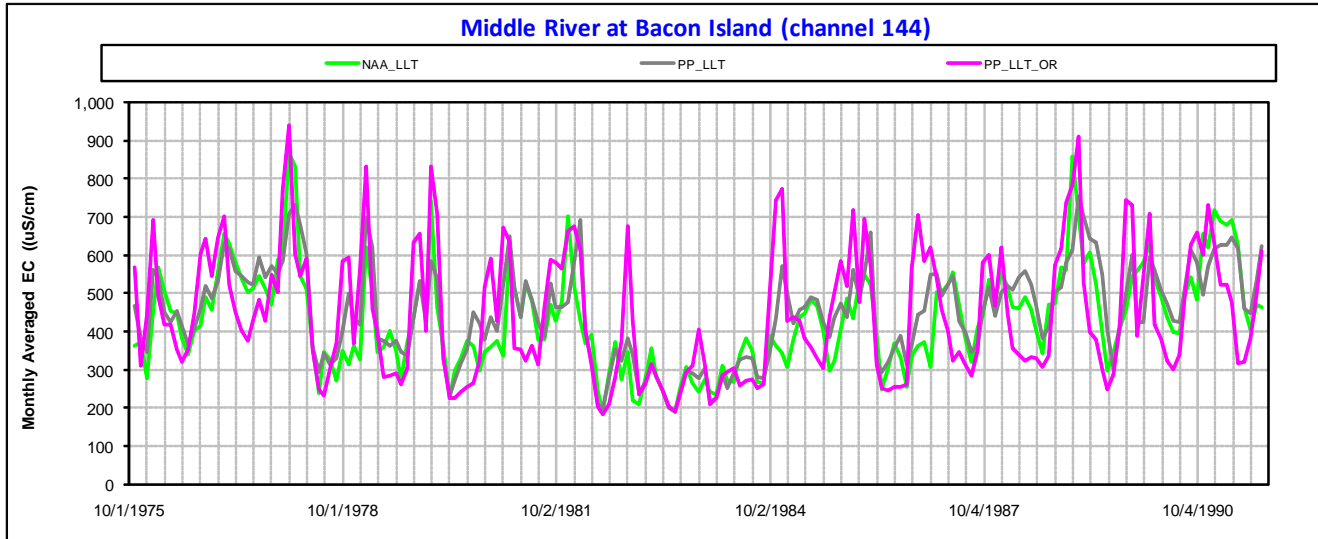
Salinity at San Joaquin River at Prisoners Point

Fall increases as Martinez salinity not distributed in Old River (moved toward Middle River)



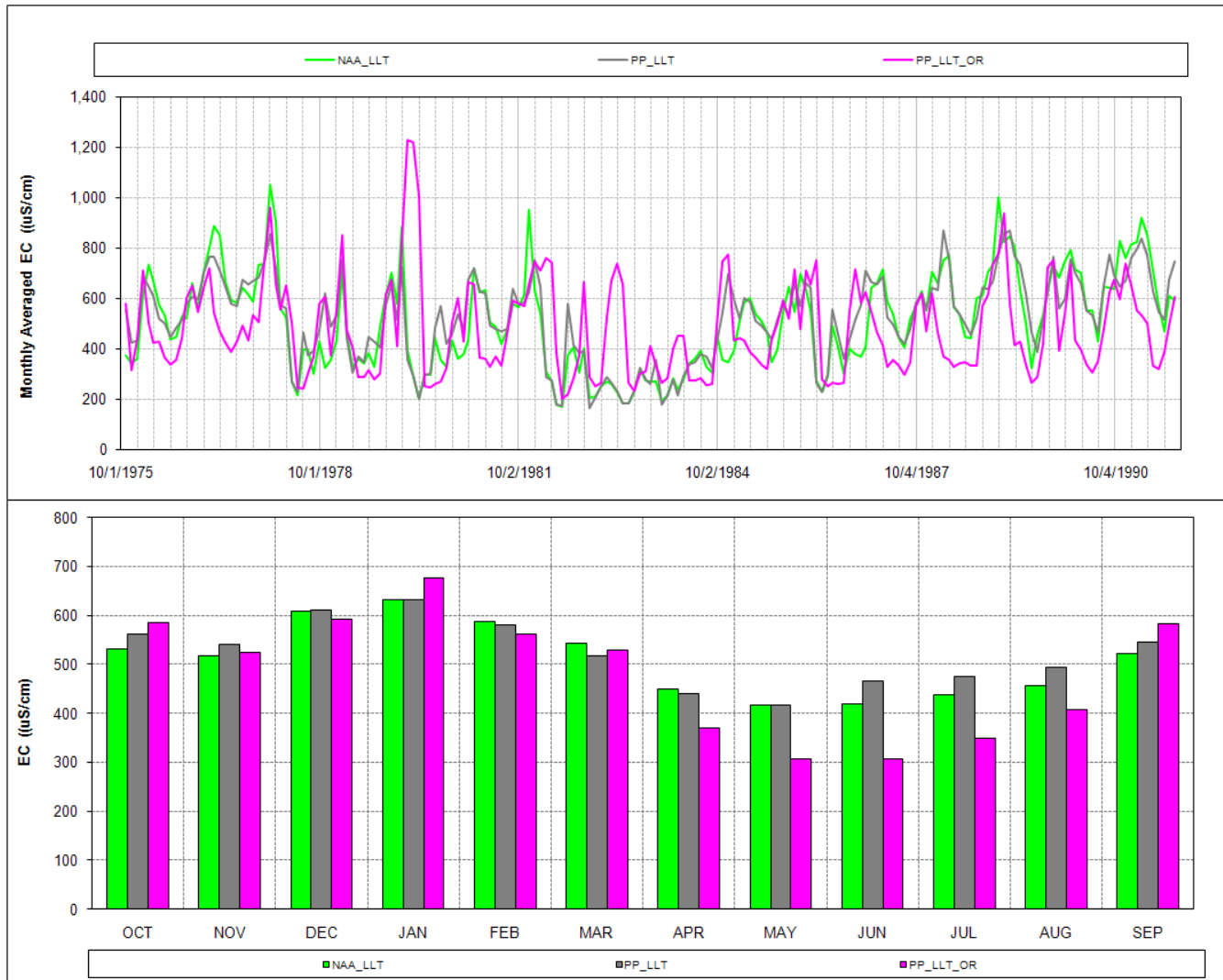
Salinity at Middle River at Bacon Island

Fall increases as Martinez salinity moved into Middle River; freshening in spring with increased Sacramento River water contributions



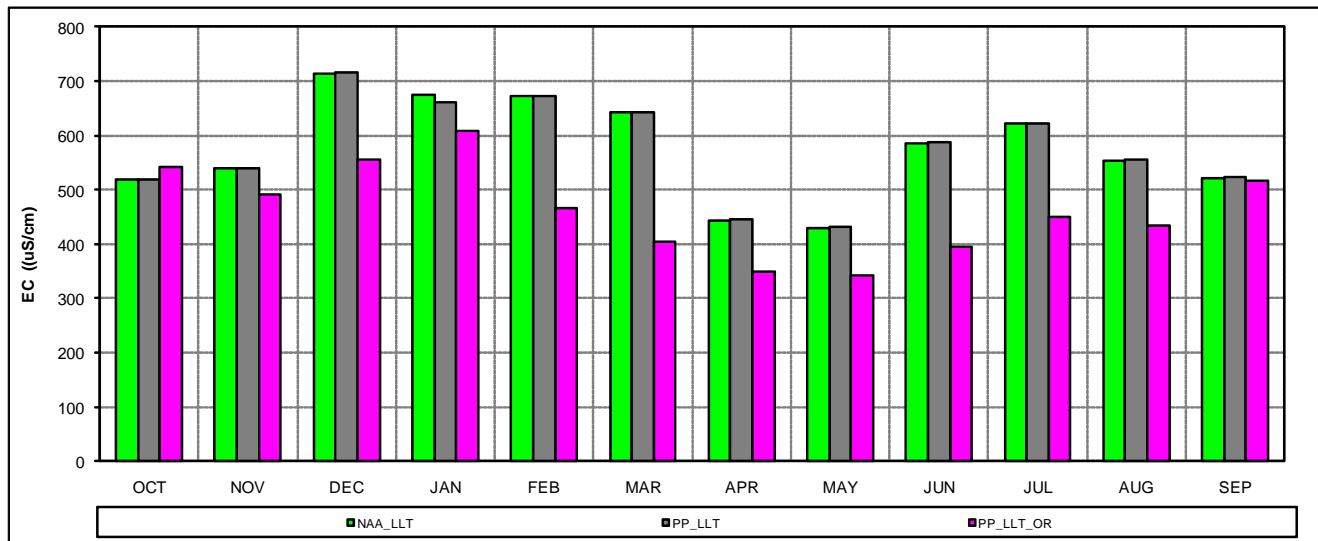
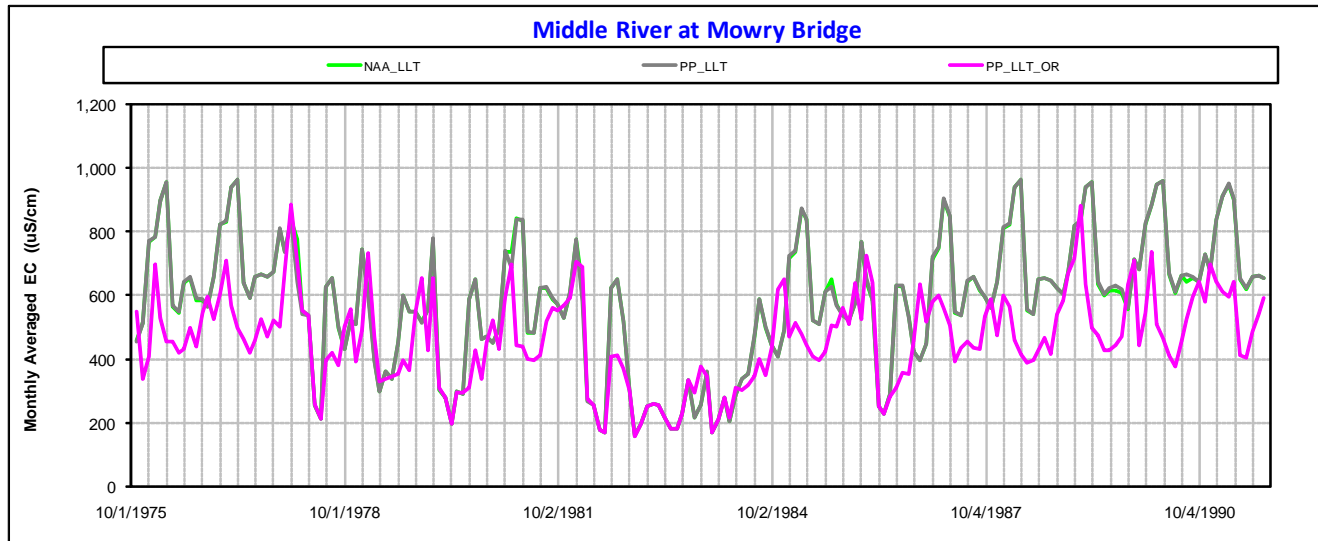
Clifton Court Forebay Inflow Salinity

Minor fall increases as Martinez salinity moved into Middle River; freshening in spring and summer with reduced San Joaquin River contributions



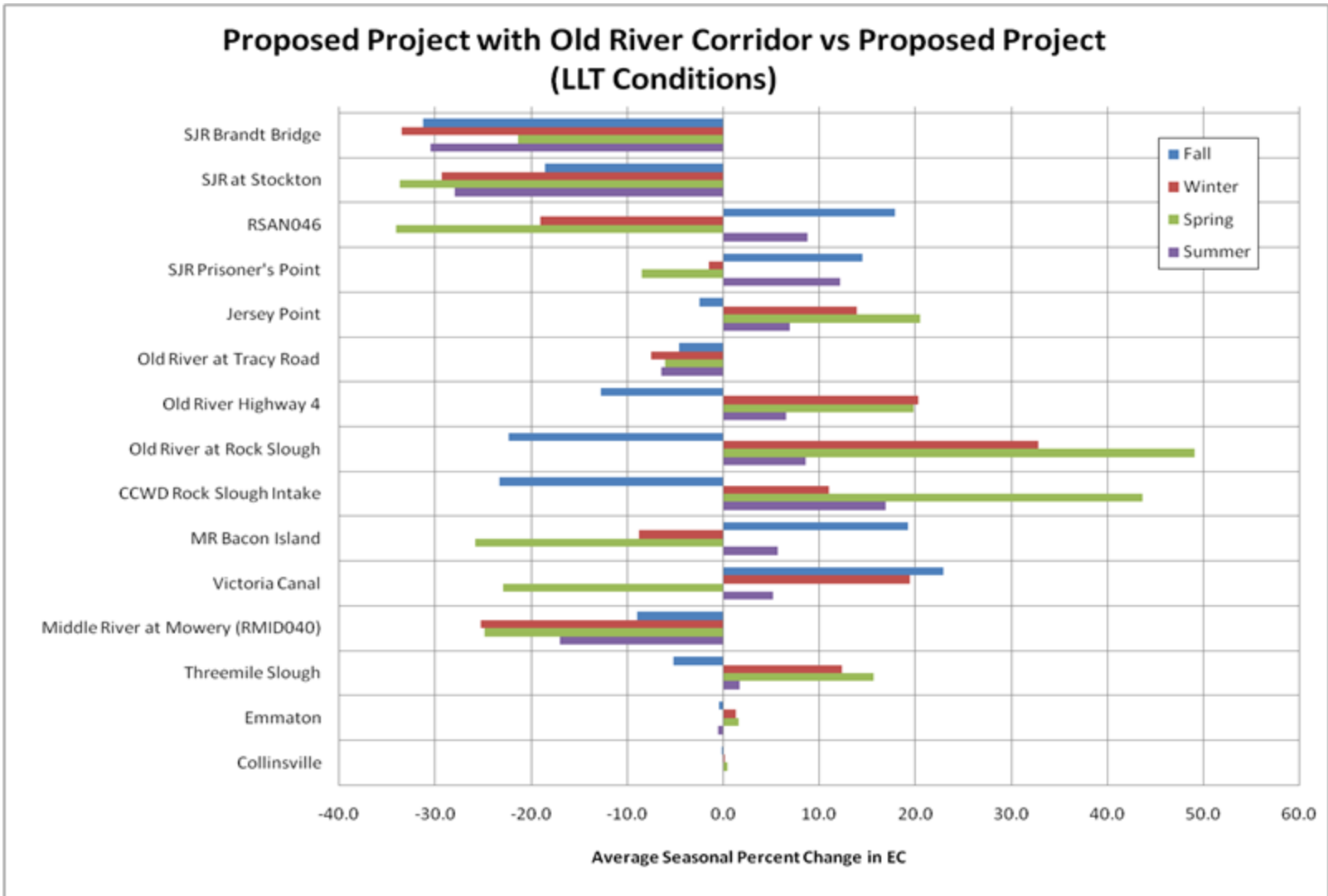
Salinity at Middle River at Mowry Bridge

Improvement in salinity with reduction in residence time because of low head pumps.
Similar results for San Joaquin River between Stockton and Head of Old River as well as
Old River between Clifton Court and Head of Old River



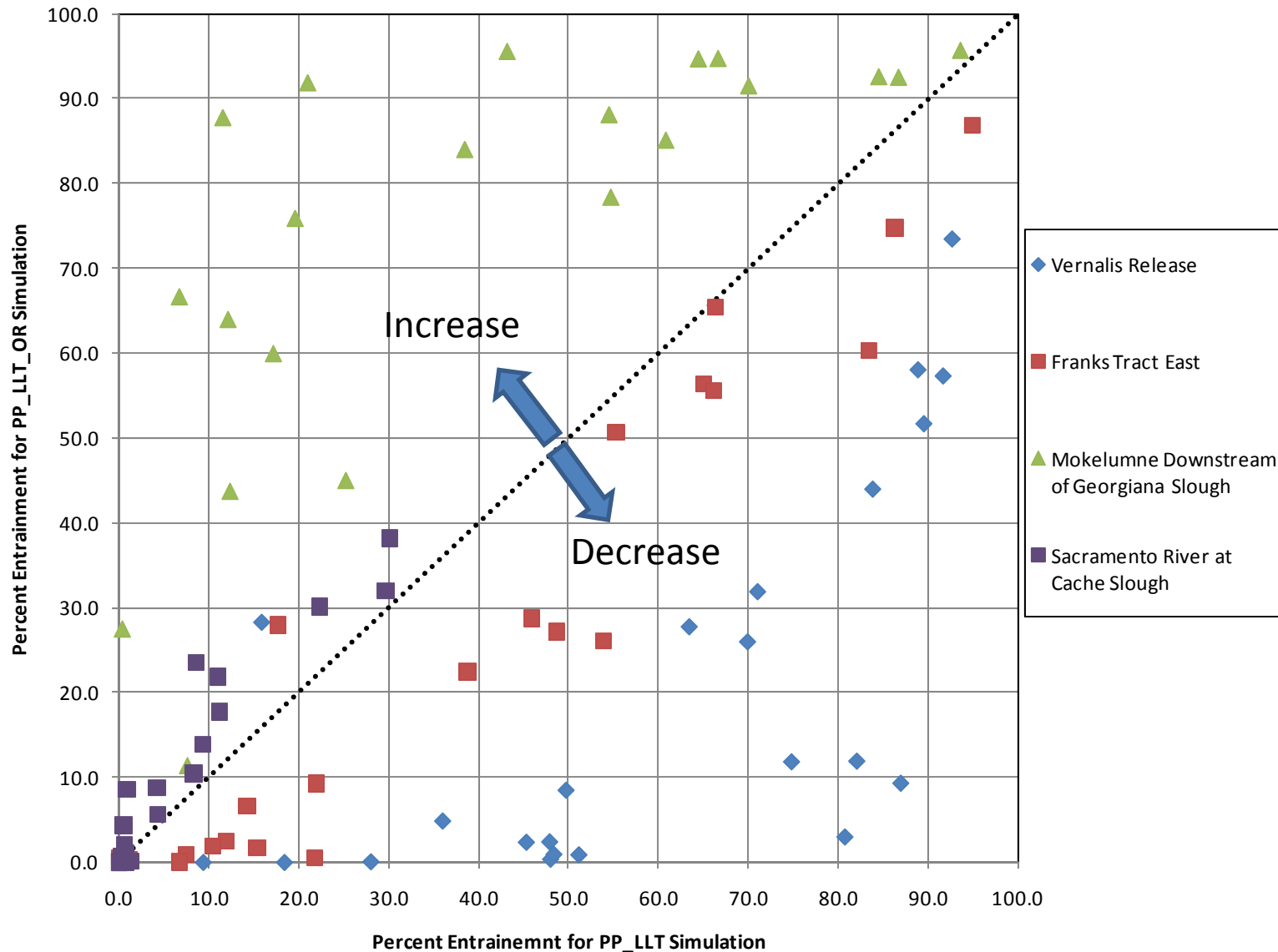
Average Seasonal Percent Change in EC

Proposed Project with Old River Corridor vs Proposed Project (LLT Conditions)



Particle Transport

South Delta Entrainment Comparison (all 24 periods, 60 day fate)

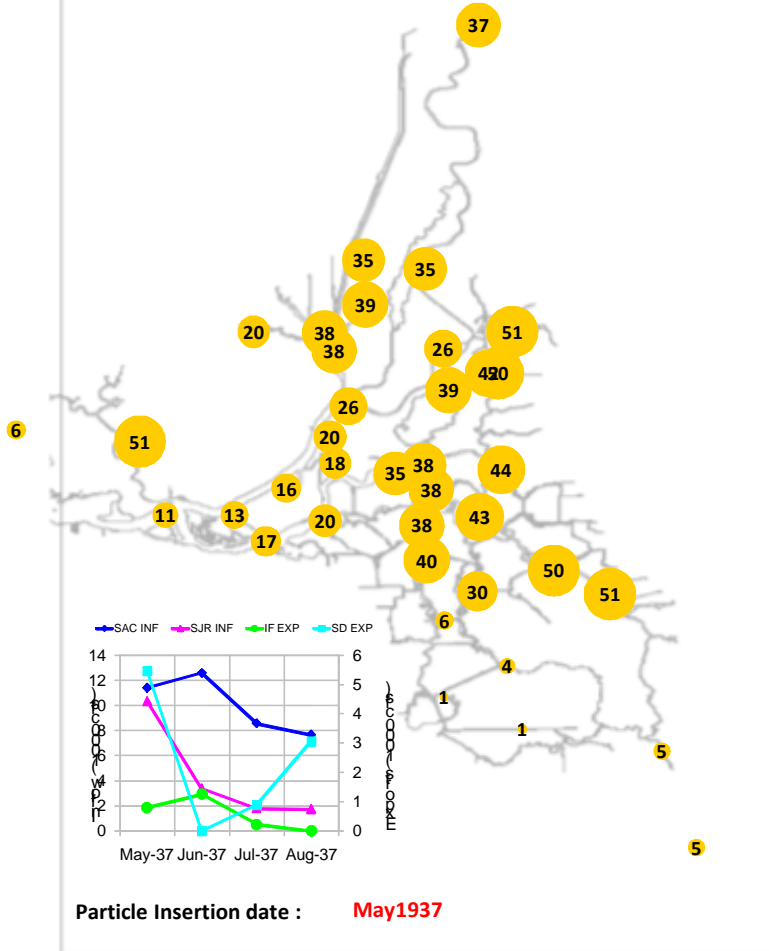


Typical Late Spring and Summer Residence Time Results

Increased Old River Residence Times

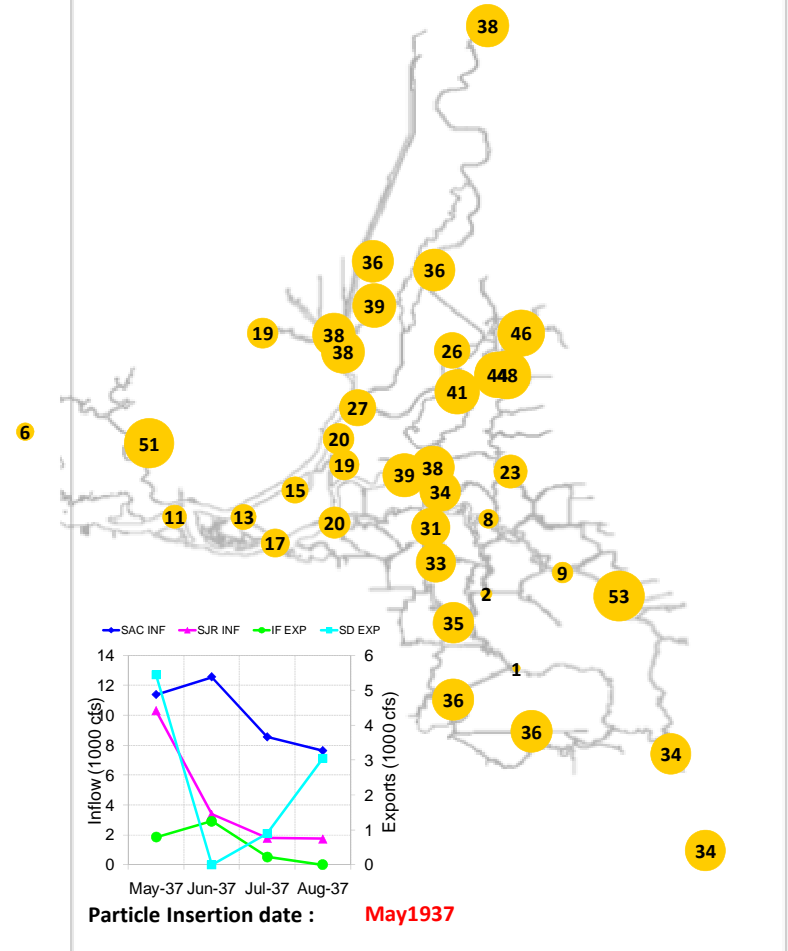
Residence Time of 50% Particles (Days)

PP_LL1



Residence Time of 50% Particles (Days)

PP_LL1_OR



Key Findings – Water Quality

- Water quality along Old River and San Joaquin near Jersey Pt show degradation
 - SWP/CVP operations may be impacted depending on future compliance
- Fall salinity in lower San Joaquin River shows minor degradation due to Middle River export corridor
- Salinity on San Joaquin River near Stockton & Brandt Bridge, and upstream of Victoria Canal shows significant improvements due to increased Sacramento River water contributions

Key Findings – Particle Entrainment

- Reduced particle entrainment in Old River and upper San Joaquin River
- Increased particle entrainment in Central Delta, Sacramento River, and Mokelumne River
- PTM results show significant entrainment from water moving through Georgiana Slough, Delta Cross Channel, and Threemile Slough (increases vs Proposed Project)
- Small entrainment still occurs for releases at Vernalis
 - travel down Old River, up San Joaquin, and up Middle River to export facilities
- **Need for isolation of Mokelumne R and measures to control cross-delta entrainment likely needed**

Key Findings – Residence Time

- General decrease in residence time on Mokelumne River, as the entrainment for particles released in this region increases substantially
- General increase in residence time for San Joaquin R near Vernalis as particles are routed into the South Delta via Old River
- General increase in residence time on Old River associated with its isolation
- General increase in residence time in the vicinity of Franks Tract
- Minor changes in residence time on the Sacramento River

Key Findings – South Delta Restoration Opportunities

- Isolation of Old River enables restoration to be considered along this corridor
 - limited opportunity under current Proposed Project configuration
- Middle River restoration opportunities would be limited due to increased conveyance to exports
- Tidal range reduced in Old and Middle Rivers; may limit “tidal” marsh opportunities
- Increased residence times along Old River would need to be evaluated for water quality/toxicity concerns