Public Hearing (3/20/13)
Bay-Delta Plan SED
Deadline: 3/29/13 by 12 noon

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY

EDMUND G. BROWN JR., *Governor*

**DEPARTMENT OF WATER RESOURCES**
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# LATE COMMENT

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March 29, 2013

Jeanine Townsend
Clerk of the Board
State Water Resources Control Board
P.O. Box 100
Sacramento, California 95814-0100

Comments on the Draft Substitute Environmental Document for Phase 1 of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan Update

Dear Ms. Townsend:

The Department of Water Resources (DWR) appreciates the opportunity to submit the following comments on the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Bay-Delta Water Quality Control Plan (WQCP) update Phase 1 draft Substitute Environmental Document (SED) released by the State Water Resources Control Board (SWRCB) on December 31, 2012. DWR finds portions of the SED to be well documented. However, for the reasons stated in this letter and the attached table of specific comments referenced to the SED, we suggest various revisions to the SED, to make it more factually accurate and legally consistent with provisions of the California Water Code. Also, DWR participated at the recent hearing on this matter and its presentation materials are also attached.

An overarching comment on the preparation of the SED is that the document, including its implementation plan, contains language assigning responsibility for portions of the WQCP to specific parties including DWR. Such assignments should be reserved for the water rights hearing. Because the WQCP update provides a foundation for the consideration of the implementation elements in a subsequent quasi-judicial proceeding, including language within the WQCP and SED that dictates a result during the subsequent water rights hearing is contrary to the procedural protections afforded to DWR and other affected water rights holders. It is the position of DWR that all language assigning responsibility to a particular party or parties within the SED and proposed WQCP text should be removed. Furthermore, any specification of measures to protect beneficial uses that are related only to flows and water allocations should be postponed to the water right phase of the State Water Resources Control Board's proceedings.

With regard to San Joaquin River flow standards, DWR believes that the SED relies in part upon incomplete and out-of-date scientific information. One consequence of this reliance is a mistaken conclusion that consensus exists about the benefits to fish species of the rock barrier at the head of Old River (HORB). Another consequence is that the SED fails to acknowledge that there are various regulatory agencies prescribing actions related to the HORB, which may lead to incompatible operational requirements. Besides these corrections to the science, DWR continues to assert that unimpaired flow standards are currently ill-suited for real-time operations because some of the necessary data are not available in a timely manner. Lastly, the SED does not adequately analyze the costs and benefits of reservoir storage losses, particularly where non-flow options exist and may achieve reasonable protection of beneficial uses.

The SED contains inappropriate and erroneous information on water quality within the south Delta. Including water levels within the WQCP and SED is inappropriate as water levels do not affect water quality. As to the factors that do impact water quality, DWR has conducted years of data collection and analysis under D1641 as to the potential impacts of the State Water Project on south Delta water quality and south Delta hydrodynamics. Tremendous staff time and effort continue to be dedicated to gathering and validating information. By virtue of these efforts and expenses, DWR and the SWRCB possess sufficient information to appropriately assign responsibility for south Delta water quality objectives. Therefore, the SED should be modified to reflect the actual impacts of the State Water Project to south Delta water quality, namely that DWR's operation of the State Water Project export facilities and the temporary barriers improves water levels for local water users, maintains net flows, improves circulation, and can improve water quality in the south Delta from what is otherwise naturally available.

## I. San Joaquin River Flow Standards

SED Scientific Information Incomplete and Out of Date

DWR brings to the attention of the SWRCB that much of the scientific information relied upon in the SED regarding fish is both incomplete and out of date. All the scenarios considered within the SED are incomplete with regard to salmonids due to the lack of predation analysis, which is generally recognized as a primary cause of mortality for migrating juvenile salmonids. The SED should consider additional information as it relates to historical salt water intrusion within much of the south Delta that limited perennial habitat for predators, like largemouth bass. Additionally, the SED should consider information on the historical flood flows that inundated much of the south Delta and provided decreased predator densities and quality rearing habitat. These two uncorrectable habitat modifications result in favorable conditions for predators. Thus, without addressing the high predation rates in the south Delta, the expected benefits to fish of the proposed changes in the WQCP may not be realized. Furthermore, the information presented in the SED on aspects of smelt, salmonids, and sturgeon is incomplete. In the attached comment tables, the SWRCB will find specific instances where the scientific information on the various fish species should be updated to reflect current thinking.

The SED fails to recognize the lack of consensus by regulatory agencies on the appropriateness of the HORB. Proposed requirements on HORB are, in part, inconsistent with existing and proposed regulations by other agencies also governing the Delta. Any inconsistencies between the various regulations can result in delay and disagreement over which is the controlling requirement at a given point in time. Instead, the SWRCB should maintain its narrative goals of balancing the beneficial uses without requiring specific actions that may be inconsistent with other regulatory requirements. In doing so, the SWRCB would maintain flexibility within the SED to work cooperatively with other regulatory processes.

Also absent from the SED is analysis of drinking water constituents. This is an important oversight to correct within chapter 5 of the SED. For instance, the SED designates municipal and domestic supplies as a beneficial use but does not address constituents of concern such as organic carbon or bromide. Again, the specific references to page and content are included in the attached comment table.

Unimpaired Flow Standards Ill-Suited for Real Time Operations

As previously discussed in the DWR comment letter submitted in May 2011, unimpaired flow criteria are not well suited for real-time operations. While theoretically feasible, DWR believes that there are several hurdles that must be overcome before water project operators can use computed unimpaired flow for real-time operations. The primary hurdle is that some of the necessary data are not available in a timely manner. In some cases, this might be resolved through integrating the different data sources. However, in many cases a solution requires development of new information or validation of current assumptions.

Flow Only Approach is Inappropriate

While DWR does not control storage along the San Joaquin River, it nonetheless questions the appropriateness of a “flow-only” approach to protecting fish and wildlife beneficial uses. It is only through a careful analysis of flow and its intended benefits that the SED will adequately analyze how to protect beneficial uses. Currently, the SED is inadequate in its analysis as to how unimpaired flow standards produce the benefits expected, and if balanced against the economic impacts of foregone water storage and use, whether non-flow options such as habitat restoration can more efficiently achieve the reasonable protection of beneficial uses.[1] Furthermore, given climate change, an understanding is necessary of the mid to long-term feasibility of a “flow-only” approach.

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[1] DWR reiterates comments it has made to the SWRCB at previous hearings that the Porter-Cologne Water Quality Control Act is not intended to address non-quality driven characteristics, particularly where doing so impairs one beneficial use at the expense of another while other reasonable solutions remain available. (*see* Water Code section 13000.) Thus, DWR questions whether: 1) flow objectives are appropriate in a water quality control plan, and 2) if considered appropriate, are flow objectives the best approach to efficiently manage the system to protect beneficial uses. The SED, like the 1995 WQCP, has components that seem to depart from the basic purpose of the Porter-Cologne Water Quality Control Act and use it to control water-related phenomena that are better and more appropriately addressed in other contexts and statutory schemes. DWR believes that the SWRCB appropriately stated this principle in its Standard Term E where waste discharge controls should be sought upon all substantial discharges prior to restricting the quantity of water diverted.

## II. South Delta Water Quality Standards

DWR recognizes and appreciates the hard work of the SWRCB and its staff in gathering a better understanding of the south Delta agricultural water quality standards. At the same time, DWR believes that substantial misunderstandings remain about the hydrodynamics of the region, the extent of local sources of degradation, and the impact of the State Water Project. These misunderstandings lead the SED to violate the general legal principle that the SWRCB has the power to regulate and protect beneficial uses, but mitigation imposed upon a party is required to be proportional to the impacts caused by that party.[2]

A longstanding criticism of the WQCP as it relates to the south Delta salinity requirements is the failure to account for degradation between the Vernalis and interior south Delta compliance locations. It is indisputable that local sources of degradation exist between these locations. This lack of an assimilative capacity allowance ignores the facts that have been presented to the SWRCB. Currently the document suggests that an open-ended assimilative capacity suitable to absorb any and all pollution discharged by in-Delta sources is required. This requirement is plainly not implementable.[3] DWR does not have the power, nor should it have the responsibility, to limit in-Delta discharges. This problem is illustrated below in the Paradise Cut 2011 study, which DWR presented to the SWRCB at the March 21, 2013 hearing. An equally important concern is the absence of an adequate description of assimilative capacity within the SED. Assimilative capacity is affected by flow direction, duration and magnitude relative to the characteristics of pollution discharged to that flow. Hence, regulations imposing a requirement upon a party to maintain assimilative capacity without granting them control over the pollution being discharged will fail to control water quality in some cases. What is notable about assimilative capacity is its lack of a relationship to water levels. Water levels are not a metric by which assimilative capacity can be measured or affected, and the SED does not show otherwise. In addition to these three foundational criticisms, DWR believes the SED fails to appropriately address south Delta water levels, flows, circulation and sources of water quality degradation.

<u>Water Levels</u>

DWR does not agree that water levels should be an objective of the WQCP, either as a numeric or narrative objective, or as part of a Program of Implementation. The SED Program of Implementation prescribes objectives for water levels in the south Delta as an

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[2] This general legal principle is underpinned by the U.S. Supreme Court cases in Nollan and Dolan, and is stated concisely within the Racanelli case where the court stated, "The public interest in the projects requires that they be held responsible only for water quality degradation resulting from the projects' own operations."

[3] In fact, Water Rights Decision 1641 recognizes that with the temporary rock barriers DWR may not always be able to control water quality in the south Delta. (D-1641 at pp. 8-12, 86-87.) Given this recognition, the facts presented by DWR as to its ability to reasonably effect change through other methods, the clear indication that local sources are significantly degrading water quality, and the lack of responsibility placed upon those local sources by the SED, DWR cannot "assure" compliance with the water quality standards as called for in the SED plan of implementation. As a consequence, practical experience would indicate the SWRCB is laying the stage for yet another cease and desist order against DWR. However, the evidence in the record supports the position that such assurances are not implementable and therefore fail the tests required by the Robie decision.

element of assimilative capacity of the channel and requires the SWP and CVP develop performance goals and monitoring for water levels. As noted above, assimilative capacity is not related to water levels.[4] Water depth or, more specifically, water volume in a channel is a better indicator. For example, Middle River water levels might be similar to Grant Line Canal, but because Middle River is shallow due to the natural accumulation of sediment, the capacity for Middle River to assimilate saline discharges from agricultural operations is much less than in Grant Line Canal, where depths are much greater and flows are higher.

DWR installs the temporary barriers to increase water levels on the lower tides to mitigate for SWP and CVP export operations impacts to those south Delta water levels. Monitoring of water levels by DWR is for the purpose of maintaining a target water level in the channels upstream of the barriers by closing or raising the weir height or manipulating culvert flap-gates. Thus, because water levels are not a component of or impact to water quality, the barriers are not legitimately included in the WQCP, and operationally are ill suited for purposes of maintaining or improving water quality.

Furthermore, imposing water level performance goals for the purposes of addressing water quality would be unreasonable because the barriers are not designed to be operable in real-time. The barriers can generally maintain at least 0.0 feet MSL water levels on all three channels above the barriers when all the culverts are fully tidally operated (not tied open). This target water level has long been acceptable by SDWA as adequate for agricultural diversions, and is over two feet better on the low tide than would be present absent the barriers and SWP/CVP exports.

<u>South Delta Flow</u>
As previously mentioned, flow is associated with assimilative capacity. However, DWR does not impair net flows in the south Delta. DWR is concerned that the SWRCB staff has erroneously extracted data from the South Delta Improvements Program EIR/EIS (Vol. 1b: Chapter 5), and used that data to portray the SWP/CVP export and temporary barriers as adversely impacting flows in the south Delta, thereby decreasing assimilative capacity to dilute local discharges. For example, SWRCB staff extracted data from table values of acre-ft/day instead of the appropriate values of cubic feet per second. This error portrays the exports and barriers as having a detrimental impact on channel net flows. A closer inspection of the referenced Table 5.2-4 shows that the net flows in each of the south Delta channels modeled were substantially the same between the “no pumping/no barriers” and “full pumping/ barriers” conditions. While it is true that full operation of the barriers reduces the magnitude of the tidal flux (flood and ebb tides) upstream of the barriers, the net flows during the day remain about the same. Net flow is the most important factor in diluting and transporting high salinity local discharges.

[4] Water levels do not further the Porter-Cologne Water Quality Control Act objective to protect water quality. Thus, water levels fall outside the “impact on the beneficial uses of water” language used by the court to justify SWRCB regulation of flows. Instead, water levels potentially pose a water access issue, but such problems are properly dealt with in a water rights permit and not a Water Quality Control Plan.

In addition, the SED indicates that the impact of the temporary barriers on tidal flux is greater than what actually occurs by stating that the barriers block the flood tide completely until the water level reaches the height of the barrier weir at which point upstream flow begins. To be clear, this is not true. The barriers are designed and constructed with either six or nine 4-foot diameter culverts that allow the flood tide to flow through the culverts and upstream well before the weir flow begins. This design operates as intended by reducing the impact of the barriers on the flood tide so that filling of the channels upstream of the barriers would be minimally restricted. The culverts and the different heights of the barriers weirs together help create unidirectional net flow upstream of the Old River and Middle River barriers and downstream past the Grant Line Canal barrier. Consequently, the normal tidal operation of the barriers maintains net flow. SWRCB also has unrefuted evidence that the barrier operations help to reduce stagnant reaches upstream of the barriers, particularly on Old River where stagnant areas naturally occur in summer months without SWP/CVP exports and barrier operations.

Circulation

DWR believes that flow direction and magnitude, i.e., “circulation” should not be an objective of the WQCP, either as a numeric or a narrative objective, or as part of the Program of Implementation. Circulation in the south Delta is a complex and ever-changing sum of inflows from upstream sources, SWP/CVP exports, tidal flux, local agricultural/municipal diversions and discharges, and channel gains/losses to groundwater. The instantaneous flow at a given location changes rapidly due to these influences and is difficult to predict. More importantly, controlling circulation in real-time is not possible given the limits of SWP/CVP export and temporary barrier operations and lack of control over tidal flux, groundwater exchanges, and local agricultural/municipal withdrawals and returns that will vary unpredictably.

Over 20 years of monitoring the operations of the temporary barriers has shown that, while not their primary function, the barriers generally improve circulation upstream of the barriers when fully operating during the summer months to benefit local agriculture. However, the barriers are not a panacea for all water quality problems that occur in the south Delta. Neither barriers nor exports can significantly influence the buildup of high salinity discharges in channel water of dead-end sloughs such as Paradise Cut and Sugar Cut. A dramatic illustration of the effect high salinity flows from Paradise Cut can have upon the EC measurements at the Old River at Tracy Road Bridge compliance station was presented to the SWRCB on March 21, 2013. High salinity flows from Paradise Cut make their way into Old River under certain tidal conditions and dramatically increase the salinity EC measurements at the compliance station—often resulting in an exceedance of the station objective.

In addition, recent modeling performed by DWR and provided to the SWRCB shows that in a 21-year period, stagnant or “null zones” (zero net daily flows) are rare and infrequently occur in the south Delta at about the same rate under “no export/no barriers” conditions when compared with historical exports and barrier operations.

Given that the data clearly demonstrates circulation in the south Delta is not made worse by SWP export operations and the temporary barriers operation can improve circulation, the SWRCB cannot legitimately require DWR to meet circulation objectives and monitoring requirements.

Salt and Contributions to Water Quality Degradation

As indicated above, DWR does not cause degradation of water quality in the south Delta through manipulation of water levels and flows. Furthermore, DWR is not a source of saline discharges to the south Delta. In fact, Water Rights Decision 1641 recognizes that SWP exports decrease local salinity. Neither its exports nor barriers operate in a manner that would lower water quality from that naturally available. To the extent that the SWRCB wishes to reduce salt in the system it must address the significant local sources of pollution. Absent such an approach, San Joaquin River flows will not necessarily assure water quality.

A prime example of this principle is the 2011 Paradise Cut study presented to the SWRCB on March 21, 2013. This study provides the SWRCB fairly conclusive information that local sources of salinity are triggering violations of the south Delta salinity objectives, and these violations are not due to any lack of reasonable assimilative capacity within the watershed. To summarize, through the spring of 2011, San Joaquin River flows were well above normal. Consequently water levels, flows, circulation and incoming salinity were excellent. As a result, assimilative capacity could not reasonably get any better. Beginning around March 25 and continuing until around May 10, low salinity water entered Paradise Cut directly from the San Joaquin River. . Shortly after March 25th, salinity at the Old River at Tracy Road Bridge compliance location saw a rapid increase in salt. As the flood flows continued and excellent incoming water quality persisted, EC within Paradise Cut and at the Old River at Tracy Road Bridge compliance location diminished to roughly the low levels of the incoming San Joaquin River. However, despite this thorough flushing of Paradise Cut, EC levels rapidly returned to a significantly high level as these flood flows decreased and water ceased to flow directly from the San Joaquin River into Paradise Cut. The return to high salinity within Paradise Cut was accompanied directly by increased salinity levels at the Old River at Tracy Road Bridge compliance location. The data is clear, Paradise Cut discharges to the south Delta are a direct cause of significant salinity reaching the Old River compliance station and has and will continue to cause exceedances at that station.

It is not clear to DWR why the SWRCB is proposing to make DWR responsible for assimilative capacity for local sources and evapo-concentration of salinity in the south Delta. It seems that the Board is suggesting that DWR is responsible for diluting local agricultural and municipal discharges of high-salinity water, instead of regulating these dischargers to ensure their discharges do not increase the background salinity of the receiving waters. As shown above, DWR has long recognized that a major source of high-salinity water flowing into Old River and adversely impacting water quality at the Old River near Tracy Road Bridge compliance station is Paradise Cut and Sugar Cut. Both cuts are dead-end channels that receive discharges from agricultural operations and municipal and

State correctional facilities. Due to naturally poor circulation in these channels, salinity builds up to extremely high levels that eventually flow out to Old River under specific hydrodynamic conditions. DWR has no ability to control these discharges or the circulation in these channels. Recent data during high flows on the San Joaquin River indicate that even high flows of low salinity water down Old River cannot assure that spikes of salinity in excess of the salinity objective won't occur.

The SWRCB has some options for resolving south Delta salinity issues. For instance DWR recommends the Central Valley Regional Water Quality Control Board utilize the NPDES and Irrigation Lands Regulatory programs to aggressively address the problem with high-salinity discharges into poor-circulation water bodies, such as Paradise Cut and Sugar Cut. In addition, locals, including agricultural diverters, reclamation districts and water agencies, can take advantage of programs and sources of funding, some of which are listed in the SED, and other that may be available through DWR bond-funded local assistance programs. Local agricultural diverters can also look to farming practices elsewhere that are successful at reducing salt impacts, such as the Suisun Marsh Preservation Agreement.

Increased Responsibility for DWR in Proposed Water Quality Alternatives

The objectives for the proposed alternatives include meeting water quality objectives throughout channel reaches rather than at the previously specified compliance locations within Water Rights Decision 1641. Such an approach to monitoring water quality places additional responsibility on DWR to control for in-Delta diversions and discharges, factors DWR cannot influence. Flows downstream of the compliance locations at Old River at Tracy Road Bridge and Old River at Middle River are naturally low. Even with the water level benefits associated with the temporary barriers program, current modeling indicates that almost all the incoming flow is diverted by in-Delta uses and the reduced amount of water returned to the channels is of worse water quality. Therefore, controlling for water quality within channel reaches is more difficult and costly. Regardless, however, DWR believes it should not have the responsibility to ensure water quality within the south Delta.

Monitoring

DWR emphasizes to the SWRCB that data on south Delta diversions and discharges are not available. DWR does not have the authority to compel production of this information. Without knowing the quantity and quality of water use in the region, monitoring lacks usefulness. Thus, while DWR has done extensive modeling of the area to characterize the spatial and temporal distribution of water within the south Delta, an essential set of inputs to improving the simulations is the operation of local irrigators. DWR must know the rates, timing, and duration of agricultural diversions and returns and the quality of the return flows. The SED requires DWR and Reclamation to submit a plan after six months of meetings and, assuming the plan is approved, implement the plan. DWR and Reclamation do not have the authority to require diverters to regularly measure and report their diversions and returns (quantity and quality). The SWRCB does have this authority, and should recognize the need to take a stronger stance toward in-Delta reporting.

If the SWRCB does not change the SED monitoring requirements, monitoring will remain incomplete. Purposefully incomplete information should not be used to make regulatory decisions, and no legitimate action could be taken based upon such unbalanced monitoring. However, where the SWRCB does incorporate south Delta diverters in the monitoring and reporting requirements, DWR has the expertise and programs that can assist local water users.

Once again, DWR appreciates the opportunity to comment on the draft SED and looks forward to working further with the SWRCB in this process. If there are any questions on these comments or you would like additional information, please contact me at (916) 653-8045.

Sincerely,

Paul Helliker
Deputy Director

Attachments

**Attachment**

**California Department of Water Resources**
**Review Document Comment Form**

**Document:** Draft Substitute Environmental Document in Support of Potential Changes to the Water Quality Control Plan for the Bay-Delta: San Joaquin River F0lows and Southern Delta Water Quality

**Date:** March 28, 2013

| Comment # | Page # | Section # | Comment |
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| **General Comments:** | | | |
| 1 | | | The executive summary and following chapters start with an existing condition that assumes that DWR and USBR have control over the water quality in the southern Delta. Operations of DWR do not significantly degrade or improve salinity in the South Delta. Yet in the existing condition and the alternatives, DWR is held responsible for controlling that salinity. The second alternative provides a "relaxation" of the 0.7 EC objective to 1.0 at the interior South Delta in the Summer months and maintaining the 0.7 EC at Vernalis. The focus of this change is due to the report on salinity needs for crops in the South Delta not because there is an acknowledgement that DWR cannot control the salinity levels in the interior South Delta. The third alternative would move the salinity standard to 1.4 EC.<br><br>During the other months of the year, when barriers are not in operation, the objectives are equal to 1.0 at Vernalis and the interior stations. If Vernalis is 1.0 or greater, degradation at the interior stations will happen and that degradation is not caused by DWR operations. |
| 2 | | | There are no Delta modeling studies that examine how DWR and USBR have caused or impacted the salinity degradation in the interior South Delta included in the SED. DSM2 studies results are taken from the SDIP program (chapter 5 of SED) but do not address the degradation. |

| Comment # | Page # | Section # | Comment |
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| 3 | | | Relationships between Vernalis flow and water quality at the current objective locations are developed within the document and used to show that there are fewer occurrences of water quality violations with higher San Joaquin flow alternatives. Since the proposed water quality alternatives are looking at water quality along channel reaches and not at specific locations, this analysis needs some additional work.<br><br>Relationships between Vernalis flow and salinity at the current objective locations are developed in Appendix F.2 (Section F.2.1.4) and are referenced within the main body of the SED (chapter 5). The regressions have a fair amount of scatter which reflects times when at a particular Vernalis flow the salinity may be higher or lower than what is indicated by the regression equation. A buffer value is added to account for the scatter.<br><br>Below are some comments concerning this approach. Slide 14 in http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/sds_srjf/sjr/docs/dwr_flows_salinity010611.pdf shows 30 day running average graphs of Vernalis flows (lavender shading), DSM2 Old River at Tracy flows (black shading), Vernalis EC (blue line), and Old River at Tracy EC (black line). Generally when there is an increase in Vernalis flows, there is an improvement in salinity at Vernalis but not in all cases. Water quality in July and August of 2008 when there is lower flow (slightly less than 1000 cfs) is similar to water quality in December 2006 – March 2007 when flows are closer to 2500 cfs. This will be reflected in the scatter of the regression developed in Appendix F.2.<br><br>Increased flow, without significantly improved water quality at Vernalis will not greatly impact the water quality in the Middle River reach and the Old River reach due to smaller flows in the two channels even at higher Vernalis flows. Data and modeling simulations show that a large increase in Vernalis flow will not result in a proportional increase in flow in Old and Middle Rivers. The additional flow will move down Grant Line Canal. Flows move on average (without barriers) from upstream to downstream on Old and Middle River. The current objective locations are upstream in the channel reaches. Slide 14 shown in the link above shows that |

| Comment # | Page # | Section # | Comment |
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| | | | increasing flows at Vernalis (lavender shaded area) does not result in a proportional increase in flow at Old River at Tracy (black shaded area) due to the limited flow ability of the channel. Changes in flows are impacted by the barriers with the Head of Old River Barrier having the most significant effect on direction of flow. With or without barriers, flows in Old River are on the order of a few hundred cfs. Due to that lower flow, consumptive use on Old River and agricultural return quality will have a larger impact on the water quality moving through Old River.<br><br>For example, for the channel reach from Old River at Tracy west to just beyond the Old River barrier location, the average July (2007-2011) estimated diversion is 225 cfs, a large percentage of the total flow moving through the channel. The seepage into the island is estimated at 11 cfs and the drainage back into the channel for the reach is 82 cfs with an estimated EC of 739 umhos/cm. During winter months, such as January, the EC is estimated to be 1352 umhos/cm. In addition, for higher flows, flow may be moving from the San Joaquin River into Paradise cut which may be flushing out concentrated salinity and peaks of higher EC may affect the channel reach. Because of this lower flow in Old and Middle Rivers, even with higher SJR flow at Vernalis, water quality at Vernalis is significantly more important than flow amount in the SJR on water quality values in the interior of the South Delta. In order to offset the impact of in-Delta sources along the whole channel reach, the water quality at Vernalis would have to be appreciably better than the current or proposed objectives. |
| 4 | | | Suggest adding additional description or explanation of climate change and the changing landscape that would result in sea level rise. The SED does not address or discuss climate change. |
| **Executive Summary:** | | | |
| 1 | ES-6 | | "Elevated salinity is caused by … diversion of water by the…SWP…" Diversion of water by the SWP does not cause higher salinity in the south Delta. Please see subsequent technical comments. |
| 2 | ES-7 | | With regards to providing low lift pumps to meet water quality objectives. DWR has analyzed this concept and reported that it was not "reasonable" given the |

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| | | | costs and the small improvement in reducing water quality exceedances at the south Delta interior compliance stations. If the SWRCB increases the salinity objective to 1.0 dS/m EC, the need for low lift pumps is further unjustified. |
| 3 | ES-15 | ES 5.5 | This section states the Department is required to design a comprehensive operations plan to address the effects of CVP and SWP pumping operations on assimilative capacity in the southern Delta. This statement assumes that there is a causation of water degradation by DWR pumping with no supporting evidence in the SED document. |
| 4 | ES-45 | | Low Lift pumps are put forward as a possible solution within the document. Low Lift pumps have not been determined a viable alternative. Even with the larger pumps, water quality objectives could not be met within the modeling studies. http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/lhscs_rpt.pdf . The conclusion of the report, "Low Head Pump Salinity Control Study" April 2011, is attached. |
| **Chapter 2:** | | | |
| 1 | 2-32 | 2.6.1 | The Grant Line Canal is not two parallel canals (Fabian and Bell canals). The Grant Line Canal is a separate canal and the other canal parallel to Grant Line Canal is the Fabian and Bell Canal. The Fabian and Bell Canal is a single channel, not two. The Fabian and Bell Canal is named after the two merchants/farmers who partnered to dig the canal in the late 1800's after a dispute with the owners of the Grant Line Canal over access. |
| 2 | 2-32 | 2.6.1 | Exports are described as pulling water across the Delta upstream. This is how it appears to be if flows are averaged over a tidal day. What is actually happening for SWP exports is that tides provide the biggest energy moving the fresher water upstream with a very small increase in flow due to exports. CCFB captures that water after the peak water level of the flood tide and less water makes it back downstream on the ebb tide. |
| 3 | 2-32 | 2.6.1 | "This represents an average tidal flow of about 3,500 cfs flowing into these |

| Comment # | Page # | Section # | Comment |
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| | | | channels during the flood tides (for about 12 hours each day) and about 3,500 cfs flowing out during the ebb tides." Tidal Flows into Old River are closer to 100 cfs as indicated in section 5.2.7. More concentrated water quality impacts occur when diversions/and drainages are of the same magnitude. |
| 4 | 2-36, 37 | 2.6.4 | The SED states that the LSJR flow at Vernalis has a large effect on the salinity at Vernalis and the South Delta. As stated in the general comments, for the water quality alternatives, DWR will be held responsible not just for the current objective locations but for EC in reaches of channels. Due to the lower flow of Old and Middle Rivers, the in Delta sources of diversions/returns and EC will have a larger impact to the water quality regardless of the increase in Vernalis flows. The water quality at Vernalis would have to be significantly improved in order to meet the newer objectives or even if at an extremely improved EC, the alternative water quality objectives along the channel reach may not be reached due to a large impact by in Delta sources, The water quality over the flow amount makes has the biggest influence on water quality in Old and Middle Rivers. http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/sds_srjf/sjr/docs/dwr_flows_salinity010611.pdf, Slide 14<br><br>The SED states that higher CVP and SWP pumping also have a large effect on southern Delta salinity as higher pumping brings more Sacramento River water across the Delta to the export pumps and results in lower salinity. Better Sacramento water quality can make it into the south Delta area (Old and Middle River) when barriers are operating. This water is also mixed with water from the ocean and other inflows. The amount of water tidally pumped into the South Dela is limited since the barriers are rock with culverts and the tidal flows into Old River for example, are relatively small, on the order of a hundred or less cubic feet per second. With higher SJR flow and no barriers, tidal impacts are considerably less. |
| 5 | | General comment | This chapter did not seem to address the role of climate change or sustainability. |
| 6 | | General comment | Although municipal and domestic supplies were designated as beneficial uses of water for community, military, or individual water supply systems including drinking |

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| | | | water supplies, chapter 5 did not address any drinking water constituents of concern for example, organic carbon or bromide. |
| **Chapter 5:** | | | |
| 1 | 5-33 | 5.2.7, para. 3, line 5 | 7,000 cfs should be 5,000 cfs. The spring HOR barrier is not installed if the SJR flow is above 5,000 cfs. Once installed, it can remain in place during flows up to about 8,000 cfs. |
| 2 | 5-32 | 5.2.7 | These studies come from work done a few years ago. There have been changes in the operational design of the barriers that will impact the results slightly. |
| 3 | 5-34 | 5.2.7 | Consider adding a percentage and a source the percentage is based on to the sentence "The combined pumping is almost always greater than the SJR flow at Vernalis". |
| 4 | 5-37 | Paragraph 2 | The text describing the water levels above and below the Old River barrier is not correct. The text currently says "The minimum tidal elevations were -1.0 feet downstream of the barrier, and were increased to +1 feet MSL when the barrier was installed (with culverts open) in early April. The minimum elevations were increased to feet MSL when the culverts were closed in early June (after the VAMP period). The effect of the temporary barrier on minimum tidal elevations (MLW) was an increase of about 2-2.5 feet." It should be changed to read "The minimum tidal elevations were **between 0.0 and** -1.0 feet downstream of the barrier, and were increased to **between 0.0 and** +1 feet MSL **above the barrier** when the barrier was installed (with culverts open) in early April. The minimum elevations were increased to **between 1.0 and 2.0** feet MSL **above the barrier** when the culverts were closed in early June (after the VAMP period). The effect of the temporary barrier on minimum tidal elevations (MLW) was an increase of about 2 feet **above the barrier**." |
| 5 | 5-37 | Para. 2, last sentence | The net flow in Old River with temporary barriers is NOT greatly reduced, in fact, it is almost identical to no barrier/no export net flow. The maximum flows of the flood/ebb flows are greatly reduced, but the net flow remains about -70 cfs. Per |

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| | | | SDIP EIR/EIS Section 5.2-31, Table 5.2-4. |
| 6 | 5-38 | Para. 1, lines 12-13 | Downstream flow was 675 cfs NOT 1,340 cfs. The 1,340 number is the af/day, not flow. Upstream flow was -746 cfs NOT -1,480 cfs. The -1,480 number is also the af/day, not flow. See SDIP EIR/EIS Section 5.2-31, Table 5.2-4. |
| 7 | | 5.4 | The impact analysis uses two modeling tools, CALSIM II and WSE. CALSIM II was used to simulate the baseline condition, and the WSE was used to simulate the LSJR alternatives. The impact analysis was conducted by comparing the results of baseline and LSJR alternatives (i.e. evaluating the differences between baseline and LSJR alternatives).<br><br>The traditional way to perform this type of impact analysis is to use the same modeling tool to simulate the baseline and the alternatives, and then compare the results, so all the other assumptions are “canceled-out” to focus on the effects of alternatives. In the SED, there is no description explaining why using two different tools (one for the baseline simulation and another for the alternatives) is an appropriate method of analysis. |
| 8 | 5-40 | Para. 1, lines 2-4 | Incorrect figures for flows. 680 cfs should be 343 cfs, and -712 cfs should be -359 cfs. The larger figures are af/day, not flow. The net flow was NOT increased, but <u>decreased</u> from -71 (no pumping, no gates/barriers) to -17 (full pumping, no gates/barriers). The minus sign (-) indicates flow direction, not increase/decrease. |
| 9 | 5-42 | Para. 1, lines 8-9 | Although this text was taken from the SDIP EIR/EIS, it’s misleading. While upstream flow OVER the weir does not take place until water levels downstream reach 2.0 feet MSL, the text suggests the barrier is blocking the flood tide completely until that level is reached. This is not true. The Old River barrier contains nine 4-foot diameter culverts that have flap gates on the upstream end of the culverts. These flap gates open on the flood tide to allow tidal flow through these culverts, well before the tide reaches the level of the weir when weir overflow begins. All three barriers on Middle River, Grant Line Canal, and Old River operate this way; however Middle River and Grant Line barrier contain six |

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| | | | culverts instead of nine. These designs were intentional to ensure unidirectional net flows upstream on Old River and Middle River and downstream on Grant Line Canal barrier. The normal operation of the temporary barriers reduces the number of stagnant or "null zones" above the barriers compared with no barriers/no exports. |
| 10 | 5-42 | Para. 1, lines 16-17 | The statement that "the TBP may also cause increased salinity in channels upstream of the barriers" is false. The normal operation of the TBP barriers reduces the occurrence of stagnant or "null zones" when compared with no barriers/no export conditions. When DWR manipulates the culvert operations under specific tidal conditions, improved circulation is provided to further reduce the possibility of null zones and reduce localized poor water quality conditions; however the improved circulation reduces water levels upstream of the barriers which may not be tolerable for local agricultural diversion operations, depending on ag demand at the time. DWR coordinates culvert operations with SDWA to determine whether water levels or circulation is more important. |
| 11 | 5-49 | Para. 1, last sentence | This statement about the Old River at Tracy Blvd Bridge not accurately indicating the salinity of the water being supplied to Old River is true and is a key reason this station should not be a compliance station for south Delta salinity objectives. Historically this station poorly reflects the water quality being supplied to the south Delta but has been used by the SWRCB to compel the SWP and CVP exporters to change operations to somehow effect an improvement in water quality at this station, or face regulatory actions including fines and ceasing export operations. DWR and the USBR have long explained to the SWRCB that exceedances at this station are adversely impacted by local high salinity discharges, particularly in Paradise Cut, that under certain tidal and flow conditions will cause spikes in salinity measurements at this station. These spikes cannot be influenced or controlled by SWP and CVP operations. |
| 12 | 5-63 | Para. 3, lines 3-5 | Assimilative capacity is not related to water levels but to water depth or more specifically, the volume of water in a channel. For example, water levels in Middle River and Grant Line Canal can be at the same level, such as 1.0 feet MSL, but |

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| | | | the assimilative capacity is dramatically different. This is because Middle River is much shallower and carries much less flow than Grant Line Canal. Water level objectives are only meaningful for south Delta agriculture for diverting water on low tides, but are not a meaningful surrogate for water quality. |
| 13 | | General comment | Assessments only indicate whether alternative management plans cause a significant negative impact compared to baseline and do not indicate whether or how much alternative management plans will result in improved population numbers or survival. Restoration of a more historical, dynamic hydrograph would generally be expected to benefit native aquatic species by improving native species habitat through natural processes. However, all the scenarios considered were missing two related components that may be necessary to relieve what is generally recognized as a primary cause of mortality for migrating juvenile salmonids: predation in the South Delta. The first missing component is the reestablishment of historical low flows in late summer/early fall that allowed salt water intrusion into much of the South Delta; salt water intrusion would diminish perennial habitat for (and therefore densities of) obligate fresh water predators like largemouth bass. The second component is reestablishment of extreme high flows during late-spring/early summer snow melt that historically transformed much of the South Delta into an extensive freshwater marsh. These floods would dilute predator densities and provide quality rearing habitat for migrant juveniles. Neither of these components are currently possible because of the need to maintain low salinities for south Delta water withdrawals and the need to protect suburban developments in historical flood zones. Without addressing high predation rates in the South Delta, the potential benefits to fish of the proposed changes to the water quality control plan may not be fully realized. |
| **Chapter 7:** | | | |
| 1 | 7-10 | Green sturgeon location | Green sturgeon location description needs to include the San Joaquin River. The publication using CDFW and USFWS has not been published. |
| 2 | 7-10 | Green sturgeon | The habitat description for Green Sturgeon should clarify that 8 – 14 centigrade is the spawning temperature range. Adult habitat temperature can be as high as 22 |

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| | | habitat | centigrade as commonly seen on the Feather River. |
| 3 | 7-10 | Delta Smelt Habitat | The habitat description for delta smelt is outdated & we can't really state with much certainty what smelt "prefer". Delta smelt are common in the low salinity zone (1-6 ppt), but also frequently occur in freshwater areas such as Cache Slough Complex (Sommer et al. 2012). |
| 4 | 7-11 | Sacramento Splittail | Actually, there is a recreational fishery for splittail. The description of splittail habitat is outdated. It should say: "Spawn among submerged and flooded vegetation in sloughs, river channels, marshes, and seasonal floodplain. " |
| 5 | 7-13 | Striped bass habitat | Better to say "rivers" than "streams" |
| 6 | 7-13 | White sturgeon location | The location of the White sturgeon needs to include the San Joaquin River. White sturgeon are frequently caught in the San Joaquin River and eggs have been recovered (CDFW, USFWS, publications pending) |
| 7 | 7-14 | American shad location | Shad also occur in tributaries such as Yuba, American, and Feather Rivers. |
| 8 | 7-16 | Paragraph 4 | Omits one population of Spring-run Chinook salmon on the Sacramento River; Butte Creek should be included. Following removal of the PG&E dams above the hatchery, a record return of Spring-run occurred on Butte Creek in 2012. |
| 9 | 7-17 | Second to last paragraph | Might add that steelhead juveniles also use seasonal floodplain (Sommer et al. 2001). |
| 10 | 7-18 | Green sturgeon paragraph 4 | The biology of juvenile green sturgeon has not been well studied. |
| 11 | 7-18 | Green sturgeon Paragraph 5 | This sentence is confusing. How can fish rear for 1-4, but only during summer and fall? |
| 12 | 7-19 | Paragraph 2 | It is wrong that delta smelt migration begins in Sept-Oct. Their migration |

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| | | | coincides with first flush, which typically occurs December-March (Sommer et al. 2012). Also, the spawning distribution is outdated. It should include the north Delta and Cache Slough Complex, both MAJOR spawning areas. |
| 13 | 7-19 | Paragraph 3 | Outdated. Only some delta smelt are transported to the low salinity zone. There is actually much more variability in their behavior. For example, some larvae choose to remain in freshwater (Sommer et al. 2012). Also, consider deleting the last sentence since it is so outdated. Even if it still applies, the stated mechanism may be totally wrong. Growth often slows down as fish get older—this is a simple allometric effect. |
| 14 | 7-19 | Paragraph 4 | The description of smelt diet is outdated. As described in Moyle (2002), the diet of smelt includes zooplankton, but is surprisingly diverse. |
| 15 | 7-19 | Paragraph 5 | The last reference should be reviewed as—it applies to salmon, not necessarily delta smelt. |
| 16 | 7-20 | Longfin smelt, second paragraph | Longfin smelt are also found throughout the legal Delta including Yolo Bypass. |
| 17 | 7-20 | Longfin smelt, third paragraph | The sentence regarding spawning – CDFW surveys have shown that spawning occurs over a larger area.<br>• http://www.dfg.ca.gov/delta/data/longfinsmelt/documents/LongfinsmeltFactSheet_July09.pdf<br>• http://www.fws.gov/cno/es/speciesinformation/Longfin%20Smelt%2012%20month%20finding.pdf |
| 18 | 7-20 | Longfin smelt, second paragraph | It is wrong that longfin smelt are rare upstream of Rio Vista. They are relatively common in Cache Slough Complex (CDFW, unpublished data) and in lower Yolo Bypass (Sommer et al. 2003). Should also note that longfin distribution includes the Pacific Ocean (Rosenfield and Baxter 2008). |
| 19 | 7-20 | Longfin smelt, third paragraph | Based on 20 mm Survey distributions and Hobbs et al. 2010, spawning is much broader than suggested here. For example, they are common in the north Delta, and Napa River. |

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| 20 | 7-20 | Longfin smelt, last paragraph | This whole paragraph is very outdated. We now understand that splittail abundance is primarily driven by access to upstream floodplain habitat (Moyle et al. 2004; Sommer et al. 2007), not salinity intrusion. |
| 21 | 7-21 | Sacramento splittail diet | Sentence regarding Sacramento splittail diets. The Sacramento splittail has a wider diet than what is depicted in the description. http://www.escholarship.org/uc/item/61r48686#page-2 |
| 22 | 7-21 | Paragraph 3 | This discussion is very outdated. See Sommer et al. (2008) for an updated understanding of juvenile splittail behavior. Their behavior changes substantially on a diel basis, and as they grow older. |
| 23 | 7-21 | Paragraph 4 | Ditto. Splittail don't feed almost exclusively on mysids. Please update this text based on Feyrer et al. (2003). |
| 24 | 7-25 | Paragraph 2 | Footnote three makes it seem like striped bass only live near 2 ppt. This is wrong—their larval distribution is much broader. It is true, however, that juvenile production is typically better in wetter years. The center of juvenile striped bass distribution is affected by the position of the salt field as indexed by X2 (Dege and Brown 2003; Sommer et al. 2012). However, young striped bass have a relatively broad distribution across the low salinity zone and freshwater tidal habitat. X2 has at least a modest effect on annual production of young striped bass, although in recent years the effect has become muted (Sommer et al. 2007). |
| 25 | 7-25 | Paragraph 3 | Striped bass are a major source of mortality to fishes throughout the delta, not just at the SWP. |
| 26 | 7-25 | White sturgeon, third paragraph | Include the San Joaquin River. USFWS has recovered white sturgeon eggs in the San Joaquin River. (Zac Jackson, Anadromous Fish Restoration Program/San Joaquin River Restoration Program US Fish and Wildlife Service has led these studies.) |
| 27 | 7-28 | Table 7-4 | Not sure what the Rosenfield and Baxter (2007) reference is. Staff is aware of |

| Comment # | Page # | Section # | Comment |
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| | | | their 2008 publication, but it is for longfin smelt, not any of these fishes. |
| 28 | 7-44 | Diversion and Entrainment, paragraph 4 | The second sentence claims that exports outside of the range tested by Newman and Brandes (2008) could affect salmon. This may be true, but the sentences that follow do not logically support that statement (as claimed in the text). Just because exports affect OMR flows (Sentence 3), doesn't mean that exports outside of the 2008 study could affect salmon. |
| 29 | 7-45 | Paragraph 5 | Sentence 5 should acknowledge that there is evidence that delta smelt don't enter the south Delta unless turbidities are high (Grimaldo et al. 2009). |
| 30 | 7-46 | Last paragraph | Need a citation for the statement that predation in the south Delta is higher than everywhere else. The references that follow in the paragraph do not make that claim. If there is no citation, the first sentence needs to be qualified (e.g. "There is reason to believe that….”). |
| 31 | 7-127 | Analysis, second paragraph | In this paragraph it should also be noted that climate change will change habitat with sea level rise. This effect could be greater than temperature to many species. |
| 32 | 7-127 | Analysis, third paragraph | In the first sentence: sea level rise, depending on start benchmark, is expected to rise 20 inches by 2030. |
| **Appendices** | | | |
| 1 | F.2-34 | | Page F.2-34 and subsequent pages tend to state that CALSIM results match well with measured data, but from the figures F.2-2 g and i for Vernalis, scatter seems too large to indicate so. |
| 2 | F.2-85 | | Page F.2-85 (Fig F.2.10b): for 2003, EC values for Old River at Tracy B. are similar to those for Mossdale. For the years 2000-2002, EC at Tracy were higher, while Vernalis, Mossdale, Brandt ECs seem to roughly follow 2000-2002 patterns (i.e. relationship among these stations). The text does not seem to explain what the reason may be for this contrast seen for Tracy EC in 2003. |

| Comment # | Page # | Section # | Comment |
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| 3 | F.2-91 | | The historical relationship using Vernalis EC and flow to determine water quality levels is limited in its usefulness.<br>• In Appendix F.2 and in Chapter 5, a regression is developed from historical data to determine the degradation in salinity between Vernalis and other south Delta water quality locations. The regression is a relationship between EC and Flow and shows a scatter of data. The equation developed from this shows the average increase in salinity. Due to the scatter there are times when the degradation exceeds the average. At those times, the objectives could be exceeded. The analysis should include maximum impacts.<br>• The regressions look at a relationship between flow and salinity at the current objective locations. The alternatives propose not just select locations but whole channel reaches. These relationships are then extrapolated for the Middle River and Old River reaches east of the current objective locations. Increases in flow into Old and Middle River are not proportional to increases in flows at Vernalis so it is unlikely that this relationship will hold up for the reaches. (DWR showed flow/salinity relationships in a previous workshop) http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/sds_srjf/sjr/docs/dwr_flows_salinity010611.pdf |
| 4 | App-K, South Delta pg. 1 | | Table incorrectly indicates Vernalis objective as 1.0 EC in all months instead of 0.7 EC (April-August) and 1.0 EC (September-March). |
| 5 | App-K, South Delta pg.2 | 1, 2nd Paragraph | Assimilative capacity is not related to water levels but to water depth or more specifically, the volume of water in a channel. Water levels in Middle River and Grant Line Canal for example, can be at the same level such as 1.0 feet MSL, but the assimilative capacity is dramatically different because Middle River is much shallower and carries much less flow than Grant Line Canal. Water level objectives are only meaningful for south Delta agriculture for diverting water on low tides, but are not a meaningful surrogate for water quality. |
| 6 | App-K, | 1, | DWR concurs that the existing salinity conditions in the southern Delta are suitable |

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| | South Delta pg. 2 and 5 | Paragraph i | for agriculture. Existing SWP and CVP export operations and the installation and operation of the temporary barriers can continue to provide suitable water levels, flows, and circulation as they have historically. DWR and USBR currently coordinate export and barrier operations with South Delta Water Agency, SWRCB staff, and stakeholders in monthly coordination meetings. These meetings discuss current operations, barrier status and configuration (flap gate open/closed), water quality, water levels, and any local agricultural diversion problems. Actions resulting from these meetings may include re-operation of barrier flap gates, weir closing or raising (Grant Line Canal and Middle River), modeling studies, and more. It is not clear to DWR what the benefit of the new requirements proposed by the SWRCB (Comprehensive Operations Plan, Monitoring and Reporting Protocol, and Monitoring Special Studies) would be and how they could improve upon coordination, operations, and actions that are already in place and working well. |
| 7 | App.-K, South Delta pg. 2 | 1, Paragraph. i | "Performance goals" such as water levels and flows when applied to the temporary rock barriers would be very difficult to apply because the barriers are not designed to be operable in real time as would permanent operable gates that are envisioned under the South Delta Improvements Program. The barriers can generally maintain at least 0.0 feet MSL water levels on all three channels above the barriers when all the culverts are fully tidally operated (not tied open). This target water level has long been acceptable by SDWA as adequate for agricultural diversions, and is considerably better than would be present absent the barriers and SWP/CVP exports. However, the barriers were designed to maintain a unidirectional net flow pattern that improved circulation and were not designed to maintain any particular flow volume. Flow in any particular channel depends on inflows into the south Delta, consumptive use by agricultural and municipal diversions/discharges, strength of the tidal flux, and SWP and CVP exports. Flows will vary throughout the day and cannot be "maintained" by any operation of the rock barriers. |
| 8 | App.-K, South Delta | 1, Paragraph. i, | A report to the SWRCB by December 31 of each year would be extremely difficult to comply with. The temporary barriers are in place and operating until November |

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| | pg. 3 | last sentence | 30 of each year. Analyzing the past year's operation of the barriers and SWP/CVP export operations and completing a report to the Board would need much more than 30 days after the barriers operations season ends. DWR recommends if this reporting requirement is retained, that the report be due by March 1 the following year. |
| 9 | App.-K, South Delta pg. 3 | 1, Paragraph. ii | DWR will continue to install and operate the temporary barriers to mitigate for the SWP and CVP impacts to water levels in the south Delta, and to improve circulation to benefit agricultural diversions. It is not clear to DWR why the SWRCB is proposing to make DWR and USBR responsible for assimilative capacity for local sources and evapo-concentration of salinity in the south Delta. It seems that the Board is suggesting that DWR and USBR are responsible for diluting local agricultural and municipal discharges of high-salinity water, instead of regulating these dischargers to ensure their discharges do not increase the background salinity of the receiving waters. DWR has long recognized that major sources of high-salinity water flowing into Old River and adversely impacting water quality at the Old River near Tracy Road Bridge compliance station are Paradise Cut and Sugar Cut. Both cuts are dead-end channels that receive discharges from agricultural operations and municipal and State correctional facilities. Due to poor circulation in these channels, salinity builds up to extremely high levels that eventually flow out to Old River under specific hydrodynamic conditions. DWR and USBR have no ability to control these discharges and the circulation in these channels. Recent data during high flows on the San Joaquin River (SJR) indicate that even high flows of low salinity water down Old River from the SJR cannot assure that spikes that exceed the salinity objective at the Old River near Tracy Road Bridge compliance station won't occur. |
| 10 | App.-K, South Delta pg.3 | 1, Paragraph. iii | As already mentioned, additional regulatory studies, monitoring, and reporting are not necessary to continue the SWP and CVP export operations and the temporary barriers operations which already have been operated in coordination with SDWA and SWRCB staff through regular monthly meetings and intermediate meetings and phone calls. As stated elsewhere in the text of this SED, the Board acknowledges that existing south Delta salinity is adequate for agricultural |

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| | | | purposes; consequently DWR sees no reason for additional regulatory requirements. |
| 11 | App.-K, South Delta pg.4 | 1, Paragraph. iii and iv. | DWR recommends the Central Valley Board utilize the NPDES and Irrigation Lands Regulatory programs to aggressively address the problem with high-salinity discharges into poor-circulation water bodies, such as Paradise Cut and Sugar Cut. The high-salinity content of the discharges are not adequately diluted by the receiving waters and concentrate within these channels to extremely high levels. Eventually, under specific hydrodynamic conditions, the high-salinity water in one or both of the cuts makes its way to Old River just upstream of the Old River at Tracy Road Bridge compliance station, often causing a spike in EC and possible an exceedance of the EC objective. Flow objectives on the San Joaquin River with low salinity water will not always improve conditions in Old River near Paradise Cut and the Old River at Tracy Road Bridge compliance station as was observed during high flows in spring 2011 (DWR oral testimony, March 20, 2011). Salinity in this area of Old River often is directly impacted by high salinity concentrations in Paradise Cut that build-up from local discharges into the dead-end cut, and then move into Old River under certain hydrodynamic conditions. Project export and barrier operations cannot change conditions in Paradise Cut that would change this situation. |
| 12 | App.-K, South Delta pg.1 | Table 2 | This table should resemble more the table in Chapter 3, Table A-2, pg A-11. However, the water levels and circulation portion of Table A-2 would be inappropriate objectives for a WQCP and should not be included. Also, because degradation occurs downstream of Vernalis, the winter objective at Vernalis of 1.0 EC should have a corresponding objective for the interior south Delta objectives of 1.4 EC, not 1.0 EC. Having identical objectives at all four locations would almost ensure exceedances of the 1.0 EC objectives at interior locations if this EC value were to remain in place, particularly given that in the winter, agricultural operations are leaching fields to remove salt in the soils and discharging the salt into south Delta channels. |
| 13 | App.-K, | Item ii | 1. ii. "DWR and USBR's water rights will be conditioned to require continued |

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| | South Delta pg. 3 and San Joaquin, pg 10. | | operations of the agricultural barriers at Grant Line Canal, Middle River, and Old River at Tracy, or other reasonable measures, to address the impacts of SWP and CVP export operations on water levels and flow conditions that might affect the assimilative capacity for local sources and evapo-concentration of salinity in the southern Delta. This shall include modified design or operations as determined by the Comprehensive Operations Plan."<br><br>This conditioning on water rights limits the adaptive measures that DWR can utilize for Delta Smelt protections, and it was the OCAP Final Interim Relief Court Order on 12-14-07 that called for DWR to not install the HOR Barrier until after VAMP was completed. On page 10 of 11 of Appendix K, under the heading *Develop and Implement Improvements to Barrier Programs* it is stated "USFWS, NOAA Fisheries, DFG, DWR and USBR should work together to evaluate the potential impacts and benefits of installing physical or nonphysical barriers at the Head of Old River and other locations in the Delta, and should implement appropriate changes to protect native fish and wildlife."<br><br>As the Fish and Wildlife Service Biological Opinion is being remanded, how would the Board reconcile potential discrepancies between the Plan and the Biological Opinion(s), such as a mandate for the HOR Barrier to not be installed for delta smelt protections or if VAMP is re-initiated, when it is stated that the Department's water rights will be conditioned on continuing to operate the barriers? For example, NMFS 2009 BiOp, on page 205 in regards to critical habitat for Green sturgeon, states that "the installation of the barriers under the South Delta Temporary Barriers Program (TBP) enhances the potential to delay movement and migratory behavior in the channels of the South Delta." This issue also applies to the call for construction of pump stations and operable barriers in the South Delta to replace the temporary barriers that are used now. |
| 14 | App.-K, San Joaquin | | Re: "Develop and Implement Improvements to Barrier Programs. Results from the Vernalis Adaptive Management Plan studies have shown that installation of a physical barrier at the Head of Old River during April and May helps to improve |

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| | pg 10 of 11 | | survival of outmigrating juvenile LSJR Chinook salmon."<br>Since 2007, acoustical tag studies have been conducted in the South Delta in lieu of CWT studies (SJRGA, 2008). Now that several years of acoustic telemetry study results are available, these data provide a more reliable and current representation of juvenile salmonid survival in the South Delta. As a result, the effectiveness of a physical barrier at the Head of Old River is under reconsideration.<br>The acoustical tag studies provide better information on the migration paths of tagged salmon smolts and the data obtained has been used to estimate route entrainment and reach specific survival. Although technical difficulties and study design issues occurred during the first few years of these study efforts, the latest available data from these experiments is much more detailed and informative.<br>In a recently published paper describing South Delta acoustic tagging study results form 2009 and 2010, Buchanan et al. (2013) concluded:<br>*"Survival through the southern (i.e., upstream) portion of the Delta was very low in 2009, estimated at 0.06, and there was* ***no significant difference between the Old River and San Joaquin River routes****. Estimated survival through the Southern Delta was considerably higher in 2010 (0.56), being* ***higher in the Old River route than in the San Joaquin route****. Total estimated survival through the entire Delta (estimated only in 2010) was low (0.05); again, survival was higher through the Old River.* ***Most fish in the Old River that survived to the end of the Delta had been salvaged from the federal water export facility on the Old River and trucked around the remainder of the Delta****." [emphasis added]*<br><br>Thus, acoustic telemetry results from 2009 and 2010 do not support the notion that Old River survival is worse than survival through the mainstem San Joaquin River.<br>Results from the 2011 study, not yet published but presented by Rebecca Buchanan at recent scientific conferences, indicate survival rates were again higher in Old River (0.038) relative to the San Joaquin River (0.007). As in 2010, the improved survival of tagged fish in the Old River route in 2011 appears to result from salvage and transport from the export facilities.<br>Given acoustic telemetry study results to-date, providing access to salvage |

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| | | | facilities via Old River may be one of the best near-term strategies for enhancing through-Delta survival of San Joaquin River salmonid emigrants. This view was also echoed in the 2012 Independent Review of Long-term Operations Opinions (Anderson et al., 2012) where the authors recommended the use of a barrier at the HORB be "reconsidered" as the barrier effectively forced migrating smolts into portions of the Delta where survival was shown to be less than 2%.They further state that recent data suggests that an effort routing migrating smolts through Old River to the CVP pumps may prove to be a better option. |

# Low Head Pump Salinity Control Study

**Prepared**
**to meet requirements of the**
**State of California State Water Resources Control Board**
**Water Rights Order WR 2010-0002, Condition A.7**

California Department of Water Resources
Bay-Delta Office
1416 9th Street, Room 215
Sacramento, CA 94236-001

CA DWR Bay-Delta Office
April 2011

# IV. Conclusions

DSM2 modeling results of low head pumping used in conjunction with the temporary rock barriers in the south Delta indicate the potential for improved water quality at the two D1641 interior south Delta compliance locations C8-Old River near Middle River and P12-Old River at Tracy Road Bridge. The potential for improved water quality at C6-San Joaquin River at Brandt Bridge was not indicated although modeling results showed some minor reduction in exceedences. General observations indicate that pumping at either the Middle River or Old River barrier sites would be the most effective at improving water quality measured at the compliance station closest to that barrier. Pumping only at the Grant Barrier site is less effective at improving water quality at both compliance stations. General observations regarding concurrent pumping at two barriers indicate that pumping at more than one barrier site is less effective at reducing exceedences for the same total pumped flow. For all scenarios redirected impacts regarding water levels and water quality at diversion points of interest and on flow regarding Net Delta Outflow appear to be minor based on daily average flow data and 30-day running average water quality data.

The results show that low head pumping, when pumping at only one barrier site, could be effective at:

- Eliminating all of the historical exceedences at C8-Old River near Middle River, but only about 2% of the at P12-Old River at Tracy Bridge by pumping at the Middle River barrier at a flow of 500 cfs ;
- Eliminating approximately 43% of the historical exceedences at P12-Old River at Tracy Road Bridge but only about 4% of the exceedences at C8-Old River near Middle River by pumping at the Old River barrier at a flow of 500 cfs
- Eliminating approximately 63% of the historical at P12-Old River at Tracy Road Bridge but only about 22% of the exceedences at C8-Old River near Middle River by pumping at the Old River Barrier at a flow of 1000 cfs;
- Eliminating approximately 4% of the historical exceedences at C8-Old River near Middle River and 22% of the historical exceedences at P12-Old River at Tracy Road Bridge by pumping at the Grant Line barrier at a flow of 500 cfs; and
- Eliminating approximately 26% of the historical exceedences at C8-Old River near Middle River and 55% of the exceedences at P12-Old River at Tracy Road Bridge by pumping at the Grant Line barrier at a flow of 1000 cfs or greater.
- Eliminating less than 4% of the historic at C6-San Joaquin River at Brandt Bridge for all scenarios and flows

The results show that low head pumping, when pumping concurrently and equally at the Middle River and Old River barrier sites, could be effective at:

- Eliminating approximately 7% of the historical exceedences at C8-Old River near Middle River and 18% of the historical exceedences at P12-Old River at Tracy Road Bridge by pumping at a combined flow of 500 cfs; and
- Eliminating approximately 96% of the historical exceedences at C8-Old River near Middle River and about 40% of the historical exceedences at P12-Old River at Tracy Road Bridge by pumping at a combined flow of 1000 cfs or greater.
- Eliminating less than 4% of the historic exceedences at C6-San Joaquin River at Brandt Bridge for all scenarios and flows

The success with which low head pumping could eliminate or reduce the historical exceedences is affected by a number of factors. In particular, the success is influenced by the sources of water which would be drawn into the south Delta. These sources include the Sacramento River, the San Joaquin River, and San Francisco Bay water. For the July through October period of 2007-2009 analyzed in this report, the majority of the water at C8-Old River near Middle River and at P12-Old River at Tracy Road Bridge came from the San Joaquin River. Simulated low head pumping at Middle River changed the major water source at C8-Old River near Middle River to the lower-salinity Sacramento River water, but only slightly increased the amount of Sacramento River water at P12-Old River at Tracy Road Bridge. Conversely, pumping at Old River changed the major water source at Old River at Tracy to the lower-salinity Sacramento River water, but only slightly increased the amount of Sacramento River water at C8-Old River near Middle River. For all of the alternatives, increasing the pumping rate from 500 to 1000 cfs increased the fraction of lower-salinity Sacramento River water at the compliance sites. This increase in pumping also introduces a larger fraction of higher-salinity water from San Francisco Bay.

The results of modeling analysis of redirected impacts resulting from low head pumping, while dependent on pumped flow volume, range from no change (NC) to slight for average conditions. These impacts include reductions in water levels and changes in water quality. Locations of most interest regarding these impacts are agricultural diversions downstream of the barrier sites and various water supply export locations. Based on average daily flow data the average decrease in water levels downstream of the temporary barriers varied from NC to 0.09 feet at pumping rates up to 1000 cfs. The corresponding maximum water level decrease varied from 0.16 to 0.36 feet. Similarly, the average decrease in water levels at the water supply export locations varied from NC to 0.05 feet. The corresponding maximum water level decrease varied from 0.11 to 0.22 feet. Because the modeled results are based on average daily flow data intermittent periods with larger decreases in water levels would be expected to occur.

Changes in water quality at the agricultural diversions downstream of the barriers would vary under the low head pumping scenarios. In general, these changes would be beneficial with decreased salinity similar to that indicated for the interior south Delta compliance locations. The analysis of water quality changes at the water support export locations of interest indicate that salinity changes would be less than 1% at all export sites, with the exception of Victoria Canal which showed a maximum change as an increase in salinity ranging from 2.3 to 4.3% for 500 to 1000 cfs, respectively. Because the modeled results are based on a 30-day running average EC data intermittent periods with larger changes in concentrations would be expected to occur.

The range of estimated costs includes installation of typical pump station features and infrastructure for either screen approach. The flat screen intake is typically used for higher flow water supply intakes and includes automated screen cleaning systems. The cylindrical screen intakes are significantly less costly and provide the advantage of being retractable from a canal or river for cleaning using a brush cleaning system. The less costly cylindrical screen approach was used for the temporary cylindrical screen alternatives but screens would be manually installed and removed each year.

The range of estimated costs to construct and operate either permanent or temporary pumping facilities as single- or two-pumping site alternatives is summarized below. The costs are conceptual level planning costs with an accuracy of -25% to 50% and include initial capital (Table IV.1), and annual and capitalized costs (Table IV.2). The initial capital costs include construction, real estate, design, environmental compliance and permitting, construction management, and a 25% contingency for materials and installation. Annual costs include operation and general maintenance of the facilities. Overall capitalized costs were developed as an indicator of the relative cost of the permanent and temporary alternatives. The capitalized cost is the initial capital cost plus the annual cost adjusted to represent the time value of future expenditures.

| | Single Pumping Sites | | |
|---|---|---|---|
| **Total Pumping Capacity (cfs)** | 250 | 500 | 1000 |
| **Pump facility Configuration** | | | |
| **Temporary** | $5.5-20.7 | $9.8-40.9 | $19.6-80.9 |
| **Permanent Cylindrical Screen** | $20.2-60.8 | $40.9-112.9 | $81.7-234.3 |
| **Permanent Flat Screen** | $120-161.4 | $214.5-286.6 | $391.7-551 |
| | **Two Pumping Sites** | | |
| **Total Pumping Capacity (cfs)** | 250 | 500 | 1000 |
| **Pump facility Configuration** | | | |
| **Temporary** | $14.9 | $28.4 | $55.5 |
| **Permanent Cylindrical Screen** | $49.5 | $87.6 | $168.1 |
| **Permanent Flat Screen** | $186.9 | $301.0 | $540.7 |
| [1] All values in million | | | |

**Table IV.1 Range of Estimated Alternative Initial Capital Costs**

| | Single-Pumping Sites | | | | | |
|---|---|---|---|---|---|---|
| **Total Pumping Capacity (cfs)** | 250 | | 500 | | 1000 | |
| **Pump facility Configuration** | | | | | | |
| **Temporary** | $10-22.6 | $147.6-343.9 | $15.6-45.1 | $232.8-685.8 | $32.4-89.9 | $482.9-1365 |
| **Permanent Cylindrical Screen** | $0.7-1.4 | $30-80.4 | $1.4-2.6 | $60.5-149.6 | $2.7-5.3 | $121-310.1 |
| **Permanent Flat Screen** | $3.4-4.5 | $179-210 | $6.1-8.5 | $325-376.1 | $11.8-16.3 | $602-719.7 |
| | **Two-Pumping Sites** | | | | | |
| **Total Pumping Capacity (cfs)** | 250 | | 500 | | 1000 | |
| **Pump facility Configuration** | | | | | | |
| **Temporary** | $17.8 | $269 | $33.5 | $507.3 | $62.7 | $951.9 |
| **Permanent Cylindrical Screen** | $1.3 | $68.0 | $2.3 | $120.8 | $4.5 | $232.8 |
| **Permanent Flat Screen** | $4.7 | $254.3 | $8.0 | $414.6 | $14.7 | $750.3 |
| [1] All values in million<br>[2] Annual Cost \| Capitalized Cost | | | | | | |

**Table IV.2 Range of Estimated Alternative Annual and Capitalized Costs**

In summary, the estimated costs vary depending on the pumping capacity, the technical approach and the barrier installation site. The flat and cylindrical screen costs are based on designs incorporating screening criteria specified by NMFS for juvenile salmon and CDFG recommendations regarding USFWS criteria for delta smelt. This conservative approach is taken to reduce any potential negative impact to these species. Less restrictive screening criteria would result in lower costs and may be applicable given the proposed operation period for low head pumping. The temporary alternatives provide the least initial capital costs but overall capitalized costs can exceed the capitalized cost for some permanent alternatives as a result of substantial annual operation and maintenance costs. The permanent flat screen alternatives have the highest initial capital costs due to the material and installation costs for the flat screen technology. The costs also vary by barrier installation site as a result of site-specific conditions. In particular, the Middle River barrier site requires substantial dredging to provide sufficient submergence for the pump facility intake screens.

The alternative providing the greatest reduction in exceedences for concurrent or two-pumping site alternatives is 1000 cfs pumping equally split between Middle River and Old River barriers as described under Hydrodynamic and Water Quality Modeling. The least capitalized cost to implement this alternative is $232.8 million, which utilizes permanent cylindrical screens, has an initial capital cost of $168.1 million and annual costs of $4.5 million. The comparable costs utilizing temporary skid mounted pump systems with manually-placed cylindrical intake screens are $55.5 million with an annual cost of $62.7 million. Although the initial capital cost of $55.5 million for a temporary system is lower than the comparable cost of the permanent system, the annual costs are substantial and the associated capitalized cost is larger by a factor of almost four ($951.9 to $232.8 million).

Environmental compliance and permitting for the construction and operation of either permanent or temporary low head pumping facilities are considered to be a modification of the currently implemented temporary barriers project. Minor modifications to existing permits and mitigation obligations are anticipated. Potential impacts to environmental factors are expected to range from "less than significant" to requiring general mitigation actions or environmental commitments. Overall, the permanent systems would require that DWR provide mitigation for the footprint of the new pumping systems in addition to the mitigation already in place for the temporary barriers project. For the temporary pumping systems, no additional mitigation for species is expected but the installation and removal of these systems each year could result in air quality effects for which additional mitigation is required.

Environmental documentation and permit requirements for the permanent systems are expected to include preparation of a supplemental Initial Study/Mitigated Negative Declaration under CEQA, USACE Clean Water Act Section 404 and Rivers and Harbors Section 10 permitting, including Endangered Species Act consultation with USFWS and NMFS, as well as consultation on EFH per the Magnusson-Stevens Act. At the State level coordination with the CDFG will be required to obtain a 1601 Streambed Alteration Agreement as well as an Incidental Take Permit. Additionally, a Section 401 certification or waiver will be needed from the SWRCB for approval of in-water work. At the local level, coordination with the San Joaquin Valley Air Pollution Control District will be needed to obtain a construction emission reduction credit lease. These documentation and permitting actions are expected to require approximately 18-months to complete.

Due to the temporary nature of the temporary pumping systems, environmental documentation and permit requirements are expected to be limited. State level coordination will be required with the CDFG to obtain an Incidental Take Permit and local level coordination required with the San Joaquin Valley Air Pollution Control District to obtain a construction emission reduction credit lease. These documentation and permitting actions would require approximately 12 months to complete.

The actual permits that would be required and the time to acquire them would depend on the actual estimated effects of the final proposal and coordination with resource and regulatory agencies. This also assumes that there would be no need to re-consult on the CVP/SWP Long Term Operations Biological Opinions primarily because there are no expected increased effects on federally-listed species resulting from the proposed annual July through October system operation. As described above, the permit requirements are based on the assumption that construction of these facilities would be included as an amended project description for the temporary barriers, similar to previous modifications (i.e., Middle River barrier raise). As such, permit documents would be abbreviated and would indicate that implementation of the pumping facilities would be a modified component of the overall TBP. Should this be unacceptable to the regulatory agencies, the estimated timelines to obtain these permits would increase.

Attachment

# DWR Comments on SWRCB SED

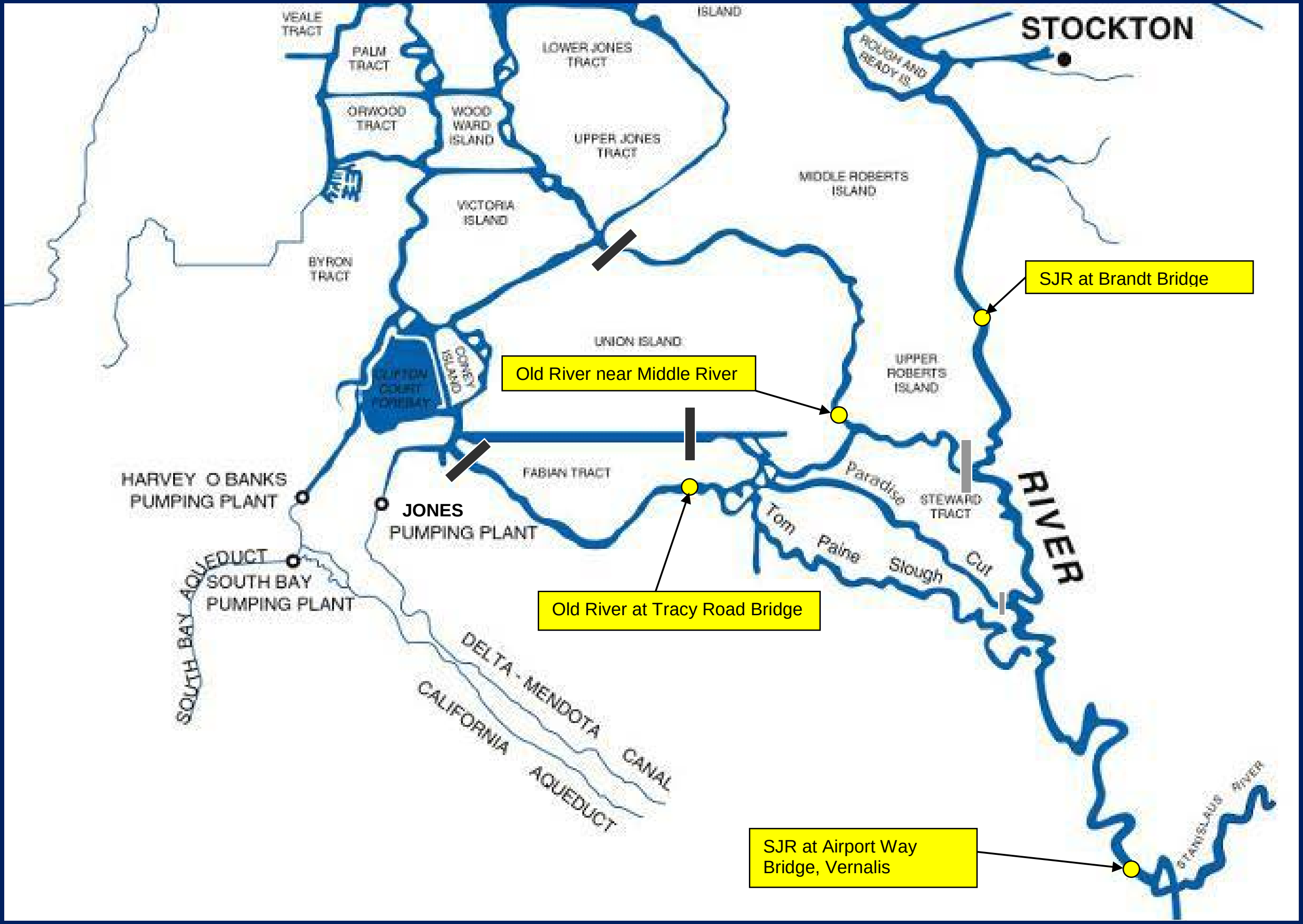
March 20, 2013

Katherine Kelly and Mark Holderman
Bay-Delta Office
California Department of Water Resources

# Outline

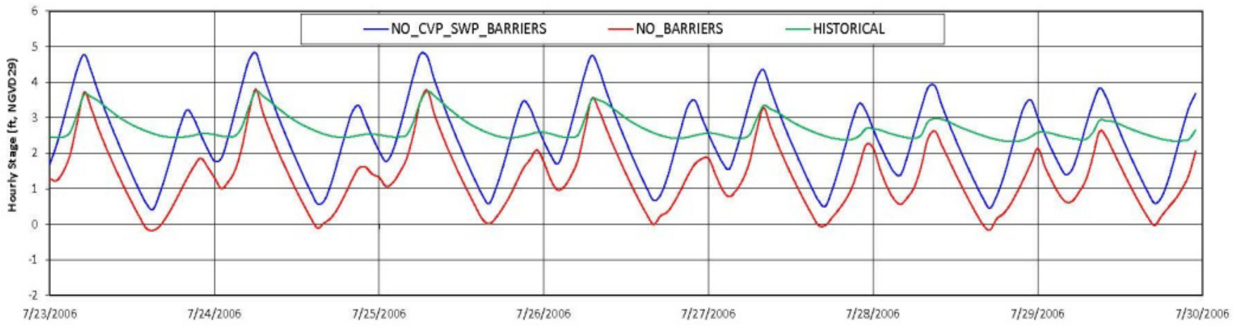
- Temporary Barriers Project
- Circulation and null zones
- Sources of water in the south Delta
- Salinity changes during high flows
- Summary

# Barriers and Compliance Sites

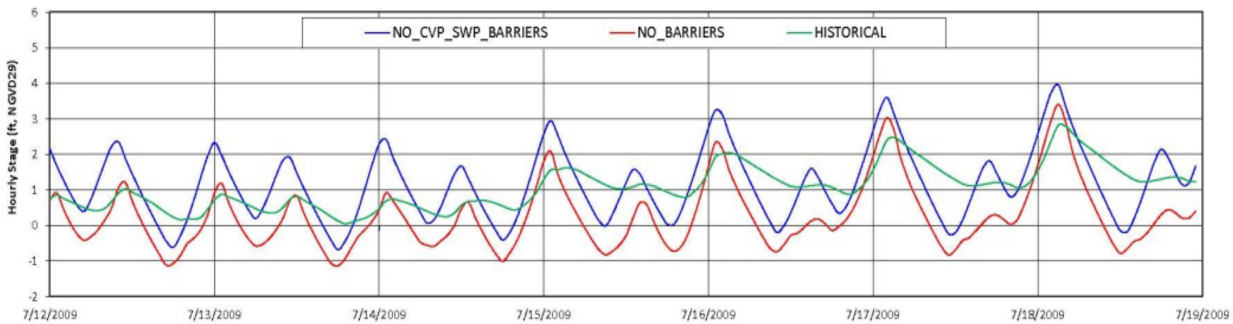


# Water Level Improvements with Barriers on Old River

2006 Wet Year

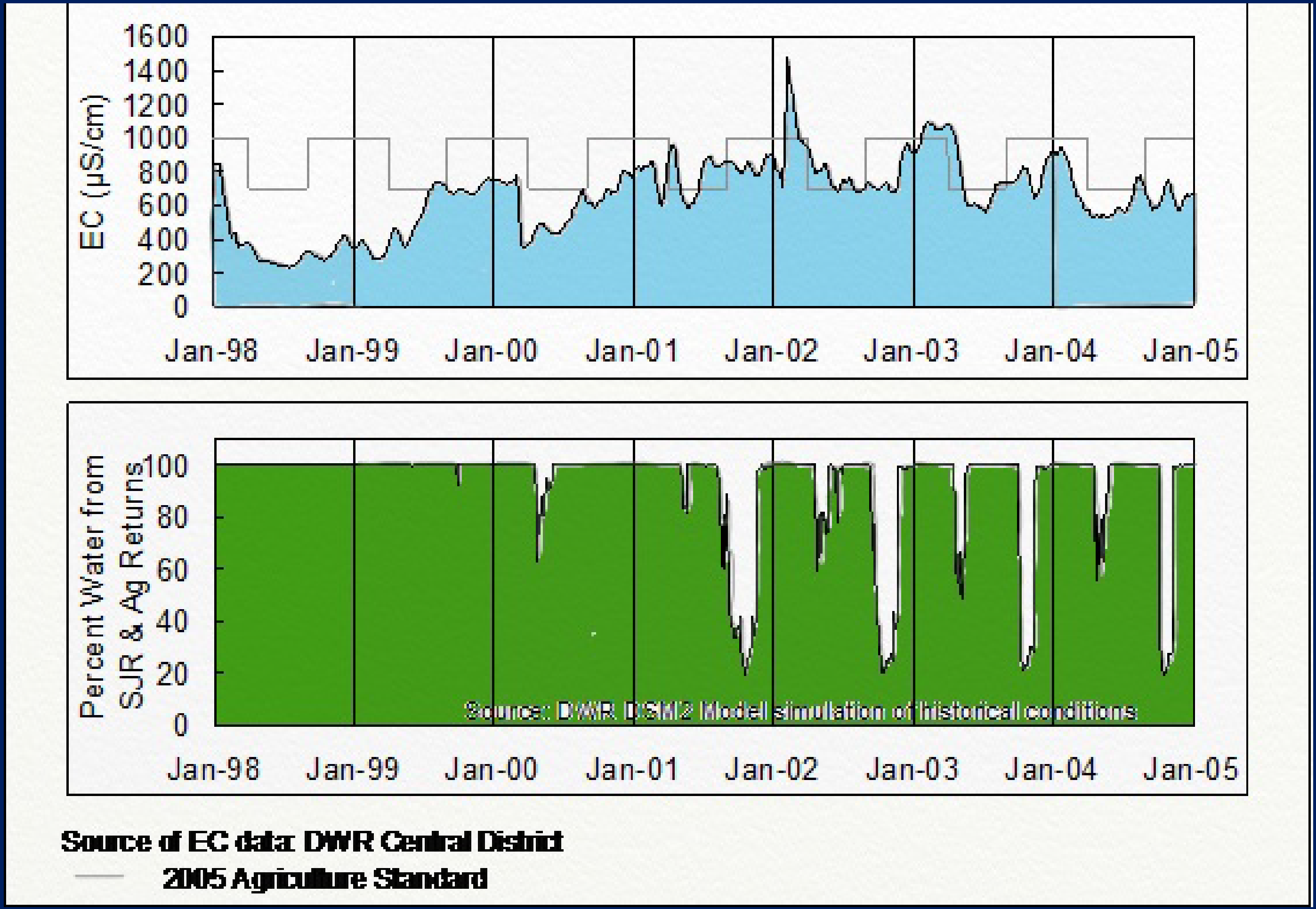



2009 Dry Year



# Sources of Water in The South Delta

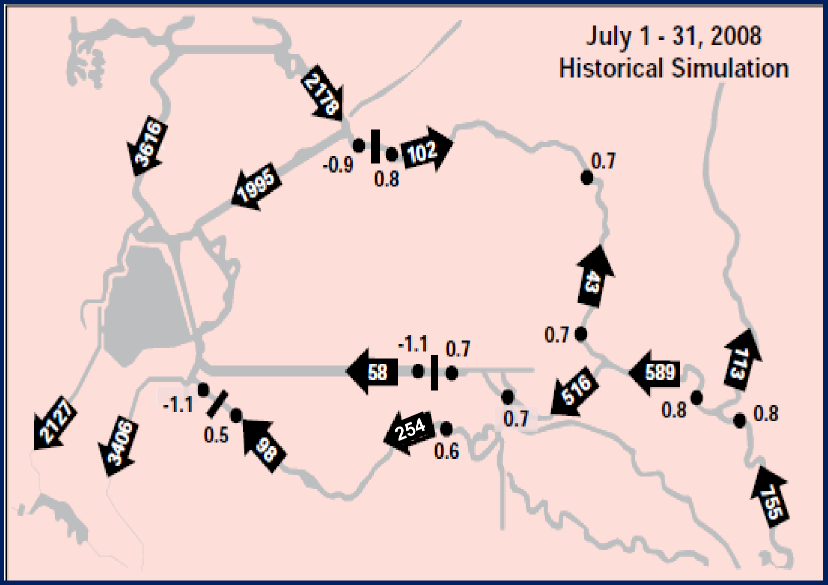
# Observed EC and Sources of Water at Old River at Tracy Road Bridge

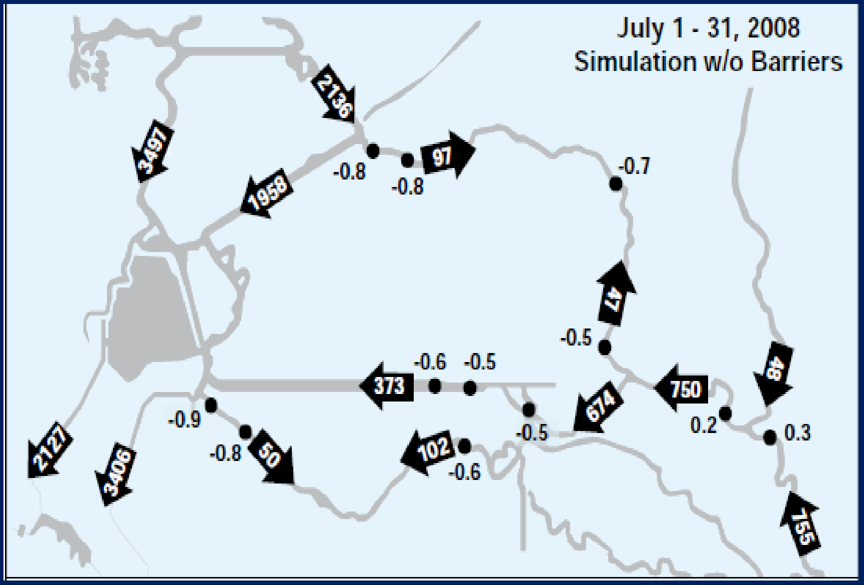


# Circulation and Null Zones in the South Delta

# Circulation and Null Zones

- Temporary Barriers Improve Circulation
  - Source: South Delta Temporary Barriers Project Monitoring Reports



# Circulation and Null Zones

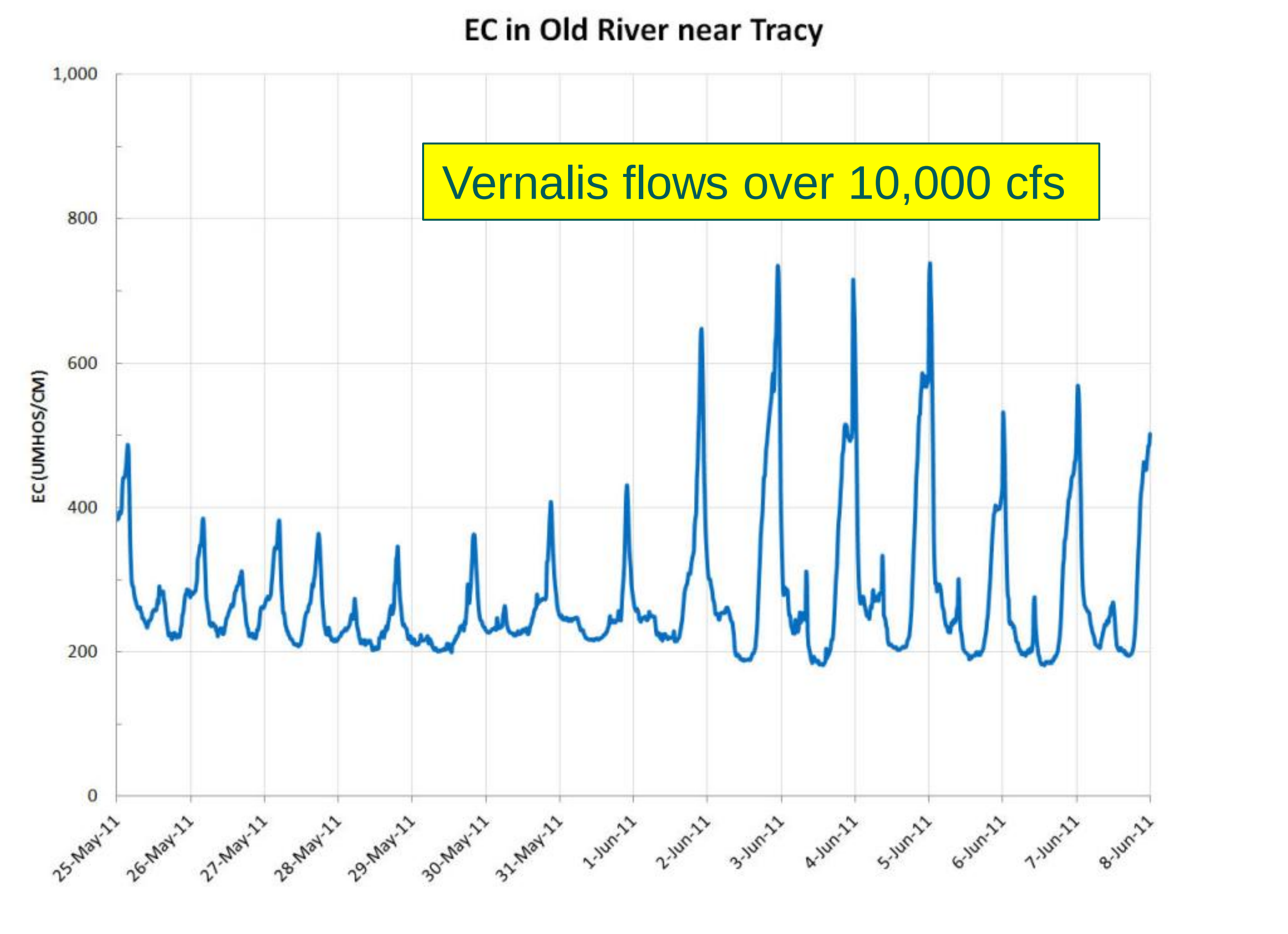
- Null zones occur without exports and barriers
- Locations of null zones can change with exports and barriers
- Total number of null zones not significantly different
  - Source: 33rd Annual Progress Report to the SWRCB (Methodology for Flow and Salinity Estimates in the Sacramento-San Joaquin Delta 2012)
- Null zones do not equal poor water quality

# Salinity Changes during High Flow Periods

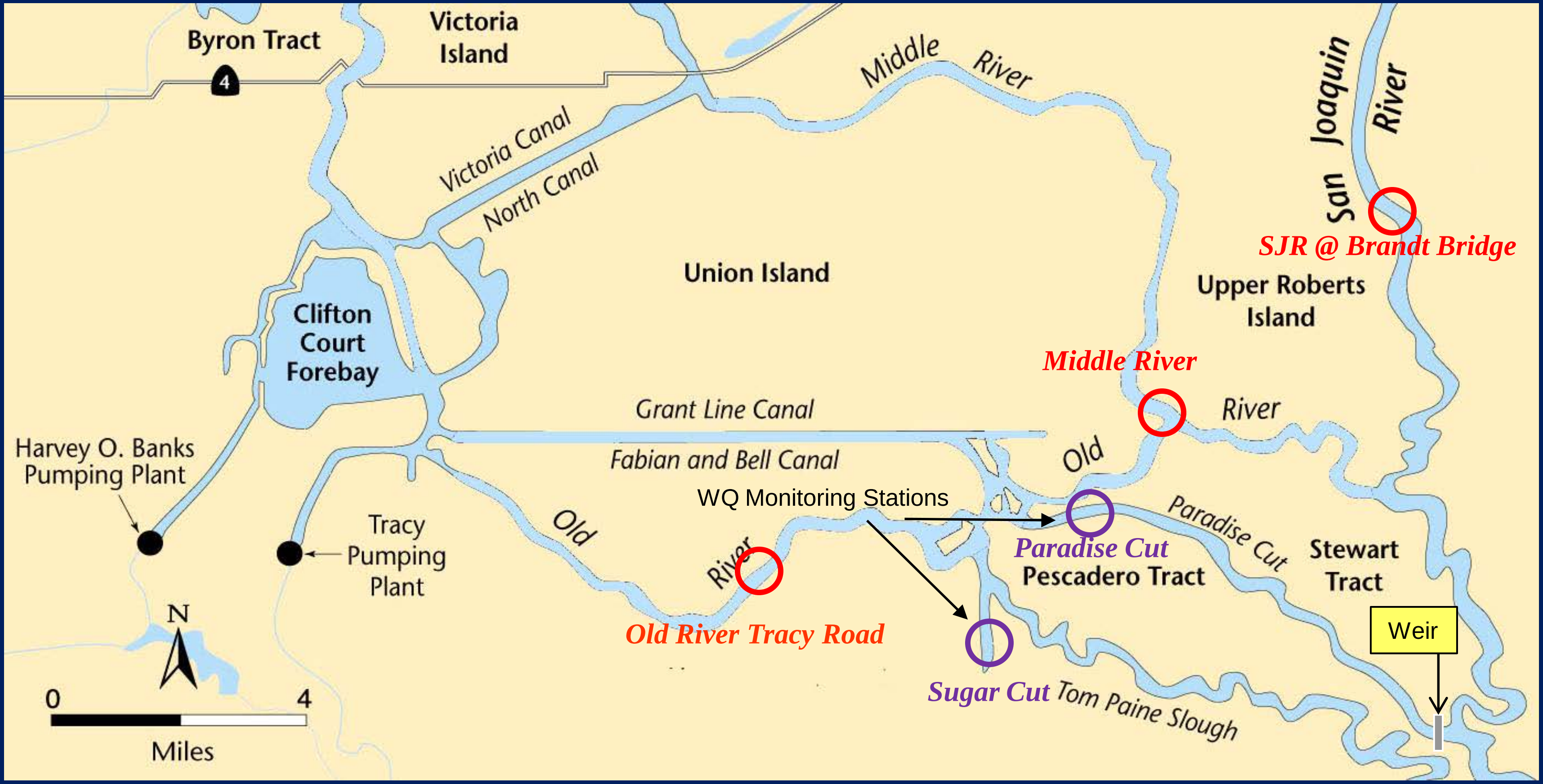
# Background

- Salinity monitored at four compliance stations in south Delta—Vernalis, Brandt Bridge, Middle River, and Old River at Tracy Road Bridge
- Old River at Tracy Road Bridge has persistent salinity spikes, occasionally exceeding water quality objectives
- Why?

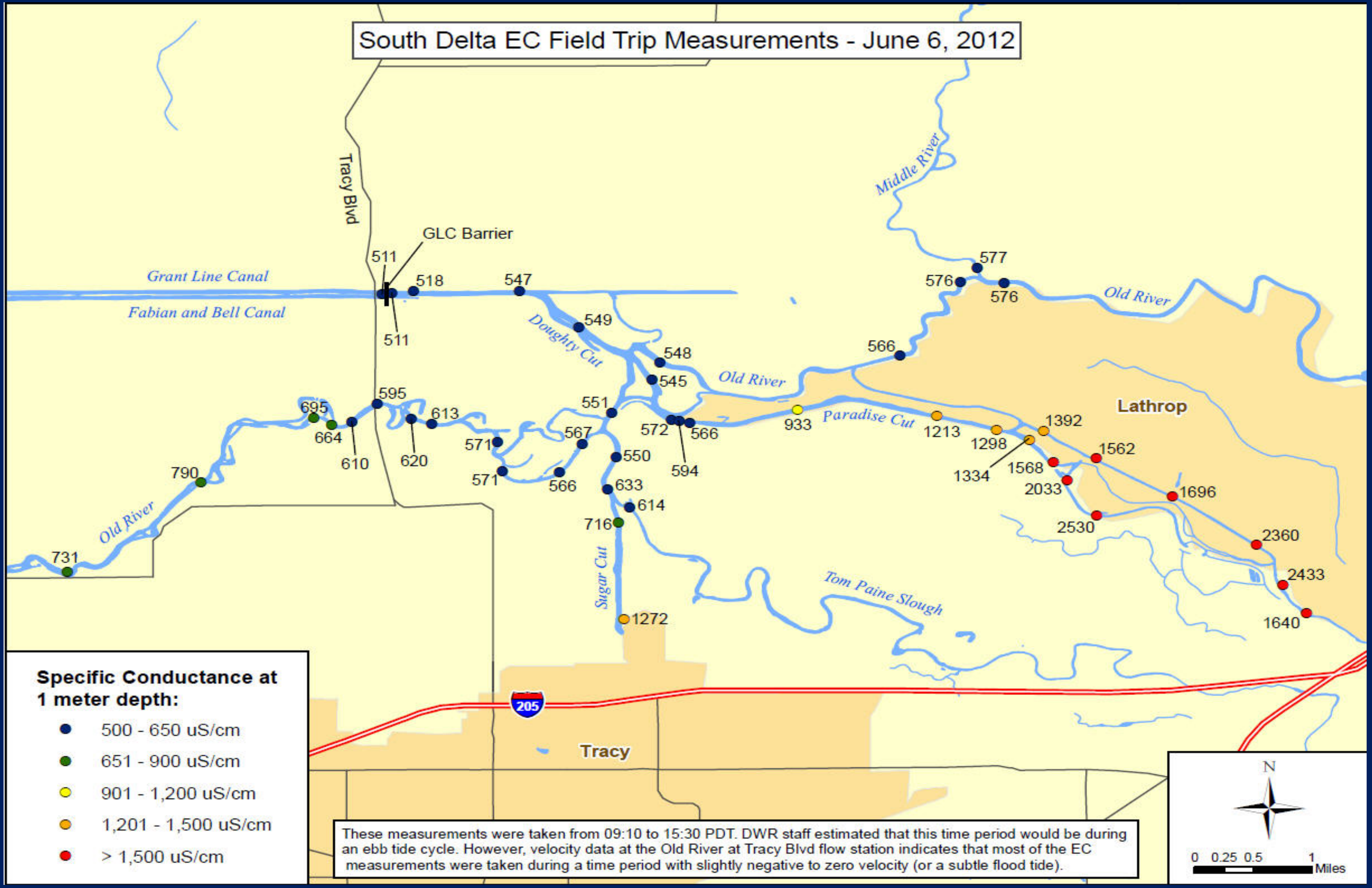
# Salinity Spikes in Old River during High Flows at Vernalis in June 2011



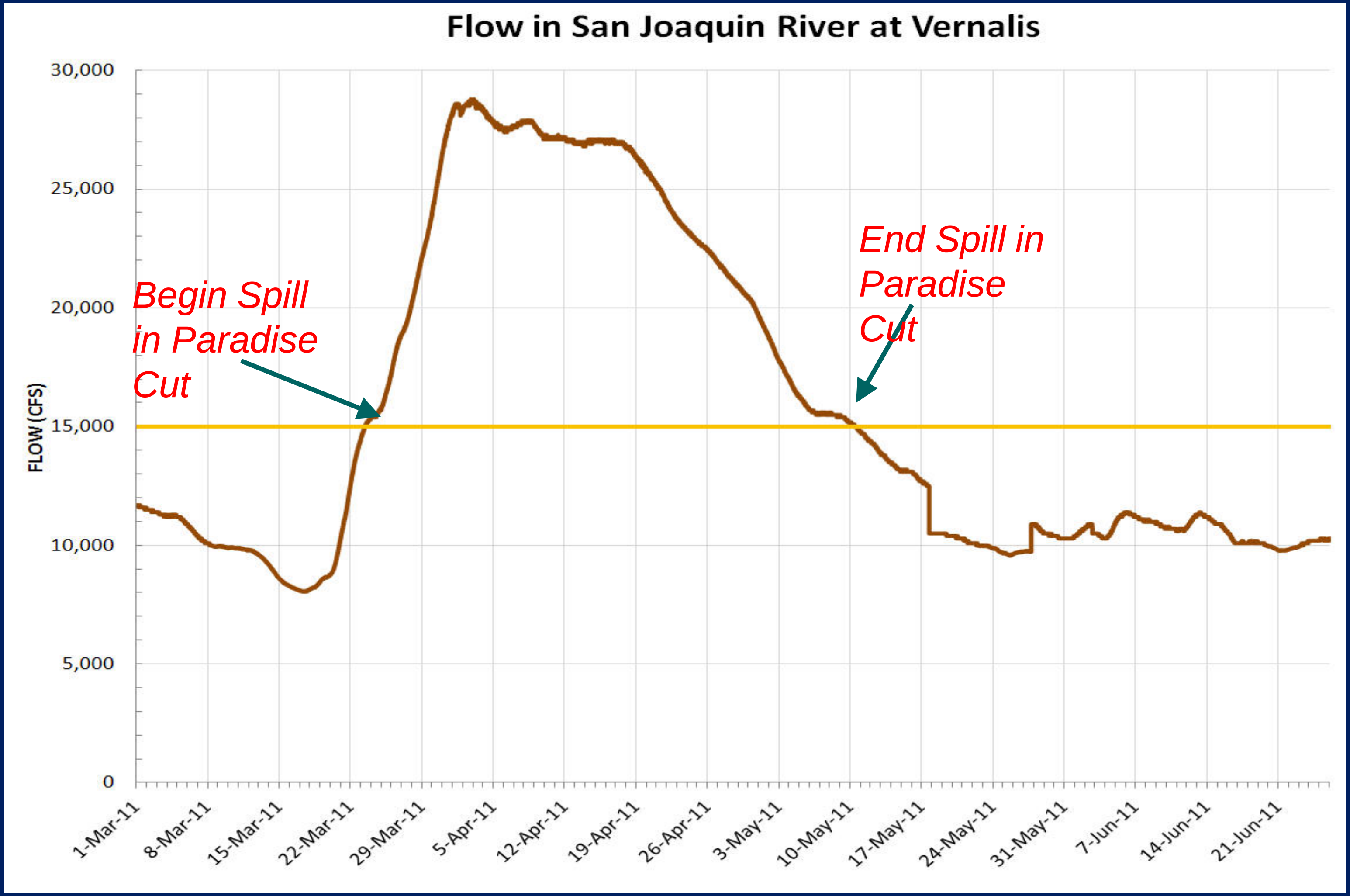
# Paradise and Sugar Cut: Sources of High Salinity Water



# Recent South Delta EC Grab Sampling Data



# High 2011 Vernalis Flows Flushed Paradise Cut

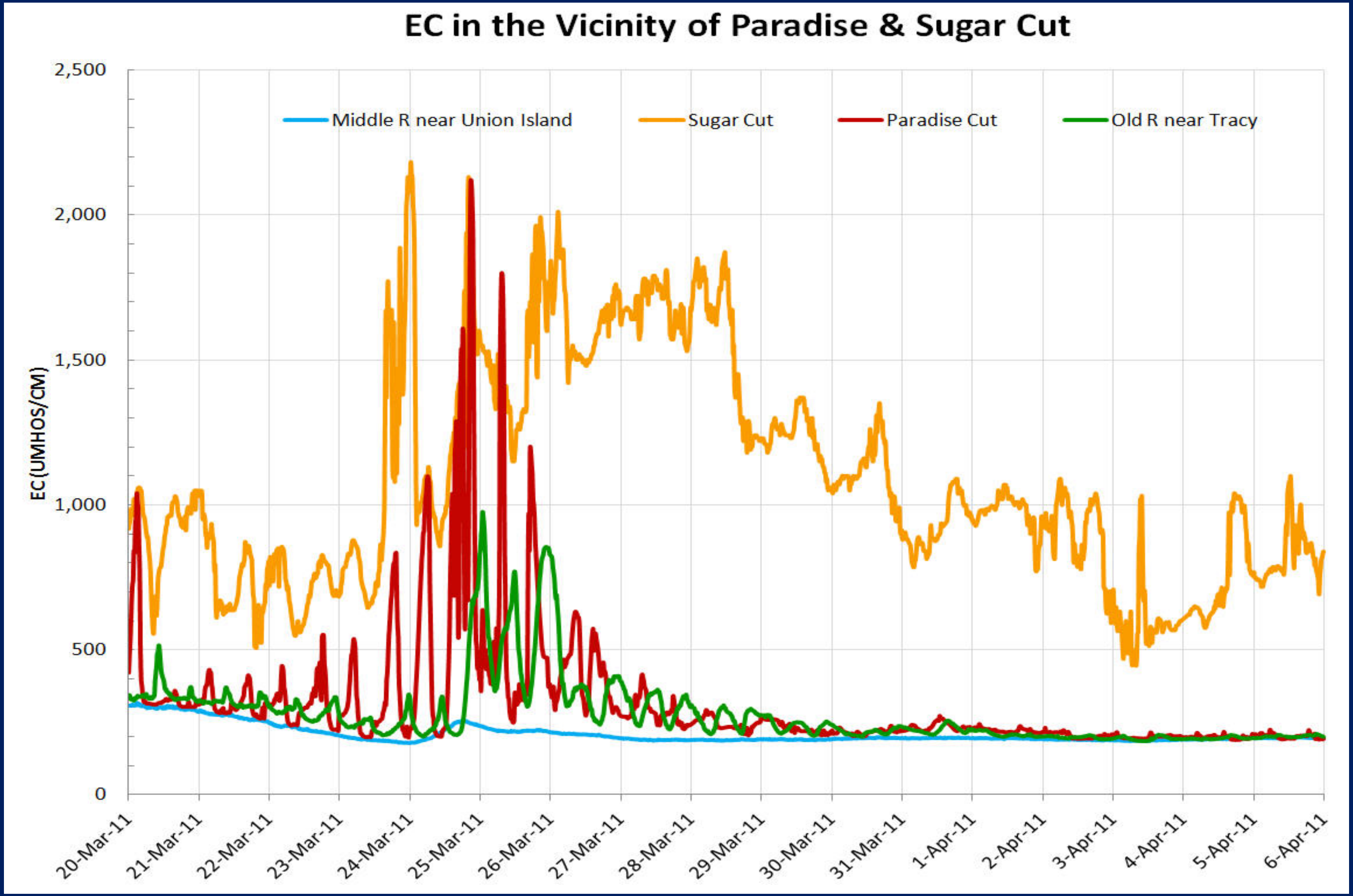


# Paradise Cut Weir Flow in March 2011

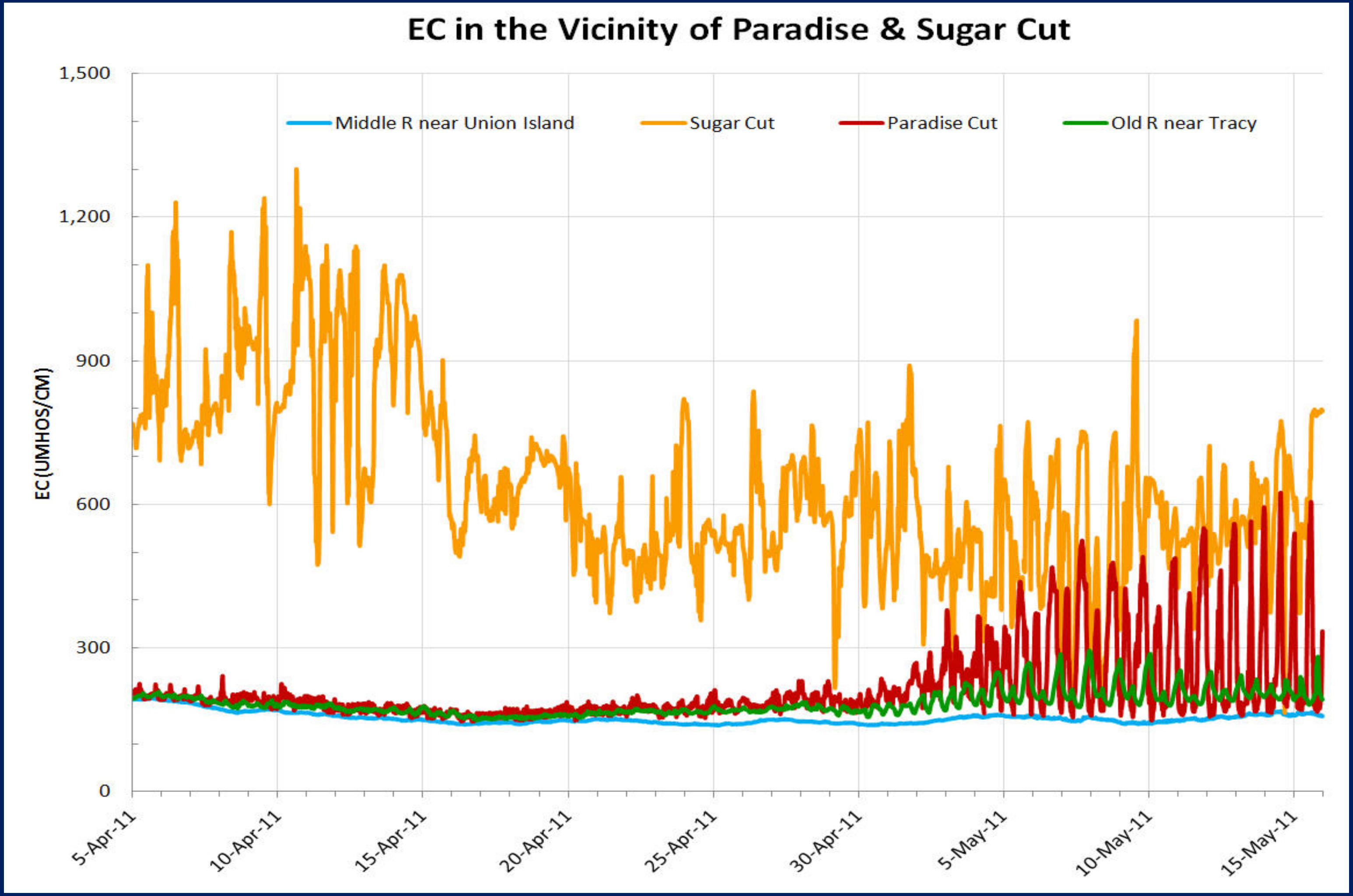
Normal

Spilling

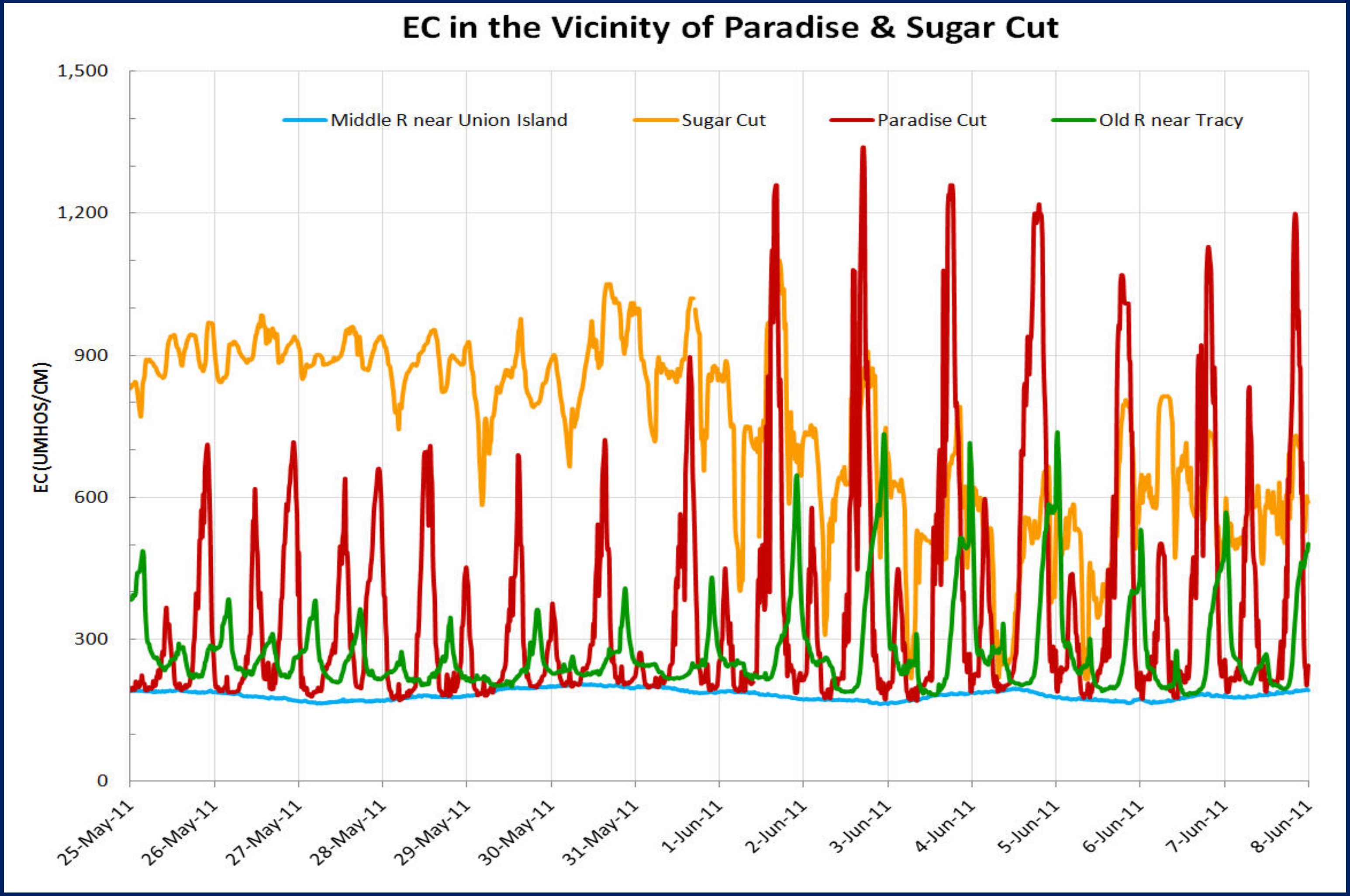
# Weir Flow Causes High Salinity Plume from Paradise Cut



# Salinity Increases in Paradise Cut After Flushing Ends



# Paradise Cut Salinity Directly Causes Salinity Spikes at Old River



# Summary

- TBP exceeds mitigation necessary for SWP impacts on water levels/circulation
- Salinity problems in south Delta are not caused by SWP operations
- Assign responsibility for water quality proportionate to parties whose actions cause degradation