

Compilation of Joint Contra Costa County and Solano County exhibits in the WaterFix Change Petition Hearing plus DWR Exhibit 334

1. CCC-SC-20 Delta Independent Science Board to DSC 30Sep2015 RDEIR-SDEIS comments
2. CCC-SC-28 Difference Between 16-year and 82-year Analyses of Water Quality Impacts
3. CCC-SC-31 November 2009 Conceptual Engineering Report Design for Screened Intake to Clifton Court Forebay
4. CCC-SC-51 Written Rebuttal Testimony of Dr. Richard A. Denton
5. CCC-SC-60 Daily Old River at Bacon Island EC in November for CWF H3+
6. CCC-SC-63 Proposed WaterFix Project Increases Exports during Drier Periods
7. CCC-SC-64 Proposed WaterFix Project Reduces Sacramento Inflows at Freeport
8. CCC-SC-74 Historical Trends in Fall X2 from DAYFLOW
9. DWR-334 2016 CCWD Agreement



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September 30, 2015

To: Randy Fiorini, Chair, Delta Stewardship Council
Charlton Bonham, Director, California Department
of Fish and Wildlife

From: Delta Independent Science Board

Subject: Review of environmental documents for California WaterFix

We have reviewed the partially Recirculated Draft Environmental Impact Report/ Supplemental Draft Environmental Impact Statement for the Bay Delta Conservation Plan/California WaterFix (herein, "the Current Draft"). We focused on how fully and effectively it considers and communicates the scientific foundations for assessing the environmental impacts of water conveyance alternatives. The review is attached and is summarized below.

The Current Draft contains a wealth of information but lacks completeness and clarity in applying science to far-reaching policy decisions. It defers essential material to the Final EIR/EIS and retains a number of deficiencies from the Bay Delta Conservation Plan Draft EIR/EIS. The missing content includes:

1. Details about the adaptive-management process, collaborative science, monitoring, and the resources that these efforts will require;
2. Due regard for several aspects of habitat restoration: landscape scale, timing, long-term monitoring, and the strategy of avoiding damage to existing wetlands;
3. Analyses of how levee failures would affect water operations and how the implemented project would affect the economics of levee maintenance;
4. Sufficient attention to linkages among species, landscapes, and management actions; effects of climate change on water resources; effects of the proposed project on San Joaquin Valley agriculture; and uncertainties and their consequences;
5. Informative summaries, in words, tables, and graphs, that compare the proposed alternatives and their principal environmental and economic impacts.

The effects of California WaterFix extend beyond water conveyance to habitat restoration and levee maintenance. These interdependent issues of statewide importance warrant an environmental impact assessment that is more complete, comprehensive, and comprehensible than the Current Draft.

**Review by the Delta Independent Science Board of the
 Bay Delta Conservation Plan/California WaterFix
 Partially Recirculated Draft Environmental Impact Report/
 Supplemental Draft Environmental Impact Statement**

September 30, 2015

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EXPECTATIONS FOR IMPACT ASSESSMENT OF CALIFORNIA WATERFIX

The Sacramento – San Joaquin Delta presents interconnected issues of water, biological resources, habitat, and levees. Dealing with any one of these problem areas is most usefully considered in light of how it may affect and be affected by the others. The effects of any actions further interact with climate change, sea-level rise, and a host of social, political, and economic factors. The consequences are of statewide importance.

These circumstances demand that the California WaterFix EIR/EIS go beyond legal compliance. This EIR/EIS is more than just one of many required reports. Its paramount importance is illustrated by the legal mandate that singles it out as the BDCP document we must review.

It follows that the WaterFix EIR/EIS requires extraordinary completeness and clarity. This EIR/EIS must be uncommonly complete in assessing important environmental impacts, even if that means going beyond what is legally required or considering what some may deem speculative (below, p. 4). Further, the WaterFix EIR/EIS must be exceptionally clear about the scientific and comparative aspects of both environmental impacts and project performance (p. 9).

These reasonable expectations go largely unmet in the Bay Delta Conservation Plan/California WaterFix Partially Recirculated Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement Draft (herein, “the Current Draft”). We do not attempt to determine whether this report fulfills the letter of the law. But we find the Current Draft sufficiently incomplete and opaque to deter its evaluation and use by decision-makers, resource managers, scientists, and the broader public.

BACKGROUND OF THIS REVIEW

The Delta Reform Act of 2009, in §85320(c), directs the Delta Independent Science Board (Delta ISB) to review the environmental impact report of the Bay Delta Conservation Plan (BDCP) and to provide the review to the Delta Stewardship Council and the California Department of Fish and Wildlife. On May 14, 2014, we submitted our review of the BDCP’s Draft Environmental Impact Report/Draft Environmental Impact Statement (herein, the “Previous Draft”), which had been posted for review on December 9, 2013. This review¹ contained three main parts: an extended summary, detailed responses to charge questions from the Delta Stewardship Council, and reviews of individual chapters. Although the Previous Draft considered vast amounts of scientific information and analyses to assess the myriad potential environmental impacts of the many proposed BDCP actions, we concluded that the science in the Previous Draft had significant gaps, given the scope and importance of the BDCP.

The proposed BDCP actions have now been partitioned into two separate efforts: water conveyance under California WaterFix² and habitat restoration under California EcoRestore³. Environmental documents in support of California WaterFix (the Current Draft) were made available for a 120-day comment period that began July 10, 2015. The Current Draft focuses on three new alternatives for conveying Sacramento River water through the Sacramento – San

¹ <http://deltacouncil.ca.gov/sites/default/files/documents/files/Attachment-1-Final-BDCP-comments.pdf>

² <http://www.californiawaterfix.com/>

³ <http://resources.ca.gov/ecorestore/>

Joaquin Delta. One of them, Alternative 4A, is the preferred alternative, identified as California WaterFix.

The Delta Stewardship Council asked us to review the Current Draft and to provide our comments by the end of September 2015. We are doing so through this report and its summary, which can be found in the cover letter.

The review began in July 2015 with a preliminary briefing from Laura King-Moon of California Department of Water Resources (three Delta ISB members present). The Delta ISB next considered the Current Draft in a public meeting on August 13–14 (nine of the ten members present)⁴. The meeting included a briefing on California EcoRestore by David Okita of California Natural Resources Agency and a discussion of the Current Draft and California WaterFix with Cassandra Enos-Nobriga of California Department of Water Resources (DWR) and Steve Centerwall of ICF International.

The initial public draft of this review was based on our study of Sections 1-4 of the Current Draft and on checks of most resource chapters in its Appendix A. This public draft was the subject of a September 16 meeting that included further discussions with Cassandra Enos-Nobriga⁵ and comments from Dan Ray of the Delta Stewardship Council staff. Additional comments on that initial draft were provided by DWR in a September 21 letter to the Delta ISB chair⁶. These discussions and comments helped clarify several issues, particularly on expectations of a WaterFix EIR/EIS.

This final version of the review begins with a summary in the cover letter. The body of the report continues first with a section on our understanding of major differences between the BDCP and California WaterFix. Next, after noting examples of improvement in the Current Draft, we describe our main concerns about the current impact assessments. These overlap with main concerns about the Previous Draft, which we revisit to consider how they are addressed in the Current Draft. Finally, we offer specific comments on several major Sections and Chapters.

DIFFERENCES BETWEEN THE BDCP AND CALIFORNIA WATERFIX

The project proposed in the Current Draft differs in significant respects from what was proposed as the BDCP in December 2013. Here we briefly state our understanding of some main differences and comment on their roles on this review:

- The time period for permitting incidental take under Section 7 of the federal Endangered Species Act (ESA) and Section 2081(b) of the California Endangered Species Act (CESA) is substantially less than the 50 years envisioned as part of a Habitat Conservation Plan (HCP) and Natural Community Conservation Plan (NCCP) in BDCP. As a result, the science associated with many impacts of climate change and sea-level rise may seem less relevant. The permitting period for the project proposed in the Current Draft remains in place unless environmental baseline conditions change substantially or other permit requirements are not met. Consequently, long-term effects of the proposed project remain important in terms of operations and expected benefits (p. 8).

⁴ <http://deltacouncil.ca.gov/docs/delta-isb-meeting-notice-meeting-notice-delta-isb/delta-independent-science-board-isb-august-13>

⁵ Written version at https://s3.amazonaws.com/californiawater/pdfs/63qnf_Delta_ISB_draft_statement_-_Enos_-_FINAL.pdf

⁶ <http://deltacouncil.ca.gov/docs/response-letter-dwr>

- In this shortened time frame, responsibility for assessing WaterFix’s effects on fish and wildlife would fall to resource agencies (National Marine Fisheries Service, U.S. Fish and Wildlife Service, California Department of Fish and Wildlife). Other impacts would be regulated by a variety of federal and state agencies (Current Draft Section 1).
- The proposed habitat restorations have been scaled back. The Current Draft incorporates elements of 11 Conservation Measures from BDCP to mitigate impacts of construction and operations. Most habitat restoration included in the Previous Draft has been shifted to California EcoRestore. Our review of the Previous Draft contained many comments on the timing of restoration, species interactions, ecological linkages of conservation areas, locations of restoration areas and the science supporting the efficiency and uncertainty of effective restoration. Some of these comments apply less to the Current Draft because of its narrower focus on water conveyance.
- There remains an expected reliance on cooperative science and adaptive management during and after construction.
- It is our understanding that the Current Draft was prepared under rules that disallow scientific methods beyond those used in the Previous Draft. The rules do allow new analyses, however. For example, we noticed evidence of further analyses of contaminants, application of existing methods (e.g. particle tracking) to additional species (e.g., some of the non-covered species), and occasional selection of one model in place of the combined results of two models (e.g., fish life cycle models SALMOD and SacEFT).

IMPROVEMENTS ON THE PREVIOUS DRAFT

A proposed revamping of water conveyance through the Sacramento-San Joaquin Delta involves a multitude of diverse impacts within and outside of the Delta. Unavoidably, the EIR/EIS for such a project will be complex and voluminous, and preparing it becomes a daunting task in its own right. The inherent challenges include highlighting, in a revised EIR/EIS, the most important of the changes.

The new Sections 1 through 4 go a long way toward meeting some of these challenges. Section 1 spells out the regulatory context by discussing laws and agencies that establish the context for the Current Draft. Section 2 summarizes how the Previous Draft was revised in response to project changes and public input. Section 3 describes how the preferred alternative in the Previous Draft (Alternative 4) has been changed. Section 4 presents an impressive amount of detailed information in assessing the sources of habitat loss for various species and discussing how restoration and protection can mitigate those losses. Generally comprehensive lists of “Resource Restoration and Performance Principles” are given for the biological resources that might be affected by construction or operations. For example, page 4.3.8-140 clearly describes a series of measures to be undertaken to minimize the take of sandhill cranes by transmission lines (although the effectiveness of these measures is yet to be determined).

Section 4 also contains improvements on collaborative science (4.1.2.4, mostly reiterated in ES.4.2). This part of the Current Draft draws on recent progress toward collaborative efforts in monitoring and synthesis in support of adaptive management in the Delta. The text identifies the main entities to be involved in an expected memorandum of agreement on a monitoring and adaptive-management program in support of the proposed project.

Appendix A describes revisions to the resource chapters of the Previous Draft. Track-changed versions of the chapters simplify the review process, although this was not done for the

key chapter on aquatic resources (p. 17). We noticed enhanced analyses of contaminants and application of methods such as particle tracking to additional species, including some of the non-covered taxa; a detailed treatment of *Microcystis* blooms and toxicity; more information about disinfection byproducts; improved discussion of vector control arising from construction and operational activities; and revised depiction of surficial geology. Potential exposure of biota to selenium and methylmercury is now considered in greater detail. Evaluations will be conducted for restoration sites on a site-specific basis; if high levels of contaminants cannot otherwise be addressed, alternative restoration sites will be considered (page 4.3.8-118). Incidentally, this is a good example of adaptive management, although it is not highlighted as such. Explanations were provided for why the nitrogen-to-phosphorus ratio was not specifically evaluated, why dissolved vs. total phosphorus was used in the assessment, and how upgrades to the Sacramento Regional Wastewater Treatment Plant would eventually affect phosphorus concentrations.

CURRENT CONCERNS

These and other strengths of the Current Draft are outweighed by several overarching weaknesses: overall incompleteness through deferral of content to the Final EIR/EIS (herein, "the Final Report"); specific incompleteness in treatment of adaptive management, habitat restoration, levees, and long-term effects; and inadequacies in presentation. Some of these concerns overlap with ones we raised in reviewing the Previous Draft (revisited below, beginning on p. 10).

Missing content

The Current Draft lacks key information, analyses, summaries, and comparisons. The missing content is needed for evaluation of the science that underpins the proposed project. Accordingly, the Current Draft fails to adequately inform weighty decisions about public policy. The missing content includes:

1. Details on adaptive management and collaborative science (below, p. 5).
2. Modeling how levee failures would affect operation of dual-conveyance systems (below, p. 7). Steve Centerwall told us on August 14 that modeling of the effects of levee failure would be presented in the Final Report.
3. Analysis of whether operation of the proposed conveyance would alter the economics of levee maintenance (below, p. 7).
4. Analyses of the effects of climate change on expected water exports from the Delta. “[A]n explanation and analysis describing potential scenarios for future SWP/CVP system operations and uncertainties [related to climate change] will be provided in the Final Report” (p. 1-35 of the Current Draft).
5. Potential impacts of climate change on system operations, even during the shortened time period emphasized in the Current Draft (below, p. 8 and 11).
6. Potential effects of changes in operations of the State Water Project (SWP) and Central Valley Project (CVP), or other changes in water availability, on agricultural practices in the San Joaquin Valley (p. 12).
7. Concise summaries integrated with informative graphics (below, p. 9 and 13). The Current Draft states that comparisons of alternatives will be summarized in the Final Report (p. 1-35).

While some of the missing content has been deferred to the Final Report (examples 2, 4, and 7), other gaps have been rationalized by deeming impacts “too speculative” for assessment.

CEQA guidance directs agencies to avoid speculation in preparing an EIR/EIS⁷. To speculate, however, is to have so little knowledge that a finding must be based on conjecture or guesswork. Ignorance to this degree does not apply to potential impacts of WaterFix on levee maintenance (example 3; see p. 7) or on San Joaquin Valley agriculture (example 6; p. 12).

Even if content now lacking would go beyond what is legally required for an EIR/EIS, providing such content could assist scientists, decision-makers, and the public in evaluating California WaterFix and Delta problems of statewide importance (above, p. 1).

Adaptive management

The guidelines for an EIR/EIS do not specifically call for an adaptive-management plan (or even for adaptive management). However, if the project is to be consistent with the Delta Plan (as legally mandated), adaptive management should be part of the design.

The Current Draft relies on adaptive management to address uncertainties in the proposed project, especially in relation to water operations. The development of the Current Draft from the Previous Draft is itself an exercise in adaptive management, using new information to revise a project during the planning stage. Yet adaptive management continues to be considered largely in terms of how it is to be organized (i.e., coordinated with other existing or proposed adaptive-management collaborations) rather than how it is to be done (i.e., the process of adaptive management). Adaptive management should be integral with planned actions and management—the Plan A rather than a Plan B to be added later if conditions warrant. The lack of a substantive treatment of adaptive management in the Current Draft indicates that it is not considered a high priority or the proposers have been unable to develop a substantive idea of how adaptive management would work for the project.

There is a very general and brief mention of the steps in the adaptive management process in Section 4 (p. 4.1-6 to 4.1-7), but nothing more about the process. We were not looking here for a primer on adaptive management. Rather, we expected to find serious consideration of barriers and constraints that have impeded implementation of adaptive management in the Delta and elsewhere (which are detailed in the Delta Plan), along with lessons learned on how adaptive management can be conducted overcome these problems.

The Current Draft contains general statements on how collaborative science and adaptive management under California WaterFix would be linked with the Delta Collaborative Science and Adaptive Management Program (CSAMP) and the Collaborative Adaptive Management Team (CAMT). These efforts, however, have taken place in the context of regulations and permits, such as biological opinions and biological assessments required under the Endangered Species Act. We did not find examples of how adaptive management would be applied to assessing—and finding ways to reduce—the environmental impacts of project construction and operations.

Project construction, mitigation, and operations provide many opportunities for adaptive management, both for the benefit of the project as well as for other Delta habitat and ecosystem initiatives, such as EcoRestore. To be effective in addressing unexpected outcomes and the need for mid-course corrections, an adaptive-management management team should evaluate a broad range of actions and their consequences from the beginning, as plans are being developed, to facilitate the early implementation and effectiveness of mitigation activities.

⁷ https://s3.amazonaws.com/californiawater/pdfs/bo0lx_Delta_ISB_Draft_Statement_&_Response_Letter_-_Enos_-_FINAL.pdf

The Current Draft defers details on how adaptive management will be made to work: “An adaptive management and monitoring program will be implemented to develop additional scientific information during the course of project construction and operations to inform and improve conveyance facility operational limits and criteria” (p. ES-17). This is too late. If adaptive management and monitoring are central to California WaterFix, then details of how they will be done and resourced should be developed at the outset (now) so they can be better reviewed, improved, and integrated into related Delta activities. The details could include setting species-specific thresholds and timelines for action, creating a Delta Adaptive Management Team, and capitalizing on unplanned experiments such as the current drought⁸. Illustrative examples could use specific scenarios with target thresholds, decision points, and alternatives. The missing details also include commitments and funding needed for science-based adaptive management and restoration to be developed and, more importantly, to be effective.

The protracted development of the BDCP and its successors has provided ample time for an adaptive-management plan to be fleshed out. The Current Draft does little more than promise that collaborations will occur and that adaptive management will be implemented. This level of assurance contrasts with the central role of adaptive management in the Delta Plan and with the need to manage adaptively as climate continues to change and new contingencies arise.

Restoration as mitigation

Restoration projects should not be planned and implemented as single, stand-alone projects but must be considered in a broader, landscape context. We highlighted the landscape scale in our review of the Previous Draft and also in an earlier review of habitat restoration in the Delta⁹. A landscape approach applies not just to projects that are part of EcoRestore, but also to projects envisioned as mitigation in the Current Draft, even though the amount of habitat restoration included (as mitigation) in the Current Draft has been greatly reduced. On August 13 and 14, representatives of WaterFix and EcoRestore acknowledged the importance of the landscape scale, but the Current Draft gives it little attention. Simply because the CEQA and NEPA guidelines do not specifically call for landscape-level analyses is not a sufficient reason to ignore them.

Wetland restoration is presented as a key element of mitigation of significant impacts (example below in comments on Chapter 12, which begin on p. 18). We noticed little attention to the sequence required for assessing potential impacts to wetlands: first, avoid wetland loss; second, if wetland loss cannot be avoided, minimize losses; and third, if avoidance or minimization of wetland loss is not feasible, compensate. Much of the emphasis in the Current Draft is on the third element. Sequencing apparently will be addressed as part of the permitting process with the US Army Corps of Engineers (USACE) for mitigation related to the discharge of dredged or fill material.¹⁰ However, it is difficult to evaluate the impacts on wetlands in advance of a clarification of sequencing and criteria for feasibility.

Mitigation ratios

Restoring a former wetland or a highly degraded wetland is preferable to creating wetlands from uplands¹¹. When an existing wetland is restored, however, there is no net gain of

⁸ <http://deltacouncil.ca.gov/docs/adaptive-management-report-v-8>

⁹ <http://deltacouncil.ca.gov/sites/default/files/documents/files/HABITAT%20RESTORATION%20REVIEW%20FINAL.pdf>

¹⁰ Letter from Cassandra Enos-Nobriga, DWR, September 21, 2015.

¹¹ <http://www.nap.edu/openbook.php?isbn=0309074320>

area, so it is unclear whether credits for improving existing wetlands would be considered equivalent to creating wetlands where they did not recently exist.

In view of inevitable shortcomings and time delays in wetland restorations, mitigation ratios should exceed 1:1 for enhancement of existing wetlands. The ratios should be presented, rather than making vague commitments such as “restore or create 37 acres of tidal wetland...” The Final Draft also needs to clarify how much of the wetland restoration is out-of-kind and how much is in-kind replacement of losses. It should examine whether enough tidal area exists of similar tidal amplitude for in-kind replacement of tidal wetlands, and whether such areas will exist with future sea-level rise. We agree that out-of-kind mitigation can be preferable to in-kind when the trade-offs are known and quantified and mitigation is conducted within a watershed context, as described in USACE’s 2010 guidance for compensatory wetland mitigation.¹² Since then, many science-based approaches have been developed to aid decision-making at watershed scales, including the 2014 Watershed Approach Handbook produced by the Environmental Law Institute and The Nature Conservancy¹³.

Restoration timing and funding

To reduce uncertainty about outcomes, allow for beneficial and economical adaptive management, and allow investigators to clarify benefits before the full impacts occur, mitigation actions should be initiated as early as possible. Mitigation banks are mentioned, but are any operational or planned for operation soon? The potential for landowners to develop mitigation banks could be encouraged so restoration could begin immediately, engendering better use of local knowledge, financial profit, and local support for the project. We are told that the timing of mitigation will be coordinated with other review processes that are currently ongoing.⁶

Levees

A comprehensive assessment of environmental impacts should relate California WaterFix to levee failure by examining the consequences each may have for the other. The interplay between conveyance and levees is receiving additional attention through the Delta Levee Investment Strategy.

On the one hand, the Current Draft fails to consider how levee failures would affect the short-term and long-term water operations spelled out in Table 4.1-2. A rough estimate was proposed under the Delta Risk Management Study¹⁴ and another is part of a cost-benefit analysis for the BDCP¹⁵. The Final Report should provide analyses that incorporate these estimates.

On the other hand, the Current Draft also fails to consider how implementing the project would affect the basis for setting the State’s priorities in supporting Delta levee maintenance. This potential impact is illustrated by a recent scoring system of levee-project proposals that awards points for expected benefits to “export water supply reliability”¹⁶. Further efforts to quantify these benefits have been recommended as part of a comprehensive risk assessment that

¹² [http://www.sac.usace.army.mil/Portals/43/docs/regulatory/Guidelines for Preparing a Compensatory Mitigation Planf.pdf](http://www.sac.usace.army.mil/Portals/43/docs/regulatory/Guidelines%20for%20Preparing%20a%20Compensatory%20Mitigation%20Planf.pdf)

¹³ https://www.eli.org/sites/default/files/eli-pubs/watershed-approach-handbook-improving-outcomes-and-increasing-benefits-associated-wetland-and-stream_0.pdf

¹⁴ http://www.water.ca.gov/floodmgmt/dsmo/sab/drmosp/docs/Delta_Seismic_Risk_Report.pdf

¹⁵ http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Draft_BDCP_Statewide_Economic_Impact_Report_8513.sflb.ashx

¹⁶ http://www.water.ca.gov/floodsafe/fessro/docs/special_PSP14_final.pdf

would guide the Delta Levees Investment Strategy¹⁷. Public safety, a focus of the Delta Flood Emergency Management Plan,¹⁸ is just one asset that levees protect. The Current Draft does not evaluate how the proposed project may affect estimates of the assets that the levees protect.

The Current Draft cites levee fragility mainly as a reason to build isolated conveyance for Sacramento River water (examples, p. 1-1, 1-7, 1-9). In a similar vein, the California WaterFix website states, “Aging dirt levees are all that protect most of California’s water supplies from the affects [*sic*] of climate change. Rising sea levels, intense storms, and floods could all cause these levees to fail, which would contaminate our fresh water with salt, and disrupt water service to 25 million Californians”¹⁹. Neither the Previous Draft nor the Current Draft, however, provides a resource chapter about Delta levees. Such a chapter would be an excellent place to examine interacting impacts of conveyance and levees.

Long-term effects

With the shortened time period, several potential long-term impacts of or on the proposed project no longer receive attention. While these effects may not become problematic during the initial permit period, many are likely to affect project operations and their capacity to deliver benefits over the long operational life of the proposed conveyance facilities. In our view, consideration of these long-term effects should be part of the evaluation of the science foundation of the proposed project.

The No-Action alternative establishes the baseline for evaluating impacts and benefits of the proposed alternative(s). It is therefore important to consider carefully how the baseline is established, as this can determine whether particular consequences of the alternatives have costs or benefits. Climate change, for example, is considered under the No-Action alternative in the Current Draft, as is sea-level rise. Climate change is expected to reduce water availability for the proposed northern intakes, and both climate change and sea-level rise are expected to influence tidal energy and salinity intrusion within the Delta²⁰. Changes in water temperature may influence the condition of fishes that are highly temperature-dependent in the current analyses. These environmental effects, in turn, are likely to influence environmental management and regulation; from the standpoint of water quality they may even yield environmental benefits if agricultural acreage decreases and agricultural impacts are reduced.

Rather than consider such effects, however, the Current Draft focuses on how the proposed project would affect “the Delta’s resiliency and adaptability to expected climate change” (Current Draft section 4.3.25). Quite apart from the fact that “resiliency” and “adaptability” are scarcely operational terms, the failure to consider how climate change and sea-level rise could affect the outcomes of the proposed project is a concern that carries over from our 2014 review and is accentuated by the current drought (below, p. 11).

The Current Draft states that “Groundwater resources are not anticipated to be substantially affected in the Delta Region under the No Action Alternative (ELT) because surface water inflows to this area are sufficient to satisfy most of the agricultural, industrial, and municipal water supply needs” (p. 4.2-16). This conclusion is built on questionable assumptions; the current drought illustrates how agriculture turns to groundwater when surface-water availability diminishes. Groundwater regulation under the recently enacted Sustainable

¹⁷ <http://deltacouncil.ca.gov/docs/delta-levee-investment-strategy/dlis-peer-review-technical-memorandum-31>

¹⁸ <http://www.water.ca.gov/floodmgmt/hafoo/fob/dreppr/InterdepartmentalDraftDFEMP-2014.pdf>.

¹⁹ <http://www.californiawaterfix.com/problem>

²⁰ <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0024465>

Groundwater Management Act (SGMA) can also be expected to have long-term effects on the proposed project—effects that the Current Draft does not assess. Ending of more than a million acre-feet of overdraft in the southern Central Valley under the SGMA is likely to increase demand for water exports from the Delta in the coming decades. The Current Draft discusses the potential effects of the project on groundwater (for example, in Sections 4.3.3 and 5.2.2.3), but we found only two brief, descriptive mentions of SGMA in the 235 pages of Section 5. The implications of prolonged droughts (e.g., on levee integrity) and of the consequences of SGMA receive too little attention in the Current Draft.

The Current Draft suggests that unnamed “other programs” that are “separate from the proposed project” will use elements of the Previous Draft to implement long-term conservation efforts that are not part of California WaterFix (Current Draft, p. 1-3). The Final Report should provide assurances that such other programs will step in, and could go further in considering their long-term prospects.

Informative summaries and comparisons

According to guidance for project proponents, “Environmental impact statements shall be written in plain language and may use appropriate graphics so that decision-makers and the public can readily understand them” (Code of Federal Regulations, 40 CFR 1502.8). Far-reaching decisions should not hinge on environmental documents that few can grasp.

This guidance applies all the more to an EIR/EIS of the scope, complexity, and importance of the Current Draft. It demands excellent comparative descriptions of alternatives that are supported by readable tables and high-quality graphics, enumeration of major points, well-organized appendices, and integration of main figures with the text. For policy deliberations, the presentation of alternatives should include explicit comparisons of water supply deliveries and reliabilities as well as economic performance. For decision-makers, scientists, and the public, summaries of impacts should state underlying assumptions clearly and highlight major uncertainties. The Current Draft is inadequate in these regards.

The Previous Draft provided text-only summaries for just the two longest of its resource chapters (Chapters 11 and 12). A fragmentary comparison of alternatives was buried in a chapter on “Other CEQA/NEPA required sections” (part 3 of Chapter 31) but fell far short of what was needed. Both the Previous and Current Drafts have been accompanied by a variety of outreach products for broad audiences (e.g., the descriptive overview of the BDCP Draft EIR/EIS²¹). These products do little to compensate for the overall paucity of readable summaries and comparisons in the Previous and Current Drafts.

For over three years, the Delta ISB has been specifically requesting summaries and comparisons: first in June 2012²², then in June 2013²³, and again in a review of the Previous Draft in May 2014 (footnote 1, p. 1). Appallingly, such summaries and comparisons remain absent in the Current Draft. The generally clear writing in Sections 1 through 4 shows that the preparers are capable of providing the requested summaries and comparisons. Prescriptions in CEQA and NEPA in no way exclude cogent summaries, clear comparisons, or informative graphics. And three years is more than enough time to have developed them.

²¹ Highlights+of+the+Draft+EIS-EIR+12-9-13.pdf

²² http://deltacouncil.ca.gov/sites/default/files/documents/files/DISB_Letter_to_JMeral_and_DHoffman-Floerke_061212.pdf

²³ http://deltacouncil.ca.gov/sites/default/files/documents/files/DISB%20Comments%20on%20Draft%20BDCP%20Document.doc_.pdf

On August 14, 2015, representatives of California WaterFix assured us that this kind of content would eventually appear, but only in the Final Report. That will be far too late in the EIR/EIS process for content so critical to comprehending what is being proposed and its potential impacts.

PRIOR CONCERNS AND THEIR RELEVANCE TO THE CURRENT DRAFT

The Delta ISB review of May 14, 2014 emphasized eight broad areas of concern about the scientific basis for the Previous Draft. Each is summarized below, followed by a brief appraisal of how (or whether) the concern has been dealt with in the Current Draft. While the reduced scope of the proposed project has reduced the relevance of some issues, particularly habitat restoration and other conservation measures, other concerns persist.

Our persistent concerns include the treatment of uncertainty, the implementation of adaptive management, and the use of risk analysis. These topics receive little or no further attention in the Current Draft. We also found few revisions in response to points we raised previously about linkages among species, ecosystem components, or landscapes; the potential effects of climate change and sea-level rise; and the potential effects of changes in water availability on agricultural practices and the consequent effects on the Delta. Our previous comments about presentation also pertain.

Effectiveness of conservation actions

Our 2014 review found that many of the impact assessments hinged on optimistic expectations about the feasibility, effectiveness, or timing of the proposed conservation actions, especially habitat restoration.

This is arguably less of a concern now, given the substantially shorter time frame of the revised project and narrower range of conservation actions designed for compensatory restoration. Nonetheless, the Current Draft retains unwarranted optimism, as on page 4.3.25-10: “By reducing stressors on the Delta ecosystem through predator control at the north Delta intakes and Clifton Court Forebay and installation of a nonphysical fish barrier at Georgiana Slough, Alternative 4A will contribute to the health of the ecosystem and of individual species populations making them stronger and more resilient to the potential variability and extremes caused by climate change.” A scientific basis for this statement is lacking, and an adaptive or risk-based management framework is not offered for the likely event that such optimism is unfulfilled.

Is it feasible for even the reduced amounts of mitigation and restoration to be completed within the time period proposed? Perhaps yes. Is it feasible that these actions will mitigate impacts over the long term? This is more problematic. To be effective, mitigation actions should deal with both the immediate and long-term consequences of the project. The proposed permitting should allow for monitoring long enough to assess the effectiveness of habitat restoration measures, which will need to extend beyond the initial permitting period.

Uncertainty

The 2014 review found the BDCP encumbered by uncertainties that were considered inconsistently and incompletely. We commented previously that modeling was not used effectively enough in bracketing uncertainties or exploring how they may propagate or be addressed.

In the Current Draft, uncertainties and their consequences remain inadequately addressed, improvements notwithstanding. Uncertainties will now be dealt with by establishing “a robust program of collaborative science, monitoring, and adaptive management” (ES 4.2). No details about this program are provided, so there is no way to assess how (or whether) uncertainties will be dealt with effectively. Although sensitivity modeling was used to address the effects of changes in the footprint and other minor changes of the revised project, full model runs were not carried out to assess the overall effects of the specific changes. Consequently, modeling that would help to bracket ranges of uncertainties or (more importantly) assess propagation of uncertainties is still inadequate.

Many of our prior concerns about uncertainties pertained to impacts on fish. If those uncertainties have now been addressed in Chapter 11, they are difficult to evaluate because changes to that chapter have not been tracked in the public draft (below, p. 17).

There are also uncertainties with the data generated from model outputs, although values are often presented with no accompanying error estimates. This situation could be improved by presenting results from an ensemble of models and comparing the outputs.

Effects of climate change and sea-level rise on the proposed actions

Our 2014 review stated concerns that the Previous Draft underestimated effects of climate change and sea-level rise across the 50-year timeline of the BDCP. With the nominal duration shortened substantially, most of the projected impacts of climate change and sea-level rise may occur later. But climate-related issues remain.

First, the Current Draft is probably outdated in its information on climate change and sea-level rise. It relies on information used in modeling climate change and sea-level rise in the Previous Draft, in which the modeling was conducted several years before December 2013. The absence of the climate-change chapter (Chapter 29) in the Previous Draft from Appendix A in the Current Draft indicates that no changes were made. In fact, the approaches and assumptions in the Current Draft remained unchanged from the Previous Draft in order to ensure consistency and comparability across all the Alternatives, even though newer scientific information had become available.⁶ Yet climatic extremes, in particular, are a topic of intense scientific study, illustrated by computer simulations of ecological futures²⁴ and findings about unprecedented drought²⁵. The Current Draft does not demonstrate consideration of recently available climate science, and it defers to the Final Report analysis of future system operations under potential climate and sea-level conditions. In fact, the Current Draft generally neglects recent literature, suggesting a loose interpretation of “best available science.”

Second, climate change and sea-level rise are now included in the No-Action Alternative, as they will transpire whether or not WaterFix moves forward. A changed future thus becomes the baseline against which Alternative 4A (and the others) are compared. Changes in outflow from the Delta due to seasonal effects of climate change and the need to meet fall X2 requirements are considered in Section 4.3.1. The difference in outcomes then depends on assumptions about the facility and operations of Alternative 4A and the other Alternatives. Sensitivity analyses indicate that the impacts of the different Alternatives are generally similar in comparison to the No Action Alternative under the range of climate projections considered.⁶ Thus, “Delta exports would either remain similar or increase in wetter years and remain similar

²⁴ <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0024465>

²⁵ Cook, B.I., Ault, T.R., and Smerdon, J.E., 2015, Unprecedented 21st century drought risk in the American Southwest and Central Plains: *Science Advances*, v. 1, doi:10.1126/sciadv.1400082.

or decrease in the drier years under Alternative 4A as compared to the conditions without the project.” (p. 4.3.1-4). Such an inconclusive conclusion reinforces the need to be able to adapt to different outcomes. Simply because the Alternatives are expected to relate similarly to a No Action Alternative that includes climate change does not mean that the Alternatives will be unaffected by climate change.

Interactions among species, landscapes, and the proposed actions

The Previous Draft acknowledged the complexities produced by webs of interactions, but it focused on individual species, particular places, or specific actions that were considered in isolation from other species, places, or actions. Potential predator-prey interactions and competition among covered and non-covered fish species were not fully recognized. Confounding interactions that may enhance or undermine the effectiveness of proposed actions were overlooked. In our 2014 review we recommended describing and evaluating the potential consequences of such interactions, particularly in Chapters 11 (Fish and aquatic resources) and 12 (Terrestrial resources).

The Current Draft recognizes that mitigation measures for one species or community type may have negative impacts on other species or communities, and mitigation plans may be adjusted accordingly. But the trade-offs do not seem to be analyzed or synthesized. This emphasizes the need for a broader landscape or ecosystem approach that comprehensively integrates these conflicting effects.

Effects on San Francisco Bay, levees, and south-of-Delta environments

In 2014 we pointed to three kinds of impacts that the Previous Draft overlooked: (1) effects on San Pablo Bay and San Francisco Bay in relation to Delta tides, salinity, and migratory fish; (2) effects of levee failures on the proposed BDCP actions and effects of isolated conveyance on incentives for levee investments; and (3) effects of increased water reliability on crops planted, fertilizers and pesticides used, and the quality of agricultural runoff. The Current Draft responds in part to point 1 (in 11.3.2.7) while neglecting point 2 (above, p. 7) and point 3.

On point 3: Although the Current Draft considers how the project might affect groundwater levels south of the Delta (7.14 to 7.18), it continues to neglect the environmental effects of water use south of (or within) the Delta. Section 4.3.26.4 describes how increased water-supply reliability could lead to increased agricultural production, especially during dry years. Elsewhere, a benefit-cost analysis performed by ICF and the Battle Group²⁶ calculated the economic benefits of increased water deliveries to agriculture in the Delta. The Current Draft does not fully consider the consequences of these assumptions, or of the projections that the project may enhance water-supply reliability but may or may not increase water deliveries to agriculture (depending on a host of factors). We have been told that to consider such possibilities would be “too speculative” and that such speculations are explicitly discouraged in an EIR/EIS. Yet such consequences bear directly on the feasibility and effectiveness of the project, and sufficient information is available to bracket a range of potential effects. Our previous concerns are undiminished.

The impacts of water deliveries south of the Delta extend to the question of how each intake capacity (3,000, 9,000, or 15,000 cfs) may affect population growth in Southern

²⁶ Hecht, J., and Sunding, D., Draft Bay Delta Conservation Plan statewide economic impact report, August 2013.

California. Section 4.4.1-9 treats the growth-enabling effects of alternative 2D lightly, saying that additional EIS review would be needed for future developments.

Implementing adaptive management

In the Previous Draft, details about adaptive management were to be left to a future management team. In our 2014 review we asked about situations where adaptive management may be inappropriate or impossible to use, contingency plans in case things do not work as planned, and specific thresholds for action.

Although most ecological restoration actions have been shifted to California EcoRestore (p. 5), we retain these and other concerns about adaptive management under California WaterFix. If the mitigation measures for terrestrial resources are implemented as described, for example, they should compensate for habitat losses and disturbance effects of the project. The test will be whether the measures will be undertaken as planned, be as effective as hoped, and continue long enough to fully mitigate effects. This is where adaptive management and having contingency plans in place becomes critically important. It is not apparent that the mitigation plans include these components.

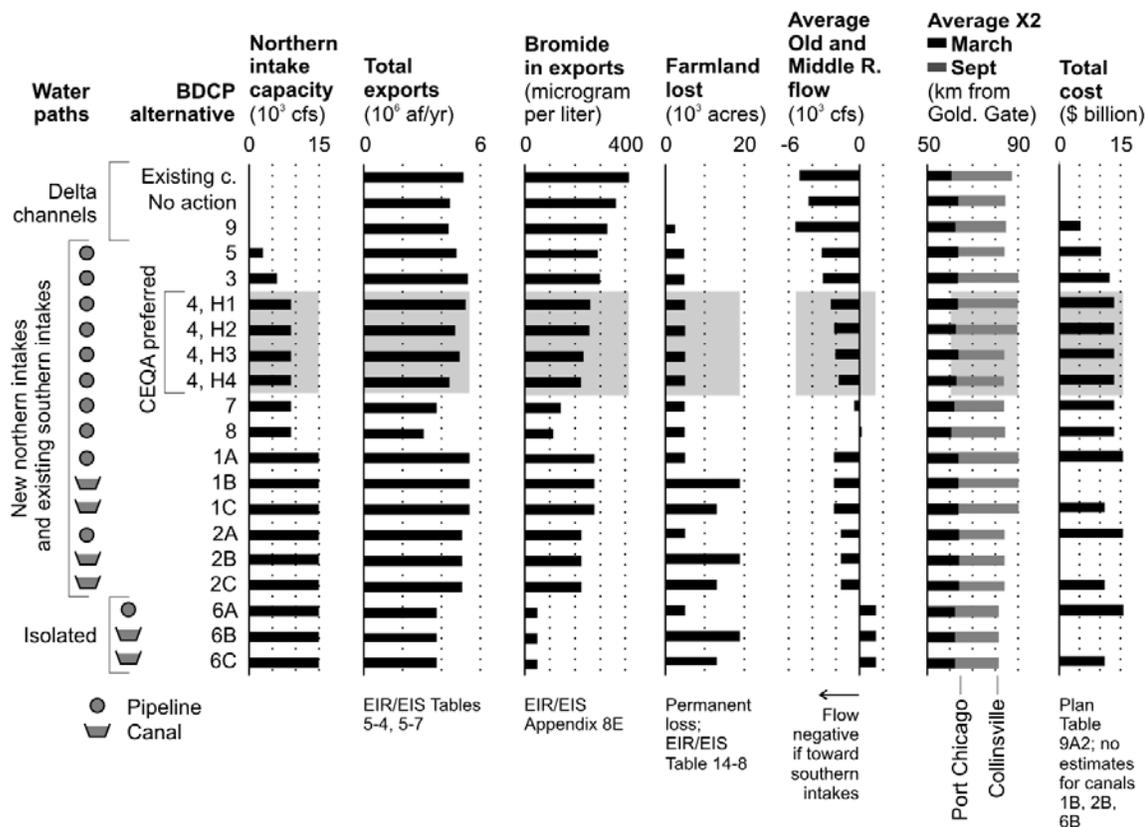
Reducing and managing risk

Our 2014 review advised using risk assessment and decision theory in evaluating the proposed BDCP actions and in preparing contingency plans. We noticed little improvement on this issue, just a mention that it might be considered later. This is not how the process should be used.

Comparing BDCP alternatives

The Previous Draft contained few examples of concise text and supporting graphics that compare alternatives and evaluate critical underlying assumptions. Rudimentary comparisons of alternatives were almost entirely absent. The Current Draft retains this fundamental inadequacy (p. 9).

Our 2014 review urged development and integration of graphics that offer informative summaries at a glance. We offered the example reproduced below. If the Current Draft contains such graphics, they would need to be ferreted out from long lists of individual pdf files. Because they are not integrated into the text where they are referenced in the Current Draft, the figures cannot readily illustrate key points.



COMMENTS ON INDIVIDUAL SECTIONS AND CHAPTERS

This final section of the review contains minimally edited comments on specific points or concerns. These comments are organized by Section or Chapter in the Current Draft. Many are indexed to pages in the section or chapter named in the heading.

Alternatives 4A, 2D, and 5A (Section 4)

It is good that the proposed alternatives are seen as flexible proposals, as it is difficult to imagine that any proposal for such a complex and evolving system could be implemented precisely as proposed. Some initial and ongoing modifications seem desirable, and unavoidable.

The operating guidance for the new alternatives seems isolated from the many other water management and environmental activities in and upstream of the Delta likely to be important for managing environmental and water supply resources related to Delta diversions. While it is difficult to specify detailed operations for such a complex system, more details on the governance of operations (such as the Real Time Operations process) would be useful. The operational details offered seem to have unrealistic and inflexible specificity. Presentations of delivery-reliability for different alternatives remain absent. Environmental regulations on Delta diversions have tended to change significantly and abruptly in recent decades, and seem likely to change in the future. How sensitive are project water supply and environmental performance to changes in operating criteria?

The collaborative science ideas seem philosophically attractive, but are not given much substance. Monitoring is mentioned, but details of organization, intent, and resources seem

lacking. Adequate funding to support monitoring, collaborative science, and adaptive management is a chronic problem. Section ES.4.2 states that “Proponents of the collaborative science and monitoring program will agree to provide or seek additional funding when existing resources are insufficient.” This suggests that these activities are lower in priority than they should be.

The three new alternatives, 4A, 2D, and 5A, seem to have modest changes over some previous alternatives, with the exception of not being accompanied by a more comprehensive environmental program. In terms of diversion capacities, they cover a wide range, 3,000 cfs (5A), 9,000 cfs (4A), and 15,000 cfs (2D). The tables comparing descriptions of the new alternatives to previous Alternative 4 are useful, but should be supplemented by a direct comparison of the three new alternatives.

The new Sustainable Groundwater Management Act (SGMA) seems likely to increase demands for water diversions from the Delta to the south to partially compensate for the roughly 1.5-2 maf/year that is currently supplied by groundwater overdraft.

The State seems embarked on a long-term reduction in urban water use, particularly outdoor irrigation. Such a reduction in urban water use is likely to have some modest effects on many of the water-demand and scarcity impacts discussed.

The climate change analysis of changes in Delta inflows and outflows is useful, but isolating the graphs in a separate document disembodies the discussion. The fragmentation of the document by removing each Section 4 figure into a separate file is inconvenient for all, and makes integrated reading practically impossible for many.

The details of the alternative analyses seem mostly relevant and potentially useful. Much can be learned about the system and the general magnitude of likely future outcomes from patient and prolonged reading of this text. An important idea that emerges from a reading of the No Action Alternative is that the Delta, and California water management, is likely to change in many ways with or without the proposed project. The No Action and other alternatives also illustrate the significant inter-connectedness of California’s water system. The range of impacts considered is impressive, but poorly organized and summarized.

The discussion of disinfection by-product precursor effects in Delta waters is improved significantly, but could be made more quantitative in terms of economic and public-health impacts.

The discussion on electromagnetic fields is suitably brief, while the tsunami discussion could be condensed.

The effects of the likely listing of additional native fish species as threatened or endangered seems likely to have major effects on project and alternative performance. These seem prudent to discuss, and perhaps analyze.

Is Alternative 2D, with 15,000 cfs capacity, a serious alternative? Does it deserve any space at all?

Table 4.1-8 implies that tidal brackish/*Schoenoplectus* marsh. Should some of this be considered tidal freshwater marsh?

The dynamics of the Delta are largely determined by water flows. The Current Draft acknowledges that water flows and salinity will change in complex ways. There are statements about how inflows, outflows, and exports will change in Alternative 4A in relation to baseline (No-Action) conditions (p. 4.3.8-13). What is the scientific basis on which these changes will be managed? Will models be used? What confidence should we have in current projections? Have the effects of droughts or deluges been considered?

4.3.7-10, line 13: Text on disturbing sediments and releasing contaminants needs to add nitrogen and phosphorus to the concerns.

Water quality (Chapter 8)

8-3, line 13: *Microcystis* is singled out as a cyanobacterium that can (but doesn't always) produce the toxin, microcystin; however, there are other cyanobacteria that sometimes produce other toxins. Different genera can differ in the nutrient that limits their blooms (see 2014 letter by Hans Paerl in *Science* 346(6406): 175-176). For example, *Microcystis* blooms can be triggered by N additions because this species lacks heterocysts, while toxin-producing *Anabaena* blooms can be triggered by P additions, because *Anabaena* has heterocysts and can fix N. The frequently repeated discussion of cyanobacteria blooms needs to be updated. Also cite Paerl on page 8-45 line 8. Ditto on page 8-103 and 8-106 line 34.

8-8. In our earlier comments, we recommended that carbon be separated into its dissolved and particulate forms for consideration of water quality impacts because dissolved organic carbon (DOC) is the form most likely to react with chloride and bromide and result in formation of disinfection by-products. The section on bromide focuses on interactions with total organic carbon (TOC), rather than DOC. Carbon is primarily considered with respect to formation of disinfection by-products but carbon plays a central role in the dynamics of the Delta, affecting processes such as metabolism, acidity, nutrient uptake, and bioavailability of toxic compounds. Carbon cycling determines ecosystem structure and function in aquatic systems. It also modifies the influence and consequences of other chemicals and processes in aquatic systems. Dissolved organic carbon (DOC), for example, influences light and temperature regimes by absorbing solar radiation, affects transport and bioavailability of metals, and controls pH in some freshwater systems. Respiration of organic carbon influences dissolved oxygen concentrations and pH.

8-18, line 12 says that salt disposal sites were to be added in 2014; were they?

8-19 and 8-20: "CECs" is not defined and seems to be used incorrectly. Change "CECs" to "EDCs" on page 8-19 and to "PPCPs" on page 8-20.

8-21, line 18-19: Such a statement should be qualified. The conclusion that marine waters are N-limited and inland waters are P-limited is outdated. Recent papers, including the above, find more complex patterns.

8-22, lines 18 and 30: Choose either "cyanobacteria" or "blue-green algae;" using both will confuse readers who may perceive them as different.

8-23, lines 15-16: Say how the N:P ratio changed composition, not just that it did change composition.

8-23 through 8-25: Uncertainties (e.g., standard deviation or standard error of the mean) associated with the mean concentrations of DOC should be presented. It is impossible to interpret differences between the values that are presented without knowledge of the variation around the mean values (e.g., without knowledge of variation around the mean, it is difficult to evaluate whether DOC concentrations at south vs. north-of-Delta stations and Banks headworks differ from one another; 3.9 to 4.2 mg/L vs. 4.3 mg/L).

8-65, line 12: Specify if DO is for daytime or night, and for surface, bottom or mid-water column.

8-75, line 6: The failure to consider dissolved P (DP) should be addressed; there is much greater uncertainty. The adherence of some P to sediment does not prevent considerable

discharge of P as DP. Also on page 8-95 line 40, qualify predictions due to lack of consideration of DP.

8-82, line 4-5: It seems unlikely that current levels of *Microcystis* growth in the Delta are dependent on the exclusive uptake of ammonia. Temperature is one of the primary factors driving *Microcystis* blooms and global warming could promote bloom occurrence. Consider revising this section to, “Because it seems unlikely that current levels of *Microcystis* growth in the Delta are dependent on the exclusive uptake of ammonia, the frequency, magnitude and geographic extent of *Microcystis* under future scenarios is difficult to predict.”

8-105, line 8: Would total nitrogen be dominated by nitrate just by increasing ammonia removal? Depending on redox and microbiota, why wouldn't nitrate be converted to ammonium?

A lot of attention is given to factors controlling *Microcystis* blooms in this chapter but little attention is given to its toxicity. Just as factors controlling blooms are not fully understood, the regulating factors of cellular toxin contents remain poorly understood. As a result, the impact of blooms on the environment can vary (e.g., large blooms of non-toxic or low toxin organisms may have impacts on environmental variables such as nutrient uptake and dissolved oxygen consumption while small blooms of highly toxic organisms could impact food webs) [see: Ma et al. (2015) Toxic and non-toxic strains of *Microcystis aeruginosa* induce temperature dependent allelopathy toward growth and photosynthesis of *Chlorella vulgaris*. Harmful Algae 48: 21–29].

Fish and aquatic resources (Chapter 11)

We found individual conclusions or new analyses difficult to identify in this key chapter because changes to it were not tracked in the public version of the Current Draft and there was no table of contents that could have assisted in side-by-side comparison with the Previous Draft.

Effects of temperature

We noticed more emphasis on temperature concerning the fish ‘downstream’ impacts (but without tracked changes this becomes difficult to document).

The main temperature variable used expresses the percentage of time when monthly mean temperatures exceed a certain rate or fall within a certain boundary. The biological impact, however, is difficult to assess with these numbers. If all of the change occurred just during operations or just during one day, the biological impact could be much different than a small change every day (provided by using means). Graphs of changes and listing of extreme highs and lows during a model run would have more biological meaning. Also, comparisons were made using current baseline conditions and did not consider climate change effects on temperatures.

Fish screens

It is unclear how (and how well) the fish screens would work. The description of fish screens indicates that fish >20 mm are excluded, but what about fish and larvae that are <20 mm, as well as eggs? Table 11-21 seems out of date, because some fish screens appear to have been installed, but data on their effects are not given. Despite the lack of specific data on how well screens function, the conclusion that there will be no significant impact is stated as certain (e.g., page 1-100 line 38).

Here, as in many other places, measures are assumed to function as planned, with no evidence to support the assumptions. The level of certainty seems optimistic, and it is unclear whether there are any contingency plans in case things don't work out as planned. This problem persists from the Previous Draft.

Invasive plants

Cleaning equipment is mentioned, but it is not specifically stated that large machinery must be cleaned before entering the Delta. Section 4.3.8-358 says equipment would be cleaned if being moved within the Delta. Cleaning is essential to reduce transfer of invasive species; a mitigating measure is to wash equipment, but it must also be enforced.

Weed control (fire, grazing) is suggested, but over what time frame? It may be needed in perpetuity. That has been our experience at what is considered the world's oldest restored prairie (the 80-yr-old Curtis Prairie, in Madison, WI).

Weed invasions can occur after construction is completed; how long will the project be responsible for weed control? 3-5 years won't suffice.

4.3.8-347. Herbicides are prescribed to keep shorebird nesting habitat free of vegetation, but toxic effects of herbicides on amphibians etc. are not considered.

4.3.8-354. Impacts of invasive plants seem underestimated. Impact analysis implies that the project disturbance area is the only concern, when dispersal into all areas will also be exacerbated. At the Arboretum, a 1200-ac area dedicated to restoration of pre-settlement vegetation, invasive plants are the main constraint. A judgment of no significant impact over just the disturbance area is overly optimistic.

4.3.8-356. Does not mention need to clean equipment to minimize import of seeds on construction equipment.

Cryptic acronym and missing unit

Figure 2: SLR x year: y axis lacks units; reader has to continue on to table 11-20 to find that it is cm.

Terrestrial biological resources (Chapter 12)*Effects on wetlands and waters of the United States (WOTUS)*

Page 12-1, line 18-19 says: "Under Alternatives 2D, 4, 4A, and 5A, larger areas of non-wetland waters of the United States would be filled due to work in Clifton Court Forebay; however, the Forebay would ultimately expand by 450 acres and thus largely offset any losses there." Is the assumption that, acre for acre, all jurisdictional waters are interchangeable, whether of different type or existing vs. created? The literature does not support this assumption.

The text argues that the wetlands would be at risk with levee deterioration, sea-level rise, seismic activity, etc. But the solution is for "other programs" to increase wetlands and riparian communities. What if this project causes the problem, e.g. via vibration?

CM1 alternative 4A would fill 775 acres of WOTUS (491 wetland acres); Alt 2D would fill 827 (527 wetland) + 1,931 ac temporary fill at Clifton Court Forebay; Alt 5A would fill 750 (470 wetland). That's a lot of area. The timing and details of mitigation measures are not provided. References to the larger Delta Plan suggest that compensations would come at unknown times. Piecemeal losses such as indicated here: "Only 1% of the habitat in the study area would be filled or converted" (Chapter 12, line 29, page 12-22) is how the US has lost its historical wetlands. What are the overall cumulative impacts of wetland losses in the Delta? What is the tipping point beyond which further wetland losses must be avoided? The proposed project is one part of the broader array of management actions in the Delta and should be considered in that broader context.

Habitat descriptions

How will mudflats be sustained for shorebirds? Exposed mud above half-tide can become vegetated rapidly. In the Delta, the bulrush *Schoenoplectus californicus* tolerates nearly continuous tidal submergence.

Are soils clayey enough for the proposed restoration of up to 34 acres of vernal pool and alkali seasonal wetland near Byron? These areas will need to pond water, not just provide depressions.

12-243, line 18: How would adding lighting to electrical wires eliminate any potential impact to black rails? This mitigation is overstated.

Several of the species accounts (e.g., bank swallow) indicate that there is uncertainty about how construction or operations will impact the species. In most cases, monitoring is proposed to assess what is happening. But to be effective, the monitoring results need to be evaluated and fed into decision-making, as visualized in the adaptive-management process. There is little explicit indication of how this will be done or funded.

Land use (Chapter 13)

Alternative 4A would allow water diversion from the northern Delta, with fish screens, multiple intakes, and diversions limited to flows that exceed certain minima, e.g., 7000 cfs. This would reduce flood-pulse amplitudes and, presumably, downstream flooding. How does this alter opportunities for riparian restoration? Which downstream river reaches are leveed and not planned to support riparian restoration? Where would riparian floodplains still be restorable?

Over what surface area does the pipeline transition to the tunnel? At some point along the pipeline-tunnel transition, wouldn't groundwater flow be affected?

Up to 14 years of construction activities were predicted for some areas (e.g., San Joaquin Co.); this would have cumulative impacts (e.g., dewatering would affect soil compaction, soil carbon, microbial functions, wildlife populations, and invasive species). What about impacts of noise on birds; e.g., how large an area would still be usable by greater sandhill cranes?

State how jurisdictional wetlands have been mapped and how the overall project net gain or net loss of wetland area has been estimated. If mitigation consists only of restoration actions in areas that are currently jurisdictional wetlands, then there would be an overall net loss of wetland area due to the project. A mitigation ratio >1:1 would be warranted to compensate for reduced wetland area. This was also a concern for Chapter 12.

Up to 277 ac of tidal wetlands are indicated as restorable; text should indicate if these are tidal freshwater or tidal brackish wetlands (or saline, as is the typical use of "tidal wetlands").

13-19. On the need to store removed aquatic vegetation until it can be disposed: there are digesters for this purpose, and they might be efficient means of mitigation if management of harvested aquatic plants will be long-term. A waste product could be turned into a resource (methane fuel).

13-19, line 12: Text says that "predator hiding spots" will be removed. What are these?

13-19, line 20: What are the E16 nonphysical fish barriers? An electrical barrier?

13-20, line 19: Boat-washing stations are mentioned; would these discharge pollutants (soap, organic debris?)

Difference Between 16-year and 82-year Analyses of Water Quality Impacts

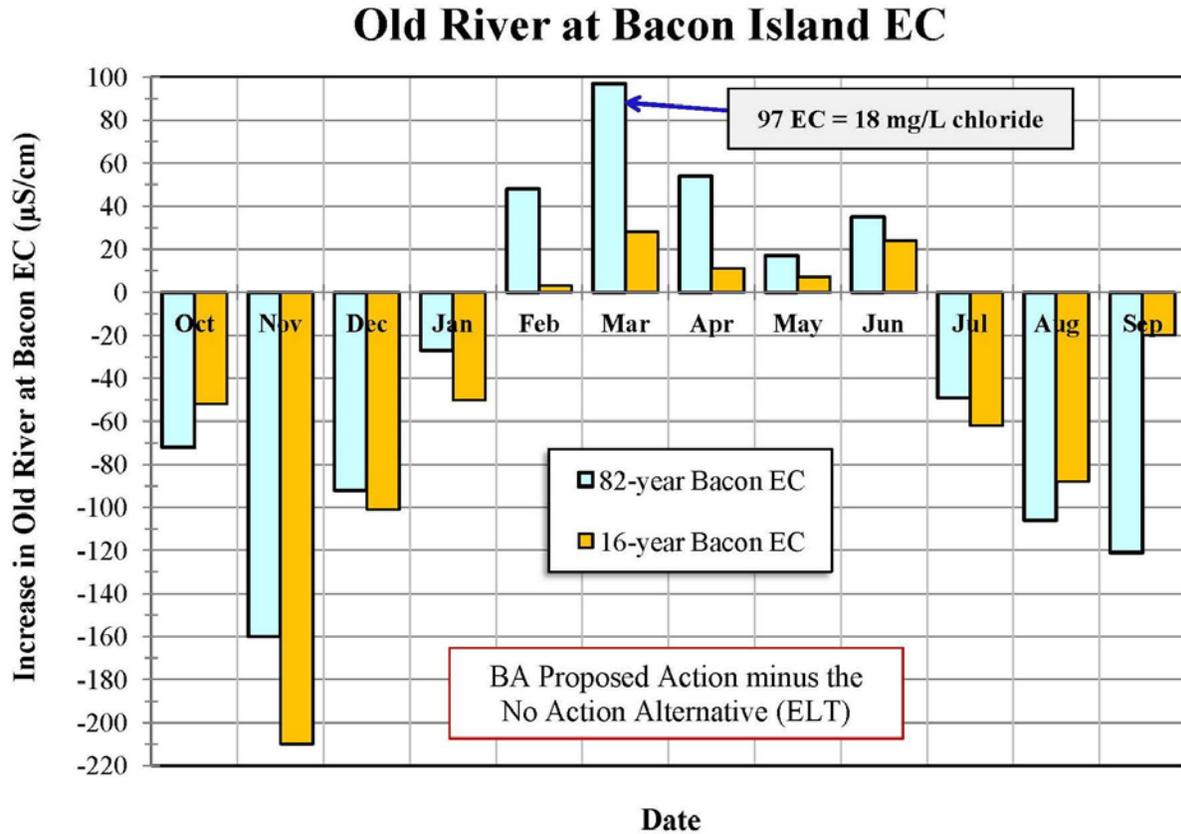


Figure 1: Increases in specific conductance (EC) on Old River at Bacon Island for water years 1922-2003 and 1976-1991 (82-years and 16-years, respectively). The water quality data are from the WaterFix Biological Assessment (BA) Proposed Action (PA) and No Action Alternative (NAA) at Early Long Term (ELT). (SWRCB-104). Using only a 16-year average underestimates the adverse impacts in February-June and overestimates the simulated benefits in November-January.

Old River at Bacon Island EC - March

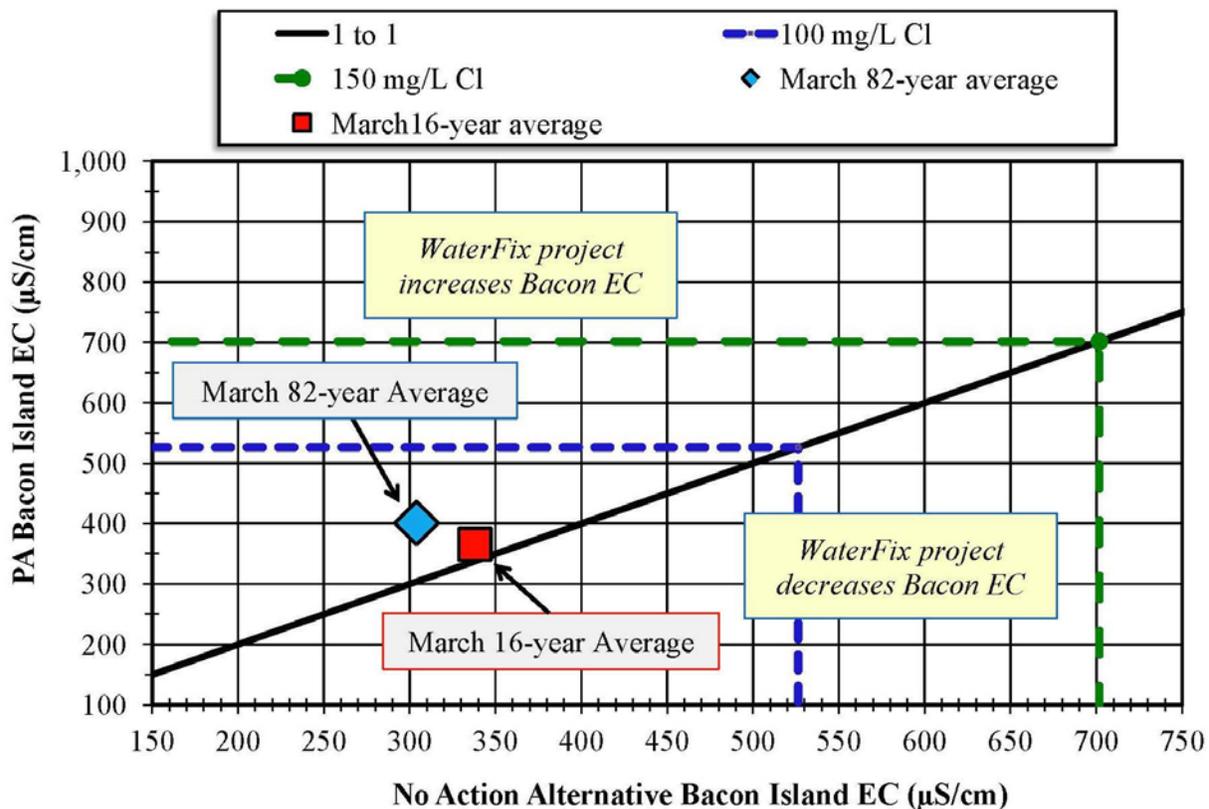


Figure 2: 16-year and 82-year averages of Bacon EC data for March from the Biological Assessment modeling with the Proposed Action EC plotted as a function of the No Action Alternative EC (red square and blue diamond, respectively). Because this location is close to a D-1641 Municipal and Industrial compliance location, equivalent chloride concentrations of 150 mg/L is also shown. The equivalent 100 mg/L chloride concentration is plotted for comparative purposes.

Old River at Bacon Island EC - March

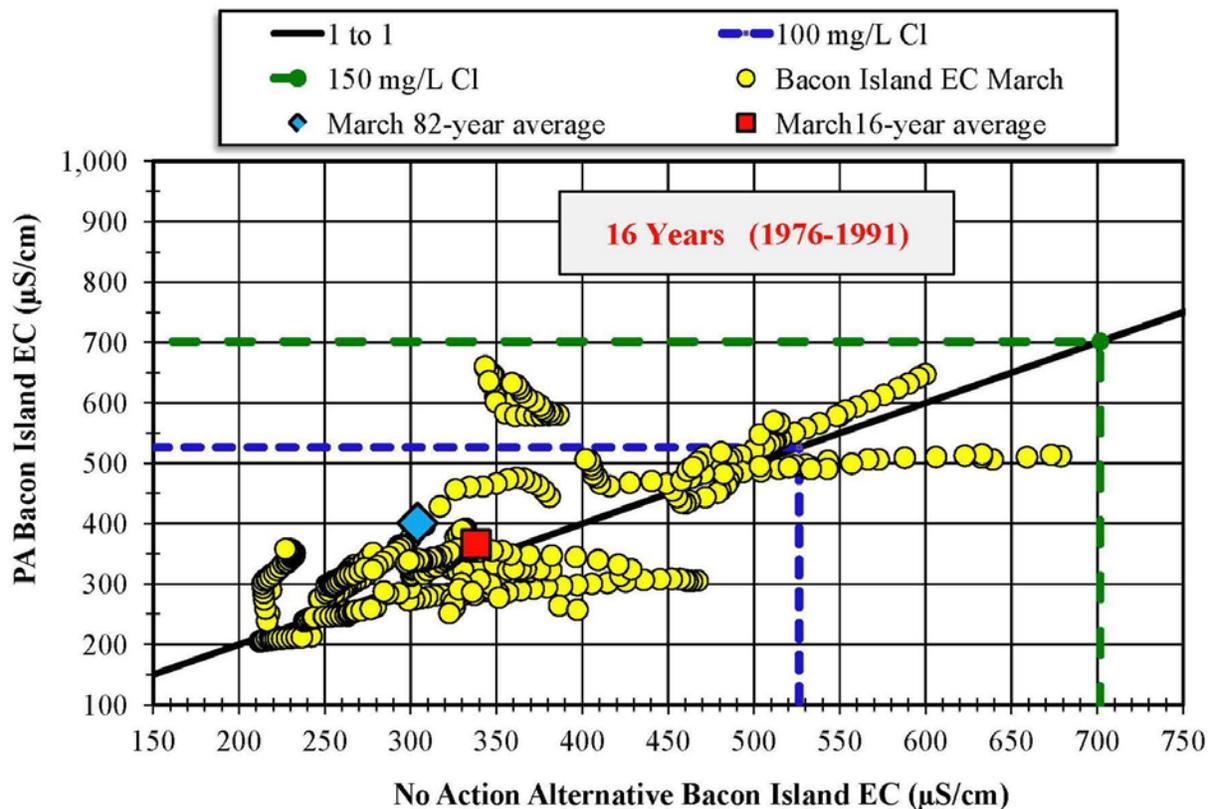


Figure 3: 16-year subset of daily-averaged Bacon EC data for March from the Biological Assessment modeling with the Proposed Action EC plotted as a function of the No Action Alternative EC (496 data points). Also shown are the corresponding 16-year and 82 year averages (red square and blue diamond). Because this location is close to a D-1641 Municipal and Industrial compliance location, equivalent chloride concentrations of 150 mg/L is also shown. The equivalent 100 mg/L chloride concentration is plotted for comparative purposes.

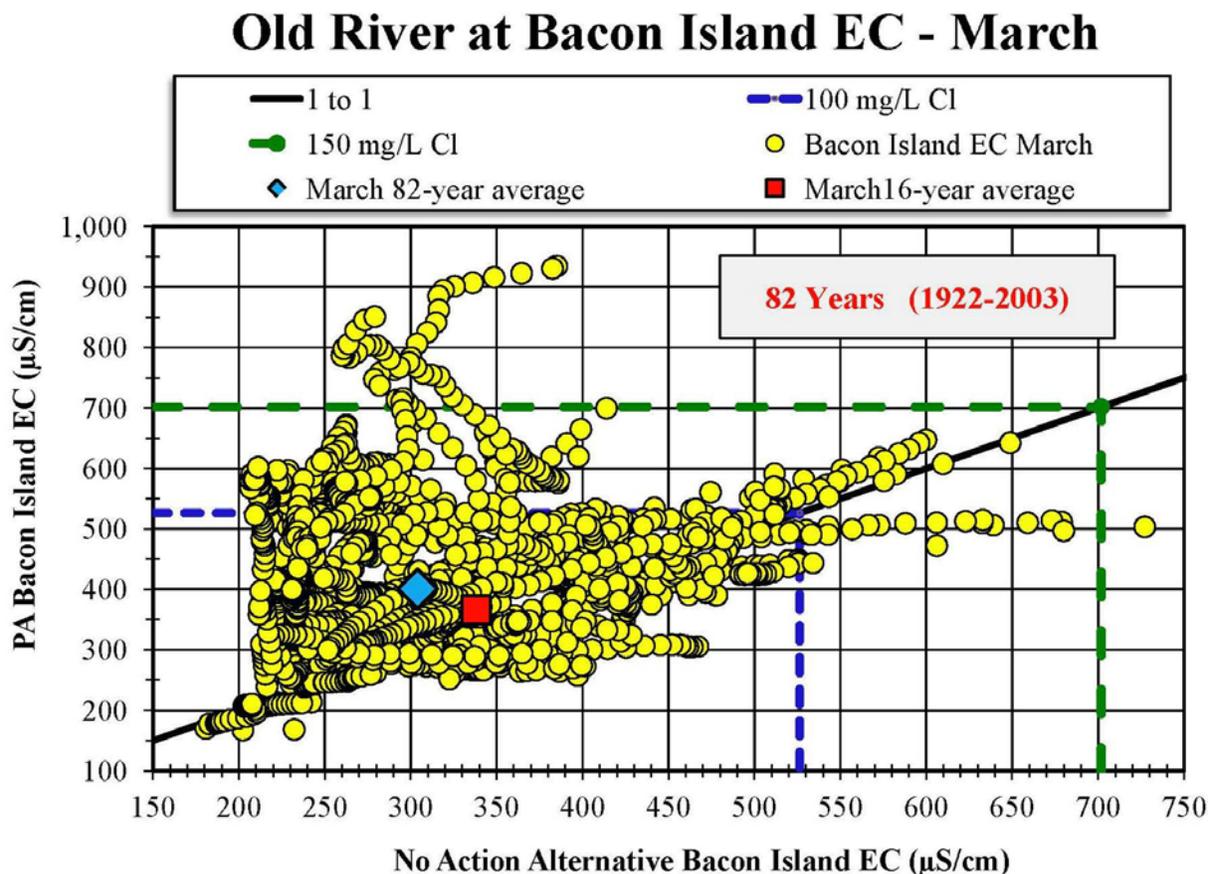


Figure 4: 82-years of daily-averaged Bacon EC data for March from the Biological Assessment modeling with the Project Action EC plotted as a function of the No Action Alternative EC (2,542 data points). Also shown are the corresponding 16-year and 82-year averages for March (red square and blue diamond). Because this location is close to a D-1641 Municipal and Industrial compliance location, equivalent chloride concentrations of 150 mg/L is also shown. The equivalent 100 mg/L chloride concentration is plotted for comparative purposes.

Old River at Bacon Island EC - November

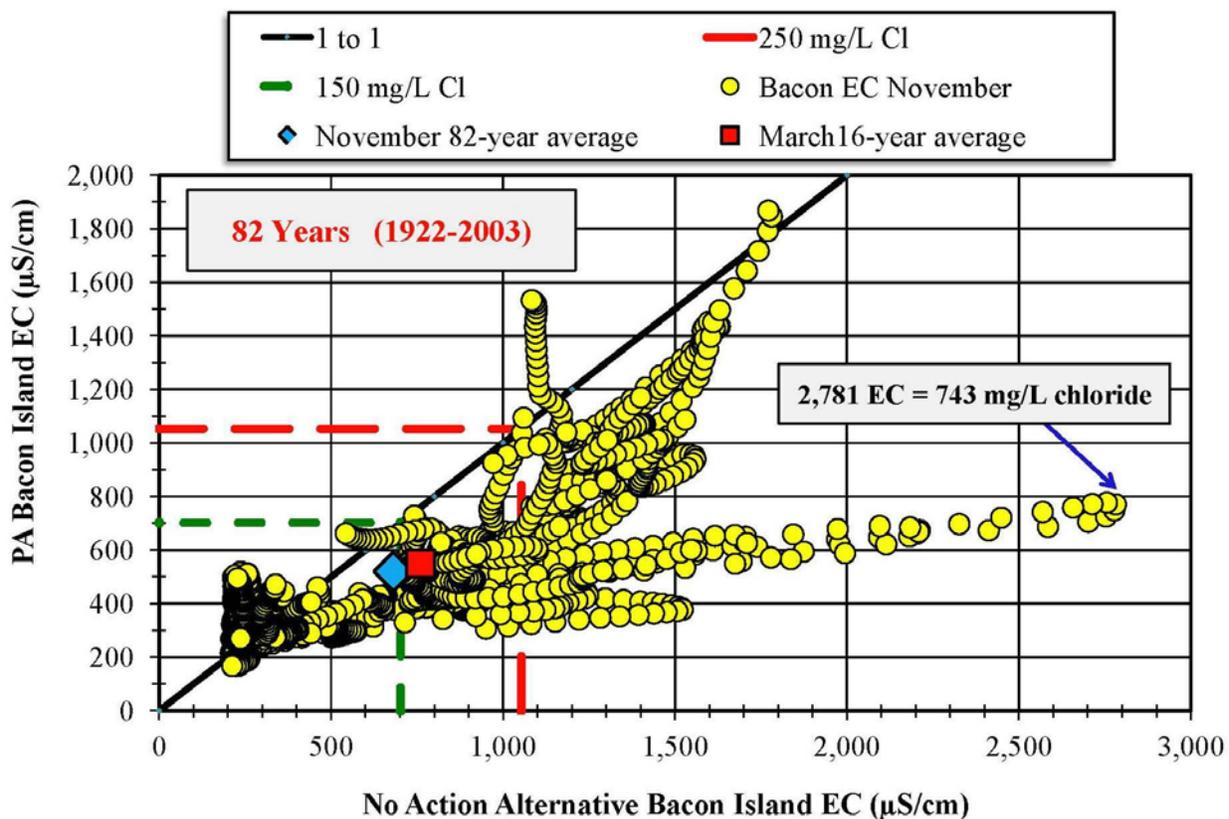


Figure 5: 82-years of daily-averaged Bacon EC data for November from the Biological Assessment modeling with the Project Action EC plotted as a function of the No Action Alternative EC. Also shown are the corresponding 16-year and 82 year averages for March (red square and blue diamond). Because this location is close to a D-1641 Municipal and Industrial compliance location, equivalent chloride concentrations of 250 mg/L and 150 mg/L are also shown.

November 2009 Conceptual Engineering Report Design for Screened Intake to Clifton Court Forebay

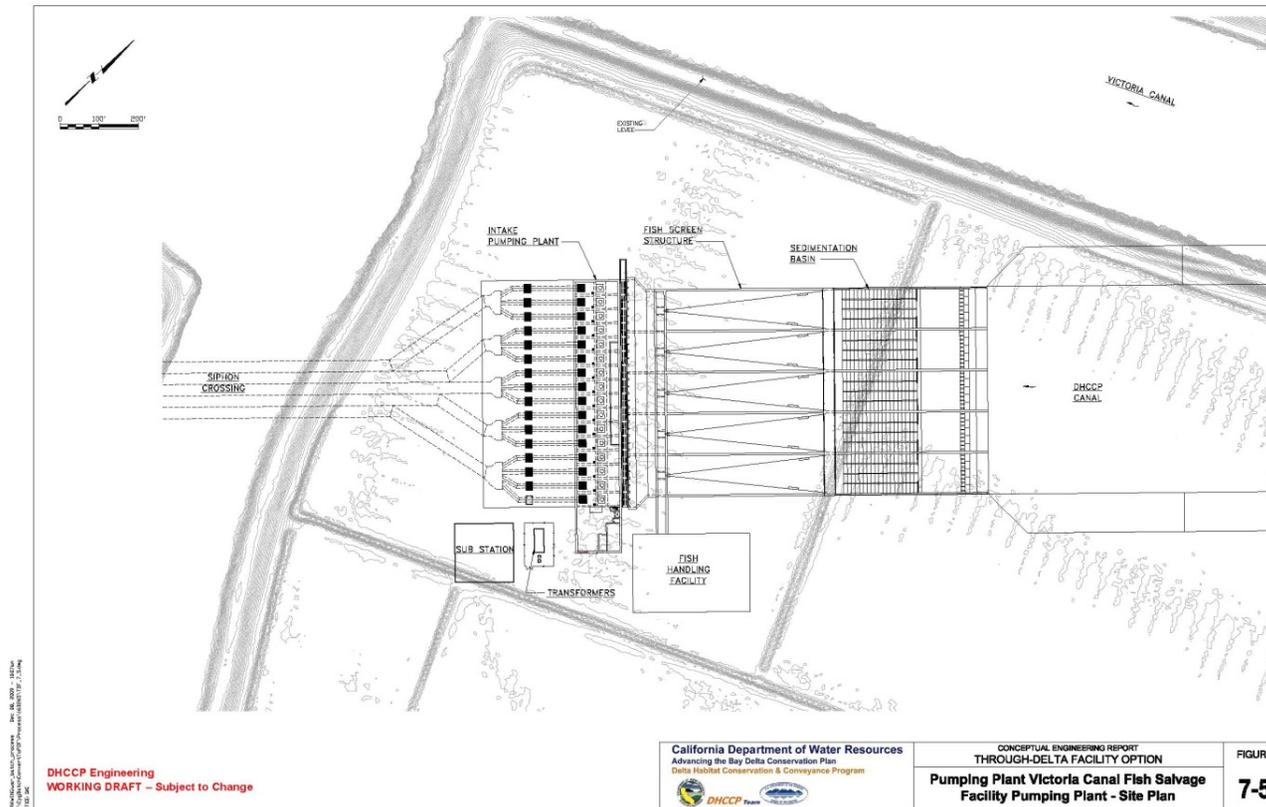


Figure 7-5: Pumping Plant Victoria Canal Fish Salvage Facility Pumping Plant – Site Plan

Source: DWR’s November 2009 Conceptual Engineering Report – Through-Delta Facility Conveyance Option, Figure 7-5

http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Conceptual_Engineering_Report-Through_Delta_Option.sflb.ashx

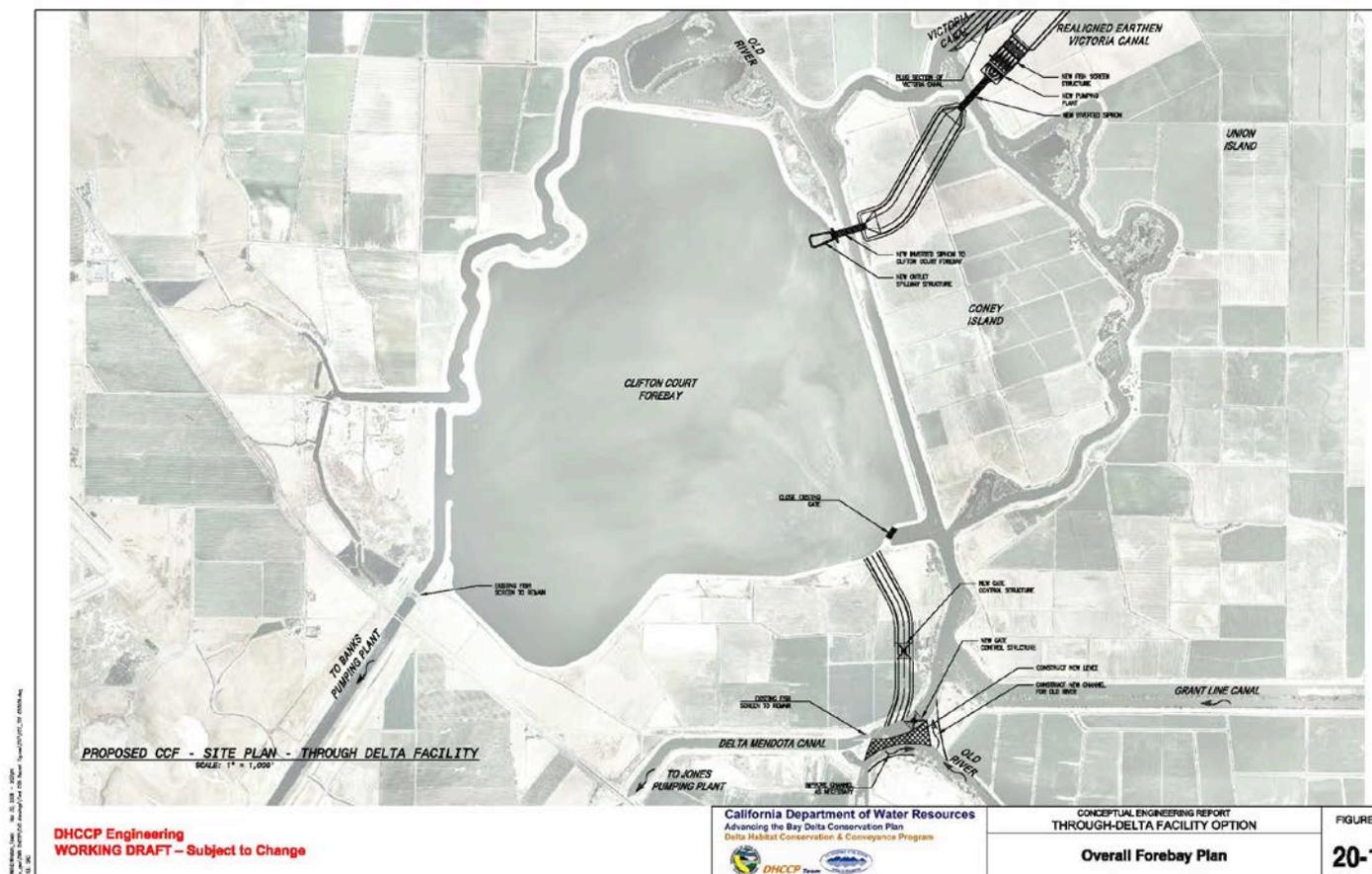


Figure 20-1: Overall Forebay Plan [showing location of Victoria Canal intake in top right corner]

Source: DWR’s November 2009 Conceptual Engineering Report – Through-Delta Facility Conveyance Option, Fig. 20-1

http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Conceptual_Engineering_Report-Through_Delta_Option.sflb.ashx

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18
 19 BEFORE THE
 20 CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

21 HEARING IN THE MATTER OF
 22 CALIFORNIA DEPARTMENT OF WATER
 RESOURCES AND UNITED STATES
 23 BUREAU OF RECLAMATION REQUEST
 FOR A CHANGE IN POINT OF
 24 DIVERSION FOR CALIFORNIA
 25 WATERFIX

PART 2 REBUTTAL TESTIMONY AND
 SUMMARY OF TESTIMONY OF DR.
 RICHARD A. DENTON, PH.D., P.E.,
 SUBMITTED ON BEHALF OF CONTRA
 COSTA COUNTY, CONTRA COSTA
 COUNTY WATER AGENCY, AND
 SOLANO COUNTY

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1. Declaration of Qualifications

I, Dr. Richard Denton, declare that I am a Water Resources Consultant and sole-proprietor of Richard Denton and Associates. I have 45 years of experience in the areas of hydraulics and water quality. I received my Bachelor of Engineering (Civil) with First Class Honours in 1972 from the University of Canterbury, Christchurch, New Zealand. I received a Doctor of Philosophy (Ph.D.) in Civil Engineering in 1978 from the University of Canterbury. I am a registered Civil Engineer in the State of California (C47212).

From 1989 to 2006, I was an employee of the Contra Costa Water District (“CCWD”), Concord, California, and served for much of that time as Water Resources Manager. From 1982 to 1989, I was an Assistant Professor in Civil Engineering (Hydraulic and Coastal Engineering) on the faculty of the University of California at Berkeley. During the mid-80s, while at U.C. Berkeley, I prepared four detailed technical reports on the currents and water quality in San Francisco Bay under a contract from the State Water Resources Control Board (“SWRCB”).

I have been involved in SWRCB Bay-Delta water right and water quality hearings since 1989. I have extensive experience analyzing Central Valley operations and flow and salinity regimes in the Sacramento-San Joaquin Delta (“Delta”). I provided key input to the environmental review and water rights permitting for CCWD’s Los Vaqueros Project and development of the 1994 Bay-Delta Accord. Since 1996, I participated in development and permitting of the Grassland Bypass Project which regulated agricultural runoff and resulted in significant decreases in selenium and salinity loads from the west side of the San Joaquin Valley. I also served as chair of the CALFED Operations and Fish Forum from 2001 to 2006.

In 1995, I received the first annual Hugo B. Fischer Award from the California Water and Environmental Modeling Forum in recognition of my development and innovative application of a salinity-outflow model for the Delta. In 2010, I received a

1 Career Achievement Award from the California Water and Environmental Modeling
2 Forum.

3 As a Water Resources Consultant, I assisted CCWD's completion of the
4 environmental permitting of CCWD's Middle River Intake Project and Los Vaqueros
5 Enlargement Project. I am currently assisting Contra Costa County, the Contra Costa
6 County Water Agency, and Solano County on issues related to the California WaterFix
7 Project and efforts to restore the Delta ecosystem and increase California's water
8 supply reliability.

9 I am the author of 13 academic papers in peer-reviewed journals, 10 papers in
10 conference proceedings and 6 research reports. A copy of my statement of
11 qualifications has been accepted into the hearing record as Exhibit CCC-SC-2.

12 13 **2. Summary of My Detailed Rebuttal Testimony**

14 Preparation of detailed rebuttal testimony regarding the current WaterFix project
15 is very difficult without access to accurate and representative modeling of the current
16 version of project operations and its adverse effects on water quality in the Delta.

17 The most recent modeling study of the proposed WaterFix project released to the
18 SWRCB and the public, CWF H3+, does not represent the current version of the project.
19 CWF H3+ is the Project adopted by DWR that is the subject of the Petition for Change
20 in Point of Diversion requested by DWR and Reclamation. (Exhibit DWR-1010, Page 2,
21 Line 15)

22 Because SWP contractors are expected to fund most of the cost of the WaterFix
23 twin tunnels, almost all of the exports through the north Delta diversion facility ("NDD")
24 will be SWP water. This is different than what was assumed in CWF H3+.

25 If the twin tunnels are operating in the spring and summer primarily or exclusively
26 for the SWP, then CWF H3+ misrepresents the relative drawdown of the State Water
27 Project ("SWP") and Central Valley Project ("CVP") upstream reservoirs. The
28 corresponding environmental impacts due to changes in the flows and temperatures

1 downstream of the major upstream dams are also not simulated accurately or disclosed.

2 The CWF H3+ modeling also assumed a Rio Vista minimum flow requirement
3 from January through August. However, that flow requirement is not among Petitioners'
4 operating criteria for the WaterFix project, as currently proposed. This also makes the
5 CWF H3+ modeling unacceptable for the purposes of this Part 2 hearing.

6 The CWF H3+ modeling, and earlier modeling studies, used a redefined
7 export/inflow ("E/I") ratio that allows more water to be exported from the Delta than
8 allowed under D-1641. This redefined E/I ratio does not apply to or limit exports
9 through the twin tunnels (isolated facility) in the north Delta, which means the E/I ratio's
10 original biological purpose, to protect against entrainment of fish, eggs and larvae, is not
11 achieved. The Petitioners' fishery expert, Dr. Marin Greenwood, testified in Part 2 that
12 eggs and larvae are present above the north Delta intakes.

13 The Petitioners have proposed the WaterFix project operating criteria be
14 modified in the future through adaptive management within a range bounded by the
15 Boundary 1 and Boundary 2 scenarios. However, the Boundary 1 alternative does
16 nothing to provide additional protection for fish and the Delta ecosystem: no Fall X2
17 requirements and no enhanced spring outflows. If the WaterFix project were to be
18 operated to Boundary 1 operating criteria, Delta outflows would be dangerously low,
19 especially in the Fall, resulting in even greater adverse impacts on water quality in the
20 Delta than disclosed for CWF H3+.

21 The CWF H3+ modeling, released to the public by the Petitioners as part of their
22 Part 2 case-in-chief, fails to consistently increase exports in wetter months ("Big Gulp")
23 and increases exports above existing levels in drier months when Delta outflows are
24 very low and the Delta ecosystem is most vulnerable. This is the exact opposite of the
25 claim made by the Petitioners that the proposed WaterFix project will "*improve the*
26 *ecosystem through reduction and reverse flow occurrences, flow patterns that will*
27 *become more consistent with natural flow patterns, by increasing exports in the wetter*
28 *periods and decreasing them in the dryer [sic.] periods"* (Transcript, February 22,

1 2018, Page 44, Line12.) Instead of taking a “Little Sip” during drier periods, the
2 proposed WaterFix project takes a huge gulp.

3 The SWRCB should consider including a permit term that limits exports based on
4 Delta outflow so exports would indeed be reduced during drier periods (*i.e.*, achieve the
5 “Little Sip” concept), and to help improve, restore and sustain the Delta ecosystem.

6 The Petitioners’ claim that the CWF H3+ scenario is within the range of
7 Alternative 4A, scenarios H3 and H4, is incorrect and misleading. The CWF H3+
8 scenario has more stringent restrictions on south Delta exports in April and May and
9 less restriction on Old and Middle River (“OMR”) flows in October and November.
10 These major differences in operating criteria result in Delta outflows, south-of-Delta
11 exports and Delta salinities for CWF H3+ that are well outside the range of scenarios H3
12 and H4.

13 The Petitioners have failed in Part 2 to present the CWF H3+ Delta inflow and
14 outflows in a form that informs the SWRCB whether the WaterFix project is consistent
15 with the SWRCB’s 2010 Delta Flow Criteria or the proposals being considered by the
16 SWRCB as part of the current update to the Bay-Delta Water Quality Control Plan.

17 The Part 2 proposed WaterFix project, CWF H3+, still shows up to 30%
18 reductions in the Sacramento inflow to the Delta at Freeport, and it shows daily-
19 averaged chloride concentrations near the intake to the Contra Costa Canal that are
20 well in excess of the SWRCB’s D-1641 Municipal and Industrial daily water quality
21 standard of 250 mg/L. These are the same problems I identified in my Part 2 case-in-
22 chief testimony using earlier WaterFix modeling for the Biological Assessment, BA H3+.

23 Without accurate and representative modeling and analysis of the proposed
24 project, the SWRCB will lack the basis to make an accurate or informed decision about
25 the environmental, water quality and water supply impacts or benefits of the project, or
26 the impacts of the project on legal users of water. The SWRCB should reject the
27 WaterFix change petition until the Petitioners correct this myriad of problems with their
28 proposed project.

1 **3. The Current Modeling and Analyses (CWF H3+) Do Not Represent**
2 **Current Version of Proposed WaterFix Project.**

3 The California WaterFix Administrative Draft Supplemental Environmental Impact
4 Report/Environmental Impact Statement (the “ADSEIR/EIS”), released to the public by
5 the California Department of Water Resources (“DWR”) and U.S. Bureau of
6 Reclamation (“Reclamation”) on June 12, 2018 (Exhibit SWRCB-113), based its
7 analysis of the environmental impacts of the proposed project on the same modeling
8 study, CWF H3+, submitted into evidence by DWR in Part 2 of this hearing (Exhibits
9 DWR-1077 and DWR-1078).

10 Final internal review and approval for meeting the requirements of the California
11 Environmental Quality Act (“CEQA”) and National Environmental Policy Act (“NEPA”)
12 have not been completed by DWR and Reclamation, and the ADSEIR/EIS is not a
13 public draft environmental document. However, DWR is unlikely to revise the
14 ADSEIR/EIS to include an updated modeling study before release of the official public
15 California WaterFix Draft Supplemental Environmental Impact Report/Environmental
16 Impact Statement (the “Draft SEIR/EIS”).

17 The CWF H3+ modeling assumes that the federal CVP will divert up to 4,600
18 cubic feet per second (cfs) of water for export via the twin tunnels. This is the maximum
19 amount that the CVP can divert at the Jones Pumping Plant up into the Delta Mendota
20 Canal.

21 Figure 1 in CCC-SC-52¹ shows the modeled CVP exports via the WaterFix twin
22 tunnels as a function of the total amount diverted through the twin tunnels, based on the
23 DWR’s CWF H3+ modeling data. The proposed maximum capacity of the two tunnels is
24 9,000 cfs. Tables 1 and 2 in CCC-SC-52 present the 82-year average export data by
25 month and the monthly-averaged CVP isolated facility export data, respectively.

26 On average, the CVP received about 40% of the total exports through the twin
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¹ Exhibit CCC-SC-52 is a true and correct copy.

1 tunnels (also referred to as the “isolated facility”). In many months, all of the water
2 going through the twin tunnels was for the CVP (100% share).

3 In the staged implementation (single tunnel) modeling released by DWR on
4 February 7, 2018², there was only a single, 6,000-cfs tunnel and the CVP share was
5 capped at only 1,000 cfs (CCC-SC-52, Table 3.)

6 The Metropolitan Water District of Southern California (“Metropolitan”) Board of
7 Directors is scheduled to vote on July 10, 2018, on a staff recommendation to pay for
8 the entire second tunnel and a share of the first tunnel, or 64.6% of the project cost
9 (Exhibit CCC-SC-67³). Metropolitan already voted to fund the second tunnel on April
10 10, 2018 but a revote was required for procedural reasons.

11 The CVP share of the twin tunnels’ diversions will therefore be much less than
12 assumed in CWF H3+, possibly even zero. This decision results in an inadequate
13 analysis of upstream SWP and CVP reservoir operations and the environmental
14 impacts in key fish species downstream of those reservoirs. The SWRCB did not
15 require the Petitioners to provide new modeling data that represents this significantly-
16 reduced CVP share.

17 Because CWF H3+ assumes the CVP share of the twin tunnels can be up to
18 51% of the total capacity, the CWF H3+ modeling used in the ADSEIR/EIS and in Part 2
19 fails to adequately simulate the relative releases from the CVP upstream reservoirs
20 (Shasta and Folsom Reservoirs) and the SWP’s Oroville Reservoir, or the flows in the
21 rivers downstream of those reservoirs and down into the Delta (CCC-SC-52, Figure 2.)
22 If the CVP use of the twin tunnels is limited, releases of stored water from Shasta and
23 Folsom Reservoirs are likely to be less than in CWF H3+ modeling, and the drawdown
24 of Oroville Reservoir by the SWP is likely to be greater.

25 These water levels and downstream flows are very important for fish and senior
26

27 _____
28 ² <https://www.californiawaterfix.com/resources/updated-calsim-dsm2-and-biological-modeling-data/>

³ Exhibit CCC-SC-67 is a true and correct copy of selected slides from the document

1 water right holders in Northern California. Unless the Petitioners present updated and
2 more detailed operations and water quality modeling reflecting the new SWP and CVP
3 shares of twin tunnel diversions, the SWRCB will lack the basis to make an accurate or
4 properly informed decision about the key hearing issues, such as the impacts on key
5 fish species and legal users of water in the upstream tributaries.

6
7 **4. The Current Modeling and Analyses (CWF H3+) Do Not Accurately**
8 **Represent Sacramento Flows at Rio Vista during January through**
9 **August.**

10 During cross-examination of DWR's expert witness, Eric Reyes, on February 27,
11 2018, by Solano County's attorney, Daniel Wolk, Mr. Reyes acknowledged that DWR's
12 CWF H3+ model study includes a minimum Rio Vista flow requirement of 3,000 cfs for
13 January through August (the "Rio Vista Flow Standard"). (Transcript, February 27, 2018,
14 Page 194 starting at Line 21.)

15 Mr. Reyes testified that he thought this was just a modeling assumption and not a
16 part of the proposed WaterFix project. It was something that was just left in the model.

17 Unless DWR intends the Rio Vista Flow Standard to be an operating criterion
18 and permit term, DWR has failed to provide the State Board with modeling that
19 represents the actual proposed project.

20 Mr. Reyes stated his belief that there was only one month when WaterFix
21 operations were controlled by the Rio Vista Flow Standard. (Transcript, February 27,
22 2018, Page 198 starting at Line 16.) In fact, for CWF H3+ there are four months when
23 flow and export operations in the Delta by the SWP and CVP were determined by the
24 need to meet this Rio Vista Flow Standard. There are also two months when the
25 September-December D-1641 Rio Vista standard is not met and Rio Vista flows are
26 less than 3,000 cfs, *i.e.*, September-October 1934 (see Exhibit CCC-SC-53⁴, Table 1).

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⁴ CCC-SC-53 is a true and correct copy.

1 This is a clear modeling error that has not been explained by the Petitioners. The same
2 D-1641 modeling error occurs in the No Action Alternative (“NAA”) for September and
3 October 1934.

4 Mr. Reyes testified that the Rio Vista Flow Standard “*was something done as a*
5 *modeling convenience because early editions of this were showing low outflows in*
6 *certain months. So that was difficult for the DSM-2 model to process, so we needed*
7 *something just to keep the flows higher until we essentially worked out what our issues*
8 *were. And those issues were worked out, however, the criteria was left in, just the*
9 *modeling.*” (Transcript, February 27, 2018, Page 197 starting at Line 4.)

10 The SWRCB needs the opportunity to review proposed WaterFix project
11 modeling that does not include this Rio Vista Flow Standard in order to make a fair and
12 legal determination regarding the proposed WaterFix project. The SWRCB needs to be
13 able to determine whether the proposed WaterFix project and north Delta diversions
14 would result in unreasonably low Rio Vista flows and Delta outflows, in both the
15 CALSIM II simulations and in actual future operations with the proposed WaterFix
16 project.

17 The SWRCB should also consider whether a Rio Vista Flow Standard permit
18 term is needed, January through August, to ensure the SWP operators do not cause
19 Delta outflows to become very low once the WaterFix project comes on line. As Mr.
20 Reyes testified (Transcript, February 27, 2018, Page 197, starting at Line 4), the earlier
21 modeling indicated this could be a problem.

22 Such unreasonably low outflows would result in large increases in seawater
23 intrusion and significant adverse impacts on water quality in the Delta.

24 Unless all operating criteria and D-1641 standards are correctly simulated in the
25 WaterFix modeling, the SWRCB will lack the basis to make an accurate or properly
26 informed decision about the key hearing issues.

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1 **5. The Current Modeling and Analyses (CWF H3+) Do Not Accurately**
2 **Represent How the Proposed Project Will Actually Be Operated**
3 **Under Adaptive Management.**

4 The Petitioners have testified that the WaterFix adaptive management range
5 varies from the Boundary 1 to Boundary 2. (Exhibit DWR-1010, Page 9, Line 3;
6 Transcript, February 22, 2018, Page 66, starting at Line 22.)

7 The Boundary 1 Scenario has essentially no additional environmental flows or
8 export constraints. Boundary 1 does not include the Fall X2 requirement from the U.S.
9 Fish and Wildlife Service 2008 Biological Opinion (Exhibit SWRCB-87) and
10 recommended by the SWRCB in its 2010 Delta Flows Criteria Report (Exhibit SWRCB-
11 25) and the California Department of Fish and Wildlife's⁵ 2010 "Quantifiable Biological
12 Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent
13 on the Delta" (Exhibit SWRCB-66).

14 The 82-year averaged Delta outflows for Boundary 1 in September, October, and
15 November are much lower than the NAA (Exhibit CCC-SC-54⁶, Figure 1). Figure 2 of
16 Exhibit CCC-SC-56⁷ shows how individual months in September that are between
17 18,000-20,000 cfs in the NAA are reduced to as low as 3,000 cfs for Boundary 1. If
18 WaterFix were operated to these low Delta outflows under adaptive management, there
19 would be a corresponding increase in seawater intrusion in the fall, resulting in
20 significant degradation of Delta water quality (in terms of EC and chloride
21 concentrations). (see, e.g., Figure 1 and Table 1 in CCC-SC-56).

22 Because the Petitioners are considering using adaptive management to enable
23 them to operate the proposed WaterFix project according to Boundary 1 operating
24 criteria, the proposed project could cause significant water quality impacts in the Delta,
25 beyond those reported by the Petitioners for the CWF H3+ modeling. The
26

27 ⁵ At that time, called the Department of Fish and Game.

28 ⁶ Exhibit CCC-SC-54 is a true and correct copy.

⁷ Exhibit CCC-SC-56 is a true and correct copy.

1 corresponding impacts on legal users of water could also be larger than disclosed by
2 the Petitioners in Part 1 for Scenarios H3 and H4 (or CWF H3+.)

3 The SWRCB must include permit terms in the revised SWP and CVP permits
4 that ensure that WaterFix adaptive management actions to improve conditions for fish
5 do not result in worsening of Delta water quality (as would occur operating to the
6 Boundary 1 Scenario under adaptive management) and increased impacts on other
7 legal users of water.

8
9 **6. The Current WaterFix Modeling (CWF H3+) Is Not Within the Range of**
10 **Alternative 4A, Scenarios H3 and H4.**

11 The Petitioners testified in Part 2 of this hearing that “*CWF H3+ is the Project*
12 *adopted by DWR that is the subject of the Petition for Change in Point of Diversion*
13 *requested by DWR and Reclamation.*” (Exhibit DWR-1010, Page 2, Line 15). The
14 Petitioners further claim in Part 2 that CWF H3+ is within the range of alternatives
15 described in Part 1 and within the operational range of Alternative 4A, Scenarios H3 to
16 H4. (Exhibit DWR-1008, Slide 5; Exhibit DWR-1010, Page 8, Line 26.)

17 Under cross examination, the Petitioners’ witnesses acknowledged that the
18 flows, exports and salinities for the proposed WaterFix project CWF H3+ were outside
19 the range of scenarios H3 and H4 in some months (see, e.g., Transcript, February 27,
20 2018, Page 186, Line 8; Transcript, February 27, 2018, Page 201, starting at Line 4).

21 The Petitioners attempt to argue that their description of Alternative CWF H3+
22 being within the range of H3 and H4 only refers to operating criteria (e.g., Transcript,
23 February 22, 2018, Page 213, starting at Line 8.)

24 However, the SWRCB’s determination of whether there are significant adverse
25 impacts of the proposed project on the Delta ecosystem, the environment and legal
26 users of water should be based on the reservoir storage levels, the flows and
27 temperatures for fish in upstream tributaries and the Delta, the degradation of water
28 quality in the Delta due to reduced outflows, and other related parameters. These

1 parameters are the result of specific operating criteria, such as minimum flow limits and
2 maximum EC and chloride standards, but the bottom line is their impacts on the
3 environment and legal users of water.

4 The operating criteria for Scenarios H3 and H4, and the Biological Assessment
5 modeling BA H3+ included October and November limits on flow reversals in Old and
6 Middle River (OMR > -5,000 cfs). The operating criteria for CWF H3+ eliminated
7 (“updated”) these OMR limits (Exhibit DWR-1028, Slide 11). OMR limits are intended to
8 benefit fish. The elimination of OMR limits in CWF H3+ significantly reduced Delta
9 outflows in October compared to both H3 and H4, and significantly increased salinities
10 in the Delta.

11 Scenarios H3 and H4 had specific OMR operating criteria in October and
12 November, but CWF H3+ did not include such OMR operating criteria, so CWF H3+ is
13 not within that range of operating criteria. More importantly, as is discussed below,
14 degradation of Delta water quality in October, November and December is much greater
15 in CWF H3+ than either H3 or H4.

16 17 **6.1 The WaterFix modeling and operations criteria have changed** 18 **significantly since the Scenario H3 and H4 model runs.**

19 It is important to remember that the Petitioners’ Delta conveyance project has
20 been continually changing since the start of the original Bay Delta Conservation Plan
21 (“BDCP”) in 2006. The BDCP proposed project had adverse water quality impacts for
22 EC and chloride concentrations that were determined to be “*significant and*
23 *unavoidable*” (Exhibit SWRCB-5, Chapter 8 – Water Quality).

24 The WaterFix conveyance-only project was announced publicly in April 2015.
25 The Petitioners have determined that, with the proposed WaterFix project, those
26 salinity-related water quality impacts are less than significant (Exhibit SWRCB-110,
27 Pages 125-128). That finding is based on mitigation measure WQ-11: *Avoid, minimize*
28 *or offset, as feasible, reduced water quality conditions*. DWR intends to achieve this

1 mitigation measure and “avoid” water quality impacts by adaptively managing diversions
2 at the north and south Delta intakes, and by adaptively managing the Head of Old River
3 barrier, if feasible (Exhibit SWRCB-110, Page 125).

4 When the Petitioners developed Scenarios H3 and H4, they assumed the 2009
5 National Marine Fisheries Service Biological Opinion (Exhibit SWRCB-84, Page 632
6 and Page 642 *et seq.*) requirements for the limits on the ratio of San Joaquin inflow to
7 south Delta exports (April 1 through May 31) would not need to be met for the WaterFix
8 project. (Exhibit DWR-116.)

9 However, in preparing the WaterFix Biological Assessment (Exhibit SWRCB-104)
10 and the BA H3+ modeling, the Petitioners complied with the NMFS 2009 Biological
11 Opinion’s San Joaquin River Inflow to Export Ratio requirement (Action IV.2.1).

12 The BA H3+ modeling also was the basis for the WaterFix Final EIR/EIS that was
13 released to the public on December 22, 2016.

14 Between the release of the WaterFix Final EIR/EIS to the public on December
15 22, 2016, and DWR’s later certification of the WaterFix Final EIR/EIS on July 21, 2017
16 (Exhibit SWRCB-109), DWR and Reclamation consulted further with the U.S. Fish and
17 Wildlife Service, National Marine Fisheries Service, and the California Department of
18 Fish and Wildlife. The corresponding biological opinions and Incidental Take Permit
19 were issued on June 23, 2017, June 16, 2017 and July 26, 2017, respectively (Exhibit
20 SWRCB-105, SWRCB-106 and SWRCB-107, respectively).

21 As part of those consultations with the fisheries regulatory agencies, the following
22 additional modifications were made to the proposed project and incorporated into the
23 certified WaterFix Final EIR/EIS (Exhibit SWRCB-109):

- 24 1. New Spring Delta outflow targets and criteria, March-May; and
- 25 2. Elimination of the -5,000 cfs minimum Old and Middle River flow (OMR)
26 targets for October and November.

27 This resulted in a new modeling study CWF H3+ that served as the basis of the
28 Petitioners’ testimony in Part 2 of this hearing, and that served as the basis for DWR’s

1 CEQA findings for the certified WaterFix Final EIR/EIS. The CWF H3+ modeling was
2 not made available to the public until November 30, 2017. This was the date that DWR
3 submitted its Part 2 Case-in-Chief, and it was the date when the Cases-in-Chief of all
4 other Part 2 parties were due. This deprived Contra Costa County, the Contra Costa
5 County Water Agency, and Solano County of the opportunity to review, prior to
6 submitting their Part 2 testimony, the full CWF H3+ modeling – *the modeling that DWR*
7 *relied on when preparing its Part 2 testimony*. As discussed in more detailed in section
8 6.3 below, there are significant adverse water quality impacts in CWF H3+ that were in
9 the modeling for previous versions of the WaterFix project such as BA H3+ and
10 Scenarios H3 and H4.

11 The removal of the October-November minimum OMR targets resulted in lower
12 Delta outflows in October and November.

13 The WaterFix proposed project operational criteria were also refined based on
14 2017 USFWS and NMFS biological opinions by including a new real-time operations
15 approach for the following (Exhibit DWR-1008, Slide 6):

- 16 • North Delta Intake Bypass Flows
- 17 • South Delta export criteria for October-November
- 18 • Head of Old River Gate operations.

19 However, these real-time operations were not incorporated into the CWF H3+
20 modeling.

21
22 **6.2 In August 2017, the Petitioners failed to produce available**
23 **CWF H3+ full model runs after Contra Costa County, Contra**
24 **Costa County Water Agency, and Solano County requested**
25 **those data to inform their Part 2 testimony.**

26 The parties to Part 2 were seriously prejudiced in preparing their Part 2 testimony
27 and exhibits because the CWF H3+ modeling was not made available until November
28 30, 2017, even though it was the basis of DWR's certification of the WaterFix Final

1 EIR/EIS on July 21, 2017. Contra Costa County, Contra Costa County Water Agency,
2 and Solano County specifically requested any updated WaterFix modeling in August
3 2017, but were only directed to modeling data that were described as “*not a full run but*
4 *instead just sensitivity information.*” (Exhibit CCC-SC-57⁸, email from B.G. Heiland
5 (DWR) to Richard Denton, August 31, 2017.) DWR did not acknowledge that the CWF
6 H3+ full model runs had already been completed by mid-May 2017.

7 The Zip file for the CWF H3+ CALSIM operations modeling output (Exhibit DWR-
8 1077) is dated 4/28/2017. The Zip file for the CWF H3+ DSM2 EC water quality
9 modeling output (Exhibit DWR-1078) is dated 5/15/2017. These key WaterFix modeling
10 data model runs were completed early enough that DWR could have made the model
11 runs available to the parties and the public well before the November 30, 2017 deadline
12 for submission of Part 2 cases-in-chief. Moreover, these full model runs were available
13 at the time of Contra Costa County, Contra Costa County Water Agency, and Solano
14 County’s request in August 2017. DWR failed to produce the available full model runs
15 at a time when the agencies were preparing their Part 2 case-in-chief.

16
17 **6.3 The CWF H3+ operations criteria and resulting flow and water**
18 **quality simulations model runs are very different than the**
19 **Scenario H3 and H4 range.**

20 Modeling study CWF H3+ is the basis for the environmental analysis in the
21 WaterFix ADSEIR/EIS, released to the public on June 12, 2018. There are three major
22 differences in operations criteria between Alternative 4A, Scenarios H3 and H4, and the
23 current version of the proposed WaterFix project, CWF H3+:

- 24 1. CWF H3+ complies with the April-May limits on the ratio of San Joaquin
25 inflow to south Delta exports (Exhibit DWR-116).
- 26 2. CWF H3+ has new Spring Delta outflow targets and criteria, March-May

27
28 _____
⁸ Exhibit CCC-SC-57 is a true and correct copy of the document.

1 3. The -5,000 cfs minimum OMR flow targets for October and November in
2 Scenarios H3 and H4 and BA H3+ are eliminated.

3 These new operations criteria substantially reduced total south-of-Delta exports
4 in April and May and reduced Delta outflows in October relative to Scenarios H3 and
5 H4. This reduction in Delta outflows in October results in a corresponding increase in
6 seawater intrusion into the Delta and net degradation of water quality.

7 Figure 1 in Exhibit CCC-SC-58⁹ shows the October Delta outflows for CWF H3+
8 relative to the corresponding outflows from the NAA for water years 1922-2003. Also
9 plotted are the October outflows for Alternative 4A, Scenario H3 and H4, the basis of
10 the Petitioners' testimony in Part 1 of this hearing. The outflows for Scenarios H3 and
11 H4 are generally higher than the NAA, but the CWF H3+ outflows are the same or
12 slightly lower.

13 Figure 2 in Exhibit CCC-SC-58 shows the November Delta outflows for CWF H3+
14 relative to the corresponding outflows from the NAA for water years 1922-2003. Also
15 plotted are the November outflows for Alternative 4A, Scenario H3 and H4. Only outflow
16 data less than 16,000 cfs are plotted because changes in outflow at low outflow have
17 the greatest effect on seawater intrusion and water quality in the Delta. When Delta
18 outflows are less than 10,000 cfs, all of the with-project alternatives have Delta outflows
19 close or equal to the D-1641 Delta outflow standards (Exhibit SWRCB-21) and are
20 lower than the NAA outflows.

21 Figure 2 in Exhibit CCC-SC-54 shows the 82-year averages Delta outflows for
22 each month for the NAA, CWF H3+ and Alternative 4A, Scenario H3 and H4. In
23 October, the long-term averaged outflows for Scenarios H3 and H4 are generally higher
24 than the NAA, but the CWF H3+ average outflow is slightly lower than the NAA.

25 Figure 1 in Exhibit CCC-SC-54 shows the 82-year averages Delta outflows for
26 each month for the NAA, CWF H3+, and Boundary 1 and Boundary 2. Boundary 1 is
27

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⁹ Exhibit CCC-SC-58 is a true and correct copy.

1 the worst-case scenario for adaptive management of the proposed WaterFix project
2 because Delta flows are low, seawater intrusion into the Delta increases and there is
3 less protection for fish. Unlike the other WaterFix alternatives in Figure 1, Boundary 1
4 does not include the Fall X2 requirements (Exhibit DWR-515).

5 Boundary 2 in Figure 1 (Exhibit CCC-SC-54) is representative of, but not as
6 stringent as, the SWRCB's 2010 Delta Flow Criteria report recommendations (Exhibit
7 SWRCB-25). If Boundary 2 criteria were operated, WaterFix annual south-of-Delta
8 exports would be much less than either CWF H3+ or the NAA (CCC-SC-59, Figure 3).

9 In September, October and November, the Boundary 1 outflows are even less
10 than for CWF H3+, representing even larger seawater intrusion to the Delta than for the
11 CWF H3+ alternative. In all months, except April and May, the Boundary 2 outflows are
12 much higher than for CWF H3+ suggesting CWF H3+ will not leave enough unimpaired
13 flow in the Central Valley and Delta systems to meet the outflows recommended by the
14 SWRCB in its 2010 Delta Flow Criteria Report as necessary to restore and sustain key
15 fish species.

16 Figure 1 in Exhibit CCC-SC-55¹⁰ shows the increases in salinity (EC) in Old River
17 at Bacon Island relative to the No Action Alternative (NAA) due to the proposed Water
18 Fix project CWF H3+. Also shown are the increases in EC for Alternative 4A, scenarios
19 H3 and H4. This was the range of the WaterFix proposed project presented by the
20 Petitioners in Part 1 of this hearing. The version of the project for the Biological
21 Assessment and public release of the Final EIR/EIS, BA H3+, is also plotted. The
22 averaging is for the 16 years from October 1, 1975 through September 30, 1991. CWF
23 H3+ EC changes are well outside the range of H3 and H4 in October, November,
24 December, February, March, and April. There is significant degradation of water
25 quality, in terms of salinity, in October, November, March, April and June.

26 The Petitioners acknowledged these large increases in EC and chloride
27
28

¹⁰ Exhibit CCC-SC-55 is a true and correct copy.

1 concentration under cross-examination. (Transcript, February 22, 2018, starting at Page
2 199, Line 11.) Figure EC3 (Exhibit DWR-1015, Page 22) suggests the 16-year
3 averaged EC at San Andreas Landing for the proposed WaterFix project, CWF H3+, will
4 be greater than the NAA from September-November and February-June. Water quality
5 degradation on individual days or months could be even greater. CWF H3+ is outside
6 the range of Alt. 4A, scenarios H3 and H4 (Part 1 proposed project) in October-
7 November and February- April.

8 Figure CL1 in Exhibit DWR-1015, Page 24, suggests the 16-year averaged
9 chloride concentration at the Contra Costa Canal for the proposed WaterFix project,
10 CWF H3+, will be greater than the NAA from September-November, February-April, and
11 June. CWF H3+ is outside the range of Alternative 4A, scenarios H3 and H4 (Part 1
12 proposed project) from October-April.

13 The Petitioners have attempted in Part 2 to minimize these changes from the
14 Part 1 modeling (Scenarios H3 and H4) to the Part 2 modeling (CWF H3+), and the
15 corresponding significant increase in adverse impacts on the Delta ecosystem, the
16 environment and legal users of water.

17 In Exhibit DWR-1028, Slide 4, the Petitioners state the comparison of CWF H3+
18 with BA H3+ (sensitivity analysis): "*showed that overall operations including upstream*
19 *storage, river flows, and water supply deliveries remained similar.*" In Exhibit DWR-
20 1028, Slide 6, the Petitioners testify the August 2016 Biological Assessment included
21 only one set of operations criteria (H3+) and claim "*the July 2017 NOD included slight*
22 *revisions to H3+.*"

23 This is not correct. One of those changes, elimination of the October-November
24 OMR limits, was a major change, and it produced significant decreases in Delta outflow
25 in October and large increases in salinity in the Delta in October, November and
26 sometimes December.

27 In the Petitioners' water quality PowerPoint (Exhibit DWR-1027, Slide 4), the
28 Petitioners claim:

- 1 • CWF H3+ EC results generally fall between H3 and H4;
- 2 • CWF H3+ D-1641 M&I and Ag Water Quality Objectives are met the
- 3 majority of the time; and
- 4 • Any small percentage of probability of exceedence is equal to or less than
- 5 the NAA except at Emmaton which has a slightly higher probability.

6 These claims also are not correct. Figures 1 and 2 in Exhibit CCC-SC-55 clearly
 7 show that significant increases in salinity in the Delta relative to Scenarios H3 and H4 in
 8 October and November and significant water quality degradation in those months
 9 relative to the NAA. Since passage of the 2009 Delta Reform Act, it is State policy that
 10 the Bay-Delta should be managed to achieve the inherent objective of improving water
 11 quality to protect human health and the environment consistent with achieving water
 12 quality objectives in the Delta (Cal. Wat. Code, § 85020(e)).

13 Solano County, Contra Costa County and the Contra Costa County Water
 14 Agency submitted detailed CEQA/NEPA comments on the WaterFix Final EIR/EIS
 15 (released for public review and comment on December 22, 2016), including a comment
 16 by Solano County that *“the Final EIR/EIS is inadequate because it presents modeling*
 17 *data for a number of different versions of the preferred alternative (Alternative 4A), but*
 18 *not the current version of the Project.”* (Exhibit SWRCB-108, page 78.)

19 The Petitioners’ response to Solano County’s CEQA/NEPA comment was:

20 *“Commenter claims that the Delta outflow under Alternative 4A H3+*
 21 *scenario does not fall within H3 and H4 scenarios. This is incorrect.*
 22 *Changes in long-term average Delta outflow under Alternative 4A*
 23 *(ELT) as compared to the No Action Alternative (ELT) and Existing*
 24 *Conditions are shown in Figures 5-37 through 5-39 and Tables 5-*
 25 *10 through 5-12. As shown in Figure 5F.4-27, the incremental*
 26 *changes in Delta exports under H3+ compared to the No Action*
 27 *Alternative are found to be within the H3 and H4 scenarios.”*

28 This response to Solano County’s comment is inadequate. The figures referred

1 to in the Petitioners' response (Exhibit SWRCB-108, page 78) are based on H3+
2 modeling, but it is BA H3+ modeling, not the project that was adopted, CWF H3+. The
3 responses to this comment should have been based on a comparison with the adopted
4 and then "*current version*" of the proposed WaterFix project.

5 It is clear from the Delta outflow and Delta water quality data for the CWF H3+
6 alternative in Exhibits CCC-SC-54 and CCC-SC-55, and the Petitioners' own testimony
7 (Exhibit DWR-1015), that, in some months, the CWF H3+ Delta outflows and Delta EC
8 and chloride concentrations are indeed well outside the range of Scenarios H3 and H4.

9 The Petitioners describe these changes in Figure 1 of Exhibit DWR-1010, but
10 either (1) ignore the application of the April-May limit on the San Joaquin inflow to south
11 Delta exports ratio, or (2) incorrectly categorize the April-May limit as "*updated spring*
12 *outflow criteria*." Limiting exports from the south Delta as required by the 2009 NMFS
13 Biological Opinion (Exhibit SWRCB-84) can result in increased Delta outflows, but not in
14 every case. The effect of reducing exports from the south Delta could sometimes be
15 offset by increased exports from the new north Delta intakes, or releases from upstream
16 reservoirs could be reduced.

17 The Petitioners have made significant changes to their project since Part 1 but
18 have failed to adequately analyze and disclose those changes. The changes have
19 resulted in reductions in Delta outflows at key times of the year, reduced exports in
20 April-May which resulted in increased exports in later months (Exhibit CCC-SC-59¹¹,
21 Figures 1 and 2), and significant adverse impacts on EC and chloride concentrations in
22 the Fall.

23 Without detailed information about these significant impacts and a commitment
24 by the Petitioners to fully mitigate those impacts, the SWRCB will lack the basis to make
25 an accurate or informed decision about the key hearing issues.
26
27

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¹¹ Exhibit CCC-SC-59 is a true and correct copy.

1 **7. The Petitioners Incorrectly Redefine the SWRCB’s D-1641**
2 **Export/Inflow Standard to Eliminate North Delta Exports from This**
3 **Standard.**

4 The Petitioners have arbitrarily redefined the export/inflow ratio in Water Rights
5 Decision 1641 (“D-1641”) to allow more water to be exported (Exhibit SWRCB-21,
6 pages 184-187.) The current definition of the export/inflow ratio in D-1641 is (total
7 exports) divided by (total Delta inflow), where all the exports currently come from the
8 south Delta.

9 The Petitioners have redefined the export/inflow ratio as (south Delta exports)
10 divided by (total Delta inflow, minus North Delta exports). (Exhibit SWRCB-102, 2016
11 Final BDCP/California WaterFix EIR/EIS, Chapter 3, pages 3-38.)

12 This redefinition would allow the Petitioners to export more water than the official
13 D-1641 definition, especially in June. A detailed analysis of the CWF H3+ modeling
14 data shows that the total south-of-Delta exports for CWF H3+ exceeded the exports that
15 would have been allowed if the WaterFix project had been modeled using the original
16 SWRCB D-1641 definition of the E/I ratio in 57 months out of the total $82 \times 12 = 984$
17 months, October 1921 through September 2003. (Exhibit CCC-SC-61¹².)

18 The Petitioners’ redefinition of the export/inflow ratio means that exports through
19 the north Delta intakes would be unconstrained by the export/inflow standard. There
20 would be no limit on total exports due to the export/inflow standard during periods when
21 exports were only being made through the north Delta intakes. If south Delta exports
22 are zero, the export/inflow ratio as redefined by the Petitioners is also zero.

23 This is unacceptable because it eliminates the D-1641 protection against
24 entrainment of eggs and larvae at the Delta export pumps and intakes, in this case, at
25 the proposed north Delta intakes. It is contrary to the State’s co-equal goal of policy of
26 protecting, restoring, and enhancing the Delta ecosystem (Cal. Wat. Code, § 85054)

27
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¹² Exhibit CCC-SC-61 is a true and correct copy.

1 and the State policy of restoring the Delta ecosystem, including its fisheries and wildlife,
2 as the heart of a healthy estuary and wetland ecosystem. (Cal. Wat. Code, § 85020
3 (c).)

4
5 **7.1 The original biological objective for the export/inflow ratio was**
6 **to reduce entrainment of fish, egg, and larvae entrainment.**

7 The November 3, 1994 “Biological Explanation of the Joint Water Users
8 Proposed Bay-Delta Standards”¹³ formed the basis for development of the December
9 1994 Bay-Delta Accord and the new Bay-Delta standards in D-1641. I was a contributor
10 to that proposal. Key excerpts from the Biological Explanation are given in Exhibit
11 CCC-SC-62¹⁴.

12 The Biological Explanation document makes clear that the goal of the
13 export/inflow limits was to reduce fish, egg and larvae entrainment and mortality at the
14 pumps. The Biological Explanation document, at page 2-19, states that the Biological
15 Objective of the Export/Inflow ratio is to: *“Reduce fish, egg, and larvae entrainment and*
16 *mortality at the pumps through export restrictions and intensive real-time*
17 *monitoring/response designed to detect presence of fish in areas adjacent to the*
18 *pumps.”*

19 The Biological Explanation document, at page 2-19, states that the Intended
20 Benefits of the Export/Inflow ratio include that *“exports should decrease during those*
21 *years when fresh water inflow to the Delta is decreased and a larger percentage of fish*
22 *and other aquatic organisms are geographically distributed further upstream where their*
23 *susceptibility to export losses is increased.”* (Exhibit CCC-SC-62.)

24
25 _____
26 ¹³ The November 3, 1994 “Biological Explanation of the Joint Water Users Proposed Bay-Delta
27 Standards” can be downloaded from the following link:
28 https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/wq_control_plan/s/1995wqcp/admin_records/part05/368.pdf

¹⁴ Exhibit CCC-SC-62 is a true and correct copy of selected pages from the document.

1
2 **7.2 The Petitioners' fishery expert testified eggs and larvae of fish**
3 **species would occur at the north Delta intakes.**

4 Petitioners' fishery expert in Part 2, Dr. Marin Greenwood, provided testimony
5 that eggs and larvae would be present above the north Delta intakes and therefore
6 susceptible to entrainment at that location:

- 7 • *"CWF H3+ NDD are outside the main range of Delta Smelt and Longfin*
8 *Smelt and therefore are limited in their potential to cause adverse effects*
9 *such as entrainment of larvae. However, there is a potential for restricted*
10 *access of smelts to shallow water habitat upstream of the NDD and this*
11 *potential effect will be mitigated with 1,750 acres of restoration."* (Exhibit
12 Exhibit DWR-1012, Page 4, Line 2.)
- 13 • *Striped Bass and American Shad egg/larval entrainment at NDD*
14 – *Most spawning upstream of NDD*
15 ▪ *Striped Bass eggs/larvae drift downstream to Delta*
16 ▪ *Many American Shad rear upstream*
17 – *Some protection from spring flow criteria (less exports)*
18 (Exhibit DWR-1029, Slide 34.)
- 19 • *"BDCP-covered fishes in my testimony (White Sturgeon, Sacramento*
20 *Splittail, Pacific and River Lamprey) spawn upstream of the Delta and*
21 *generally move downstream into the Delta and adjacent areas as larvae or*
22 *juveniles, as do Striped Bass and American Shad."* (Exhibit DWR-1012,
23 Page 51, Line 16.)
- 24 • *"Entrainment of Striped Bass and American Shad early life stages (eggs*
25 *and larvae) was found to be a significant and unavoidable impact in the*
26 *FEIR/S. Striped Bass spawn in and upstream of the Delta. Eggs and larvae*
27 *move downstream at small sizes that could make them susceptible to*
28 *entrainment at the NDD. The FEIR/S (Exhibit SWRCB-102, Section*

1 11.3.5.2, *Impact AQUA-201, p. 11-3537*) found that the entrainment of
2 *Striped Bass at the NDD would constitute a significant and unavoidable*
3 *impact of the CWF H3+, based primarily on assessment of ten spring*
4 *(March, April, May, or June) simulated monthly periods of DSM2 particle*
5 *tracking modeling results for the H3 operational scenario.” (Exhibit*
6 *SWRCB-102, Section 11.3.4.2, Table 11-1A-96, p. 11-679.)” (Exhibit DWR-*
7 1012, Page 52, Line 16.)

8 Export/inflow limits are needed at both the south and north Delta intakes to
9 protect against entrainment of eggs and larvae of Delta smelt and other key fish
10 species.

11 In Part 1, the Petitioners (Jennifer Pierre) dismissed the effect of the change in
12 definition of the export/inflow ratio as inconsequential. (Transcript, Friday, July 29, 2016,
13 Page 233, Line 10.) The CWF H3+ data presented in Exhibit CCC-SC-61 suggest
14 additional water is able to be exported, primarily in the month of June. Redefining D-
15 1641 standards to allow additional delta exports in months when the additional exports
16 would not otherwise be permitted is not inconsequential.

17

18 **7.3 The Petitioners even used a third definition of the**

19 **export/inflow ratio in Scenarios H2 and H4.**

20 The Petitioners appear to have made an additional, unexplained, assumption: in
21 the case of Alternative 4A, Scenarios H2 and H4, the Sacramento River inflow was
22 assumed to be upstream, rather than downstream, of the proposed north Delta intakes.
23 (Exhibit SWRCB-102, Chapter 3, Page 3-39, Footnote 57.)

24 *“In computing the E/I ratio for Scenarios H1 and H3, the*
25 *Sacramento River Inflow is considered to be downstream of the*
26 *north Delta intakes. However, in computing the E/I ratio for*
27 *Scenarios H2 and H4, the Sacramento River inflow was assumed*
28 *to be upstream of the proposed north Delta intakes.”*

1 Scenario H4 was a version of the proposed project presented in Part 1 of this
2 hearing. This is an arbitrary third definition of the export/inflow ratio in D-1641.

3 The WaterFix project must operate to the original definition of the export/inflow
4 ratio to help reduce the entrainment of eggs and larvae at the north Delta intakes.
5 Unless new modeling is provided that complies with the D-1641 standard, the SWRCB
6 will lack the basis to make an informed decision.

7 The SWRCB should include a permit term in any new or revised SWP and CVP
8 water rights permits that clearly defines the export/inflow ratio, as applied to DWR and
9 Reclamation operations, as (total north and south exports) divided by (total Delta
10 inflow).

11
12 **8. New Version of Proposed Project (CWF H3+) Does Not Comply with**
13 **“Big Gulp, Little Sip” Concept.**

14 The Petitioners claim in Part 2 of this hearing that the proposed WaterFix project,
15 as represented by CWF H3+, will “*reduce water exports in drier years when Delta*
16 *aquatic resources are subject to increased stresses; and increase Delta exports in*
17 *wetter years when aquatic resources are not as affected by stresses in the Delta.*”
18 (Exhibit DWR-1010, Page 12, Line 2.)

19 During their oral testimony, the Petitioners claimed WaterFix will “*improve the*
20 *ecosystem through reduction and reverse flow occurrences, flow patterns that will*
21 *become more consistent with natural flow patterns, by increasing exports in the wetter*
22 *periods and decreasing them in the dryer [sic.] periods*” (Transcript, February 22,
23 2018, Page 44, Line 12.)

24 This “*Big Gulp, Little Sip*” concept was one of the early Planning Principles
25 adopted by the Steering Committee for the original Bay-Delta Conservation Plan
26 (BDCP), *i.e.*, “*Divert more water in the wetter periods and less in the drier periods.*”
27 (Exhibit CCC-SC-12, Bay Delta Conservation Plan, March 2009 brochure, “An Overview
28 and Update,” Page 6.) The BDCP and WaterFix project proponents often promoted this

1 “Big Gulp, Little Sip” concept. (Exhibit CCC-SC-13.)

2 In my written case-in-chief testimony (Exhibit CCC-SC-3, Page 11, Line 21), I
3 discussed how the WaterFix BA H3+ modeling did not comply with either the “Big Gulp”
4 or “Little Sip” portion of the concept. The proposed WaterFix project cannot consistently
5 capture extra water for export reductions during wet periods when Delta outflows are
6 very high. Similarly, in many dry months when Delta outflows are very low and the
7 Delta ecosystem is stressed, the WaterFix project would increase south-of-Delta
8 exports above the existing typical combined permitted capacity of 11,280 cfs. In some
9 cases, dry-period total exports would be increased by as much as 30 percent.

10 The version of the proposed WaterFix project submitted by the Petitioners for
11 Part 2 of this hearing, CWF H3+, likewise fails to comply with the “Big Gulp, Little Sip”
12 concept. (Exhibit CCC-SC-63¹⁵).

13 To ensure the proposed WaterFix project does not rely on exports from the Delta
14 during dry periods, the SWRCB should limit total exports based on Delta outflow. For
15 example, the SWRCB could limit total SWP and CVP south-of-Delta exports to 1.5
16 times the Delta outflow (the red diagonal line in Figure 1 of Exhibit CCC-SC-63). An
17 example of this kind of limit was previously shown in Figure 5 in Exhibit CCC-SC-17.

18 A limit on exports based on Delta outflow would reduce exports during drier
19 periods (i.e., achieve the “Little Sip” concept) and help improve, restore and sustain the
20 Delta ecosystem.

21
22 **9. The Proposed WaterFix Project, CWF H3+, Sometimes Reduces**
23 **Rather than Increases Sacramento Inflows to the Delta at Freeport.**

24 In my case-in-chief written testimony (Exhibit CCC-SC-3, Page 17, Line18), I
25 discussed how the WaterFix project (based on BA H3+ modeling) sometimes reduced
26 Sacramento River inflows to the Delta (well above the proposed North Delta Intakes) by
27

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¹⁵ Exhibit CCC-SC-63 is a true and correct copy.

1 as much as 30 percent.

2 As shown in Figure 1 of Exhibit CCC-SC-64¹⁶, the new proposed WaterFix
 3 project (CWF H3+) also reduces Sacramento River flows at Freeport by as much as 30
 4 percent.

5 The SWRCB, in its 2010 Delta Flow Criteria Report (Exhibit SWRCB-25),
 6 recommended significant increases of Sacramento inflow to the Delta and Delta outflow
 7 would be necessary in January through June in the Delta ecosystem for fishery
 8 protection, under existing conditions. Some of the reductions in flows, as measured at
 9 Freeport, caused by the proposed WaterFix project occur during the January through
 10 June period.

11 It is not sufficient to control the flow in the Sacramento River downstream of the
 12 NDD using percentage bypass rules. This would control how much of the inflow at
 13 Freeport can be diverted into the twin tunnels and what percentage should be left in the
 14 river to protect migrating anadromous fish species, but does not require absolute
 15 Sacramento inflow targets. The WaterFix project should be setting enhanced inflow
 16 targets such as those recommended in 2010 by the SWRCB and California Department
 17 of Fish and Wildlife, not reducing Sacramento inflows to the Delta.

18 Before the SWRCB can make an informed decision on the Petitioners' petition,
 19 the Co-Hearing Officers should require the Petitioners to analyze and disclose the
 20 reduction in inflows to the Delta at Freeport due to the WaterFix project, and to present
 21 this information as part of this hearing, so that the corresponding significant adverse
 22 environmental impacts of these flow reductions on the Bay-Delta ecosystem can be fully
 23 understood.

24 ///

25 ///

26 ///

27

28

¹⁶ Exhibit CCC-SC-64 is a true and correct copy.

1 **10. Petitioners have Eliminated Minimum Old and Middle River (OMR)**
2 **Flow Limits of -5,000 cfs for October and November Without**
3 **Explaining the Consequences.**

4 In my case-in-chief written testimony (Exhibit CCC-SC-3, Page 20), I discussed
5 how the WaterFix modeling (BA H3+ and earlier versions like Alternative 4A, Scenario
6 H3 and H4) had artificially high Delta outflows in October, which resulted in
7 underestimation of adverse water quality impacts in the Delta in October, November,
8 and sometimes December.

9 To simulate a 14-day shut down in south Delta exports during the October pulse
10 flow on the San Joaquin River (modeled as October 16-31) in BA H3+ (Exhibit DWR-
11 1075, Exhibit DWR-1076), the Petitioners assumed that Old and Middle River (OMR)
12 flows would be limited to a minimum of -5,000 cfs during the whole month of October.
13 (See Exhibit DWR-515, p. 6, Table 3, footnote c.) The same -5,000 cfs minimum OMR
14 limit was also applied in November in the earlier CALSIM II modeling studies.

15 However, the most recent version of the WaterFix project modeling (CWF H3+)
16 has removed these -5,000 cfs minimum OMR flows. In the July 2017 “Developments
17 after Publication of the Proposed Final Environmental Impact Report” (Exhibit SWRCB-
18 108 at Page 130), the Petitioners describe this change as follows:

19 *“Changes to south Delta export constraints: In the Final EIR/EIS*
20 *and in the BA, operational criteria included additional Old and*
21 *Middle River (OMR) flow requirements and south Delta export*
22 *restrictions during October and November. For the proposed action,*
23 *these OMR flow requirements and the south Delta export*
24 *restrictions were removed.”*

25 The Petitioners have not explained why these south Delta export restrictions,
26 based on OMR flows, were removed, or whether CWF H3+ model study accurately
27 simulates the 14-day shut down in south Delta exports during the October pulse flow on
28 the San Joaquin River. What is apparent, however, is that removing these October and

1 November OMR restrictions reduces Delta outflows in October in particular, and causes
2 significant adverse increases in EC and chlorides concentrations in the Delta in the fall,
3 relative to the NAA.

4 As shown in Figure 1 in Exhibit CCC-SC-58, the outflows in October for
5 Scenarios H3 and H4 are generally higher than the NAA, but the CWF H3+ outflows are
6 lower. November Delta outflows for Scenarios H3 and H4 and CWF H3+ are all
7 generally lower than the NAA. (Figure 2 in Exhibit CCC-SC-58.)

8 The Petitioners have failed through the CEQA/NEPA process, and through this
9 Change Petition hearing process, to fully disclose the degradation of water quality in the
10 Delta (increased EC and chloride concentrations) that would occur with the WaterFix
11 CWF H3+ version of the proposed project.

12 For example, in Exhibit DWR-1027, Slide 4, the Petitioners present the following
13 bullets:

- 14 • CWF H3+ EC results generally fall between H3 and H4
- 15 • CWF H3+ D-1641 M&I and Ag Water Quality Objectives are met the
16 majority of the time
- 17 • Any small percentage of probability of exceedance is equal to or less than
18 the NAA except at Emmaton which has a slightly higher probability

19 In Slide 5 (Exhibit DWR-1027), the Petitioners merely acknowledge that
20 exceptions to CWF H3+ falling between H3 and H4 occur when (Petitioners' bullets):

- 21 • Higher spring outflow requirements resulted in less exports and as a result
22 higher interior Delta salinity (south of the SJR)
- 23 • Removal of export constraints in the fall results in lower Delta Outflow and
24 higher salinity.

25 The Petitions fail to disclose significant adverse water quality impacts in the
26 Delta. It is not sufficient to state that the proposed project will meet legally required D-
27 1641 water quality objectives a majority of the time. The Petitioners should have
28 acknowledged that there will be large increases in EC at Emmaton relative to the NAA

1 from October through December (Exhibit DWR-1027, Slide 18).

2 The elimination of the OMR limits for October-November result in large increases
3 in chloride concentration at the intake to the Contra Costa Canal relative to the version
4 of the WaterFix project presented in Part 1 of this hearing, Alternative 4A, Scenarios H3
5 and H4 (Exhibit DWR-1027, Slide 24). The largest increases occur in October and
6 November, but the chloride concentrations for CWF H3+ are outside the range of, and
7 higher than, the chlorides for H3 and H4 for October through April (Exhibit DWR-1027,
8 Slide 24).

9 The Responses to Comments on the WaterFix Final EIR/EIS (Exhibit SWRCB-
10 102) also appear to be based on the earlier BA H3+ modeling and not on the CWF H3+
11 modeling that was supposed to represent the adopted project in the certified WaterFix
12 Final EIR/EIS. By changing their project between the public release of the WaterFix
13 Final EIR/EIS and the certification of the WaterFix Final EIR/EIS, and by not
14 acknowledging these changes in their Responses of Comments, the Petitioners have
15 failed to disclose these significant adverse water quality impacts to the public and the
16 SWRCB.

17 The ADSEIR/EIS, released on June 12, 2018 (Exhibit CCC-SC-66¹⁷), further
18 exacerbates this failure to disclose and adequately mitigate significant adverse water
19 quality impacts. The water quality chapter, Chapter 8, only consists of three pages
20 (Exhibit CCC-SC-65¹⁸) and compares the new proposed project with modified facilities
21 with the adopted project CWF H3+. The adverse impacts of CWF H3+ relative to both
22 the public WaterFix Final EIR/EIS (BA H3+) and the NAA are not disclosed.

23 The environmental documents prepared by the Petitioners fail to adequately
24 disclose the significant adverse impacts of the proposed WaterFix project on Delta
25 water quality and fail to provide the basis for the SWRCB to make an accurate or fully
26 informed decision on the municipal, industrial and environmental water quality impacts

27 _____
28 ¹⁷ Exhibit CCC-SC-66 is a true and correct copy of this document.

¹⁸ Exhibit CCC-SC-65 is a true and correct copy of this document.

1 of the WaterFix project.

2
3 **11. Petitioners do not Disclose Whether CWF Delta Inflows and Outflows**
4 **Are Consistent with the SWRCB's 2009 Delta Flow Criteria**
5 **Recommendations.**

6 In my case-in-chief written testimony (Exhibit CCC-SC-3, Page 36), I discussed
7 how the Petitioners have previously failed to disclose how the ratios of Delta inflows and
8 outflows to unimpaired flow for the WaterFix alternatives compare with the SWRCB's
9 2010 Delta Flow Criteria (Exhibit SWRCB-25). I provided evidence based on an earlier
10 WaterFix modeling study, BA H3+, that showed the simulated WaterFix Delta outflows
11 are typically well below SWRCB's recommendation of 75 percent of unimpaired flow
12 during January through June (Exhibit CCC-SC-35.)

13 California Water Code section 85086(c)(2) states: "*Any order approving a change*
14 *in the point of diversion of the State Water Project or the federal Central Valley Project*
15 *from the southern Delta to a point on the Sacramento River shall include appropriate*
16 *Delta flow criteria and shall be informed by the analysis conducted pursuant to this*
17 *section. The flow criteria shall be subject to modification over time based on a science-*
18 *based adaptive management program that integrates scientific and monitoring results,*
19 *including the contribution of habitat and other conservation measures, into ongoing*
20 *Delta water management.*"

21 The Petitioners case-in-chief for Part 2 of this hearing again failed to provide
22 evidence in a form (e.g., percentages of unimpaired flow) that would allow the SWRCB
23 to determine whether CWF H3+ is consistent with the 2010 inflow and outflow
24 recommendations of the SWRCB and California Department of Fish and Wildlife
25 (Exhibits SWRCB-25 and SWRCB-66, respectively).

26 The Petitioners acknowledge that this hearing will include consideration of
27 "appropriate Delta flow criteria" as described in the Delta Reform Act and stated by
28 Hearing Officers in the California WaterFix Hearing Ruling Regarding Scheduling of Part

1 2 and Other Procedural Matters, August 31, 2017, page 12. (Exhibit DWR-1010, Page
2 10, Line 17.)

3 The Petitioners offer the increased spring Delta outflow criteria in CWF H3+ as
4 benefiting aquatic resources consistent with the USFWS and NMFS Biological Opinions
5 and the Delta Reform Act. (Exhibit DWR-1010, Page 10, Line 21.) However, no
6 evidence is provided that discloses whether these increases in CWF H3+ are sufficient
7 to match the SWRCB's 2010 Delta Flow Criteria recommendations.

8 In fact, the 82-year average Delta outflows in March in CWF H3+ are lower than
9 the outflows in Alternative 4A, scenario H4. (Exhibit CCC-SC-58, Figure 3.)

10 Unless the Petitioners provide evidence and testimony regarding the
11 percentages of unimpaired flow that apply to different WaterFix alternatives, the
12 SWRCB will lack the basis to make accurate or fully informed decisions about the
13 whether the flows are sufficient to full protect fish species and about other key issues for
14 this hearing.

15
16 **12. Excessive Exceedances of Water Quality Standards Render the**
17 **Water Quality Modeling Useless for Analyzing and Disclosing Water**
18 **Quality Impacts of Proposed WaterFix Projects.**

19 Figure 1 of Exhibit CCC-SC-60 shows the full 82-year subset of daily-averaged
20 Old River at Bacon EC data from the WaterFix proposed project CWF H3+ modeling for
21 the month of November. As was shown in Exhibit CCC-SC-55, Figure 2, the long-term
22 averaged salinities for CWF H3+ at this location were the highest in November
23 compared to all other months.

24 The data plotted are for the water years 1922 through 2003 (82 x 30 = 2,460 data
25 points). Data above the 1:1 diagonal line represent adverse water quality impacts of the
26 proposed WaterFix project. Data points below the diagonal line represent improvements
27 in water quality.

28 My case-in-chief testimony was based on the Biological Assessment modeling

1 for the Proposed Action, BA H3+ (Exhibit CCC-SC-28, Figure 5). That earlier WaterFix
2 alternative assumed OMR minimum flows of -5,000 cfs in October and November. This
3 resulted in artificially high outflows in the fall which resulted in an unrealistic
4 improvement in water quality. The current WaterFix proposed project CWF H3+
5 eliminated these OMR restrictions in October and November. The Delta outflows were
6 much lower resulting in significant water quality degradation in the Delta with respect to
7 salinity (Exhibit CCC-SC-55, Figure 2.)

8 Figure 1 in Exhibit CCC-SC-60¹⁹ shows based upon the water quality modeling
9 for the WaterFix project that the project is still fatally flawed. The daily EC values are
10 often well in excess of 1,053 $\mu\text{S}/\text{cm}$, which is the equivalent of 250 mg/L chloride
11 concentration (according to the conversion equations in Exhibit DWR-509). The D-1641
12 compliance location in this area for both the 250 and 150 mg/L chloride standards is off
13 Rock Slough at the intake to the Contra Costa Canal. The water quality at this
14 compliance location is strongly influenced by the water quality at the Bacon Island
15 station. The highest EC value for the No Action Alternative is 2,846 $\mu\text{S}/\text{cm}$, which is the
16 equivalent of 761 mg/L chloride concentration.

17 These extremely high EC values should not be dismissed as anomalies as the
18 Petitioners have suggested (Exhibit DWR-66, Page 3, Line 7.) They are too frequent
19 and persistent. Having chloride concentrations as high as 761 mg/L in an area where
20 the maximum allowable daily value is 250 mg/L renders the water quality impact
21 analysis invalid.

22 In real-time operations of the Delta by the SWP and CVP project operators, the
23 250 mg/L standard would be met, by among other things, increasing Delta outflow. To
24 reduce chloride concentrations from 700 mg/L or more down to 250 mg/L would require
25 a significant amount of additional outflow which would typically reduce the amount of
26 water that could be exported at that time. Those export losses are often made up in
27

28 _____
¹⁹ Exhibit CCC-SC-60 is a true and correct copy.

1 subsequent months in real-time Delta operations or by additional reservoir releases.
2 This could then shift adverse impacts to subsequent months, something that is not
3 disclosed in this flawed modeling study.

4 Unless the daily D-1641 Municipal and Industrial water quality standards are met
5 in the WaterFix operations and water quality modeling, the SWRCB will lack the basis to
6 make an accurate or properly informed decision about the key hearing issues.

7
8 **13. Petitioners do not Present an Operations and Water Quality Analysis**
9 **of the Proposed WaterFix Project When the Enhanced Spring**
10 **Outflows Are Provided Through Contracts with Willing Sellers.**

11 The enhanced Spring outflows that were incorporated into CWF H3+ require that
12 water to meet these outflow targets be purchased from willing sellers in the tributaries
13 upstream of the Delta (Transcript, February 22, 2018, Page 69, starting at Line 16.) The
14 Petitioners have not presented any evidence that there are any willing sellers who will
15 contribute to compliance with the Biological Opinion Spring Outflow Criteria and have
16 contracted with DWR to provide that water. The Petitioners have also failed to identify a
17 dedicated funding source for these water purchases.

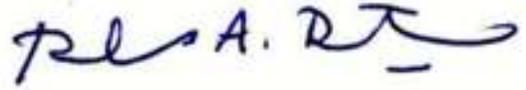
18 The Petitioners modeled the enhanced Spring flows by reducing exports, not as
19 less local diversion or additional reservoir releases upstream (which would result if there
20 were voluntary water transfers). The Petitioners need to present modeling showing the
21 environmental impacts of the WaterFix project for a range of conditions from full access
22 to willing sellers to no willing sellers. The Petitioners should also clarify how the SWP
23 and CVP will share the responsibility for meeting these enhanced Spring flows.

24 (Transcript, February 22, 2018, Page 72, Line 1.)

25 Without this information, the SWRCB will lack the basis to make an accurate or
26 fully informed decision about the WaterFix project will have adverse impacts on key fish
27 species, the Delta ecosystem and legal users of water.

28

Executed on this 11th day of July, 2018, in Oakland, California.

A handwritten signature in blue ink, appearing to read "R.A. Denton", with a horizontal line underneath.

Richard A. Denton, Ph.D., P.E.

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Daily-Averaged Old River at Bacon Island EC in November for CWF H3+

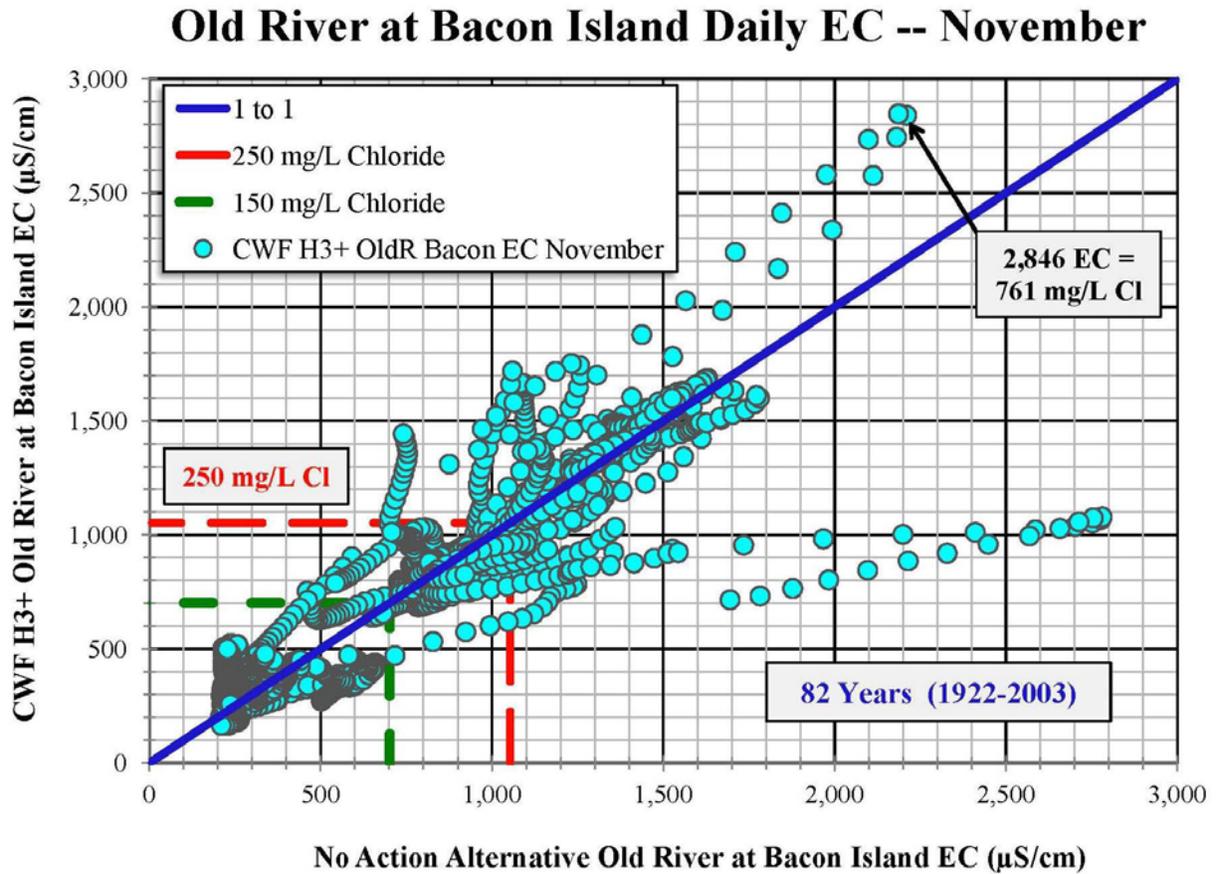


Figure 1: Daily-averaged Old River at Bacon Island EC for November for the proposed WaterFix project CWF H3+ plotted as a function of the No Action Alternative (NAA). The data are from the full 82-year CALSIM II modeling period, October 1, 1921 through September 30, 2003. Because this location is close to a D-1641 Municipal and Industrial water quality compliance location (the intake to the Contra Costa Canal), equivalent chloride concentrations of 250 mg/L and 150 mg/L are also shown. For many days in November, the chloride concentrations for both CWF H3+ and the NAA are well in excess of the 250 mg/L year-round maximum.

Proposed WaterFix Project Would Increase Exports During Drier Periods

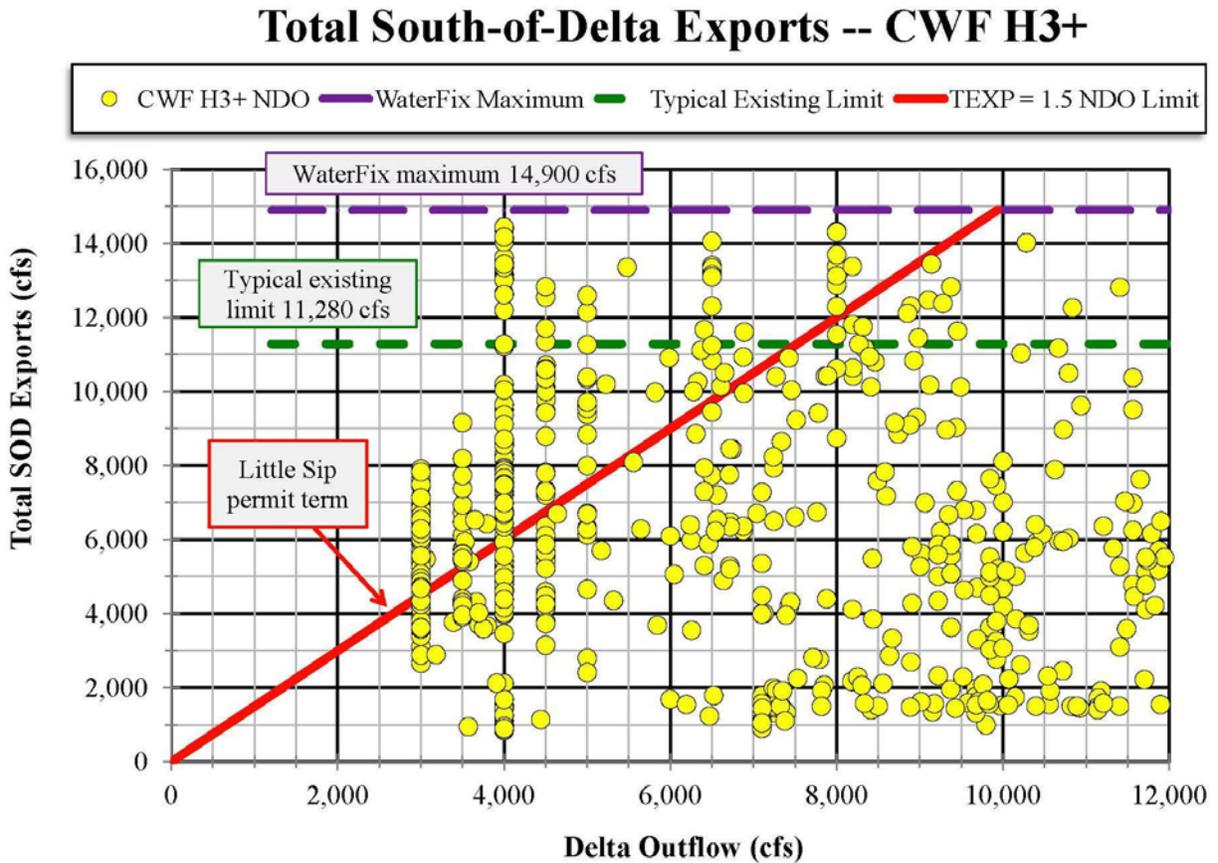


Figure 1: Monthly-averaged total South-of-Delta exports for the proposed WaterFix project CWF H3+ as a function of the corresponding Delta outflow. The data represent the modeling period, October 1, 1921 through September 30, 2003. Only data for outflows less than 12,000 cfs are plotted to highlight the proposed WaterFix operations during drier periods. The WaterFix project increases exports beyond existing levels when Delta outflows are very low and the Delta ecosystem is most vulnerable. This is the exact opposite of the “Little Sip” concept. The suggested 1.5 times Delta outflow limit would help ensure operations consistent with the “Little Sip” concept.

Proposed WaterFix Project Reduces Sacramento River Inflows at Freeport

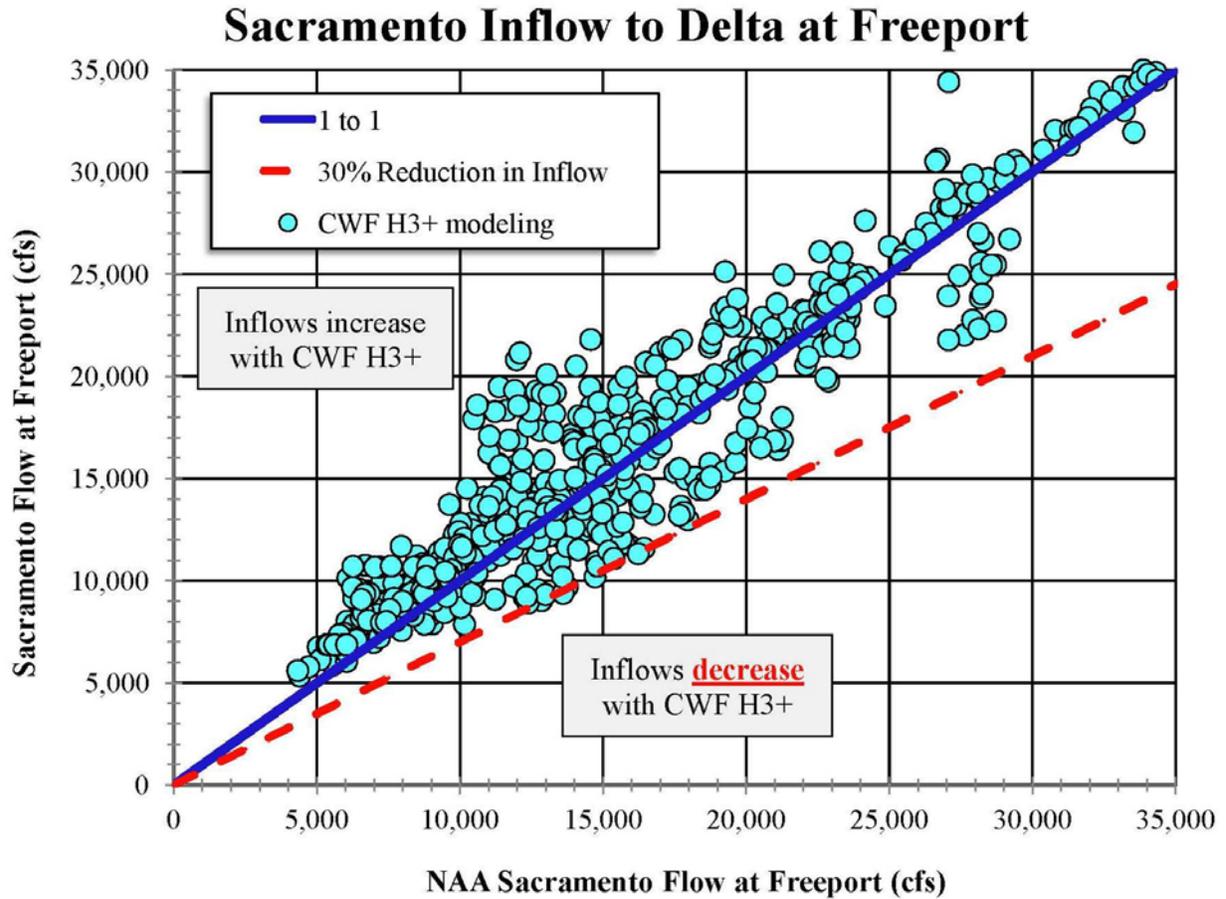


Figure 1: Monthly-averaged Sacramento River flows into the Delta at Freeport for the proposed WaterFix project CWF H3+ as a function of the corresponding No Action Alternative (NAA) flows. The data are for the period, October 1, 1921 through September 30, 2003. Only flows less than 35,000 cfs are plotted. The WaterFix project would reduce inflows to the Delta at Freeport by as much as 30% in some months.

Historical Trends in Fall X2 from DAYFLOW

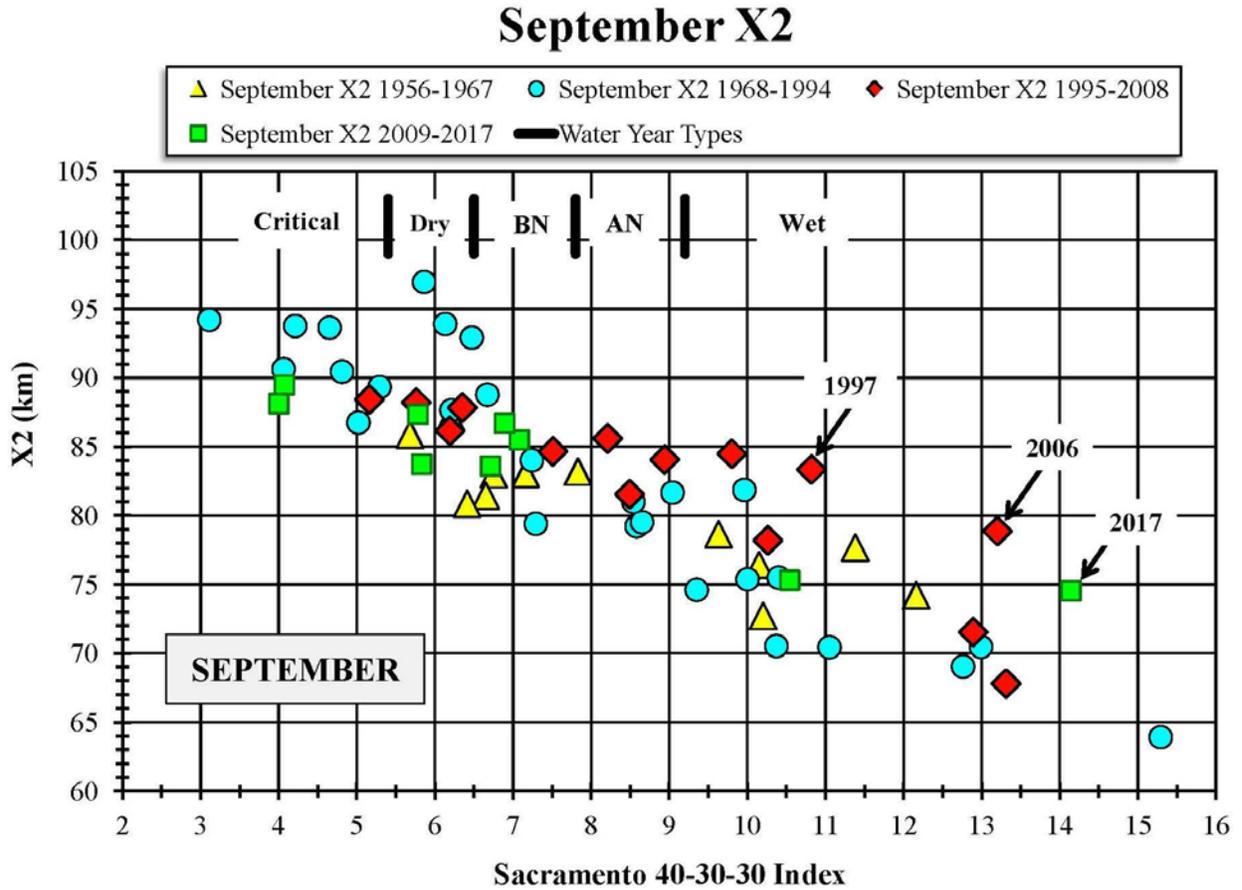


Figure 1: Historical monthly-averaged X2 for the month of September as a function of the Sacramento 40-30-30 water year index for the period 1956-2017. The data are categorized into four periods: Pre-SWP (1956-1967); Pre-Bay-Delta Accord (1968-1994), Post-Accord (1995-2008); and Post-2008-2009 Biological Opinions (2009-2017).

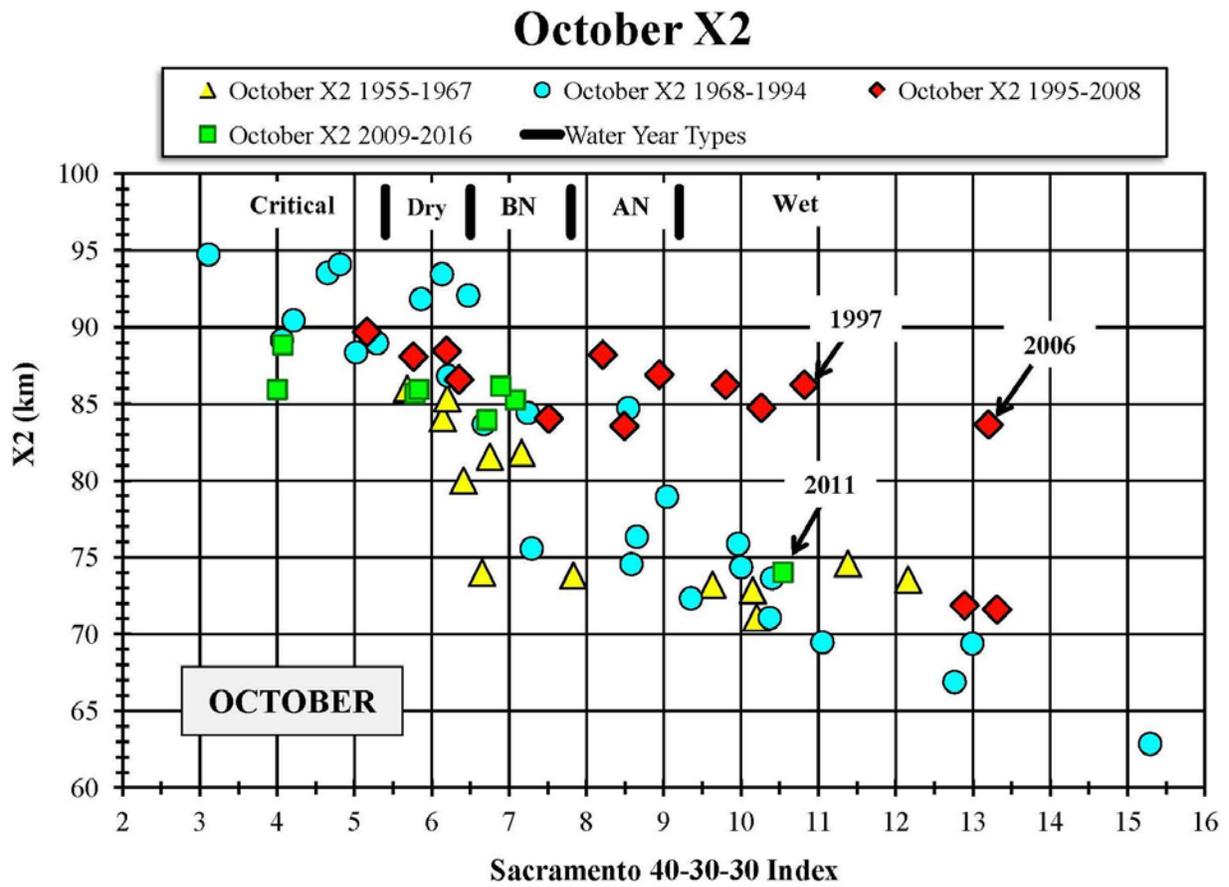


Figure 2: Historical monthly-averaged X2 for the month of October as a function of the Sacramento 40-30-30 water year index for the period 1955-2016. The data are categorized into four periods: Pre-SWP (1955-1967); Pre-Bay-Delta Accord (1968-1994), Post-Accord (1995-2008); and Post-2008-2009 Biological Opinions (2009-2016).

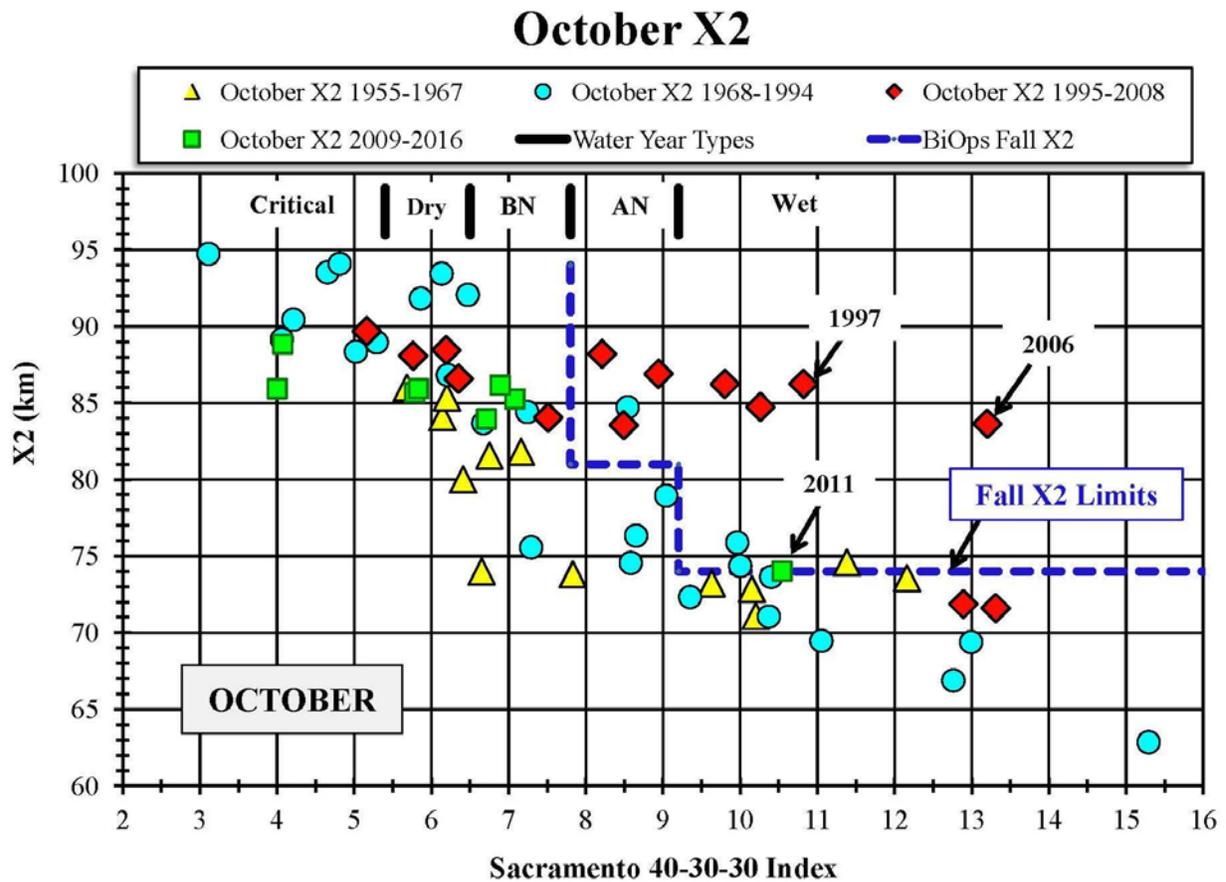


Figure 3: Historical monthly-averaged X2 for the month of October as a function of the Sacramento 40-30-30 water year index for the period 1955-2016. The data are categorized into four periods: Pre-SWP (1955-1967); Pre-Bay-Delta Accord (1968-1994), Post-Accord (1995-2008); and Post-2008-2009 Biological Opinions (2009-2016). The Fall X2 limits for wet and above normal years (74 km and 81 km, respectively) from the USFWS Biological Opinion (SWRCB-87, page 282) is also shown. There were a number of years after 1994 when the October X2 was much higher than the previous historical trend.

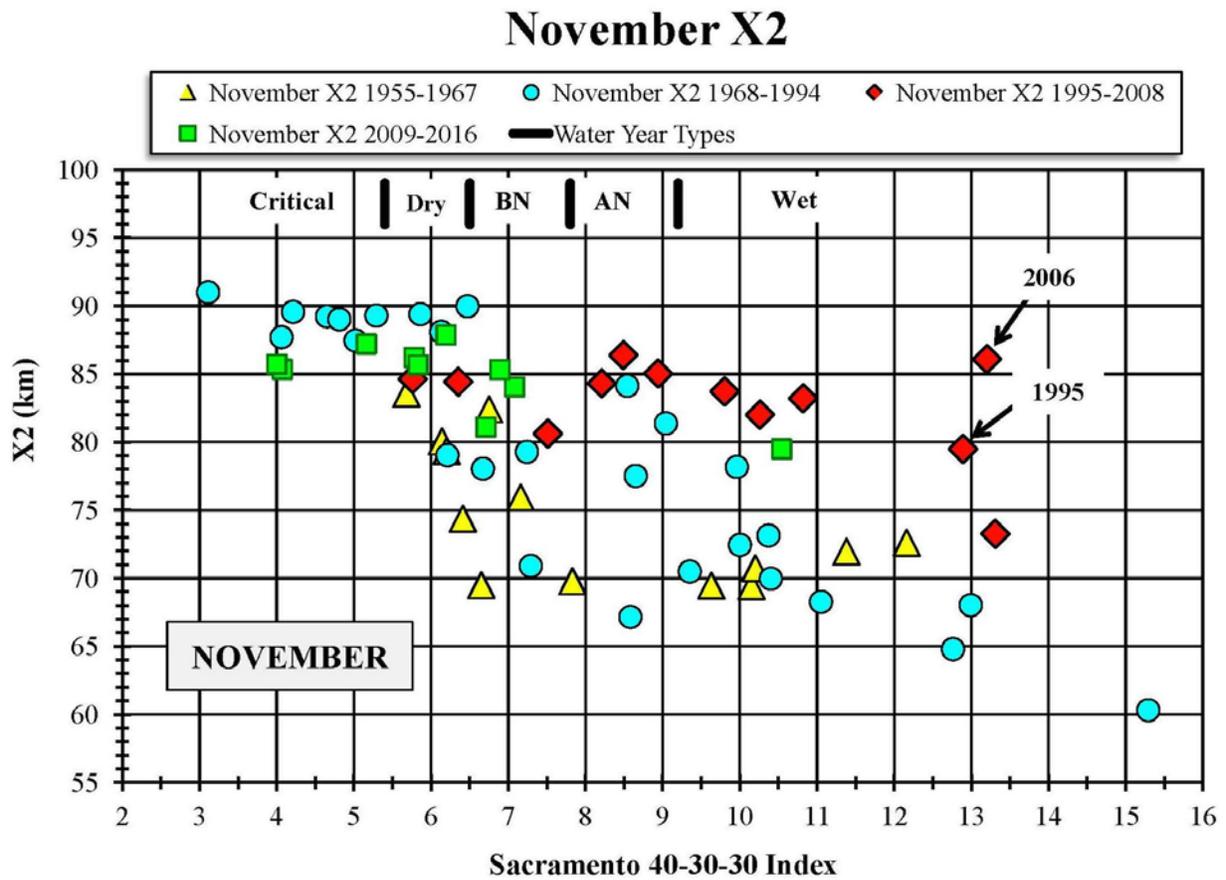


Figure 4: Historical monthly-averaged X2 for the month of November as a function of the Sacramento 40-30-30 water year index for the period 1955-2016. The data are categorized into four periods: Pre-SWP (1955-1967); Pre-Bay-Delta Accord (1968-1994), Post-Accord (1995-2008); and Post-2008-09 Biological Opinions (2009-2016).

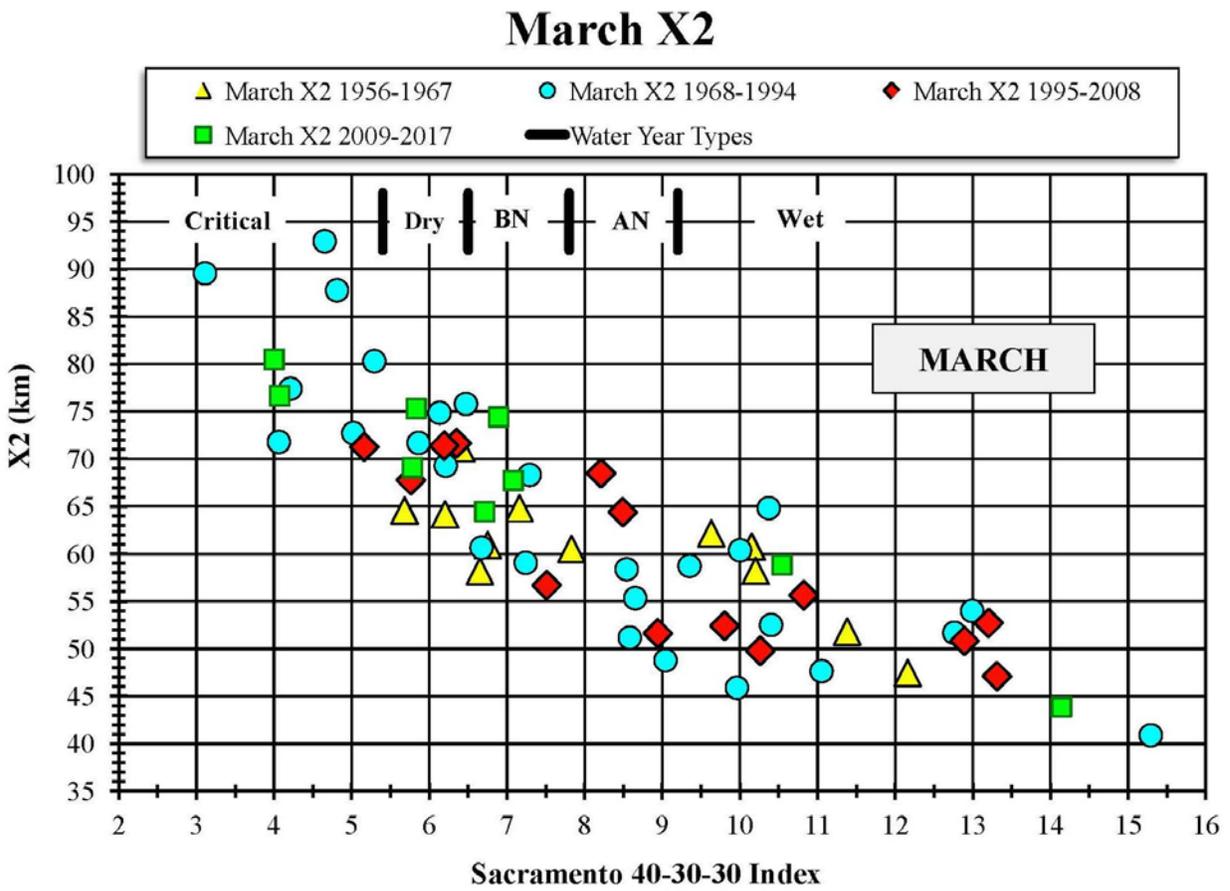


Figure 5: Historical monthly-averaged X2 for the month of March as a function of the Sacramento 40-30-30 water year index for the period 1956-2017. The data are categorized into four periods: Pre-SWP (1956-1967); Pre-Bay-Delta Accord (1968-1994), Post-Accord (1995-2008); and Post-2008-2009 Biological Opinions (2009-2017).

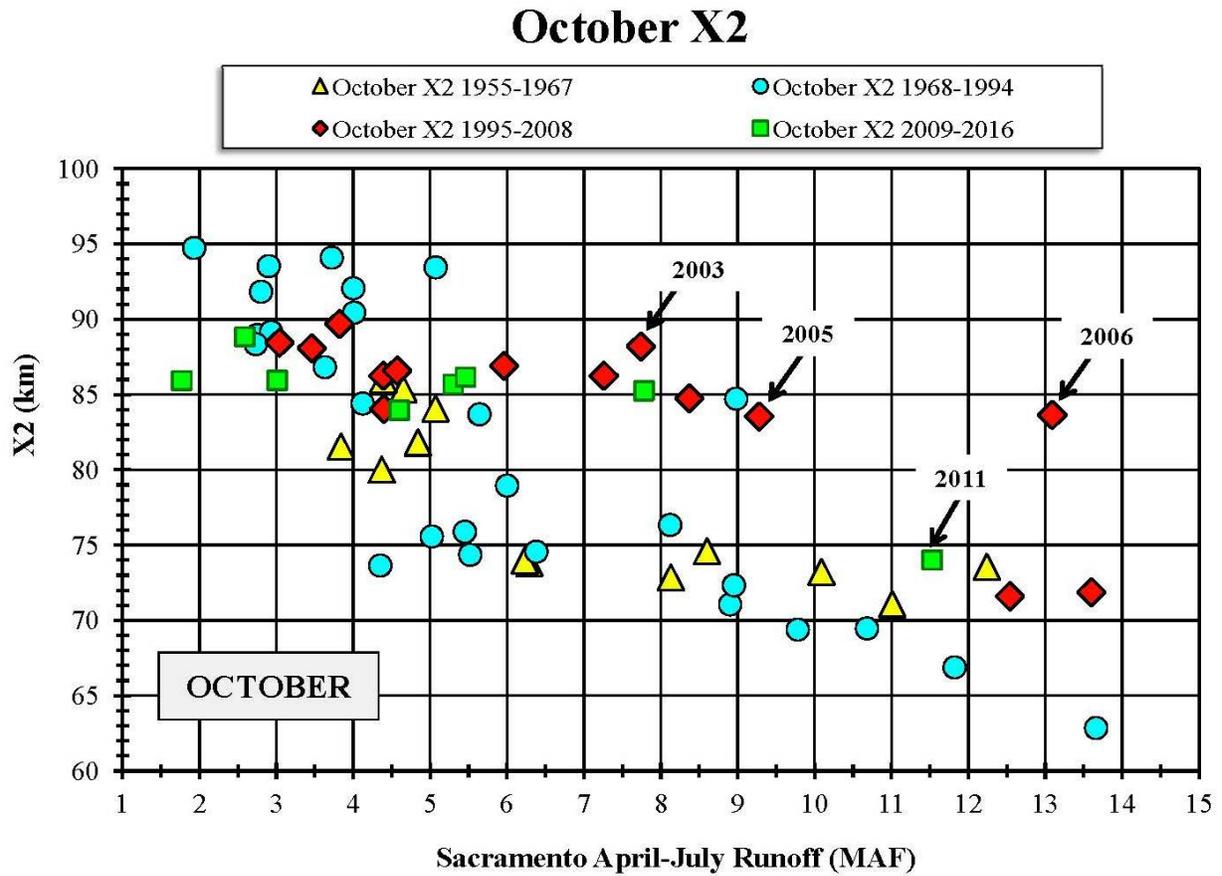


Figure 6: Historical monthly-averaged X2 for the month of October as a function of the Sacramento April-July unimpaired runoff for the period 1955-2016. The data are categorized into four periods: Pre-SWP (1955-1967); Pre-Bay-Delta Accord (1968-1994), Post-Accord (1995-2008); and Post-2008-2009 Biological Opinions (2009-2016).

**AGREEMENT FOR MITIGATION OF IMPACTS
TO CONTRA COSTA WATER DISTRICT FROM CONSTRUCTION AND
OPERATION OF BAY DELTA
CONSERVATION PLAN/ CALIFORNIA WATERFIX**

This Agreement for Mitigation of Impacts to Contra Costa Water District (“CCWD”) from Construction and Operation of the Bay Delta Conservation Plan / California WaterFix (this “**Agreement**”), by and between CCWD and the California Department of Water Resources (“DWR” and, together with CCWD, each a “**Party**” and, collectively, the “**Parties**”), is made as of the reference date of March 24, 2016. Capitalized terms not otherwise defined in this Agreement shall have the meanings set forth in Section 12.

RECITALS

- A. WHEREAS**, DWR and the United States Bureau of Reclamation (“**Reclamation**”) together have prepared a 2013 Draft Environmental Impact Report / Environmental Impact Statement (“**DEIR/S**”) and a 2015 Partially Recirculated Draft Environmental Impact Report / Supplemental Environmental Impact Statement (“**2015 RDEIR/SDEIS**”) for a project titled the Bay Delta Conservation Plan (“**BDCP**”), which includes Action Alternative 4A, called the California WaterFix (“**CWF**”) (collectively, “**BDCP/CWF**”);
- B. WHEREAS**, the BDCP/CWF includes as one of its components a facility to convey water from one or more water diversion intakes located along the Sacramento River (“**Northern Intakes**”) to the State and/or Federal pumping facilities in the south Delta (“**Conveyance Facility**”);
- C. WHEREAS**, in addition to the Conveyance Facility, the CWF includes the following components and parameters:
1. maximum diversion of a total of up to 9,000 cubic feet per second from a total of one or more new Northern Intakes;
 2. requirements to allow sufficient flow to bypass the new Northern Intakes and remain in the Sacramento River as specified in Table 4.1-2 of the 2015 RDEIR/SDEIS and Table 3-16 in the DEIR/S;
 3. continued use of existing State and Federal intakes in the south Delta to minimize water quality degradation by refraining from diverting from the Northern Intakes above a low-level pumping quantity of 300 cubic feet per second per intake during the months of July, August, and September of each calendar year unless the rate of diversions from the South Delta channels are at least approximately 3,000 cubic feet per second;
 4. coordinated operation of the State Water Project and Federal Central Valley Project facilities to: (i) meet the Delta outflow requirements in place as of the effective date of this Agreement as specified in State Water Resources Control Board Water Rights Decision 1641 (“**D-1641**”) Table 3 at pp. 183-187 and in the

United States Fish & Wildlife Service December 2008 Biological Opinion on the Effects of Long Term Coordinated Operations of the Central Valley and State Water Project on Delta Smelt and its Designated Critical Habitat, Reasonable and Prudent Alternative Component 3 at pp. 282-283 and Action 4 in Attachment B: (ii) the Rio Vista flow requirements in place as of the effective date of this Agreement as specified in D-1641 Table 3 at p. 184, and (iii) the additional Rio Vista flow requirements for at least 3,000 cubic feet per second from January to August of each calendar year, as specified in the 2015 RDEIR/SDEIS Table 4.1-2 at p. 4.1-9; and

5. up to 305 total acres of tidal wetland restoration located at Sherman Island, Cache Slough and the North Delta, where such restoration is required as mitigation for impacts of the BDCP/CWF and provided that tidal wetland restoration located at Sherman Island will not exceed 59 acres unless DWR demonstrates to CCWD's satisfaction that the tidal wetlands restoration mitigation will cause no adverse net water quality impacts at CCWD's intakes at any time;
- D. WHEREAS**, CCWD submitted comments on the 2015 RDEIR/SDEIS expressing its position that the BDCP/CWF would result in significant water quality, water supply and construction-related impacts to CCWD and its customers, and that the 2015 RDEIR/SDEIS was inadequate in other respects. Among other comments, CCWD expressed its concerns that construction of the BDCP/CWF could damage CCWD Facilities on and near Victoria Island; and that operation of the BDCP/CWF could cause salinity, algae and other contaminants to increase at CCWD's intakes. Increased salinity, algae and other contaminants at CCWD's intakes in turn could (a) adversely affect the quality of water delivered to CCWD's customers; (b) prevent CCWD from diverting water from one or more of its intakes during periods of degraded water quality; and (c) increase CCWD's water supply, energy and infrastructure costs due to changes in the timing of CCWD's diversions, periodic changes in the intakes used by CCWD to access water meeting CCWD's water quality objectives, and replacement of some or all of CCWD's water supply.
- E. WHEREAS**, DWR and Reclamation have filed a joint water rights petition before the State Water Resources Control Board ("**State Board**") that seeks to add three new points of diversion and/or points of re-diversion to specified water rights permits for the State Water Project and Central Valley Project in connection with the CWF ("**CWF Change of Point of Diversion**"). The State Board has bifurcated its proceedings on the CWF Change of Point of Diversion into multiple parts, and CCWD has filed a protest to the petition ("**Water Rights Protest Claims**").
- F. WHEREAS**, Reclamation has participated in informal consultation on the CWF under Section 7(a)(2) of the Endangered Species Act, 16 U.S.C. § 1536(a)(2), with the U.S. Fish & Wildlife Service and National Marine Fisheries Service and to that end has made available a working draft Biological Assessment for the CWF, which is anticipated to result in a final Biological Assessment and a Biological Opinion that will be critical to how the CWF will be operated.

- G. WHEREAS**, absent an enforceable and binding agreement to mitigate impacts of the BDCP/CWF to CCWD and its customers and to fully offset increased costs to CCWD resulting from operation of the BDCP/CWF, CCWD has threatened to commence litigation arising under the California Environmental Quality Act (“**CEQA**”), National Environmental Policy Act, California Water Code, Federal and State Endangered Species Acts, and other statutes and regulations to challenge actions and final decisions by DWR, Reclamation and other permitting agencies regarding the BDCP/CFW.
- H. WHEREAS**, without admitting to any liability arising from CCWD’s alleged harms above in Recital D, DWR desires to settle the Parties’ disagreements in lieu of litigation and to ensure that the BDCP/CWF provides the mitigation under CEQA, and resolves CCWD’s water right protest as a legal user of water, the Parties have agreed on measures to, among other things, (i) mitigate the impacts identified under CEQA of the BDCP/CWF, if approved, on CCWD and its customers, and (ii) fully offset any increased costs to CCWD and its customers resulting directly or indirectly from the BDCP/CWF, if approved, all as more fully set forth in this Agreement.
- I. WHEREAS**, the Parties recognize that DWR has not decided whether or on what conditions to approve the BDCP/CWF as a project under CEQA, and the Parties intend that, except with regard to the mitigation measures that must be implemented to address impacts to CCWD and its customers if DWR approves the BDCP/CWF, this Agreement in no way affects the independent judgment to be exercised and findings required to be made by DWR or CCWD under CEQA in the event the BDCP/CWF, is approved and implemented.
- J. WHEREAS**, this Agreement is intended to protect CCWD and its customers in the event that DWR approves and implements the BDCP/CWF; by entering into this Agreement CCWD does not endorse or otherwise support approval and implementation of the BDCP/CWF.
- K. WHEREAS**, DWR will benefit from CCWD’s withdrawal of its water rights protest prior to DWR’s selection of an action alternative and approval of the BDCP/CWF and prior to approval of the water rights petition, incidental take permits and other permits and approval that will govern construction and operation of the BDCP/CWF; therefore, this Agreement is intended to bind DWR and its successors and assigns to comply with the terms of this Agreement including but not limited to conveyance of Qualifying Water to CCWD in the amounts specified by this Agreement, regardless of the physical features, components or operational parameters approved and permitted for the BDCP/CWF and regardless of whether CCWD exercises its right to comment upon, oppose or challenge actions, approvals and permits for an alternative or project modification that both (i) deviates from the components and parameters specified in Recital C, above and (ii) has the potential to harm water quality at CCWD’s intakes.
- L. WHEREAS**, operation of the BDCP/CWF could adversely affect CCWD in a manner that is not addressed by this Agreement if the BDCP/CWF is approved, permitted or modified in a manner that deviates from the project components and parameters specified in Recital C, above; accordingly, this Agreement is not intended to prevent CCWD from

commenting on, opposing, or challenging any action, permit or approval that both (i) deviates from the project components and parameters specified in Recital C, above (b) has the potential to harm water quality at CCWD's intakes.

M. WHEREAS, the Parties recognize that to fully implement this Agreement, other agreements, permits and approvals are contemplated including but not limited to: an agreement between CCWD and the East Bay Municipal Utility District ("**EBMUD**") to allow water to be conveyed to CCWD through EBMUD's Freeport Intake ("**Freeport Intake**") and the interconnection between EBMUD's Mokelumne Aqueduct and CCWD's Los Vaqueros Pipeline; State Board approval of a water rights petition to identify the Freeport Intake as a point of diversion for water diverted pursuant to CCWD's Los Vaqueros water right; State Board approval of a water rights petition to identify the new Northern Intakes as points of diversion for water diverted pursuant to CCWD's Los Vaqueros water right; a Warren Act Contract between CCWD and Reclamation for conveyance through the Folsom South Canal of water diverted at the Freeport Intake under the Los Vaqueros water right; and cooperation from Reclamation with regard to implementation of CCWD's water supply contract with Reclamation in a manner that is consistent with the terms of this Agreement.

N. WHEREAS, two of CCWD's customers, the City of Antioch ("**Antioch**") and the City of Brentwood ("**Brentwood**"), as well as the East Contra Costa Irrigation District ("**ECCID**"), which supplies water to CCWD and to Brentwood, have submitted comments on the 2015 RDEIR/SDEIS expressing their concerns that they could be adversely affected by the BDCP/CWF in a manner that would not be fully addressed by mitigation of impacts to CCWD; two of these agencies (Antioch and ECCID) have existing agreements with DWR to address water quality at their intakes, and complete mitigation for water quality impacts to all of its customers and partners is important to CCWD; therefore, this Agreement requires DWR to contact each of these agencies and, if agreeable to these agencies, to commence negotiations regarding potential impacts to these agencies beyond the impacts to CCWD that are addressed by this Agreement, it being understood that this Agreement is not intended to address potential impacts of the BDCP/CWF to Antioch, ECCID or Brentwood except to the extent such impacts are indirectly addressed as a practical matter by the CEQA mitigation measures provided for in this Agreement to mitigate the impacts of the BDCP/CWF on CCWD.

NOW, THEREFORE, THE PARTIES MUTUALLY AGREE AS FOLLOWS:

1. EFFECTIVENESS, CEQA REVIEW AND TERM OF AGREEMENT

1.1 Effective Date. This Agreement shall be effective as of the date that it is executed by both Parties, except to the extent expressly provided below in subsection 1.1.1.

1.1.1 CCWD's obligations under Section 5.1 of this Agreement shall become effective only if, after completing CEQA review of the BDCP/CWF, DWR selects and approves a BDCP/CWF action alternative that does not deviate from the components and parameters of the CWF that are described in Recital C above (a "**Conforming Action Alternative**").

1.1.2 The Parties agree and acknowledge that DWR must complete CEQA review before it can construct, operate or use the BDCP/CWF. In conducting its CEQA review, DWR reserves all of its rights, powers and discretion under CEQA with regard to the BDCP/CWF, including, to the extent permitted under applicable law, but without limiting any of DWR's obligations under this Agreement, (i) the authority to adopt mitigation measures and/or an alternative project design, configuration, capacity or location in order to reduce any identified significant environmental impacts; (ii) the authority to deny approval of the BDCP/CWF based on any significant environmental impact that cannot be mitigated; and (iii) the authority to approve the BDCP/CWF notwithstanding any significant environmental impact that cannot be mitigated, if DWR determines that these impacts are outweighed by the project's social, economic or other benefits. CCWD similarly reserves all of its rights, powers and discretion under CEQA with regard to any decision by CCWD on whether and how to approve any connection to or use of any Conveyance Facility that is part of the BDCP/CWF. Notwithstanding the discretion identified in this Section, if DWR approves the BDCP/CWF or any modification to the BDCP/CWF, DWR shall implement the terms of this Agreement.

1.1.3 The Parties further agree and acknowledge that DWR also must complete CEQA review before it can construct, operate or use any Interconnection Facilities. Pursuant to this Agreement, DWR will identify construction and operation of the Interconnection Facilities as mitigation measures in the Final EIR/EIS for the BDCP/CWF, and will include an evaluation of the environmental effects of such mitigation in the Final EIR/EIS for the BDCP/CWF. In conducting its CEQA review, DWR reserves all of its rights, powers and discretion under CEQA with regard to the Interconnection Facilities, including, to the extent permitted under applicable law, but without limiting any of DWR's obligations under this Agreement, (i) the authority to adopt mitigation measures and/or an alternative project design, configuration, capacity or location in order to reduce any identified significant environmental impacts; (ii) the authority to deny approval of the Interconnection Facilities based on any significant environmental impact that cannot be mitigated (in which case DWR also must deny approval of the associated Conveyance Facility); and (iii) the authority to approve the Interconnection Facilities notwithstanding any significant environmental impact that cannot be mitigated, if DWR determines that these impacts are outweighed by the project's social, economic or other benefits. CCWD similarly reserves all of its rights, powers and discretion under CEQA with regard to any decision by CCWD on whether and how to approve any operation or use of the Interconnection Facilities. Notwithstanding the discretion identified in this Section, if DWR approves the BDCP/CWF or modifications to the BDCP/CWF,

DWR shall implement the terms of this Agreement including but not limited to the duty to construct the Interconnection Facilities.

- 1.2 Term. Unless this Agreement is earlier terminated by mutual written agreement of the Parties, this Agreement shall remain in effect for the entire duration that the BDCP/CWF and/or any amendment, modification, supplement or replacement thereof is in operation, including, without limitation, during any lapse thereof or any cessation of use of any Conveyance Facility that is later followed by the design, construction, operation or use of the same or a new or modified Conveyance Facility. For the avoidance of doubt, this Agreement shall be effective from and after the effective date hereof, including, without limitation, at any such time that is prior to the design, construction, operation or use of any Conveyance Facility; provided, however, this Agreement will automatically terminate if all of the following occur: (i) DWR permanently withdraws its CWF Change in Point of Diversion application; (ii) for a period of twenty (20) years following execution of this Agreement, DWR does not receive State Board approval for a CWF Change in Point of Diversion or any other change in point of diversion for a Conveyance Facility; and (iii) for a period of twenty (20) years following execution of this Agreement, DWR does not commence construction of the Conveyance Facility.

2. CONSTRUCTION OF CONVEYANCE FACILITY AND INTERCONNECTION FACILITIES

2.1 Provisions Applicable to the Design, Construction and Maintenance of the Conveyance Facility and the Interconnection Facilities.

2.1.1 Coordination between CCWD and DWR regarding Design, Construction, and Maintenance Schedules. DWR shall coordinate with CCWD on the schedules for design, construction and maintenance of the portion of the Conveyance Facility located on or beneath Victoria Island, San Joaquin County (“**Conveyance Facility on Victoria Island**”) and the Interconnection Facilities (as defined in Section 2.3.1).

- (a) DWR shall provide a detailed schedule to CCWD for completion of design of the Conveyance Facility and Interconnection Facilities. DWR shall include as part of the design schedule sufficient time to enable completion of the review and comment periods provided by this Agreement prior to advertising the Conveyance Facility and Interconnection Facilities for bid and construction.
- (b) No later than one hundred twenty (120) days prior to the commencement of construction of the Conveyance Facility on Victoria Island or Interconnection Facility, whichever occurs first, and no later than ninety (90) days prior to the commencement of construction or other ground-disturbing

activities associated with maintenance of the Conveyance Facility on Victoria Island, DWR shall provide to CCWD a detailed proposed construction schedule for each facility, including the proposed scope of construction or maintenance activities, proposed dates for such construction or maintenance, construction or maintenance activities (including dewatering as described in Section 2.2.2), a schedule of typical equipment and materials and the proposed construction contractor. CCWD shall provide written comments on the proposed construction or maintenance schedules to DWR within thirty (30) days of CCWD's receipt of each proposed schedule. DWR agrees to implement all CCWD comments except to the extent implementation of one or more comments would cause substantial delay in designing, constructing or maintaining the Conveyance Facility on Victoria Island or Interconnection Facilities or would result in a substantial increase in construction or maintenance costs. To the extent DWR objects to any of CCWD's written comments, within fifteen (15) days of DWR's receipt of said comments, DWR shall notify CCWD in writing of its objection and the Parties shall meet and confer in good faith to resolve the dispute. If the Parties cannot resolve the dispute within twenty-one (21) days of DWR's written notice of objection, the matter may be submitted by either Party to arbitration pursuant to Section 7 of this Agreement.

- (c) The schedule specified in Section 2.1.1(b), above, may be changed by the Parties by mutual consent.

2.1.2 Review of Documents. Unless noted otherwise in this Agreement or unless revised by the Parties by mutual written agreement, the following review and comment process shall apply:

- (a) Any review or approval of documents by CCWD contemplated by this Agreement, including but not limited to review of project designs, technical studies, third party contracts, and contractor submittals, shall be completed within fifteen (15) working days of receipt of those documents by CCWD from DWR. If CCWD has comments on a document, CCWD shall provide such comments to DWR in writing.
- (b) Within fifteen (15) working days of receipt of said comments, DWR shall notify CCWD in writing to the extent DWR objects to any of CCWD's written comments, and the Parties shall meet and confer in good faith to resolve the dispute.

- (c) If the Parties cannot resolve the dispute within twenty-one (21) working days of DWR's written notice, the matter may be submitted to arbitration pursuant to Section 7 of this Agreement.
- (d) If CCWD does not return comments to DWR within fifteen (15) working days of CCWD's receipt of contractor submittals, DWR will respond to the contractor submittals within the timeframe stipulated in the construction contract and will not delay response waiting for CCWD comments.

2.1.3 CCWD Review of Third Party Contracts. CCWD shall have the right to review construction, maintenance and similar contracts between DWR and third parties relating to the Conveyance Facilities within 1,000 feet of the easement for CCWD's Middle River Pipeline on Victoria Island and relating to the Interconnection Facilities (each a "Third Party Contract"). In furtherance of the foregoing, DWR shall provide CCWD with drafts of each Third Party Contract in a timely manner such that CCWD can review and provide comments on such drafts. DWR shall consider all such comments in good faith; provided that, to the extent any provisions of such Third Party Contracts conflict with the terms of this Agreement, DWR shall not include them in the final contracts without the written consent of CCWD. Unless otherwise agreed to by CCWD, each Third Party Contract will contain provisions acceptable to CCWD relating to the conduct of the construction or maintenance at or affecting any CCWD Facility, including, without limitation, compliance with CCWD's environmental, health and safety programs, and the right of CCWD to require DWR to halt construction activities that could cause material damage to CCWD's property, inspection and other rights.

2.1.4 Reimbursement of CCWD Costs for Review and Coordination. Promptly upon written notice thereof from CCWD, including a reasonably detailed description of such costs, DWR shall reimburse CCWD the cost of any CCWD staff time or third-party consultant costs relating to review of documents including but not limited to project designs, technical studies, third party contracts, and contractor submittals; pre-construction and post-construction inspections; reasonable observation and inspection during construction and maintenance; or any other activities to implement this Agreement relating to design, construction and maintenance of the Conveyance Facility on Victoria Island and Interconnection Facilities.

2.1.5 Avoidance of Western Area Power Administration Facilities. Construction and maintenance of the Conveyance Facility on Victoria Island and Interconnection Facilities has the potential to impact Western Area Power Administration facilities that provide power to the CCWD Facilities on or near Victoria Island (the "**WAPA Facilities**"), including

power lines and towers. DWR shall implement measures which in the reasonable opinion of CCWD are sufficient to protect the WAPA Facilities from potential damage when siting, constructing and maintaining the Conveyance Facility on Victoria Island and Interconnection Facilities, including with respect to access roads and Western Area Power Administration right-of-ways.

- 2.1.6** Continued Access to CCWD Facilities. DWR shall ensure that CCWD has free and safe access to CCWD Facilities at all times during construction and maintenance of the Conveyance Facility and Interconnection Facilities.
- 2.1.7** Pre-Construction and Post-Construction Inspections. Prior to the commencement of construction of the Conveyance Facility on Victoria Island or the Interconnection Facilities, whichever occurs first, CCWD shall conduct a pre-construction inspection of those CCWD Facilities that could be affected by construction of the Conveyance Facility on Victoria Island and the Interconnection Facilities. Following completion of construction of the Conveyance Facility on Victoria Island and the Interconnection Facilities, CCWD shall conduct a post-construction inspection of those same CCWD Facilities to determine whether damage to those CCWD Facilities occurred as a result of construction activities.
- 2.1.8** Damage to CCWD Facilities and Access Roads. Upon written notice from CCWD describing such costs in reasonable detail, DWR shall promptly reimburse CCWD for all costs incurred by CCWD due to damage caused by construction and maintenance of the Conveyance Facility on Victoria Island and the Interconnection Facilities, including but not limited to the costs of repair or replacement of CCWD Facilities. In addition, DWR shall repair or replace any access roads and levees damaged by construction and maintenance of the Conveyance Facility on Victoria Island and the Interconnection Facilities. If DWR fails to immediately repair or replace said access roads and levees, CCWD shall have the option of conducting such repairs or replacement and DWR shall promptly reimburse CCWD for the costs of such repair or replacement, upon written notice from CCWD describing such costs in reasonable detail.
- 2.1.9** Loss of Water Supply. Any loss of CCWD water supply directly or indirectly caused by (i) construction or maintenance by DWR or its third party contractors of the Conveyance Facility, (ii) construction or maintenance by DWR or its third party contractors of any other component of the BDCP/CWF, or (iii) construction or maintenance by DWR or its third party contractors of the Interconnection Pump Station; or (iv) construction by DWR or its third party contractors of the Interconnection Pipeline and Interconnection Valve, shall be the

responsibility of DWR, and may be recouped through delivery of the same amount of water to CCWD via the interconnection between the East Bay Municipal Utility District (“**EBMUD**”) Mokelumne Aqueduct and CCWD’s Los Vaqueros Pipeline at DWR’s sole expense, or in another manner reasonably satisfactory to CCWD and at DWR’s expense.

2.1.10 Levee Subsidence. The Parties shall work in good faith to establish a set of protocols, protective measures and monitoring to address potential levee subsidence associated with construction and maintenance of the Conveyance Facility on Victoria Island and the Interconnection Facilities. Construction of the Conveyance Facility on Victoria Island or the Interconnection Facilities shall not commence until such protocols and protective measures are established to the Parties’ mutual satisfaction.

2.1.11 Hazardous Materials. DWR shall use, store and dispose of Hazardous Material to be used to construct the facilities described in Section 2 of this Agreement by DWR or DWR’s Related Parties only in compliance with any and all applicable federal, state or local environmental health or safety laws, statute, ordinance, rule, regulation or requirement (“**Environmental Laws**”). DWR shall, at DWR’s sole cost and expense, promptly undertake such removal or remedial action as may be required by Environmental Law with regard to any non-de minimis violation of any Environmental Law with regard to any Hazardous Material used by DWR or DWR’s Related Parties. “**Hazardous Material**” shall mean any asbestos-containing materials, petroleum, explosives, toxic materials, or any other substances regulated as hazardous wastes, hazardous materials, hazardous substances, or toxic substances under any Environmental Laws, including but not limited to any substance, pollutant or contaminant listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. 9601, et seq., and the regulations promulgated pursuant to the Act.

2.2 Provisions Relating to the Conveyance Facility on Victoria Island.

2.2.1 Victoria Island Safe Haven Shaft. DWR shall notify CCWD in writing in the event DWR determines that a safe haven shaft is required in conjunction with sub-surface construction and tunneling on Victoria Island. Prior to the construction of any safe haven shaft, DWR shall provide CCWD engineering drawings and data, specifications, materials, maps, hydrologic data and seismic studies relating to such shaft and such other information as may be reasonably requested by CCWD in order to review and evaluate DWR’s proposal. The location and design of such shaft shall be coordinated with CCWD pursuant to the process described in Section 2.1.2 of this Agreement.

- 2.2.2** Dewatering. DWR shall ensure that it designs and implements dewatering in conjunction with the construction and maintenance of pipelines/tunnels, shafts and other components of the Conveyance Facility to prevent damage to the CCWD Facilities that may result from dewatering. The minimum amount of dewatering necessary to implement construction and maintenance shall be effectuated only upon (i) a written settlement monitoring and corrective action plan coordinated between and executed by the Parties with direct input by CCWD regarding allowable settlement trigger points, and (ii) the placement of instrumentation on the CCWD Facilities at a site to be mutually agreed by the Parties, at DWR's sole expense, for the monitoring of settlement.
- 2.2.3** Dewatering Discharge. DWR shall neither cause nor permit any dewatering that takes place pursuant to Section 2.2.2 to have an adverse impact on the CCWD Facilities or water quality.
- 2.2.4** Restrictions on Parking and Stockpiling. DWR shall ensure that no construction and maintenance equipment shall park on or over CCWD Facilities and no construction and maintenance material shall be stockpiled on CCWD-owned property or within CCWD easements without CCWD's prior written authorization. DWR shall ensure that equipment and materials hauling activities over CCWD Facilities do not result in excessive loading, and DWR shall submit calculations and measures to reduce loads, such as trench plates, to CCWD for review and approval in advance of commencing any equipment and materials hauling activities over CCWD Facilities.
- 2.2.5** Tunnel Design to Avoid Ground Settlement. The design of the Conveyance Facility tunnels on Victoria Island shall be based on DWR's geotechnical analysis and shall include measures sufficient to avoid ground settlement within 1,000 feet of the easement for CCWD's Middle River Pipeline. CCWD shall have the right to review such geotechnical analysis, and DWR shall respond to comments by CCWD, pursuant to the process described in Section 2.1.2 of this Agreement. CCWD shall provide to DWR levels of ground settlement that can be tolerated at CCWD Facilities, to be included in the design documents used for bidding and construction of the Conveyance Facility on Victoria Island.

2.3 Design and Construction of the Interconnection Facilities.

- 2.3.1** DWR Obligation to Design and Construct Interconnection Facilities. To ensure the Secondary Method for conveying water to CCWD, as described further in Section 3.3 of this Agreement, is available for conveyance of Qualifying Water, as defined in Section 3.4 of this

Agreement, DWR shall design and construct the “**Interconnection Facilities.**”

- (a) Unless modified by mutual written agreement of the Parties, the Interconnection Facilities shall consist of the following facilities: (i) a direct connection to the Conveyance Facility, pumping station, and appurtenant facilities (collectively “**Interconnection Pump Station**”) on Victoria Island with capacity to convey Qualifying Water to CCWD’s Old River Pipeline at a normal operating capacity of 150 cubic feet per second, and with sufficient pressure for the water to reach CCWD’s Existing Transfer Pump Station while the Old River Pipeline is operating at a total flow rate of up to 320 cubic feet per second; (ii) a pipeline and appurtenant facilities with a normal operating capacity of 150 cubic feet per second to convey the water from the Interconnection Pump Station on Victoria Island to CCWD’s Middle River Pipeline (“**Interconnection Pipeline**”), (iii) a valve between the Interconnection Pipeline and CCWD’s Middle River Pipeline (“**Interconnection Valve**”); and (iv) all instrumentation and communication equipment needed for CCWD to remotely monitor all Interconnection Facilities and operate all CCWD-owned facilities.
- (b) DWR shall design and construct the Interconnection Facilities in coordination with CCWD. DWR shall provide CCWD engineering drawings and data, specifications, materials, maps, hydrologic data and seismic studies relating to the Interconnection Facilities and such other information as may be reasonably requested by CCWD in order to review and evaluate DWR’s proposal. The location and design of such Interconnection Facilities shall be coordinated with CCWD pursuant to the process described in Section 2.1.2 of this Agreement.
- (c) Prior to the commencement of construction of the Interconnection Facilities, DWR and CCWD may consider and mutually agree to increase the Interconnection Facilities’ normal operating capacity to 250 cubic feet per second, with responsibility for the costs associated with the increased capacity to be determined during negotiation of such mutual agreement. Further, during design of the Interconnection Facilities, DWR and CCWD may consider and mutually agree to a different design for the Interconnection Facilities under which the Interconnection Pipeline conveys water to CCWD’s Old River Pipeline from a new pump station connected to the Conveyance Facility at the Subdivided Clifton Court Forebay. The amount of mitigation water to be conveyed in any year is specified in

Section 3.6 and 3.7 and would be the same regardless of the size or capacity of the Interconnection Facilities.

- (d) As part of its CEQA review for the BDCP/CWF, DWR shall evaluate the Interconnection Facilities, including a capacity of 250 cubic feet per second. The Interconnection Facilities are intended as a mitigation measure to be included in the Final EIR/EIS for the BDCP/CWF. The Parties recognize that, if after DWR completes the Final EIR/EIS and approves the BDCP/EIR, DWR later elects to pursue an alternative design for the Interconnection Facilities that differs from the design selected by DWR at the time DWR certifies the Final EIR/EIS and approves the BDCP/CWF, additional CEQA review may be required. Further, this Agreement does not obligate DWR to pay the cost of CEQA review if CCWD later proposes to modify the Interconnection Facilities after they have been constructed.

2.3.2 Interconnection Facilities Design to Include Liquefaction Analysis. The design of the Interconnection Facilities shall include a liquefaction analysis that (i) evaluates potential impacts of liquefaction, and (ii) describes mitigation measures to protect the Interconnection Facilities, the appurtenant structures and the connection point between the Interconnection Facilities and the CCWD Facilities. CCWD shall have the right to review such liquefaction analysis, and DWR shall respond to comments by CCWD, pursuant to the process described in Section 2.1.2 of this Agreement.

2.3.3 Interconnection Facilities Design to Reflect Differential Settlement and Flexibility of Connections. The design of the Interconnection Facilities shall (i) evaluate and address potential differential settlement, and (ii) incorporate flexible connections between CCWD Facilities and the Interconnection Facilities to account for long-term settlement, seismic motion and/or sea level rise impacts. CCWD shall have the right to review such differential settlement analysis, and DWR shall respond to comments by CCWD, pursuant to the process described in Section 2.1.2 of this Agreement.

2.3.4 CCWD Design Review. Design of the Interconnection Facilities that may affect one or more existing CCWD Facilities is subject to review by a third party of CCWD's choice and at DWR's expense as part of the value engineering or peer review process for BDCP/CWF. CCWD shall be invited as a participant of any Value Engineering workshops held in conjunction with the Interconnection Facilities design.

2.3.5 Design Standards. The Interconnection Facilities shall be designed using the current standards for design criteria and the current seismic loading and performance requirements including site-specific seismic

use criteria at the time of design and construction for a critical facility. All electrical and mechanical equipment shall be designed to ensure immediate post-earthquake functionality following the maximum credible earthquake for the site. The design as completed by DWR shall be sealed by an overall Engineer of Responsible Charge and the appropriate discipline engineers utilized on the project, with all registered engineers being so registered in the State of California. The design shall be completed using the professional standard of care for such projects within California. CCWD shall have the right to review all design documents, including a detailed surge analysis demonstrating that CCWD Facilities will be protected from any potentially damaging operations, during the design preparation and prior to issuance of the final design for the Interconnection Facilities.

2.3.6 Costs. DWR shall secure fee title or permanent easements for, and design and construct all components of the Interconnection Facilities, in each case at its sole cost.

2.3.7 Interconnection Pump Station. After completion of construction of the Interconnection Facilities, DWR shall own, operate and maintain the Interconnection Pump Station. DWR shall inspect the Interconnection Pump Station at least once per year per all manufacturers' recommended maintenance schedules for corrosion, coatings, safety, drainage, security, electrical and mechanical functionality, structural and geotechnical performance, and any other conditions necessary to ensure reliable and safe facility operation. DWR shall promptly provide the results of such inspections to CCWD. DWR shall be responsible for repairing and replacing all components of the Interconnection Pump Station at its sole cost so that it is capable of operating in good condition and at its design capacity at all times.

2.3.8 Interconnection Pipeline and Interconnection Valve. After completion of construction of the Interconnection Pipeline and Interconnection Valve, DWR shall transfer ownership of the Interconnection Pipeline and Interconnection Valve to CCWD and CCWD shall be responsible for operation and maintenance of the Interconnection Pipeline and Interconnection Valve.

- (a) DWR shall retain the fee title or easement for the real property on which the Interconnection Pipeline and Interconnection Valve are located, but shall ensure that CCWD has full and complete access to the Interconnection Pipeline and Interconnection Valve for the purposes of inspecting, maintaining and replacing such Interconnection Pipeline and Interconnection Valve. Alternatively DWR may elect to transfer the fee title or easement for the Interconnection Pipeline and Interconnection Valve to CCWD.

- (b) CCWD shall regularly inspect the Interconnection Pipeline and Interconnection Valve, and shall promptly provide the results of such inspections to DWR. CCWD shall be responsible for repairing and replacing all components of the Interconnection Pipeline and Interconnection Valve so that they are capable of operating in good condition and at their design capacity at all times; provided, however, that DWR shall be responsible for repairing and replacing at its sole cost all components of the Interconnection Pipeline and Interconnection Valve that are defective due to construction or latent defects.

2.3.9 Interconnection Pipeline Easement. The Interconnection Pipeline shall be constructed in an easement dedicated to its purpose. DWR shall ensure that all easements for the Interconnection Pipeline and Interconnection Valve provide the ability for CCWD to access such facilities without undue burden or delay and without prior written approval, in order to operate, maintain, renew, replace or install facilities and appurtenances. DWR shall provide all easements and land agreements to CCWD for its review in advance of finalizing such easements and land agreements. The pipeline shall be designed by DWR to pressures and flow rates as approved by CCWD. The connection of the Interconnection Pipeline to CCWD Facilities shall be as approved and coordinated by CCWD.

2.3.10 Victoria Island Pump Station. The location of a pump station on Victoria Island, if needed to transfer flows from the Conveyance Facility to the CCWD Facilities, shall be subject to approval by CCWD. In requesting approval from CCWD for the location of a Victoria Island Pump Station, DWR shall provide CCWD prior to the construction of the pump station design with engineering drawings and data, power supply design, specifications, materials, maps, hydrologic data, seismic studies and any other information reasonably requested by CCWD in order to properly evaluate DWR's proposal. CCWD shall have the right to review such documents pertaining to the pump station, and DWR shall respond to comments by CCWD, pursuant to the process described in Section 2.1.2 of this Agreement.

2.3.11 Elevation of Equipment Associated with Interconnection Facilities. DWR shall ensure that any shafts, permanent pumping equipment or permanent electrical equipment associated with the Interconnection Facilities shall be located on or accessed from a finished grade consistent with U.S. Army Corps of Engineers criteria for flood protection and levee breach, and sufficient for protection in the event of sea level rise as identified at the time the design is completed and for the design life of the Interconnection Facilities, assumed for purposes of this provision to be 50 years.

- 2.3.12** Restrictions on Parking and Stockpiling. DWR shall ensure that no construction and maintenance equipment shall park on or over CCWD Facilities and no construction material shall be stockpiled on CCWD-owned property or within CCWD easements without CCWD's prior written authorization. DWR shall ensure that equipment and materials hauling activities over CCWD Facilities do not result in excessive loading, and DWR shall submit calculations and measures to reduce loads, such as trench plates, to CCWD for review and approval in advance of commencing any equipment and materials hauling activities over CCWD Facilities.
- 2.3.13** Control of Connections and Valves. All connections and valves at the CCWD Facilities shall be solely controlled and operated by CCWD.
- 2.3.14** Selection of Construction Contractor. The procedure for selection of a contractor for the construction of the Interconnection Facilities contemplated by this Agreement shall conform with then-applicable State law with regard to public works contracts.
- 2.3.15** Construction Observation Rights. CCWD shall have access to the construction site and the right to reasonably observe and comment on construction at all times during the construction of the Interconnection Facilities. Specific points of connection and coordination with CCWD Facilities shall be scheduled as part of the construction schedule and a detailed connection plan provided by DWR to CCWD a minimum of 90 days prior to the connection occurring to allow sufficient time to review, comment and accept the connection plan by CCWD. DWR shall provide CCWD all construction contractor submittals for review, and shall provide as-built documents as well as operations and maintenance manuals for all equipment to be owned and operated by CCWD.
- 2.3.16** Testing Plans. CCWD and DWR shall jointly develop multiple startup and testing procedures for the Interconnection Facilities and any pumping equipment and movement of water through the Interconnection Facilities once they have been accepted for testing and operations by both Parties.
- 2.3.17** Operational Date. The Interconnection Facilities shall be fully operational no later than the first day of operation of any Conveyance Facility.
- 2.3.18** Instrumentation. DWR shall as part of the design and construction of the Interconnection Facilities incorporate SCADA systems into its facility that can communicate with and be controlled by CCWD using a mutually agreed upon platform and communication protocols.

2.3.19 Operation, Maintenance, Repair, and Replacement of the Interconnection Facilities. DWR shall at its expense obtain all permits and other approvals necessary for the operation, maintenance, repair, and replacement of the Interconnection Facilities. DWR shall provide CCWD with copies of all permits issued and other approvals necessary for the Interconnection Facilities, including all necessary CEQA compliance documents. CCWD and DWR may only operate the Interconnection Facilities valves that they own. The Parties shall coordinate operations of their separate facilities with the operation of the Interconnection Facilities. Water supplied through the Interconnection Facilities shall be measured upstream of the point of interconnection by the flow meters located at the Interconnection Pump Station, which will be calibrated as needed to the mutual satisfaction of both Parties. The expense of calibration shall be shared equally by both Parties. The Parties shall schedule a meeting in advance of operation and confirm at that meeting the procedures by which the Interconnection Facilities shall be operated to deliver water. Each Party shall be given unrestricted access to its respective Interconnection Facilities at all times without prior notice. DWR and CCWD agree neither party has the right or obligation to operate or maintain the other party's Interconnection Facilities. Each party shall have the sole responsibility for the security of its respective property at all times. Each Party shall have responsibility for operating, maintaining, and repairing its respective Interconnection Facilities. Each Party may operate, repair or replace any of the physical works of the other's Interconnection Facilities with the prior written agreement of the other Party. Either Party may perform or contract for work on its own property, including its easement(s) or right(s) of way, in regard to its own Interconnection Facilities. The other Party shall cooperate with such work, conduct its own operations in such a manner as not to cause any unnecessary delay or hindrance, and adjust and coordinate its work so as to permit proper completion of all work in the area.

2.3.20 Future Agreements. The Parties may enter into separate, future agreements concerning the use of the Interconnection Facilities for purposes beyond the scope of this Agreement, with costs associated with such use to be determined in corresponding agreements.

3. CEQA MITIGATION OF CCWD WATER QUALITY AND SUPPLY IMPACTS BY CONVEYANCE OF WATER TO CCWD FROM AN ALTERNATE HIGH-QUALITY SOURCE

3.1 Conveyance of Mitigation Water. To mitigate for water quality and water supply impacts arising from the water quality impacts to CCWD from the construction, operation or use of any Conveyance Facility, DWR shall convey water to CCWD (i) meeting the water quality requirements of Section 3.4 of this Agreement, (ii) in the minimum amounts specified in Section 3.6 of this Agreement and

(iii) according to the schedule specified in Sections 3.7 and 3.8 of this Agreement. The method of conveying the water to CCWD shall be as specified in Section 3.2 or Section 3.3 of this Agreement, and the cost of conveying the water shall be borne by DWR as specified in Section 3.5 of this Agreement. CCWD shall identify whether the water conveyed to it by DWR is: (a) water diverted pursuant to CCWD's CVP Contract Supply, provided that it is within CCWD's then current allocation and schedule; (b) water diverted under CCWD's Los Vaqueros water right, provided that it is within the amount and season then authorized in the LV Water Right Permit and providing the Delta is then in surplus conditions; (c) transfer water purchased by CCWD, provided that CCWD has purchased the transfer water and obtained all necessary permits and approvals, or (d) or any combination of (a), (b) or (c). This Agreement does not increase the total amount of water that CCWD otherwise would be entitled to divert pursuant to its CVP Contract Supply, Los Vaqueros water right, or any water transfers. This Agreement also does not change any existing approval process for identification, scheduling, or allocation of water diverted pursuant to CCWD's CVP Contract Supply, Los Vaqueros water right, or any water transfers. Water conveyed to CCWD pursuant to this Agreement may be used as CCWD deems appropriate in its sole discretion.

3.2 Primary Method of Conveyance. The primary method of conveying the water described in Section 3.1 ("**Primary Method**") shall be through EBMUD's Freeport Intake and the interconnection between EBMUD's Mokelumne Aqueduct and CCWD's Los Vaqueros Pipeline.

3.2.1 CCWD will use reasonable efforts to enter into a separate agreement with EBMUD under which the Freeport Intake and CCWD interconnection with EBMUD's Mokelumne Aqueduct could be used to convey water to CCWD pursuant to this Agreement (such separate agreement, the "**CCWD/EBMUD Use Agreement**").

3.2.2 The Parties acknowledge that delivery of water to CCWD via the Freeport Intake and interconnection between CCWD and EBMUD's Mokelumne Aqueduct may be constrained by EBMUD's scheduling or other requirements imposed by EBMUD or regulatory agencies.

3.3 Secondary Method of Conveyance. The secondary method of conveying the water described in Section 3.1 ("**Secondary Method**") shall be through the Interconnection Facilities described in Section 2.3.1.

3.3.1 The Secondary Method shall be used if (i) DWR determines the Primary Method is impractical for scheduling or financial reasons, (ii) no CCWD/EBMUD Use Agreement is then in effect, or (iii) EBMUD determines that capacity at the Freeport Intake is not then available.

3.4 Water Quality Requirements. Regardless of whether the Primary Method or Secondary Method is used, the water to be conveyed to CCWD pursuant to this

Agreement shall, to the extent feasible, contain a maximum of 30 mg/L chlorides and a maximum of 4 mg/L total organic carbon (“Qualifying Water”). DWR shall maintain a water quality station at the Subdivided Clifton Court Forebay (if the Interconnection Pump Station is located at the Clifton Court Forebay), or at the Intermediate Forebay (if the Interconnection Pump Station is located on Victoria Island), to monitor chloride and total organic carbon and report the daily data in real-time on the California Data Exchange Center (“CDEC”) or a similar future database mutually acceptable to the Parties. If data is not available to determine whether Qualifying Water is available, CCWD shall have the sole discretion to determine whether to accept delivery of the water to be conveyed to CCWD pursuant to this Agreement. Prior to the conveyance of water to CCWD through either the Primary Method or the Secondary Method, the Parties shall evaluate existing conditions for concentrations of chlorides and organic carbon and may, by mutual agreement, amend this Agreement to modify the amount of chlorides or total organic carbon authorized for, and acceptable to, CCWD as Qualifying Water.

3.5 Costs of Conveyance to CCWD’s Existing Transfer Pump Station. Regardless of whether the Primary Method or Secondary Method is used for conveyance of water to CCWD, DWR shall bear all costs associated with conveyance to CCWD of the quantity and quality of water required by this Agreement (including, without limitation, all associated energy costs). If the Primary Method is used to convey water to CCWD, DWR shall pay EBMUD the amount charged by EBMUD for conveyance of the water from the Freeport Intake to CCWD Facilities at a pressure sufficient to lift the conveyed water to CCWD’s Existing Transfer Pump Station. If the Secondary Method is used to convey water to CCWD, DWR shall pay the costs associated with conveyance through the Conveyance Facility and from the Interconnection Pump Station to the Interconnection Valve at a pressure sufficient to lift the conveyed water to CCWD’s Existing Transfer Pump Station.

3.6 Water Conveyance to Be Scaled. The annual amount of Qualifying Water to be conveyed to CCWD shall be scaled to actual BDCP/CWF operations in each water year as follows.

3.6.1 The annual amount of Qualifying Water to be conveyed by DWR to CCWD shall be determined by the fraction of Unimpaired Sacramento River Runoff that is exported from the Delta by the CVP and SWP, in conjunction with the fraction of those exports diverted at the northern intakes, as described in the following table. Based on the BDCP modeling for the 2013 DEIR/DEIS and 2015 RDEIR/SDEIS and taking into account replacement of the requirements of the 1967 Agreement between DWR and CCWD pertaining to CCWD’s Mallard Slough Intake, the quantity of Qualifying Water to be conveyed by DWR to CCWD is expected to range between 2 and 50 thousand acre-feet (“TAF”) per water year. Exhibit A attached hereto sets forth examples of the application of the methodology set forth in this Section 3.6 and

Section 3.7 for determining the annual amount of Qualifying Water to be conveyed by DWR to CCWD in a given water year.

Annual Amount of Water to be Conveyed [TAF]

		Northern Exports / Total Exports							
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Total Exports / Sacramento River Runoff	0	2	2	5	5	5	5	5	5
	0.1	2	8	9	10	11	13	16	18
	0.2	5	10	13	15	17	20	23	26
	0.3	5	15	19	23	27	32	37	42
	0.4	5	19	25	31	37	43	49	50
	0.5	6	23	31	42	47	50		

Green shading represents the operating range in the BDCP modeling for the 2013 DEIR/DEIS and 2015 RDEIR/SDEIS. The darker the shading, the more often the operations are expected to occur.

3.6.2 If more Northern Exports or Total Exports are taken by DWR and/or Reclamation in a water year than are shown in the table in subsection 3.6.1 above, DWR and CCWD shall meet and confer to attempt to determine, by mutual agreement, an appropriate amount of Qualifying Water to be conveyed by DWR to CCWD in the next water year to mitigate water quality impacts to CCWD that occurred during the water year. If such mutual agreement cannot be reached within thirty (30) days after the end of such water year, then the minimum annual amount of Qualifying Water to be conveyed by DWR to CCWD in the next water year shall be 50,000 acre feet.

3.7 Initial Mitigation Conveyance to CCWD. In order to create a positive water balance in the Los Vaqueros Reservoir and to mitigate initial impacts of BDCP/CWF operations, DWR shall convey 30,000 acre-feet of Qualifying Water to CCWD before the beginning of the first planned full water year of operation of any part of the BDCP/CWF that could affect CCWD’s intake water quality. For the purposes of this Section 3.7, parts of the BDCP/CWF that could affect CCWD’s intake water quality include but are not limited to: the Conveyance Facility and other BDCP/CWF project components or BDCP/CWF permit conditions that could result in a substantial change to Delta hydrodynamics. Subsequently, the annual amount of Qualifying Water to be conveyed to CCWD shall be calculated in arrears in accordance with Section 3.6 after September 30th of each water year and shall be conveyed to CCWD by September 30th of the following water year.

3.8 Coordination of Scheduled Conveyance. The Parties shall collaborate to schedule Qualifying Water conveyance from DWR to CCWD pursuant to this Agreement.

- 3.8.1** The Parties agree to continue their current practice of regular operational coordination meetings.
- 3.8.2** After September 30th but no later than October 31st of each water year, DWR shall provide written notice to CCWD regarding the quantity of Qualifying Water that DWR must convey to CCWD based on application of the methodology specified in Sections 3.6 and 3.7 to conditions that occurred during the water year then most recently ended. To the extent CCWD objects to DWR's calculation of the annual amount of Qualifying Water to be conveyed, and within sixty (60) days of receipt of said notice, CCWD shall notify DWR in writing of its objection and the Parties shall meet and confer in good faith to resolve the objection. If the Parties cannot resolve the dispute within twenty-one (21) days of CCWD's written notice of objection, the matter may be submitted by either Party to arbitration pursuant to Section 7 of this Agreement.
- 3.8.3** Not later than seven (7) days after written notice from CCWD to DWR, DWR shall commence delivery of Qualifying Water to CCWD in the quantity requested by CCWD in such notice (a "**Conveyance Request**") and shall maintain delivery to CCWD at a rate of at least 150 cubic feet per second until the requisite amount of Qualifying Water is fully delivered to CCWD unless (i) a corresponding amount of Qualifying Water is not then available from both (A) the Primary Method due to EBMUD's refusal or inability to convey the requisite quantity of Qualifying Water and (B) the Secondary Method due to restraints or restrictions imposed by applicable regulatory authorities having jurisdiction over operation of the Conveyance Facility that fully prevent the conveyance of any water through the Conveyance Facility from the Northern Intakes, or (ii) the full amount of Qualifying Water to be delivered by DWR to CCWD for such water year under this Agreement already has been conveyed to CCWD. If DWR fails to commence conveyance to CCWD of the requisite amount of Qualifying Water requested by CCWD pursuant to this Section 3.8.3 within seven (7) days after its delivery of a Conveyance Request or fails to maintain delivery to CCWD at the requisite rate until the requisite amount of Qualifying Water is fully delivered to CCWD, and such conveyance by DWR is not then excused due to the circumstances described under the preceding clauses (i) and (ii), then, upon further written notice from CCWD to DWR, the Parties shall meet and confer in good faith to resolve the matter. If the Parties cannot resolve the matter within five (5) days of CCWD's written notice, the matter may be submitted by either Party to arbitration pursuant to Section 7 of this Agreement.

3.8.4 If at any time DWR is unable to convey the requisite quantity of Qualifying Water that is requested by CCWD pursuant to the preceding subsection 3.8.3 due to the circumstances described in clause (i) thereof, then DWR shall convey such requisite quantity of Qualifying Water to CCWD on the first date that is acceptable to CCWD on which the circumstances described in clause (i) of subsection 3.8.3 no longer apply.

3.8.5 DWR may deliver more Qualifying Water to CCWD than required for a given water year upon the written concurrence of CCWD. Upon CCWD's written concurrence, and upon the negotiation of terms in a separate agreement, the excess Qualifying Water delivered during a given water year may be credited against the amount of Qualifying Water that DWR is required to deliver for the subsequent water year.

3.9 Remedy for DWR Failure to Deliver Required Water. This section 3.9 does not apply if a Force Majeure event described in Section 3.10 prevents DWR from conveying Qualifying Water. In any other event if DWR fails to convey the full amount of Qualifying Water required to be conveyed to CCWD under Sections 3.6 and 3.7 of this Agreement within a given water year, despite CCWD's timely scheduling of delivery of such water and its ability to accept such water, the Parties shall meet and confer to attempt to resolve that year's water deficit by mutually agreeable and reasonable means. If the Parties cannot reach agreement within thirty (30) days after the conclusion of said water year and the failure to convey Qualifying Water within said water year was not due to an excusable event as defined in Sections 3.8.3(i)(A) and (B), which event prevented DWR from conveying the full amount of Qualifying Water to CCWD by the end of said water year, DWR shall pay CCWD, no later than thirty (30) days after the conclusion of said water year, an amount equal to twice what it would have cost to convey the water deficit for said water year through the Freeport Intake and the interconnection between EBMUD's Mokelumne Aqueduct and CCWD's Los Vaqueros Pipeline, as determined by CCWD, acting reasonably and in good faith, and set forth in a written notice to DWR. As a further remedy, DWR shall, not later than September 30th of the following water year, also convey 30,000 acre-feet of Qualifying Water for delivery to the Los Vaqueros Reservoir; provided, however, that if the Los Vaqueros Reservoir cannot then accommodate 30,000 acre feet of water, then DWR shall convey so much of such 30,000 acre feet of Qualifying Water as the Los Vaqueros Reservoir can then accommodate, with the remainder conveyed in in the next succeeding water year or, if the Los Vaqueros Reservoir cannot accommodate the remainder in such next succeeding water year, then at the earliest time as the Los Vaqueros Reservoir can accommodate such remainder. DWR shall have no obligation under this Section 3.9 if DWR fails to convey the full amount of Qualifying Water required to be conveyed to CCWD under Sections 3.6 and 3.7 of this Agreement within a given water year because either (i) CCWD fails to request and schedule delivery of such water, or (ii) CCWD informs DWR that it is not able to accept delivery of such water.

3.10 Force Majeure. If, due to Force Majeure as defined herein below, DWR is prevented from conveying the full amount of Qualifying Water required within a given water year to CCWD through both the Primary Method and the Secondary Method, DWR's payment of the remedy required under Section 3.9 shall be excused for the particular water year in which the Force Majeure conditions prevented such conveyance. However, DWR shall be required to convey the full amount of Qualifying Water required to be conveyed to CCWD pursuant to Section 3.6 of this Agreement within one water year of cessation of the Force Majeure conditions that prevented conveyance. "Force Majeure" shall include war; acts of terrorism; insurrection; strikes or lock-outs not caused by, or outside the reasonable control of, the Party claiming Force Majeure; riots; earthquakes; fires; floods; levee failure; casualties; acts of the public enemy; epidemics; quarantine restrictions; or litigation that fully enjoins required performance. If either Party is rendered wholly or partly unable to timely perform its obligations under this Agreement because of a Force Majeure event, that Party shall be excused from the performance affected by the Force Majeure event (but only to the extent so affected); provided that (i) the Party affected by the Force Majeure event, as soon as reasonably practicable after obtaining knowledge of the occurrence of the claimed Force Majeure event, gives the other Party prompt oral notice, followed by a written notice reasonably describing the Force Majeure event, (ii) the suspension of or extension of time for performance is of no greater scope and of no longer duration than is required by the Force Majeure event and (iii) the Party affected by such Force Majeure event uses all reasonable efforts to mitigate or remedy its inability to perform as soon as reasonably possible.

3.11 Evaluation and Adoption of Mitigation Measures. The following sections of this Agreement shall be adopted by DWR as CEQA mitigation measures to address the adverse environmental effects of the BDCP/CWF or any alternative thereto, upon CCWD and its customers: Sections 2.3.1, 3.1, 3.2, 3.3, 3.3.1, 3.4, 3.5, 3.6, 3.6.1, 3.6.2, 3.7, 3.8, 3.8.1, 3.8.2, 3.8.3, 3.8.4 and 3.8.5. The Final Environmental Impact Report for the BDCP/CWF shall identify such mitigation measures and evaluate the construction, operational and cumulative impacts of such mitigation measures.

4. EFFECT OF THIS AGREEMENT ON THE 1967 AGREEMENT BETWEEN DWR AND CCWD

4.1 Effect of this Agreement on 1967 DWR-CCWD Agreement. When DWR commences annual conveyance of water to CCWD pursuant to this Agreement, this Agreement shall replace and supersede the 1967 Agreement between CCWD and DWR ("**1967 Agreement**") regarding payment for the effect of State Water Project operation on water quality at CCWD's Mallard Slough intake, a copy of which is attached hereto as Exhibit B. Until DWR commences annual conveyance of water to CCWD pursuant to this Agreement, the 1967 Agreement shall remain in full force and effect and DWR shall continue to make the payments to CCWD specified by the 1967 Agreement.

5. CCWD'S NON-OPPOSITION TO BDCP/CWF

5.1 No Challenge to Environmental Document or Project Approval for Conforming Action Alternative. CCWD's Board of Directors shall not take a formal Board action in opposition to the approval of any Conforming Action Alternative. Board members are not prohibited from discussing the BDCP/CWF as individuals and with other organizations. If DWR and Reclamation approve any Conforming Action Alternative, CCWD shall not file a legal challenge to the Final Environmental Impact Report/Environmental Impact Statement for the Conforming Action Alternative, or assert any related cause of action or voluntarily join any related lawsuit as a petitioner. By no later than five (5) days after the effective date of this Agreement CCWD shall submit to DWR a letter stating that the full and complete implementation of this Agreement will address the concerns expressed in CCWD's comment letters regarding the effects that operation of a Conforming Action Alternative would have on water quality at CCWD's intakes and the potential for damage to CCWD Facilities caused by construction of a Conforming Action Alternative.

5.2 No Protests of Water Right Petitions for Conforming Action Alternative.

5.2.1 Effective upon the effective date of this Agreement, CCWD hereby releases, to the fullest extent permitted by applicable law, DWR from any and all Water Rights Protest Claims which CCWD now has or has ever had against DWR with respect to the CWF Change of Point of Diversion. For the avoidance of doubt, this release shall not include claims to enforce the terms of this Agreement.

In connection with the release contained in the preceding paragraph, CCWD waives all rights it has or may have under any applicable law, statute or ordinance, as well as under any other common law principles of similar effect, which prohibits the waiver of unknown claims, including California Civil Code Section 1542, which provides as follows:

A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor.

5.2.2 In furtherance of the foregoing, CCWD shall file a letter with the California State Water Resources Control Board to withdraw its water rights protest to the CWF Change of Point of Diversion, and any materials submitted by CCWD in connection with such protest by no later than five (5) days after the effective date of this Agreement.

- 5.3** CVP Cost Allocation Negotiations or Challenges. Except with regard to the Water Rights Protest Claims waived in section 5.2, this Agreement shall have no effect on CCWD's right to negotiate with, or bring potential claims against, Reclamation regarding cost allocations or water supply allocations for CVP water. Further, this Agreement shall have no effect on CCWD's right to negotiate with, or bring claims against, CVP contractors regarding cost allocations for CVP water.
- 5.4** Non-Project Restoration. This Agreement shall have no effect on CCWD's right to comment on, or bring potential claims against, any wetlands restoration project beyond the up to 305 acres of tidal wetlands restoration located at Sherman Island, Cache Slough and the North Delta that is required as mitigation for impacts of the CWF, of which no more than 59 acres of tidal wetlands restoration would be constructed at Sherman Island unless DWR demonstrates to CCWD's satisfaction that the tidal wetlands restoration mitigation will cause no adverse net water quality impacts at CCWD's intakes at any time. The Parties recognize that the BDCP as originally proposed included more than 305 acres of wetlands restoration; however, wetlands restoration beyond the up to 305 acres needed to mitigate impacts of the Conveyance Facility is not part of the CWF, and CCWD does not waive any right to comment on, oppose or challenge approval of such wetland restoration program or projects, nor does CCWD waive any right to comment on, oppose or challenge approval of wetland restoration program or projects exceeding 59 acres at Sherman Island unless DWR demonstrates to CCWD's satisfaction that the tidal wetlands restoration mitigation will cause no adverse net water quality impacts at CCWD's intakes at any time.
- 5.5** Future Projects. Except as specified in Section 5.1, this Agreement shall have no effect on CCWD's right to comment on, oppose, or bring claims against, any future project including, without limitation, a future project or project change that deviates from the Conforming Action Alternative or any future changes to any water quality control plan.

6. DWR'S NON-OPPOSITION TO CCWD PROJECTS AND ENCOURAGEMENT OF STAKEHOLDER SUPPORT

- 6.1** Los Vaqueros Water Right Petition - Freeport Intake Point of Diversion. The Parties recognize that for DWR to convey to CCWD water diverted pursuant to CCWD's Los Vaqueros water right through the Primary Method for conveyance, the Freeport Intake must be added as a point of diversion on CCWD's Los Vaqueros water right, and other approvals may be needed. DWR shall support a water right petition filed by CCWD to add the Freeport Intake as a point of diversion on CCWD's Los Vaqueros water right to be used to convey to CCWD up to the amount of water necessary to implement this Agreement, and DWR shall support any other related approvals needed to convey CCWD's water to CCWD through the Primary Method for conveyance.

- 6.2** Los Vaqueros Water Right Petition - Intakes for Conveyance Facility. The Parties recognize that for DWR to convey to CCWD water diverted pursuant to CCWD's Los Vaqueros water through the Secondary Method for conveyance, the Northern Intakes that will be used for any Conveyance Facility must be added as points of diversion on CCWD's Los Vaqueros water right, and other approvals may be needed. DWR shall support a water right petition filed by CCWD to add the Northern Intakes as points of diversion on CCWD's Los Vaqueros water right to be used to convey to CCWD up to the amount of water necessary to implement this Agreement, and DWR shall support any other related approvals needed to convey CCWD's water to CCWD through the Secondary Method for conveyance. The water right petitions described in Sections 6.1 and 6.2 are hereafter collectively referred to as the "**LV Water Right Petitions**".
- 6.3** LV Water Right Petitions - Conveyance Facility Users. DWR acknowledges that the changes to CCWD's Los Vaqueros water right as contemplated by the LV Water Right Petitions are essential for full implementation of this Agreement. Therefore, DWR shall require SWP contractors who participate in the Conveyance Facility, as a condition to use of the Conveyance Facility, to agree not to oppose the LV Water Right Petitions. Nothing in this Agreement would bind SWP contractors from protesting or objecting to other CCWD applications to the State Water Resources Control Board that are not necessary to implement this Agreement or that request changes to quantities of water beyond the amount that is necessary to implement this Agreement.
- 6.4** Index for Measurement of Old and Middle River Flow Requirements. DWR shall collaborate with CCWD to advocate for the use of an index for measurement of compliance with requirements for net flow in the Old and Middle Rivers, such as those in the 2008 U.S. Fish and Wildlife Biological Opinion and 2009 National Marine Fisheries Service Biological Opinion on the operations of the State Water Project and Central Valley Project, that allows diversions at CCWD's screened intakes while preserving protections for fish, provided that there is no injury to DWR's use of its water right permits.
- 6.5** Encouragement of Stakeholder Support for Regional CCWD Water Supply Reliability Projects. DWR, in collaboration with CCWD, shall facilitate discussions with the State Water Project and Central Valley Project contractors and other appropriate stakeholders on the following future regional water supply projects: (i) the enlargement of CCWD's 160,000 acre foot Los Vaqueros Reservoir, and (ii) the Bay Area Regional Desalination Project, including any water rights petitions filed for that project.
- 6.6** Antioch. DWR will within thirty (30) days following the effectiveness of this Agreement contact Antioch, which has an existing agreement with DWR to address water quality at Antioch's intakes, and, if Antioch agrees, DWR will enter into and diligently pursue negotiations with Antioch regarding potential additional impacts to water quality (and, in turn, water quantity of suitable quality) at Antioch's intakes due to the BDCP/CWF.

- 6.7** East Contra Costa Irrigation District. DWR will within thirty (30) days following the effectiveness of this Agreement contact ECCID, which has an existing agreement with DWR to address water quality at ECCID's intakes, and, if ECCID agrees, DWR will enter into and diligently pursue negotiations with ECCID regarding potential additional impacts to water quality (and, in turn, water quantity of suitable quality) at ECCID's intakes due to BDCP/CWF.
- 6.8** Brentwood. DWR will within thirty (30) days following the effectiveness of this Agreement contact the City of Brentwood, which serves ECCID water and is dependent on ECCID's existing agreement with DWR to address water quality at ECCID's intakes, and, if Brentwood agrees, DWR will enter into and diligently pursue negotiations with Brentwood regarding potential impacts to water quality (and, in turn, water quantity of suitable quality) affecting Brentwood due to BDCP/CWF.

7. ARBITRATION OF DISPUTES ARISING UNDER THIS AGREEMENT

- 7.1** Any controversy or claim arising out of or relating to this Agreement shall be resolved as provided in this Section 7, except to the extent expressly provided elsewhere in this Agreement or if equitable relief is sought by CCWD pursuant to Section 11.8. The Parties shall first negotiate in good faith to resolve the dispute. In the event the Parties are unable to resolve the dispute within thirty (30) days, such dispute shall be settled by final and binding arbitration pursuant to the commercial arbitration rules of the American Arbitration Association ("AAA"), except to the extent the remaining provisions of this Section 7 conflict with those rules, in which case the provisions of this Section 7 shall control. To the extent allowed by the arbitrator, any arbitration shall comply with the following:
- 7.1.1** The place of arbitration shall be within the City and County of San Francisco, California;
- 7.1.2** The Parties shall agree on a single arbitrator. If the Parties cannot agree on a single arbitrator within ten (10) days following submission of the dispute to arbitration, then the Parties shall each appoint one person who together will select a third person. The three persons shall constitute the arbitration panel to hear and resolve the matter submitted to it.
- 7.1.3** Written notice of the referral to arbitration will be given within five (5) business days by the referring Party to the other Party setting out the issues for resolution, the Party's position with regard to such issues, the dollar amount involved (if any) and the remedy sought. The other Party will respond within ten (10) business days of receipt of such notice by giving the referring Party notice of any counterclaims, the Party's position with regard to all issues, the dollar amount involved (if any) and the remedy sought;

- 7.1.4** The arbitration will commence within sixty (60) calendar days of the referral before the persons appointed above under subsection 7.1.3;
- 7.1.5** All documents, materials and information in the possession of each Party that are in any way relevant to the issues in dispute will be made available to the other Party forthwith hereunder. Each Party will be entitled, on an expedited basis, to propound written discovery and to obtain testimony of witnesses by deposition to the same extent as a civil litigant in a suit filed in the Superior Court under the then-prevailing California Code of Civil Procedure. To the extent possible, the arbitrators will not be bound by the rules of civil procedure or evidence and will consider such writing and oral presentations as reasonable business persons would use in the conduct of their day-to-day affairs, and may require the Parties to submit some or all of their case by written declaration or such other manner of presentation as the arbitrators may determine to be appropriate;
- 7.1.6** The decision of the arbitrators will be in writing and, upon the request of either Party, the arbitrators shall specify the factual and legal basis for the award;
- 7.1.7** In rendering the award, the arbitrators shall determine the rights and obligations of the Parties according to the laws of the State of California. The Parties acknowledge that by agreeing to arbitration, they are giving up the right to a jury trial;
- 7.1.8** During the arbitration process, the costs of arbitration, including any administration fees, arbitrators fees and costs for the use of facilities during the hearings, shall be borne equally by the Parties to the arbitration;
- 7.1.9** A decision of the arbitrators will be final and binding and the arbitrators may require remedial measures and injunctive or other equitable relief as part of any award; provided, however, that the arbitrators shall not have the power to alter, amend, modify or change any of the terms of this Agreement or to grant any remedy that is otherwise prohibited by the terms of this Agreement or not available in a court of law. The arbitrators may award legal fees and costs (including arbitration costs) to the prevailing party; and
- 7.1.10** Reference to arbitration must be made within two (2) years of the act, omission or occurrence giving rise to the referral.

8. INDEMNIFICATION

- 8.1.1** DWR shall indemnify CCWD and its Related Parties (each such Person being called an “Indemnitee”) against, and hold each Indemnitee harmless from, any and all losses, claims, damages, obligations,

liabilities and related expenses (including the fees, charges and disbursements of any counsel for any Indemnitee), incurred by, claimed, alleged or asserted against any Indemnitee by any Person (including DWR), arising out of, in connection with, or as a result of (i) the execution or delivery of this Agreement, or any agreement or instrument contemplated hereby, the performance by the Parties hereto of their respective obligations hereunder or thereunder or the consummation of the transactions contemplated hereby or thereby, (ii) the construction, operation or maintenance of the BDCP/CWF including but not limited to any Conveyance Facility; (iii) the construction, operation or maintenance of the Interconnection Pump Station; (iv) the construction of the Interconnection Pipeline or Interconnection Valve, (v) relating to crops, crop losses, livestock or structures, (vi) the use or release of Hazardous Material in, on, under or about the properties and facilities described in Section 2 of this Agreement directly or indirectly caused by DWR or DWR's Related Parties, (vii) the violation by DWR or DWR's Related Parties of any Environmental Law, (viii) the assertion by any Governmental Authority that there has been a violation by DWR or DWR's Related Parties of any Environmental Law, or (ix) any actual or prospective claim, litigation, investigation or proceeding relating to any of the foregoing, whether based on contract, tort or any other theory, whether brought by a third party or by CCWD, and regardless of whether any Indemnitee is a party thereto; provided that such indemnity shall not, as to any Indemnitee, be available to the extent that such losses, claims, damages, liabilities or related expenses are determined by a court of competent jurisdiction by final and non-appealable judgment to have resulted from the gross negligence or willful misconduct of such Indemnitee. DWR's obligations under this Section 8 shall survive the termination of this Agreement.

- 8.1.2** CCWD shall indemnify DWR and its Related Parties (each such Person being called an "Indemnitee") against, and hold each Indemnitee harmless from, any and all losses, claims, damages, obligations, liabilities and related expenses (including the fees, charges and disbursements of any counsel for any Indemnitee), incurred by, claimed, alleged or asserted against any Indemnitee by any Person (including CCWD) as a result of (i) the operation or maintenance of the Interconnection Pipeline or Interconnection Valve or (ii) any actual or prospective claim, litigation, investigation or proceeding relating to the foregoing, whether based on contract, tort or any other theory, whether brought by a third party or by DWR, and regardless of whether any Indemnitee is a party thereto; provided that such indemnity shall not, as to any Indemnitee, be available to the extent that such losses, claims, damages, liabilities or related expenses are determined by a court of competent jurisdiction by final and non-appealable judgment to have resulted from the gross negligence or willful misconduct of such

Indemnitee. CCWD's obligations under this Section 8 shall survive the termination of this Agreement.

9. REPRESENTATIONS AND WARRANTIES

Each Party represents and warrants to the other Party as follows:

9.1 Due Authorization and Enforceability. Such Party has full power, right and authority to execute, perform and deliver this Agreement and all other documents and agreements executed or to be executed by such Party in connection with the transactions contemplated hereby and thereby and to consummate the transactions contemplated hereby and thereby. The execution and delivery by such Party of this Agreement and each other document and agreement contemplated hereby, the performance by such Party of its obligations hereunder and thereunder, and the consummation by it of the transactions contemplated hereby and thereby have been duly authorized by all necessary governmental, agency or other action by such Party. This Agreement constitutes, and each other document and agreement to be executed by such Party in connection with the transactions contemplated hereby when so executed and delivered will constitute, a valid and binding obligation of such Party, enforceable in accordance with its terms, except (i) as limited by applicable bankruptcy, insolvency, reorganization, moratorium, and other laws of general application affecting enforcement of creditors' rights generally, and (ii) as limited by laws relating to the availability of specific performance, injunctive relief, or other equitable remedies.

9.2 No Conflicts. Such Party has made, obtained or been granted all approvals, consents, filings, registrations, notices, waivers and exemptions required to be obtained by it under any applicable law and regulation with respect to its execution and delivery of this Agreement and all other ancillary documents and agreements in connection with the transactions contemplated hereby and with respect to its performance of its obligations hereunder and thereunder and the consummation of the transactions contemplated hereby and thereby. The execution and delivery of this Agreement and all other documents and agreements executed or to be executed by such Party and the consummation by it of the transactions contemplated hereby or thereby will not conflict with or result in any breach or violation of any of the terms and conditions of, or constitute (or with notice or lapse of time or both constitute) a default under or a violation of, any statute, regulation, order, judgment or decree applicable to such Party, or any instrument, contract or other agreement to which such Party is a party or to which any of its assets may be bound or subject.

10. TRANSFER OF CONVEYANCE FACILITY OR INTERCONNECTION FACILITIES BY DWR

10.1 No Transfer Without Consent. DWR shall not assign, license, transfer or otherwise dispose of any of its right, title or interest in any Conveyance Facility or the Interconnection Facilities to any other Person without the prior written

- 11.3** Counterparts and Serial Signatures. This Agreement may be signed by the Parties in different counterparts and the signature pages combined to create a document binding on each and all Parties. Signatures delivered by electronic means shall be binding. Notwithstanding the preceding sentence, either Party may rescind its signature at any time prior to the date the Agreement has been fully executed by the Parties and this Agreement shall not be binding upon such rescinding Party. A Party that elects to rescind its signature pursuant to this Section 11.3 shall do so by providing written notice to the other Party in compliance with Section 11.2 of this Agreement.
- 11.4** Governing Law. This Agreement shall be governed and construed under the laws of the State of California.
- 11.5** Severability. If a court of competent jurisdiction finds any provision of this Agreement to be illegal, invalid, or unenforceable as to any circumstance, such finding shall not make the offending provision illegal, invalid, or unenforceable as to any other circumstance. If feasible, the offending provision shall be considered modified so that it becomes legal, valid, and enforceable. If the offending provision cannot be so modified, it shall be considered deleted from this Agreement. Unless otherwise required by law, the illegality, invalidity, or unenforceability of any provision of this Agreement shall not affect the legality, validity, or enforceability of any other provision of this Agreement.
- 11.6** Successors and Assigns. This Agreement shall be binding upon the Parties hereto, as well as their respective successors and assigns. Neither Party may assign this Agreement in whole or in part without the prior written consent of the other Party, and any such attempted assignment without such prior written consent shall be void ab initio. Nothing in this Agreement, expressed or implied, shall be construed to confer upon any Person (other than the Parties and their respective successors and assigns permitted hereby) any legal or equitable right, remedy or claim under or by reason of this Agreement.
- 11.7** Survival. All covenants, agreements, representations and warranties made in this Agreement shall survive the execution and delivery of this Agreement.
- 11.8** Equitable Relief. Notwithstanding anything expressed or implied to the contrary in this Agreement, each Party acknowledges that a breach or threatened breach of its obligations under this Agreement would give rise to irreparable harm to the other Party, for which monetary damages would not be an adequate remedy, and hereby agrees that in the event of a breach or a threatened breach by either Party of any such obligations, the non-breaching Party shall, in addition to any and all other rights and remedies that may be available to it in respect of such breach, be entitled to equitable relief, including a temporary restraining order, an injunction, specific performance and any other relief that may be available from a court of competent jurisdiction (without any requirement to post bond).

12. DEFINITIONS

As used in this Agreement, the following capitalized terms have the following meanings:

“**CCWD Facilities**” means all water storage and conveyance facilities and infrastructure of any kind owned, leased or licensed by CCWD, whether now existing or hereafter arising and wherever located.

“**CVP**” means the Central Valley Project, which is the federal water management facility in California operated by Reclamation.

“**CVP Contract Supply**” means water supplied to CCWD pursuant to its contract with Reclamation to receive water from the CVP.

“**Delta**” means the inland river delta and estuary in Northern California known as the Sacramento - San Joaquin River Delta.

“**Existing Transfer Pump Station**” means CCWD’s transfer pump station near Brentwood, California, and any modification or replacement thereof in whole or in part.

“**Freeport Intake**” means EBMUD’s water intake facility and pumping plant located on the Sacramento River, upstream from Freeport, California, and any modification or replacement thereof in whole or in part.

“**Intermediate Forebay**” means the forebay that DWR will construct within the North Delta that will receive water from each of the Northern Intakes before providing gravity flow through the Conveyance Facility.

“**Governmental Authority**” means the government of the United States of America or any other nation, or of any political subdivision thereof, whether state or local, and any agency, authority, instrumentality, regulatory body, court, central bank or other entity exercising executive, legislative, judicial, taxing, regulatory or administrative powers or functions of or pertaining to government.

“**Los Vaqueros Pipeline**” means the pipeline extending between the Contra Costa Canal and Los Vaqueros Reservoir, and any modification or replacement thereof in whole or in part.

“**Los Vaqueros Reservoir**” means CCWD’s water storage reservoir in Contra Costa County accessible from North Vasco Road with a storage capacity as of the date of this Agreement of approximately 160,000 acre feet of water.

“**LV Water Right Permit**” means State Water Resources Control Board Water Right Permit 20749, and any modification or replacement thereof.

“**Middle River Pipeline**” means the existing buried pipeline that transports water from CCWD’s Middle River Intake to the Old River Pipeline, and any modification or replacement thereof in whole or in part.

“**Northern Exports**” means the total water diversion at the intakes for any Conveyance Facility, including diversions by DWR, Reclamation and any successors in interest thereto.

“**Northern Intake**” means the water intake facility or facilities, inclusive of any pumping plant, at the northern end of any Conveyance Facility.

“**Old River Pipeline**” means the existing buried pipeline that transports water from CCWD’s Old River Intake to CCWD’s Existing Transfer Pump Station.

“**Person**” means any natural person, corporation, limited liability company, trust, joint venture, association, company, partnership, Governmental Authority or other entity.

“**Related Parties**” means, with respect to any Person, the directors, officers, employees, agents, trustees, administrators, managers, advisors, representatives, contractors, invitees, permittees and licensees of such Person.

“**Subdivided Clifton Court Forebay**” means the separate section of Clifton Court Forebay that will receive water from the Conveyance Facility.

“**SWP**” means the State Water Project, which is the state water management facility in California operated by DWR.

“**Total Exports**” means the total water pumped into the Delta Mendota Canal, the California Aqueduct, and any other facility to convey water to the Bay Area, the Central Valley and Southern California from CVP and SWP facilities in the South Delta (including, without limitation, water diverted from the Northern Exports into the Clifton Court Forebay).

“**Unimpaired Sacramento River Runoff**” means the sum of Unimpaired Runoff in million acre-feet at Sacramento River above Bend Bridge, Feather River at Oroville (inflow to Lake Oroville), Yuba River near Smartville, and the American River below Folsom Lake. “**Unimpaired Runoff**” represents the natural water production in a river basin, unaltered by upstream diversions, storage, or export of water to or import of water from other basins.

IN WITNESS WHEREOF, the Parties have executed this AGREEMENT as of the day and year first written above.

Dated: 3/18/16

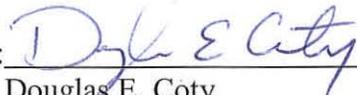
CONTRA COSTA WATER DISTRICT

By: 
Jerry Brown
General Manager

Approved As To Form:

Dated: March 17, 2016

BOLD, POLISNER, MADDOW, NELSON & JUDSON

By: 
Douglas E. Coty
General Counsel, Contra Costa Water District

Dated: 3/24/16

CALIFORNIA DEPARTMENT OF WATER RESOURCES

By: 
Mark Cowin
Director

Approved As To Form:

Dated: 3/24/16

By: 
Spencer Kenner
Chief Counsel, Department of Water Resources

EXHIBIT A
EXAMPLES OF APPLICATION OF METHODOLOGY IN SECTION 3.6 AND 3.7

		Annual Amount of Water to be Conveyed [TAF]							
		Northern Exports / Total Exports							
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Total Exports / Sacramento River Runoff	0	2	2	5	5	5	5	5	5
	0.1	2	8	9	10	11	13	16	18
	0.2	5	10	13	15	17	20	23	26
	0.3	5	15	19	23	27	32	37	42
	0.4	5	19	25	31	37	43	49	50
	0.5	6	23	31	42	47	50		

EXAMPLE OPERATIONS UNDER TERMS 3.6 and 3.7

Year of CWF Operation (Water Year)	Period of CWF Operation	Total Exports / Sacramento River Runoff	Northern Exports / Total Exports	Amount of Water Wheeled
1 (partial water year)	June - September	0.3	0.1	Initial 30 TAF per Term 3.7
2	October - September	0.3	0.3	15 TAF based on Year 1 operations
3	October - September	0.5	0.6	23 TAF based on Year 2 operations
4	October - September	0.4	0.3	Amount determined per Term 3.6.2, minimum 50 TAF based on Year 3 operations

EXAMPLE OPERATIONS UNDER TERM 3.9

Year of CWF Operation (Water Year)	Period of CWF Operation	Total Exports / Sacramento River Runoff	Northern Exports / Total Exports	Amount of Water Wheeled
15	October - September	0.4	0.5	Amount based on Year 14 ops
16	October - September	0.1	0.4	10 TAF (however, based on Year 15 operations, 43 TAF was required)
17	October - September	-	-	Payment of penalty plus 30 TAF per Term 3.9 due to deficit in Year 16 and
		0.2	0.5	11 TAF based on Year 16 operations

EXHIBIT B
1967 AGREEMENT

AGREEMENT

THIS AGREEMENT made this 21 day of April 1967, between the STATE OF CALIFORNIA, acting by and through its Department of Water Resources, hereinafter referred to as the "State", and CONTRA COSTA COUNTY WATER DISTRICT, a public body organized and existing pursuant to Division 12 of the Water Code of the State of California, hereinafter referred to as the "District",

WITNESSETH:

WHEREAS, since 1930 the District and its predecessor, California Water Service Company, have been diverting water from Mallard Slough on Suisun Bay in Contra Costa County pursuant to Water Right Permit to Appropriate Water number 3167 issued on Application number 5941 filed on November 19, 1928. Said diversions have been for direct beneficial use and to storage for later beneficial use within the service area of the Treated Water Division of the District when the water in Mallard Slough had a chloride ion content (mean tidal cycle surface zone) of 100 parts per million or less and was not otherwise polluted to make it unsuitable for treatment for municipal and domestic use (hereinafter referred to as usable river water), and

WHEREAS, the average number of days per water year (October 1 to September 30, hereinafter referred to as "year") that usable river water has been available to the District at said point of diversion is 142 and the median period of said availability is from January 15 to June 5, both days inclusive, and

WHEREAS, during each day usable river water has been and will in the

future be available to the District the quantity thereof has been and will be adequate to meet the water requirements of the District from that point of diversion during such day, and

WHEREAS, in the future the average number of days per year that usable river water will be available to the District will decrease and such decrease will be due in part to the operation of the State Water Resources Development System as defined in Section 12931 of the Water Code, and

WHEREAS, it is contemplated that the Contra Costa Canal, supplemented by the Kellogg Unit or other facilities to be constructed by the Bureau of Reclamation, will meet the District's future water requirements which are not met by usable river water. If such facilities are not constructed by the Bureau of Reclamation, water supply facilities will have to be constructed by another agency or agencies to meet the District's future requirements including a substitute water supply equal to the District's water deficiency entitlement as defined in this agreement;

NOW, THEREFORE, the parties agree as follows:

1. The term of this agreement shall begin on the first day of October, 1967, and shall continue in effect until terminated by either party by written notice to the other party given at least 12 months prior to the effective date of such termination. The effective date of termination shall be the last day of a year (September 30) and no termination shall be effective prior to September 30, 2007.

2. The State shall reimburse the District in the manner hereinafter provided for any decrease in availability to the District of usable river water

in Mallard Slough during the term of this agreement caused by operation of the State Water Resources Development System. Such decrease in availability of usable river water is hereinafter referred to as the District's "water deficiency entitlement".

3. The quantity of the District's water deficiency entitlement shall be determined for each year during the term of this agreement by the formula $E = \frac{(142 - D)}{3} \left(\frac{R + P}{142} \right)$ where E is the District's water deficiency entitlement for such year in acre-feet, D is the number of days during such year that usable river water is available to the District at Mallard Slough, R is the total quantity of water in acre-feet diverted by the District from Mallard Slough from 8:00 A. M. on January 15 to 8:00 A. M. on June 6 and P is the total quantity of water in acre-feet purchased by the District and introduced into its facilities in the vicinity of Chenery Reservoir from 8:00 A. M. on January 15 to 8:00 A. M. on June 6. If in any year D exceeds 142, the District shall have no water deficiency entitlement for such year and the amount of such excess shall offset any water deficiency entitlement of the District for an equal number of days in the next succeeding year or years when D is less than 142.

4. For the purpose of computing the District's water deficiency entitlement, the District will at its expense measure the chloride ion content of water in Mallard Slough at such intervals as shall be reasonably necessary and shall make the results of such measurements available to the State. The State may at its expense verify the accuracy of the District's measurements and any error thus disclosed shall be corrected by the District.

5. Each year during the term of this agreement that the District has a water deficiency entitlement it shall purchase a quantity of substitute water equal thereto from the Contra Costa Canal as supplemented by the Kellogg Unit or other facilities constructed by the Bureau of Reclamation to meet the District's requirement, but if sufficient water is not available to the District from such source it shall purchase said quantity of substitute water from a project or projects constructed by another agency or agencies to meet the District's future water requirements. For the purposes of this agreement, substitute water shall be deemed to have been purchased during the period beginning at 8:00 A. M. on January 15 and ending at 8:00 A. M. on June 6 of such year and the price paid by the District for substitute water shall be deemed to be the average price per acre-foot paid by the District for all untreated water purchased by it for introduction into its facilities in the vicinity of Chenery Reservoir during said period without deduction for any discount, allowance or rebate that may hereafter be made or allowed by the U. S. Bureau of Reclamation in the event the District hereafter undertakes, to any extent to operate and maintain any facilities of the U. S. Bureau of Reclamation not operated and maintained by the District as of the date of this agreement.

6. Each year during the term of this agreement that the District purchases substitute water for its water deficiency entitlement, the State will pay the District an amount of money computed in accordance with the formula $M = E(C_w + C_e - \$4.90)$ where M is the amount in dollars to be paid by the State, E is the District's water deficiency entitlement for such year determined in

the manner provided in Section 3 hereof, C_w is the amount per acre-foot paid by the District for substitute water delivered to the District as provided in Section 5 hereof, and C_e is the average amount (if any) per acre-foot paid by the District for electric energy to transport substitute water from the point of delivery thereof to the District to the District's facilities in the vicinity of Chenery Reservoir. The State shall pay said amount to the District not later than October 31 of the following year. Such payments are hereby determined to be reasonable costs of the annual maintenance and operation of the State Water Resources Development System and shall be disbursed from the California Water Resources Development Bond Fund pursuant to subsection (b) (1) of Section 12937 of the Water Code.

7. The District, in consideration of the payments by the State herein provided, releases the State from liability for any decrease in the availability to the District of usable river water at Mallard Slough caused by operation of the State Water Resources Development System during the term of this agreement.

8. The obligations of the State herein shall not be affected by any modification or discontinuance of the District's Mallard Slough pumping plant or Chenery Reservoir.

9. Nothing herein shall be deemed to be a release or waiver of any right of the District to purchase supplemental water supplies from the State with the priorities established by Water Code Section 11460, 12201 to 12204 inclusive, and 12931.

IN WITNESS WHEREOF the parties hereto have executed this agreement
by their respective officers thereunto duly authorized on the date first above
written.

Approved as to legal form
and sufficiency:

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

By P. A. Towner /s/
Chief Counsel

By William R. Gianelli /s/
Director

ATTEST:

CONTRA COSTA COUNTY WATER
DISTRICT

B. M. McCloskey /s/
Secretary

By Ralph D. Bollman /s/
President