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| 1670 | 1 | I, Senator Jim Nielsen, submit public comment on the Draft Bay Delta Conservation Plan (BDCP, or Plan) and the BDCP Draft Environmental Impact Report (EIR}/Environmental Impact Statement (EIS} with concern that this proposal is based on faulty hydrologic models and analysis and, consequently, is rife with incorrect assumptions and disastrous policies. This project, including the proposed twin tunnels that would pump water under the Delta to farms and southern California, perpetrates the notion that all of California's water issues are "Delta-centric." It neglects the watershed from which the vast quantity of the state's water resources originates. Indeed, the proposed solutions focus on solving the Delta's environmental problems and central and southern California's water supply demands, ignoring California's needs upstream. This poses serious risk to the North State's economy, environment, and way of life. | Please note that comment addresses Alternative 4, which is no longer the preferred alternative. The preferred alternative is now Alternative 4A and no longer includes an HCP. Alternative 4A, also known as California WaterFix, has been developed in response to public and agency input and is the new CEQA Preferred Alternative. Alternative 4A is also the NEPA Preferred Alternative, a designation that was not attached to any of the alternatives presented in the 2013 Public Draft EIR/EIS. Alternative 4 remains a potentially viable alternative and is being carried forward in this RDEIR/SDEIS because it represents the original habitat conservation plan/natural community conservation plan (HCP/NCCP) alternative approach, and because it provides an important reference point from which the Alternative 4A, 2D, and 5A descriptions and analyses were developed. The EIR/EIS analyzes all alternatives, including Alternative 4A. If the Lead Agencies ultimately choose the alternative implementation strategy and select an alternative presented in the RDEIR/SDEIS after completing the CEQA and NEPA processes, elements of the conservation plan contained in the alternatives in the 2013 Public Draft EIR/EIS may be utilized by other programs for implementation of the long term conservation efforts. . The proposed project would stabilize water supplies, and exports could only increase under certain circumstances. Water deliveries from the federal and state water projects under a fully implemented project would be about the same as the average annual amount diverted in the last 20 years. Although the proposed project would not increase the overall volume of Delta water exported, it would make the deliveries more predictable and reliable, while restoring an ecosystem in steep decline. Refer to Master Response 3 for more information about project objectives, purpose and need. ). With respect to exports to the south, refer to the following Master Responses for additional clarification: Master Response 44 (Decision Tree), Master Response 43 (Water Transfers), Master Response 34 (Beneficial Use of Water), Master Response 28 (Operational Criteria), , Master Response 26 (Changes in Delta Exports), Master Response 35 (Southern California Water Supply), and Master Response 25 (Upstream Reservoir Effects).See Chapter 5(Water Supply) and Appendix A (Chapter 5) in the Draft EIR/EIS and the RDEIR/SDEIS, respectively. |
| 1670 | 2 | The absence of an operating plan for the proposed twin tunnels is one fatal omission of the current draft. While exporters advocate to move the diversion upstream to ensure continued access to North State reservoirs despite "unforeseen circumstances," this plan only tends to exporters' interests and leaves northern California with the continuous burden to meet increasingly onerous Delta environmental objectives. Bear in mind that once water is exported south, it is no longer available to benefit the Delta and northern needs. Northern California reservoirs remain liable for Delta salinity goals, even if it means draining reservoirs with no remaining supply available for customer needs. In contrast, water south of the Delta can be used exclusively to meet customer demand. A realistic next draft of the BDCP will include an operating plan that does not deplete North State reservoirs in future dry years, regardless of unanticipated precipitation patterns | The operating plan for the proposed water conveyance facility is described in Conservation Measure 1 in Chapter 3 of the 2013 Public Draft EIR/EIS. A summary of this operating plan is also described in the EIR/EIS. The commenter's concerns regarding the depletion of Northern California reservoirs are noted. Please see Chapter 6 of the Final EIR/EIS for a discussion of the potential impacts of the proposed project on surface water storage. For more details about climate change and water supply reliability, see Master Response 19. For further discussion about upstream reservoir effects, see also Master Response 25. |
| 1670 | 3 | Depending on how exactly the operations of the Central Valley Project and the State Water Project are affected, the BDCP threatens to harm existing water rights and contracts. Consider the case exemplified by the City of Roseville (located within the Fourth Senate District): The BDCP assumes that the Bureau of Reclamation will operate Folsom Reservoir, the primary water source for the City's 500,000 residents, to the point at which the water level drops below Roseville reservoir's intake (known as "dead pool"} for three months in 10 percent of years. In other words, hundreds of thousands of Californians can be denied water for a several months-long period each decade. Apart from the practical devastation this would deliver to the region's economy, this is a clear violation of the City of Roseville's diversion contracts and the terms of the Bureau of Reclamation's water-right permits of Folsom Reservoir | The No Action Alternative and all action alternatives include assumptions for future climate change and sea level rise; however, no changes in regulatory requirements are assumed in the future. Therefore, in drier years, the CALSIM II model outputs result in dead pool conditions in Folsom Lake which could affect American River water rights holders. The "dead pool" conditions presented in the CALSIM II monthly model in the EIR/EIS occur because the model only calculates and reports SWP and CVP water operations at an average monthly basis, the model cannot simulate changes that occur on a weekly basis by water users and SWP and CVP operations. In addition, the model cannot make decisions that occur in real-time, such as drought operations during the ongoing drought. Instead the model includes average operating criteria for all dry periods, and does not reflect specific changes. The increased occurrences of "dead pool" conditions in the future either with or without the proposed project are primarily attributable to sea level rise, climate change and higher demands associated with water rights (primarily in El Dorado, Placer, and Sacramento counties), and not due to proposed project. |

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| 1670 | 4 | The BDCP's financing must be based on the "beneficiary pays" principle. However, the current draft does not provide this assurance. For example, habitat conservation plans are required to have adequate funding and only to be financed and affect those who voluntarily pursue a Section 10 Endangered Species Act permit. Upstream water users who are merely potentially affected stakeholders should not be harmed, asked to pay, or otherwise negatively impacted by changing operations or additional regulatory actions stemming from a Section 10 permit. The plan does not provide guarantees that only the voluntary potentially regulated entities will bear the costs. Additionally, the BDCP assumes funding from a water bond that (1) has not been passed by the electorate, (2) has been delayed twice over the past four years, (3) and may be replaced by the Legislature in the coming month. The Plan also depends on a second bond-which appears to be a politically infeasible prospect-and some ambiguous, unsecured stream of federal financing.<br><br>Unfortunately, some BDCP proponents anticipate paying for their benefits with an alarming new funding source: major water districts are considering raising property taxes without a public vote. While Proposition 13 requires most property tax increases to be vetted by a two-thirds vote, these water agencies argue that their authority to increase the taxes predates Proposition 13's provisions. One Silicon Valley district has already discussed nearly doubling the average residential property assessment . This erodes Proposition 13, which remains one of California's greatest and most popular policy achievements. It is also taxation without representation . The next draft must prevent such unfair and potentially unconstitutional funding sources.<br><br>The BDCP is based on flawed assumptions of funding, a lack of explanation for how expenses will be limited, and a belief that Californians will continue to support costly project overruns. Yet again, the North State's residents and watershed are asked to assume an unfair burden at the expense of historic water contracts and rights. Further, this draft retreats from the bipartisan 2009 California Water Plan. It continues policies based on unfounded principles, breaches of trust, and a return to failed Delta-centric policies. It also dismisses the central element of that plan, co-equal goals | Socioeconomic effects of the various alternatives are described and assessed in Chapter 16, Socioeconomics, of the 2013 Public Draft EIR/EIS. A Draft Statewide Economic Impact Report has also been published, which indicates that the proposed project would result in a substantial economic net benefit to the State of California.<br><br>Construction of individual components (e.g., intakes, tunnels) would range from one to six years. Temporary construction-related impacts include noise, visual, and transportation, among others. The construction-related impacts are disclosed in individual resource area chapters in the 2013 Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS). All impacts would be minimized and mitigated to the degree feasible and are described under each alternative in the RDEIR/SDEIS individual resource chapters and in Appendix 3B, Environmental Commitments, EIR/EIS. An analysis of economic impacts of the proposed project, including impacts related to agriculture, recreation, water rates, and taxes are also evaluated and described in the Statewide Economic Impact Report (http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Draft_BDCP_Statewide_Economic_Impact_Report_8-5-13.sflb.ashx).<br><br>Chapter 16, Socioeconomics, of the Draft EIR/EIS was revised based on the revised construction footprint for proposed water conveyance facilities, along with a refined set of construction cost and schedule assumptions developed for Alternative 4. Refer to Chapter 16, Socioeconomics, Section 16.3.3.9, in Appendix A for the revised analysis of Alternative 4. Additionally, one table from Draft EIR/EIS Appendix 16A has been incorporated into Appendix A. For more explanation on BDCP implementation and funding please see Master Response 5. For details about public trust considerations please see Master Response 13. For discussion of compliance with the Delta Reform Act please refer to Master Response 31, Appendix 3I and Appendix 3J of the Final EIR/EIS. |
| 1670 | 5 | This incomplete plan should return to the drawing board with collaborators this time mindful of past failures and resolved not to repeat them. The next drafting phase should include more influence from stakeholders within the watershed. It is my hope that you will instruct the Department of Water Resources to further revise and develop the Plan to mitigate disparate negative impacts among the regions, to correct errors, and to satisfy ambiguities | The documentation generated by this project has undergone extensive public and scientific input, discussion, and transparency, including the posting of administrative draft chapters online and providing many more opportunities for public participation than is normally required by the CEQA/NEPA processes, see Master Response 41 (Transparency). Since 2006, the BDCP and subsequently Alternative 4A, the California WaterFix Project have been developed based on sound science, using data and input gathered from various agencies and experts over many years., The planning process has involved stakeholders and independent scientists, and included more than 600 public meetings, working group meetings and stakeholder briefings. Refer to Chapter 32 (Public Involvement, Consultation, and Coordination) in the EIR/EIS and Master Response 40 (Public Outreach Adequacy).<br><br>The Federal and State Lead Agencies have done their best to make the EIR/EIS for the proposed project as fair, objective, and complete as possible. The Lead Agencies are following the appropriate legal process and are complying with CEQA and NEPA in preparing the EIR/EIS for the proposed project. These agencies readily acknowledge, however, that the document addresses a number of topics for which some scientific uncertainty exists. Such uncertainty can give rise to differing opinions as to what conclusions may be reached. |
| 1671 | 1 | The Migratory Bird Conservation Partnership comments focus primarily on Chapter 3 (Conservation Strategies), Appendix 5.A.1 (Climate Change Implications for Natural Communities and Terrestrial Species), and Chapter 29 (Climate Change). As it prepared | This comment addresses Alternative 4 (known also as the BDCP) or analysis contained within the draft BDCP Effects Analysis. A modified proposed project (Alternative 4A/California WaterFix) is being considered. Numerous comments were received that focused on various elements of the BDCP. Alternative 4 remains a |

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| | | these comments, the MBCP recognized several points of concern that recurred throughout the document. These concerns, and suggested improvements to address them, are listed below and discussed at greater length in the supporting technical comments, attached to this letter.<br><br>In many places in the document, the focus on a narrow group of threatened and endangered species has led to narrowly defined recommendations. With some relatively minor adjustments, the Conservation Measures can maintain their benefits for listed species and provide additional benefits for other species groups that will suffer impacts arising from the project, especially shorebirds and waterfowl. We offer specific suggestions about where these improvements can be made. | viable alternative. Where the comments focused on elements of the BDCP that overlap with the elements of Alternatives 2D, 4A, or 5A (e.g., CM1 as it comprises of the North Delta Diversions, tunnels, and supporting facilities), specific responses are presented. Where comments raised issues as to whether the BDCP and other HCP/NCCP alternatives in the 2013 Draft EIR/EIS were potentially feasible and could function as an alternative for purposes of meeting CEQA and NEPA's requirements to analyze a reasonable range of alternatives to the proposed project (e,g., issues regarding the BDCP Effects Analysis or financial feasibility), responses are presented generally in Master Response 5. Where comments submitted on the BDCP were focused on elements outside the scope of the environmental analysis or viability of the BDCP and other HCP/NCCP alternatives within the context of CEQA/NEPA (e.g., request of specific revisions to the BDCP related to mapping or references), no specific responses are provided and further consideration will be given to these comments, and any revisions to the Draft BDCP would only be made, if an HCP/NCCP alternative was ultimately approved at the conclusion of the CEQA/NEPA process. |
| 1671 | 2 | For cultivated lands that provide wildlife habitat, post-harvest management is an important consideration of habitat quality. Recommendations for post-harvest management should be included in any conservation measures that include wildlife-friendly agriculture. We have provide a number of references with more information on post-harvest management and have offered suggestions for where this information can be included. | See response 1671-1. |
| 1671 | 3 | There are a number of places where the conservation benefits of water management is incomplete. For example, the document does little to address the need for flooded fields for migrating shorebirds (e.g., early spring and late July). The document also fails to address water supply vulnerability if climate change impacts water delivery to areas that support restored riparian vegetation. [Migratory Bird Conservation Partnership] suggest where this information can be added to the document. | See response 1671-1. |
| 1671 | 4 | The plan should have a stated goal of maintaining or improving water deliveries to refuges. Water operations should consider direct and indirect impacts on refuge water deliveries. Refuge water supplies should be enhanced if the project results in increased exports. Changes in timing or quantity of refuge water delivered as a result of operations should be identified (by refuge, when, to what extent) and fully mitigated. | See response 1671-1. |
| 1671 | 5 | In all restoration and protection activities, we encourage the authors to consider any possible impacts of climate change and identify actions that enhance the resilience of these systems to the impacts of climate change. We have suggested ways in which the authors could incorporate climate-smart conservation principles into the restoration recommendations. | Climate change and sea-level rise consideration will be incorporated into designs for applicable restoration projects. Please see Master Response 19 for more information regarding climate change. |
| 1671 | 6 | Monitoring of shorebirds, waterfowl, and riparian songbirds should be included in the plan as a way to evaluate whether management is creating habitat that is used by birds and other wildlife. Despite the emphasis on effectiveness monitoring to guide adaptive management, there is very little monitoring of actual bird populations proposed in the DEIR. More clearly articulating how wildlife monitoring will be used in the adaptive management framework would improve the document. | The proposed project is a joint RDEIR/SDEIS prepared in compliance with the requirements of CEQA and NEPA. Before the selection and approval of an alternative considered, the Lead Agencies must comply with the necessary state and federal environmental review requirements. This document, along with the BDCP Draft EIR/EIS, and expected Final EIR/EIS are intended to provide sufficient CEQA and NEPA support for approval of the proposed project or any of the action alternatives for either compliance strategy. As implementation of the proposed project or any of the action alternatives will require permits and approvals from public agencies other than the Lead Agencies, the CEQA and NEPA documents are prepared to support the various public agency permit approvals and other discretionary decisions. These other public agencies are referred to as responsible agencies and 20 trustee agencies under CEQA (State CEQA Guidelines Sections 15381 and 15386) and cooperating agencies under NEPA (e.g., USACE and EPA).<br><br>For more information please see 1.1.5 of Section 1 Introduction of the RDEIR/SDEIS. |

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| | | | Collaborative science and adaptive management will support the proposed action by helping to address scientific uncertainty where it exists, and as it relates to the benefits and impacts of the construction and operations of the new water conveyance facility and existing CVP and SWP facilities.<br><br>A Mitigation, Monitoring and Reporting Plan have also been developed in support of the EIR/EIS process and are available for review with the Final EIR/EIS. The lead agencies believe that, taken together, the EIR/EIS, the Collaborative Science and Adaptive Management Program and the MMRP more than sufficiently provide for the monitoring of habitats and species evaluated in the EIR/EIS. |
| 1671 | 7 | The Migratory Bird Conservation Partnership remains concerned about the many uncertainties -- especially to refuge water supplies and to important habitat areas outside the Plan Area -- and provisions for research and monitoring. The BDCP will undoubtedly have very significant environmental impacts for decades to come, and it represents an opportunity to improve operations and ecosystem sustainability in and around the Delta. | See response 1671-1. The EIR/EIS evaluates impacts to the Plan but also the Project Area which includes SWP and CVP service areas north and south of the Delta. The lead agencies believe that impacts to water supplies and terrestrial species at refuges north and south of the Delta are appropriately identified in the EIR/EIS. The comment does provide more specificity regarding the type of impacts expected for “decades to come” so a more specific response cannot be provided. |
| 1671 | 8 | The DEIR Should Be Revised to Incorporate Recommendations from the Central Valley Joint Venture and the Delta Independent Science Board.<br><br>The Central Valley Joint Venture’s Recommendations Would Protect Wetlands, Water Supplies that Benefit Refuges and Wildlife, and Produce Better Adaptive Management Measures.<br><br>The Migratory Bird Conservation Partnership recommends that the BDCP and subsequent implementation and adaptive management be based on the best available science and subject to stakeholder input and peer review, where possible. As written, the BDCP appears to rely on overly optimistic projections regarding the effectiveness of mitigation measures and outcomes from monitoring. Given the delicate ecology of the Delta and the potential for massive long term environmental impacts arising from the project, caution and fact-based decision-making is necessary to ensure the success of the project. | Please see responses to comment letter 1448 (see table in the EIR/EIS) for a comprehensive response to comments from the Independent Science Board. The Central Valley Joint Venture letter was written in response to a much earlier draft of the BDCP and EIR/EIS. The CVJV letter from 2012 does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in the Final EIR/EIS.<br><br>Please also see Master Response 22 for further information regarding mitigation measures. |
| 1671 | 9 | Overall, the DEIR should be revised to ensure that BDCP activities (1) improve -- not compromise -- the condition of critical habitats in the Central Valley, (2) do not result in negative impacts to fish, wildlife, or their habitats, due to water transfers related to the BDCP, and (3) are designed to provide sustainable, predictable deliveries of water to all water users, including managers of wetlands that provide critical habitat for migratory birds.<br><br>The Migratory Bird Conservation Partnership members are also members of the Central Valley Joint Venture (CVJV). As recommended by the CVJV in its letters of July 23, 2012 and May 24, 2013, the BDCP should improve -- not compromise -- efforts to conserve wildlife and habitat in and around the Delta. In its May 24,2013 letter, the CVJV recommended that "all Delta-related planning efforts, including BDCP ... Adopt a goal to contribute to the attainment of the acreage, water and bird population goals set forth by the Central Valley Joint Venture Implementation Plan." | CEQA and NEPA do not require that projects improve habitat conditions. The EIR/EIS has thoroughly evaluated the potential impacts to fish and wildlife, including migratory birds and that assessment is provided in Chapters 11 and 12. The current proposed project is not an HCP/NCCP and therefore does not have requirements regarding biological goals and objectives or habitat acres protected. Further consideration will be given to comments specific to the BDCP, and any revisions to the Draft BDCP would only be made, if an HCP/NCCP alternative was ultimately approved at the conclusion of the CEQA/NEPA process. |
| 1671 | 10 | The Migratory Bird Conservation Partnership restates the principles set forth in the July 23, 2012 letter:<br><br>PRINCIPLE 1: Avoid Detrimental Impacts to Wetland Water Supply.<br><br>PRINCIPLE 2: Mitigate for Impacts to Brackish and Freshwater Wetland-associated Birds and Bird Habitat. | The commenter expresses concern regarding the adequacy of the EIR/EIS in addressing effects on and mitigation for migratory birds. The commenter does not provide specific reference as to where in the EIR/EIS they feel the analysis is inadequate. Chapter 12 analyzes project effects on several special-status bird species, common wildlife, and shorebirds and waterfowl and includes discussions of how conservation actions, avoidance and minimization measures, and additional mitigation measures, which include monitoring efforts, will offset project effects. Please also see Master Response 22 for further information regarding mitigation measures. |

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| | | PRINCIPLE 3: Use Adaptive Management to Improve Mitigation Outcomes.<br><br>Under each of these principles, the Central Valley Joint Venture (CVJV) provides several specific actions that should be taken. While the DEIR addresses each of these concerns in turn, the Migratory Bird Conservation Partnership (MBCP) is concerned with the DEIR's adequacy in assessing these impacts, proposing mitigation measures, and ensuring adequate monitoring and adaptive management. | |
| 1671 | 11 | The Delta Independent Science Board's recommendations would improve the DEIR's scientific content, adaptive management framework, and overall readability.<br><br>The Migratory Bird Conservation Partnership (MBCP) has also reviewed the Delta Independent Science Board's report of May 15, 2014 ("DISB Report") and concurs with many of the concerns raised therein. [Footnote 2: Available at http://deltacouncil.ca.gov/sites/default/files/documents/files/Attachment-1-Final-BDCP-comments.pdf.] Among those that generally apply to the DEIR, the MBCP agrees that the DEIR would be improved if the authors revised the draft to do the following:<br><br>- include meaningful summaries for each chapter;<br><br>- provide a clear and concise comparison of water-conveyance alternatives;<br><br>- improve and describe the framework for adaptive management and establish clear performance indicators and trigger points for adaptive management;<br><br>- identify assumptions relied upon in each chapter; and<br><br>- acknowledge uncertainties in conclusions. | The Draft EIR/EIS reflects years of collaboration, response to requests for additional information, careful thought, accumulation of the latest scientific information, and thorough analyses. Please refer to comment letters 1448 and 2546 (see the index of commenters table in the EIR/EIS) to see responses to the Delta Independent Science Board's comments which include those comments raised by the commenter. |
| 1671 | 12 | The Delta Independent Science Board's conclusions and recommendations concur with those provided by the Delta Science Program's Independent Review Panel in its review of BDCP Chapter 5 (Effects Analysis). Specifically, the Independent Panel's review found that Chapter 5 failed to:<br><br>- address critical uncertainties associated with presumed beneficial effects of tidal wetland restoration;<br><br>- clearly state critical assumptions underlying many proposed actions and consequences;<br><br>- clearly state how adaptive management will be implemented;<br><br>- present models with a range of possible scenarios;<br><br>- consider linkages and interactions;<br><br>- adequately analyze net effects; and<br><br>- acknowledge that habitat restoration is a lengthy process with uncertain results.<br><br>(See DISB Report, at Footnote 10; see also Delta Science Board Program, Independent Review Panel Report Phase 3 (Review of Chapter 5 of the Draft BDCP)) [Footnote 3: Available at http://deltacouncil.ca.gov/sites/default/files/documents/files/Delta-Science-Independent-R | Please refer to comment letters 1448 and 2546 (see the index of commenters table in the EIR/EIS) to see responses to the Delta Independent Science Board's comments which include those comments raised by the commenter. Again with regard to comments on Chapter 5 of the BDCP; further consideration will be given to these comments, and any revisions to the Draft BDCP would only be made, if an HCP/NCCP alternative was ultimately approved at the conclusion of the CEQA/NEPA process. |

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| | | eview-Panel-Report-PHASE-3-FINAL-SUBMISSION-03132014_0.pdf.] The Independent Review Panel's criticisms could be applied to several sections of the DEIR, particularly a persistent failure to identify uncertainties and assumptions, analyze direct and indirect effects, and clearly layout an adaptive management framework. | |
| 1671 | 13 | Chapter 3: Conservation Strategies<br><br>Conservation Measure 1 (Water Facilities and Operations) should be revised to address impacts to refuge water supplies.<br><br>BDCP should benefit refuge water supplies.<br><br>Public wildlife refuges rely on the Central Valley Project and State Water Project for water supplies, and are therefore impacted by BDCP operations. If the system becomes more reliable, enabling more water to be exported as a result of conveyance improvements, then the public wildlife refuges south-of-Delta should benefit.<br><br>Water deliveries to these refuges are mandated under federal law under the Central Valley Project Improvement Act (CVPIA), yet remain unfulfilled. [Footnote 4: A major environmental accomplishment of the Central Valley Project Improvement Act (CVPIA) was the commitment to deliver to refuges and wildlife areas in the Central Valley a firm (Level 2) yield of 422,252 acre-feet, 37% of the annual water needs for existing wetlands. In addition, CVPIA mandated that an additional 133,264 acre-feet of so-called Level 4 water be acquired over a ten-year period commencing in 1992, thus ensuring that roughly half of refuge water needs would be met by the project. Between 1992 and 2009, legally mandated water supplies for the refuges fell short by more than 40,000 acre-feet from mandated Level 4 quantities; the current and future droughts create the risk that even less water is likely to be delivered for refuges and wildlife.] Improvements to refuge water deliveries should be made by 1) taking advantage of the extended window for through-Delta transfers to enable CVPIA Level 4 supplies to be acquired north-of-Delta and transferred south-of-Delta; 2) providing assurances that pumping and conveyance capacity are available for refuge supplies; and 3) establishing refuges as a priority for delivery under system operations in any year type. | DWR's fundamental purpose of the proposed project is to make physical and operational improvements to the SWP system in the Delta necessary to restore and protect ecosystem health, water supplies of the SWP and CVP south of the Delta, and water quality within a stable regulatory framework, consistent with statutory and contractual obligations. By establishing a point of water diversion in the north Delta and new operating criteria to improve water volume, timing, and salinity, the proposed project is designed to improve native fish migratory patterns and allow for greater operational flexibility. The proposed project would provide more reliable water supplies to south of Delta water users, which may not preclude State and Federal refuges.<br><br>Again with regard to comments recommending that benefits to refuges specifically be included in the BDCP; further consideration will be given to these comments, and any revisions to the Draft BDCP would only be made, if an HCP/NCCP alternative was ultimately approved at the conclusion of the CEQA/NEPA process. |
| 1671 | 14 | The DEIR should be revised to consider direct impacts to refuge water supplies.<br><br>The DEIR does not adequately contemplate water supply impacts arising from the BDCP operations on wildlife refuges. BDCP operations will affect the timing and quantity of deliveries across water years. These impacts should be identified, including the specifics about which refuges are impacted, when and to what extent. Timing of impacts is especially important, since migratory bird habitat needs vary across months, weeks and water years. Impacts should consider the type of habitat impacted, as well as the species. Any detrimental impacts should be fully mitigated. | The CALSIM II model runs for the Existing Conditions, No-Action Alternative, and action alternatives provide the same volumes and patterns of refuge water supply (under Level 2 amounts). The refuge water supply deliveries are provided at a higher priority and prior to SWP and CVP water contract deliveries. Please see Chapter 5 for information on water supplies and Chapter 12 for information on impacts to terrestrial species. |
| 1671 | 15 | The DEIR should be revised to consider indirect impacts to refuge water supplies.<br><br>Because the water system is intertwined, each water management decision under BDCP will have system-wide impacts. For example, if additional outflow is needed through the Delta and operations at Oroville are altered to address this issue, there are likely impacts to Shasta operations that could impact refuge water deliveries. We ask that any water operation decisions include assessment of system-wide impacts and explicitly identify (which refuges, when and how) and address impacts to refuge water supplies. | See response 1671-14. |

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| 1671 | 16 | Conservation Measure 3 (Natural Communities Protection and Restoration) should be revised to consider a broader range of native species and to clarify objectives for acquired lands.<br><br>In Conservation Measure 3 (CM-3), the document describes the acquisition of approximately 70,000 acres to protect and enhance areas of existing natural communities and covered species habitat. These areas would also be designed to provide connectivity to existing conservation lands inside and outside the Plan Area. This Conservation Measure is the system that would be used to achieve the habitat protection described in Section 3.3, the Biological Goals and Objectives. The information in Table 3.4.3-1 covers the acreages called for in many of the other Conservation Measures. | See response 1671-1. |
| 1671 | 17 | Conservation Measure 3 should include consideration of species of special concern and other species vulnerable to climate change.<br><br>CM3 focuses on covered species with other native species rarely mentioned. There is no discussion of the California Department of Fish and Wildlife's California Bird Species of Special Concern [Footnote 5: Shuford and Gardali 2008, available at: https://www.dfg.ca.gov/wildlife/nongame/ssc/birds.html.], the species and subspecies that are mostly likely to end up being "covered" (e.g., listed as threatened or endangered) species if no conservation actions are taken.<br><br>We also suggest that the list of species be expanded to include non-listed species such as those that are vulnerable to climate change. (See, e.g., Gardali et al. 2012) [Footnote 6: Available at http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0029507.] These species could be cross-walked with the covered species to show where conservation actions could benefit multiple species.<br><br>Among the many species that merit greater consideration, tricolored blackbird should be assessed in greater detail. In particular, siting and reserve design should propose an expansion of protected and restored acreage for this species. Currently, the document discusses protection of 50 acres for the species and fails to recommend restoration of any acreage to benefit tricolored blackbirds. Given this species is in steep decline under current conditions, the DEIR should improve its analysis of impacts to tricolored blackbird, and identify and recommend additional mitigation measures that are in alignment with the Conservation Plan for this species. [Footnote 7: Available at http://tricolor.ice.ucdavis.edu/node/579.] Moreover, given that the species is currently being considered for emergency listing under the California Endangered Species Act (CESA), management of this species will be mandatory within the Plan Area. [Footnote 8: See California Fish & Game Commission, Agenda for August 6, 2014 meeting, Item 11: Possible Adoption of Emergency Regulation to Add Tricolored Blackbird (Agelaius tricolor) to the List of Endangered Species (Pursuant to Section 2076.5, Fish and Game Code), available at: http://www.fgc.ca.gov/meetings/2014/aug/080614agd.pdf.] | See response 1671-1. |
| 1671 | 18 | Goals for habitat protection and restoration should be better explained, describe management, and be connected with actual benefits for species rather than merely describing acreages.<br><br>Conservation Measure would be improved by providing the underlying reasoning or evidence supporting the determination of proposed acreages or restoration goals to benefit various species. Currently, a reviewer cannot confidently assess the adequacy of the | The analysis for CMs 2–21 was completed at a programmatic level, as described in Section 4.1.2 of Chapter 4, Approach to the Environmental Analysis, and meets NEPA and CEQA requirements. Please also note that the RDEIR/SDEIS, released in 2015, introduced a new preferred alternative, 4A, which does not include a HCP or conservation measures. The alternative implementation strategy allows for other state and federal programs to address the long term conservation efforts for species recovery in programs separate from the proposed project. Under Alternative 4A, substantially less habitat restoration would occur than under |

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| | | conservation measure on these grounds.<br><br>In addition to land acquisition, it is essential for the EIR to set forth how wetland areas will be managed, as the value of managed wetlands to particular species can vary dramatically (e.g., water depths, height and percentage of vegetation, etc.). Obviously, the ability of this conservation measure to meet its goals will depend greatly on how certain wetland areas are managed over the life of the project. | Alternative 4. Therefore, most of the restoration to which the commenter is referring would no longer apply. Please refer to Chapter 3, Alternatives, for additional detail about the habitat restoration proposed under Alternative 4A. Also, see response 1671-1. |
| 1671 | 19 | Siting and reserve design should be clarified and include additional management practices and multispecies benefits, with the ultimate outcome based on quality habitat used by the target species.<br><br>Table 3.4.3-1 summarizes much of CM-3's siting and reserve design objectives. (See DEIR, at 3.4-76-88). While the Migratory Bird Conservation Partnership supports the initial plan to protect 8,100 acres of managed wetlands, the section would be improved by considering areas outside of the Suisun Marsh, particularly areas that can support multiple taxa under a variety of climate change scenarios.<br><br>The Migratory Bird Conservation Partnership supports restoration of at least 500 acres of habitat to specifically benefit roosting Sandhill cranes. However, we believe that there is room in the plan to include specific restoration actions for other waterbird groups and thereby increase capacity for them in the Delta. We encourage the inclusion of restoration actions that can benefit waterfowl, shorebirds, and long-legged waders. | Reserve system assembly principles were used to guide decisions regarding the distribution of targeted natural communities and covered species habitats among the conservation zones to ensure the greatest biological benefits. These assembly principles will also support the decisions of the Implementation Office regarding the acquisition of reserve lands. A few of these principles are listed here:<br><br>• Protect, enhance, and restore the ecological diversity of natural communities and covered species habitats at the periphery of the Plan Area on lands most likely to accommodate future sea level rise and less likely to be flooded as a result of levee failures (i.e., terrestrial habitat areas should be located where there is a low risk of future flooding)<br><br>• Design reserves to appropriately scale the ecological gradient and emphasize compatibility between restored natural communities and working landscapes (e.g., cultivated lands)<br><br>• Protect the highest-value natural communities and covered species habitats available consistent with the BDCP implementation schedule<br><br>• Maximize connections between reserves and with existing conservation lands in and adjacent to the Plan Area<br><br>Also of note, reserve design and acquisition/protection of natural community and habitat may depend on the willingness of sellers. |
| 1671 | 20 | The document proposes protecting 48,625 acres of cultivated lands. Of this, protection goals are given for total acreage and the quality of those acres for various covered species. For cultivated lands, we noted the following issues:<br><br>Lack of consistency. It is unclear why the quality requirement is "moderate" or higher for some species (e.g., Swainson's Hawk, nonbreeding Tricolored Blackbird) but "high" or "very high" for other species (Greater Sandhill Crane); note that the table of habitat values for Swainson's Hawk (3.4.3-3) does not actually have a moderate category. Further, why should 80% of foraging habitat be of "very high" value for cranes but only 50% should be of "very high" value for Swainson's Hawks? | See response 1671-1. |
| 1671 | 21 | Management practices. The document has various tables that list the relative value of various crops to particular species. Given just the crop names are listed this appears to assume that the value of a crop is the same regardless of what the post-harvest management practice is, which is not the case. We suggest adding information to this table on post-harvest practices and their relevant values. [9] Doing so will provide greater guidance and clarity on the benefits and trade-offs.<br><br>[Footnote 9: Relevant studies regarding crop management on birds include:<br><br>* Shuford, W. D., M. E. Reiter, K. M. Strum, C. J. Gregory, M. M. Gilbert, and C. M. Hickey. 2013. The effects of crop treatments on migrating and wintering waterbirds at Staten Island, | See response 1671-1. |

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| | | 2010-2012. Final Report to The Nature Conservancy, 190 Cohasset Road, Suite 177, Chico, CA 95926.<br><br>* Shuford, W. D., M. E. Reiter, K. M. Strum, M. M. Gilbert, C. M. Hickey, and G. H. Golet. The benefits of crops and field management practices to wintering waterbirds in the Delta. Submitted to California Agriculture.<br><br>* Sterling, J. 2011. Review of literature and information on the bird use of certain agricultural crops in California's Central Valley. Report to the Nature Conservancy.<br><br>* Strum, K. M., M. E. Reiter, C. A. Hartman, M. N. Iglecia, T. R.Kelsey, and C. M. Hickey. 2013. Winter management of California's rice fields to maximize waterbird habitat and minimize water use. Agriculture, Ecosystems, and the Environment 179:116-124.<br><br>* Taft, O. W., and C. S. Elphick. 2007. Waterbirds on working lands: Literature review and bibliography development. National Audubon Society, Inc., New York.] | |
| 1671 | 22 | Compatibility. Although the protected acreage requirement for a particular species "may overlap with species-specific cultivated land requirements for other species," there appears to be no analysis of whether all of these acreage goals are compatible. For example, of the 48,625 acres of cultivated lands slated for protection, the Swainson's Hawk requires 43,325 acres, which leaves only 5300 acres for crops that are not of moderate or higher value for the hawks. But cranes are allotted 7300 acres of cultivated lands for foraging, for which 80% (5840 acres) must be of very high value (see Table 3.4.3-1). The two crops of very high value for cranes are corn and rice (Table 3.4.3-2), neither of which are of suitable value for Swainson's Hawks (Table 3.4.3-3). Hence the requirements for both of these species are more than is allocated for all species combined even assuming no other incompatibilities when looking at other species' requirements. | See response 1671-1. |
| 1671 | 23 | No net loss? It is unclear as to whether under the proposed protection and restoration scenarios for various species if there would be a net gain in habitat for covered species, or if there still might be loss of overall habitat in the Delta Plan area. Moreover, it is unclear if this may vary between natural habitats and cultivated lands. It is important to explain this clearly in the document.<br><br>Overall, while acreage goals provide a good starting point, the outcomes must be based on measures of habitat quality. These measures should include habitat use by target species, including explicit metrics that capture different habitat needs of various migratory and resident birds, by season and location. The ultimate outcome should focus on meeting the needs of these species, rather than simply creating targeted acreage. | See response 1671-1. |
| 1671 | 24 | Conservation Measure 5 should expand it's discussion of restoration opportunities and discuss overlap with other restoration opportunities.<br><br>Conservation Measures 5 (Seasonally Inundated Floodplain Restoration) describes the restoration of 10,000 acres of seasonally inundated floodplain. (See DEIR, at 3.4-145) This restoration could be accomplished by expanding floodway bypasses, setting back levees, grading restored floodplains, and removing rip-rap. The most promising opportunities are in the south Delta. Much of this area would overlap with the 5,000 acres of riparian vegetation to be restored under Conservation Measure 7.<br><br>[Migratory Bird Conservation Partnership] concurs with the need for inundated floodplain | This comment describes restoration options but does not raise any environmental issues related to the EIR/EIS. See response 1671-1. Also note that the current proposed project includes a much reduced target for habitat restoration and does not specifically include seasonally inundated floodplain. |

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| | | forest and we encourage the authors to recognize the opportunity to develop multiple-benefit floodplain projects (such as set-back levees and expanded bypasses) that can accomplish these restoration goals. More information on the multiple-benefit floodplain approach can be found here: http://www.multibenefitproject.org/. | |
| 1671 | 25 | Conservation Measure 7 should include climate-smart restoration opportunities and an improved adaptive management framework.<br><br>Conservation Measure 7 describes the restoration of 5,000 acres of riparian forest and scrub. (DEIR, at 3.4-162) This area would overlap with the area restored for Tidal Natural Communities (Conservation Measure 4), Seasonally Inundated Floodplain Restoration (Conservation Measure 5), and Channel Margin Enhancement (Conservation Measure 6). Conservation Measure would be greatly improved by considering restoration opportunities that anticipate ecological changes arising from climate change and including improve adaptive management triggers, monitoring, and management measures. | The comment speculates that some conservation measures would overlap but does not raise any issues related to the environmental analysis in the EIR/EIS. Under the proposed project, Environmental Commitment 7 includes up to 251 acres of Riparian Natural Community Restoration. As noted above, collaborative science and adaptive management will support the proposed action by helping to address scientific uncertainty where it exists, and as it relates to the benefits and impacts of the construction and operations of the new water conveyance facility and existing CVP and SWP facilities. |
| 1671 | 26 | Section 3.4.7.3.2 (Restoration Approaches) should consider climate-smart restoration opportunities.<br><br>The introductory paragraphs to 3.4.7.3.2 provide a suite of resources that will be used to inform the restoration designs. In addition to these sources, the Migratory Bird Conservation Partnership encourages the authors to also consider how the restoration designs can be used to enhance resilience to climate change (e.g., climate-smart restoration). These concepts are relatively new, and are not covered carefully in the resources that are currently listed. A framework for climate-smart restoration can be found at http://www.pointblue.org/our-science-and-services/conservation-science/habitat-restoration/climate-smart-restorationtoolkit. | The lead agencies understand that considering climate change impacts will be important in advancing specific restoration designs. The comment does not raise any issues related to the environmental analysis. |
| 1671 | 27 | Section 3.4.7.4 (Adaptive Management and Monitoring) would be improved by including better requirements for monitoring, research, and triggers for additional management measures.<br><br>Section 3.4.7.4 addresses adaptive management and specifically calls for both compliance monitoring and effectiveness monitoring. (DEIR, at 3.4-171). Specifically, it states:<br><br>Table 3.4.7-3 lists monitoring actions, metrics, success criteria, and schedules relevant to CM7, for incorporation into site-specific riparian restoration plans, as appropriate. The actual monitoring actions, success criteria, metrics, and timing will be based on the best available information at the time of implementation and may be adjusted or augmented over time through adaptive management.<br><br>(DEIR, at 3.4-171:4-8)<br><br>The Central Valley Joint Venture riparian songbird focal species should be added to this list. [Footnote 10: Available at http://www.centralvalleyjointventure.org/assets/pdf/CVJV_fnl.pdf.] These focal species were selected in order to monitor the biological response to restoration, especially when the target species (e.g., yellow-billed cuckoo and least Bell's vireo) may not respond in a timely manner simply because they are extremely rare. | See response 1671-6. |

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| 1671 | 28 | Conservation Measure 10 should be revised to discuss benefits to multiple species and improve the proposed Adaptive Management framework.<br><br>Conservation Measure 10 describes the restoration of 1,200 acres of nontidal freshwater wetlands and 500 acres of managed wetlands for greater sandhill crane roosting habitat in the Greater Sandhill Crane Winter Use Area. The restored marsh would provide giant garter snake habitat, and support waterfowl habitat.<br><br>Conservation Measure 10 discusses habitat designed and managed primarily for giant garter snakes but also for other wildlife, including waterfowl and shorebirds, "to the extent that management for these species does not reduce habitat value for the giant garter snake." The Migratory Bird Conservation Partnership strongly suggests that a table be provided that specifically lists the other species considered in this statement so benefits to them could be better understood. | See response 1671-1. |
| 1671 | 29 | Section 3.4.10.2.1 (Restoration Action) lacks adequate details to understand the benefits to cranes. (See DEIR, at 3.4-196) | See response 1671-1. Please see Chapter 12 for further information regarding impacts to terrestrial species, including cranes. With regards to Sandhill crane impacts, please also see Master Response 17. |
| 1671 | 30 | Conservation Measure 11 should be revised to include additional management measures to benefit multiple species and improve its Adaptive Management Framework.<br><br>Conservation Measure 11 describes the preparation and implementation of management plans for the protected habitats and covered species and for monitoring and maintenance of these sites in perpetuity. (DEIR, at 3.4-202) | See response 1671-1. |
| 1671 | 31 | Section 3.4.11.2.1 (Enhancement and Management Principles) includes a good list of management principles. The Migratory Bird Conservation Partnership encourages the plan authors to add "Prepare for climate change impacts" to this list. Doing so will help ensure that the management actions remain forward looking. | See response 1671-1. |
| 1671 | 32 | Section 3.4.11.2.4 (Aquatic and Emergent Wetland Natural Communities) should include language to improve flooded roost sites by incorporating the following actions:<br><br>* Flood earlier (mid-July) to maintain shallow water during the early part of fall migration when such habitat is very limited on the broader landscape. Work with mosquito districts to maintain shallow water but avoid mosquito problems, perhaps by pulse flooding and drawing down water periodically so it does not stay on too long; this also would reduce the likelihood of unfavorable vegetation growth.<br><br>* Provide shallow slope to sides to enhance edge conditions by a gradual increase in water depths to favor shorebird species using different depths; and<br><br>* Provide some unvegetated islands or internal levees for roosting. | See response 1671-1. |
| 1671 | 33 | Section 3.4.11.2.7 (Cultivated Lands) lacks adequate details regarding post-harvest management, which can greatly affect cultivated lands' value to different species or groups. The section should address whether lands will be flooded or left dry, deeply tilled vs lightly tilled (keeping grains near surface), etc. The section should also address the following:<br><br>* Timing and flooding for cranes and provide additional info on depth of flooding, which can affect compatibility for shorebirds (various depths from mudlfats to about 15 cm). [Footnote 11: See Ivey, G. L., B. D. Dugger, C. P. Herziger, M. L. Casazza, and J. P. Fleskes. | See response 1671-1. The EIR/EIS is not required to analyze impacts of farming practices in the area on foraging birds. The EIR/EIS evaluates the potential impacts of the alternatives against baseline conditions. The existing conditions section of Chapter 12 discusses the current conditions for cranes on Staten Island. Please also see Master Response 18. |

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| | | 2011. Sandhill Crane use of agricultural lands in the Sacramento-San Joaquin Delta. Final Report to the California Bay-Delta Authority.] (DEIR, at 3.4-236)<br><br>* The DEIR should assess a chop-and-roll post-harvest practice on corn (used on Staten Island) prior to flooding. This knocks down remaining stubble, which reduces weed growth, retains soil moisture, puts crop residues in contact with the soil to aid in decomposition, and provides more open foraging opportunities for cranes, waterfowl, and shorebirds. [Footnote 12: See Shuford, W. D., M. E. Reiter, K. M. Strum, C. J. Gregory, M. M. Gilbert, and C. M. Hickey. 2013. The effects of crop treatments on migrating and wintering waterbirds at Staten Island, 2010-2012. Final Report to The Nature Conservancy, 190 Cohasset Road, Suite 177, Chico, CA 95926.] | |
| 1671 | 34 | The section on Managed Wetlands: Waterfowl and Shorebirds would be improved by further review of available scientific literature. (See DEIR, at 3.4.-239) The Migratory Bird Conservation Partnership recommends that the plan authors review the materials cited here and revise the plan accordingly. [Footnote 13: Additional studies include:<br><br>* Helmers, D. L. 1992. Shorebird management manual. Western Hemisphere Shorebird Reserve Network, Wetlands for the Americas, Manomet, MA.<br><br>* Hickey, C., W. D. Shuford, G. W. Page, and S. Warnock. 2003. The Southern Pacific Shorebird Conservation Plan: A strategy for supporting California's Central Valley and coastal shorebird populations, version 1.1. PRBO Conservation Science, 4990 Shoreline Hwy. 1, Stinson Beach, CA (available at http://www.prbo.org/cms/docs/wetlands/SPSCPlan_010904.pdf)<br><br>* Central Valley Joint Venture. 2006. Central Valley Joint Venture Implementation Plan -- Conserving Bird Habitat. U.S. Fish and Wildlife Service, Sacramento (available at http://www.centralvalleyjointventure.org/assets/pdf/CVJV_fnl.pdf)]<br><br>The section should also be further improved by including more specifics about management actions, including the following:<br><br>* Drawdowns. In the spring, drawdowns should be staggered across various ponds to provide shallow water for shorebirds over a longer period (early March to early May). Mid-winter drawdowns should be conducted to provide additional shallow water and mudflat habitat for shorebirds, exposing invertebrate resources that previously were not available (such drawdowns and subsequent reflooding may also help with salt management). When feasible and where it will not promote excessive vegetation growth, flood up should start in July with staggered flood up through the time of greater flood up for waterfowl in September and October.<br><br>* Breeding shorebird habitat. The plan should include specific management recommendations to promote successful shorebird breeding. These include grading ponds to be open and with gradual slopes for foraging in shallow water. Bare or sparsely vegetated islands (or internal levees) should also be provided for nesting. [Footnote 14: See Engilis, A., Jr., and F. A. Reid. 1996. Challenges in wetland restoration of the western Great Basin. International Wader Studies 9:71-79 available at https://sora.unm.edu/sites/default/files/journals/iws/n009/p00071-p00079.pdf.] | The analysis in Chapter 12 of the EIR/EIS in Impacts BIO-178 through BIO-183 is based on the professional experience of the author, Rachel Gardiner, who has conducted shorebird research, and on review of relevant information that was cited in the analysis, which included Hickey et al. 2003, Shuford et al. 1998, Shuford et al. 2004, Shuford et al. 2013, Isola et al. 2000, Central Valley Joint Venture 2006, Ducks Unlimited 2013, Strum et al. in review, Iglecia et al. 2012, and Stralberg et al. 2011.<br><br>Alternative 4A is now the preferred project, which does not include the HCP/NCCP and no longer involves the conversion of or effects on managed wetlands in Suisun Marsh and Yolo Bypass. The amount of shorebird and waterfowl habitat affected under Alternative 4A is addressed in the analysis, as well as how the conservation and management of tidal wetlands, nontidal wetlands, grasslands, and cultivated lands would benefit shorebirds and waterfowl.<br><br>Shorebird breeding is not part of the proposed project. As noted above, further consideration will be given to these comments, and any revisions to the Draft BDCP would only be made, if an HCP/NCCP alternative was ultimately approved at the conclusion of the CEQA/NEPA process. |
| 1671 | 35 | Section 3.4.11.3 (Adaptive Management and Monitoring) should be revised to improve the adaptive management framework and monitoring. As discussed further below, the section | See response 1671-6. |

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| | | fails to identify triggers for adaptive management and does not require monitoring even of species for which recommendations are offered. | |
| 1671 | 36 | Table 3.4.11-1 (Effectiveness Monitoring) offers many recommendations for wetland and field management for waterfowl and shorebirds, but fails to recommend monitoring for these species groups. Monitoring is essential to evaluating whether proposed management occurs and whether it is effective in promoting shorebird and waterfowl use. | See response 1671-6. |
| 1671 | 37 | Chapter 29 & Appendix 5: Climate Change and the BDCP<br><br>Appendix 5 describes how climate change is expected to alter the ecology of the Plan Area and provides background information for assessing additional impacts and other interactions arising from the project. Chapter 29 addresses how the BDCP alternatives would enhance the resiliency and adaptability to climate change.<br><br>The authors use resiliency and adaptability to describe the ability of the Delta to remain stable or flexibly change as the effects of climate change increase, in a manner that it would continue to provide suitable water supply and quality and support ecosystem conditions. While both sections are fairly comprehensive, they should be improved with the incorporation of information from additional studies. | Commenter has suggested that the noted sections are "fairly comprehensive," but that they "should be improved with the incorporations of information from additional studies." But the commenter has not listed any studies that should have been considered but were not. This comment cannot be addressed with the information provided by the commenter. |
| 1671 | 38 | Appendix 5.A.1 Should Be Revised and Improved with Additional Review of Available Scientific Studies.<br><br>Appendix 5 attempts to provide baseline information for how climate change will impact the Plan Area. The section discusses several significant changes, but it would be improved by acknowledging the wide range of uncertainties in how the Delta's systems, wildlife, and habitats may change with the changing climate. Recognizing these uncertainties is necessary to ensure that a more active approach to adaptive management -- one that includes additional research and ongoing monitoring -- is adopted. | As described in Chapter 3, Description of Alternatives, and Chapter 5, Water Supply, the projections of climate change and sea level rise are only projections. However, the purpose of the BDCP EIR/EIS analyses is not to provide absolute values, but to provide a comparison of conditions under the action alternatives as compared to the Existing Conditions and the No-Action Alternative so the decision makers can select the most appropriate alternative. It is acknowledged in Chapter 5 that the model results are only to be used in a comparative manner, and that absolute conditions in the future probably will be different. During the preparation of the Draft BDCP EIR/EIS, a sensitivity analysis was completed, as presented in Appendix 5A, Section D.3, Climate Change Modeling, to simulate conditions under the No-Action Alternative and Alternative 1 under the five climate change scenarios. The operations results from these simulations were analyzed to understand the range of uncertainty in the incremental changes that would occur with a range of climate change scenarios. The sensitivity analysis indicated that Alternative 1 results would change with climate change scenarios; however, the incremental differences between the No-Action Alternative under a specific climate change scenario and Alternative 1 under the same specific climate change scenario were consistent. Because the EIR/EIS only evaluates the incremental differences, and not absolute values, between the Existing Conditions and the No-Action Alternative and the action alternatives, the incremental changes appear to be similar under a range of climate change scenarios. |
| 1671 | 39 | Section 5.A.1.4.2 (Physiological Tolerances) provides only a brief mention of the response of riparian vegetation to increased CO2 levels. (See DEIR, at 5.A.1-5:4) However, it is possible that many plant species might increase their water use efficiency with increasing CO2, which would mean they may be able to adapt to drier future conditions. | This comment is regarding Chapter 5 of the Draft BDCP. Please see response 1671-1. Consideration to comments specific to the BDCP will be given, and any revisions to the Draft BDCP would only be made, if an HCP/NCCP alternative was ultimately approved at the conclusion of the CEQA/NEPA process. |
| 1671 | 40 | Section 5.A.1.4.3 (Range Shifts) overly focuses on species moving to higher elevations or latitudes. (See EIR, at 5.A.1-5-6) Species range shifts in response to climate change are much more complicated. Species will move to where climate and other environmental conditions are suitable. [Footnote 15: Lenoir, J., Gégout, J. C., Guisan, A., Vittoz, P., Wohlgemuth, T., Zimmermann, N. E. and Svenning, J. C. (2010). Going against the flow: potential mechanisms for unexpected downslope range shifts in a warming climate.Ecography, 33: 295-303.] How and where these shifts will occur is one of the uncertainties that should be acknowledged in the DEIR. | This comment is regarding Chapter 5 of the Draft BDCP. Please see response 1671-1. Consideration to comments specific to the BDCP will be given, and any revisions to the Draft BDCP would only be made, if an HCP/NCCP alternative was ultimately approved at the conclusion of the CEQA/NEPA process. |

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| 1671 | 41 | Section 5.A.1.4.4 (Ecological Interactions) should discuss that history and models both suggest that species will form novel biological communities in the future. (See EIR, at 5.A.1-6) Because the composition of these communities will be difficult to predict, changes in ecological interactions will also be difficult to predict. [Footnote 16: See Stralberg et al. 2009. Re-Shuffling of Species with Climate Disruption: A No-Analog Future for California Birds? available at http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0006825.] | This comment has been noted. Please see response to Comment 1671-1. |
| 1671 | 42 | Section 5.1.1.4.5 Nonnative Invasive Species discusses invasive Spartina (Spartina alterniflora) as an example of the negative effects of invasive species, including potential impacts on Clapper Rail habitat. (See DEIR, at 5.A.1-7) However, previous studies have shown not demonstrated an obvious effect of invasive Spartina on Clapper Rail habitat quality. [Footnote 17: Spautz, H. and J. McBroom. 2006. California Clapper Rails in the San Francisco Estuary: Modeling habitat relationships at multiple scales to inform habitat restoration and eradication of non-native Spartina. Final Report, Olofson Environmental, Inc., to California State Coastal Conservancy, San Francisco Estuary Invasive Spartina Project. Available from http://www.spartina.org/project_documents/clapper_rails/CLRA_Habitat_Rept-2006_%20Final.pdf; see also Overton, CT, ML Casazza, JY Takekawa, DR Strong, M Holyoak. 2014. Tidal and seasonal effects on survival of the endangered California clapper rail: does invasive Spartina facilitate greater survival in a dynamic environment? Biological Invasions. doi: 10.1007/s10530-013-0634-5.] Moreover, whether invasive Spartina inhibits marsh accretion is unknown. | This comment has been noted. Please see response to Comment 1671-1. |
| 1671 | 43 | Section 5.A.1.5 (Climate Change Considerations in Reserve Design) states that it will "[r]epresent a 'portfolio' of variant forms of a species or ecosystem so that, regardless of the climatic changes that occur, there will be areas they survive and provide a source for recovery." (DEIR, at 5.A.1-8). The MBCP approves of this as a conservation strategy, and we suggest that in addition to thinking that the most appropriate species that occur at a protected area in the future may depend on the future climate, so most appropriate location of protected areas may depend on the future climate. [Footnote 18: Veloz, S. D., Nur, N., Salas, L., Jongsomjit, D., Wood, J., Stralberg, D., & Ballard, G. (2013). Modeling climate change impacts on tidal marsh birds: Restoration and conservation planning in the face of uncertainty. Ecosphere,4(4), art49.] | This comment has been noted. Please see response to Comment 1671-1. |
| 1671 | 44 | Section 5.A.1.6.1 (Tidal Perennial Aquatic) should be revised to include discussion of how physical structures such as dams and human alteration of hydrologic flows constitutes an additional and major contributor to the decline in tidal mudflats. [Footnote 19: See, e.g. Wells, Peter G. 1999. Environmental Impact of Barriers on Rivers Entering the Bay of Fundy: Report of an ad hoc Environment Canada Working Group. Technical Report Series No. 334, Canadian Wildlife Service, Ottawa, ON. 43p., at 10, 11, available at http://www.bofep.org/Publications/barrier.pdf.] (See DEIR, at 5.A.1-10: 15-18) | This comment has been noted. Please see response to Comment 1671-1. |
| 1671 | 45 | Section 5.A1.6.2 (Tidal Brackish Emergent Wetland) implies that the resilience of tidal marsh habitat in brackish marshes is entirely dependent on plant productivity. (DEIR, at 5.A.1-11) Plant productivity is more important in brackish marshes than salt marshes but the amount of suspended sediment in the system is critical for marsh sustainability particularly at lower elevations. [Footnote 20: For more information on plant productivity, sediment accretion, and sustainability at Suisun Marsh, please see Moyle, Peter B., Manfree, A. and P.L. Fiedler, eds. Suisun Marsh: Ecological History and Possible Futures. University of California Press; 1 edition (March 26, 2014). 256p. at 88-93; see also Stralberg et al. 2011. Evaluating tidal | This comment has been noted. Please see response to Comment 1671-1. |

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| | | marsh sustainability in the face of sea-level rise: a hybrid modeling approach applied to San Francisco Bay. Available at: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0027388#pone-0027388-g010.] This is important for Suisun Bay in particular because many of potential restoration sites in the bay are subsided and thus will be very sensitive to suspended concentration levels. [Footnote 21: Id.] Upstream sediment contributions will play an important role for marsh sustainability in Suisun Bay. Conservation Measures 3 and 4 should be revised to specifically address the availability of sediment. | |
| 1671 | 46 | Section 5.A.1.6.4 Valley/Foothill Riparian should be revised to discuss one of the key threats to riparian communities in the region: changes in flow regimes due to alterations of flows by human infrastructure. (See DEIR, at 5.A.1-14-15) With climate change, there is likely to be an increased demand for water, consequently hindering the ability to manage for more naturalistic flow regimes. | This comment has been noted. Please see response to Comment 1671-1. |
| 1671 | 47 | Chapter 29 Should Be Revised to Consider Impacts Over a Longer Period of Time and to Increase Specificity of Anticipated Impacts and Potential Management Actions.<br><br>Chapter 29 evaluates impacts to resources up to 2025 and 2060. However, it is expected that changes to the climate will increase significantly after 2060. [Footnote 22: See http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf.] Moreover, impacts from the BDCP will still be ongoing after that time. Therefore, the EIR should evaluate impacts beyond 2060 (i.e., up to 2100). Given that the DEIR's sea level rise projections reach out to 2100, the DEIR should consider other climate factors for which there are reasonable projections over the same period. Moreover, once again, this chapter implicitly acknowledges uncertainties related to how the BDCP will interact with climate change, but it should do so expressly, thereby identifying gaps in knowledge that warrant additional monitoring, research, and preparedness through adaptive management planning. | Chapter 29 of the EIR/EIS provides an analysis of how the proposed project would contribute to making the Delta and California's water supply system more resilient and adaptable to climate change. It is neither a required part of a CEQA analysis nor required by any Water Code section or other requirement. Further, analysis beyond the permit period of the project would provide limited value (if any) as the uncertainties in climate conditions, regulatory conditions, ecological responses, and potential improvements in technology or ecological understanding become so large that they make projections that far out into the future speculative.<br><br>The anticipated hydrologic changes due to climate change (increased temperatures and more years of critical dryness, increased water temperatures, changes in precipitation and runoff patterns, sea level rise, and tidal variations) will constrain and challenge future water management practices across the state, with or without the proposed project. The state is addressing climate change through strategies and a decision-making framework as outlined in the California Climate Adaptation Strategy and Adaptation Planning Guide. However, no single project and indeed none of the project alternatives would be able to completely counteract all of the impacts of climate change.<br><br>The State of California has acknowledged that sea level rise threatens coastal and near coastal resources (such as the Delta and Delta water supplies) and that adaptation and resiliency planning to protect these resources from expected levels of sea level rise is appropriate. (OPC, 2013) http://www.opc.ca.gov/2013/04/update-to-the-sea-level-rise-guidance-document/<br><br>(CCC, 2013) http://www.coastal.ca.gov/climate/SLRguidance.html<br><br>EO S-3-05. http://gov.ca.gov/news.php?id=1861<br><br>EO S-13-08 http://gov.ca.gov/news.php?id=11036<br><br>AB 32 also mentions SLR as a threat to California.<br><br>California Waterfix would help to address the resilience and adaptability of the Delta to climate change through water delivery facilities combined with a range of operational scenarios, measures focused on the protection, restoration, and enhancement of the Delta ecosystem and measures to reduce other stressors (Environmental Commitments 3, 4, 6, 7, 8, 9, 10, 11, 12, 15, and 16.) In addition to the added water management flexibility created by new water diversions and operational scenarios, California Waterfix would improve habitat, increase food supplies and reduce the effects of other stressors on the Delta ecosystem. By improving and expanding available habitat, the proposed project would increase resilience and adaptability to climate change by making alternative habitat available during periods of high stress, such |

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| | | | as very high or low freshwater inflow or very high salinity intrusion.<br><br>Multiple analyses were performed in the proposed project to test the robustness of the alternatives to a range of potential future conditions. Water supply, aquatic and terrestrial resources were all analyzed with projected future conditions. The proposed project will likely remain in place and functional far into the future when salinity intrusion may require less frequent use of the south Delta pumps. Far from being stranded assets, the tunnels will be part of the state's strategy in adapting to climate change.<br><br>More information on ways in which the BDCP/California WaterFix proposes to improve resiliency and adaptability of the Delta to climate change can be found in Chapter 29, Climate Change, EIR/EIS and Appendix A RDEIR/SDEIS and Appendix 3E, Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies, EIR/EIS and RDEIR/SDEIS (in appendix A). For additional information regarding GHG and Climate change, please see Master Response 19. |
| 1671 | 48 | Section 29.5.1.3 (Climate Change Effects on the Plan Area) should discuss the impacts of sea level rise on water temperature. (See DEIR, at 29-13) When sea level rise was higher in the past, the San Francisco Bay was more ocean-like, with higher salinities and cooler water temperatures. As sea level increases, similar changes would likely be evident in Suisun Bay and upstream. The document discusses how the X2 salinity position will likely change with sea level rise, but should also include how temperature gradients will likely also change in the lower parts of the Delta. | Changes in Delta water temperatures and effects on aquatic resources are presented in Section 11.3 of the EIR/EIS. |
| 1671 | 49 | Section 29.6 (Resiliency and Adaptation Analysis) fails to adequately specify how the alternatives may increase resiliency. (DEIR, at 29-16) The section should be revised to provide clear descriptions of how specific resources are vulnerable to climate change and then demonstrate how the alternatives reduce the vulnerability and result in increased resiliency.<br><br>The section's discussion of increased wetland biomass is vague and confusing. Specifically, the section states that "[i]Increased wetland plant biomass, including below ground production helps promote accretion and the ability of the marsh to keep pace with sea level rise." (DEIR, at 29-17) The section should be revised to explain how this statement relates to various plan alternatives and how they will result in increased wetland plant biomass. The section should also be expanded to discuss how water diversions may interact with sea level rise (increasing salinity, etc.) and whether changes in flood and drought frequency will affect wetland plant biomass. If these issues are covered elsewhere in the document, they should be referenced here. | This section has been revised for clarity. However, no substantive changes have been made. |
| 1671 | 50 | The Migratory Bird Conservation Partnership has reviewed the Delta Independent Science Board's report of May 15, 2014 and shares several concerns discussed in the report. If the BDCP is to proceed -- let alone succeed -- it will require an even greater commitment from the State, buy-in from Delta residents and other stakeholders, and a long term dedication by all parties to the success of the project.<br><br>For the BDCP to succeed, it will require greater coordination between agencies and with stakeholders, which will require additional funding and increased capacity for involved agencies. | This is a general statement about what would be needed from the state and stakeholder in order for the BDCP to succeed. The comment does not raise any issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/DEIS. |
| 1671 | 51 | BDCP science should be integrated with the Delta Science Program. Science efforts in the Delta should be clearly linked to scientific problems related to managing the Delta. Data collection, analysis and reporting should be rigorous, credible, and transparent. | This comment raises policy issues regarding the sharing of scientific information. It does not raise any issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/DEIS |

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| 1671 | 52 | Pilot restoration projects should be implemented immediately to allow for early testing, refinement, and adaptive management. The goal of these projects should focus on meeting habitat needs for target species, rather than simply meeting acreage goals. | This comment provides a recommendation for beginning restoration pilot projects, it does not raise any issues related to the environmental analysis in the EIR/EIS. |
| 1671 | 53 | Permits issued pursuant to the BDCP should include clear milestones, monitoring requirements, and adaptive management. | This comment is regarding the specific permits that would be issued for the BDCP. Please see response 1671-1. Consideration to comments specific to the BDCP will be given, and any revisions to the Draft BDCP would only be made, if an HCP/NCCP alternative was ultimately approved at the conclusion of the CEQA/NEPA process. |
| 1671 | 54 | [ATT 1: Letter from Central Valley Joint Venture, dated July 23, 2012 to Dr. Jerry Meral, Deputy Secretary of the California Natural Resources Agency on conserving bird habitat in California's Central Valley.] | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1671 | 55 | [ATT 2: Letter from Central Valley Joint Venture, dated May 24, 2013 to John Laird, Secretary for the California Natural Resources Agency on the habitat needs of migratory birds in the Sacramento-San Joaquin Delta and Suisun Marsh as affected by the BDCP.] | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 1 | American Rivers is committed to the successful completion of the Bay Delta Conservation Plan (BDCP). We understand success to mean: the State Water Project (SWP) and Central Valley Project (CVP) contribute significantly to attaining the co-equal goals of a sustainable Delta ecosystem and water supply reliability in the Delta.<br><br>The status quo of perpetual litigation, political conflicts, species in decline, and water shortages is simply unacceptable for the Delta and the State as a whole. It is truly time to answer the call by the State Water Resources Control Board (SWRCB) in Decision 991 (1961), which granted certain water rights to the Bureau of Reclamation for CVP operations. Fifty-three years ago, it recognized emerging conflicts between water supply users and water quality in the Delta watershed, concluding:<br><br>"...[T]he Board will reserve jurisdiction for a reasonable period…for the purpose of allowing the United States, the State of California, and the water users in the Delta, an opportunity to work out their problems by mutual agreement…. The Board…recognizes that reservation of jurisdiction does not solve the problem and without participation in good faith by all parties such action by the Board is of little consequence. The Board does not believe that reservation of jurisdiction and postponement of the day of final decision will cause the problem to disappear or diminish. Neither does it believe that the problem can be legislated out of existence nor solved by the mere weight of further investigations and studies, of which there have been many in the past, some of which have been recited in this decision. The time has arrived for the parties to meet at the conference table, recognizing that all have a responsibility and an urgent interest in an early solution." Decision 991, 1961 WL 6816 (1961), p. 23. | The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS.<br><br>Please note that the preferred alternative is now Alternative 4A (California WaterFix Project) and no longer includes an HCP. Alternative 4A has been developed in response to public and agency input and is the new CEQA Preferred Alternative. Alternative 4A is also the NEPA Preferred Alternative, a designation that was not attached to any of the alternatives presented in the 2013 Public Draft EIR/EIS. Alternative 4 remains a potentially viable alternative and is being carried forward in this RDEIR/SDEIS because it represents the original habitat conservation plan/natural community conservation plan (HCP/NCCP) alternative approach, and because it provides an important reference point from which the Alternative 4A, 2D, and 5A descriptions and analyses were developed. If the Lead Agencies ultimately choose the alternative implementation strategy and select an alternative presented in the RDEIR/SDEIS after completing the CEQA and NEPA processes, elements of the conservation plan contained in the alternatives in the 2013 Public Draft EIR/EIS may be utilized by other programs for implementation of the long term conservation efforts. |
| 1672 | 2 | An effective solution is even more urgent now. This plan has certain elements which are essential for attaining the co-equal goals in the Delta. It proposes a new point of diversion for the projects in the North Delta, as recommended by fish agencies since roughly 1961. It is intended to conserve all fish and wildlife species affected by project operations. It integrates management of flows and other stressors for these species. | The commenter's opinion related to the project is acknowledged. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS.<br><br>The comment raises the issue of other stressors. Please refer to Master Response 23. |

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| 1672 | 3 | It is long-term, based on adaptive management of conservation measures across time. It includes governance procedures that are designed to assure that permittees, regulators, and other stakeholders collaborate in plan implementation through 2065. All of these elements are significant improvements in the status quo -- indeed, reversals.<br><br>We are also mindful that this draft plan is the result of unprecedented efforts. The California Department of Water Resources, Bureau of Reclamation, and their contractors have reportedly spent more than $200 million in this process. Diverse stakeholders with very different interests and perspectives have invested literally hundreds of thousands of hours of their time in public meetings, comments, and other efforts to bring this process to closure. To that end, American Rivers was a charter member and active participant in the BDCP Steering Committee from 2006 to 2010. We participated in multiple work groups convened by the Brown Administration from 2011to 2013. We have directly contributed to the development of the plan elements related to habitat restoration, operations, and governance. | The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS.<br><br>The comment acknowledges the planning and project development by interested parties. This process is detailed in Chapter 32 of the Final EIR/EIS. |
| 1672 | 4 | Increase and reshape inflows from the Sacramento and San Joaquin Rivers to mimic the natural hydrograph and maximize the extent of frequently inundated floodplain habitat. An overwhelming body of evidence demonstrates that instream flows and associated floodplain inundation, particularly in the late winter and spring, improves conditions for numerous fish and wildlife species. Water export rules from the Delta drive upstream reservoir operations and associated inflows today and would continue to do so in the future under the plan. As a result, the BDCP, as it is presently constituted, will perpetuate an excessively altered hydrologic regime and the inexorable ecological decline of the rivers flowing into the Delta, particularly the Feather and Sacramento. | Please note that as explained in Response to Comment 1672-1, the preferred alternative is now Alternative 4A (California WaterFix Project).<br><br>Alternatives 1, 2, 3, 4, 6, 7, and 8 evaluated in the EIR/EIS support a more natural hydrology by reduction in monthly total exports of SWP and CVP water as compared to Existing Conditions and No Action Alternative in the summer and early fall months; and increase flows in the winter months when the river flows are high. For example, long-term average flows in the Sacramento River flows at Freeport under Alternative 4H4 could be up to 3 percent higher in June and 5 percent lower in January as compared to the No Action Alternative (as shown in Table C-20.20 of Appendix 5A, Section C, EIR/EIS). |
| 1672 | 5 | Invest in demand reduction and water use efficiency throughout the Bay-Delta watershed and export demand areas including the Bay Area. Excessive diversions from the Bay-Delta watershed combined with the difficulty of providing assurances that BDCP will not exacerbate this underlying problem are the primary challenges confronting a successful BDCP. Investment in conservation throughout the watershed and export demand areas is the best possible mechanism for managing both these challenges. | Please note that as explained in Response to Comment 1672-1, the preferred alternative is now Alternative 4A (California WaterFix Project).Refer to Master Response 6 and Appendix 1C of the Final EIR/EIS for further information on demand management measures, including increasing agricultural water use efficiency and water conservation.<br><br>Although components such as desalination plants and demand management measures have merit from a statewide water policy standpoint, and are being implemented or considered independently through the state, they are beyond the scope of the proposed project. The lead agencies cannot impose obligations on third parties that are not applicants under proposed project. It is important to note that the proposed project is not intended to serve as a state-wide solution to all of California's water problems, and it is not an attempt to address directly the need for continued investment by the State and other public agencies in conservation, recycling, desalination, treatment of contaminated aquifers, or other measures to expand supply and storage. |
| 1672 | 6 | Increase Delta outflow to improve conditions for pelagic species. A large body of scientific evidence indicates that more outflow (and inflow) is necessary to achieve recovery of endangered species. Due to the substantial scientific uncertainties, the Mount Report recommended that "default starting operating conditions be negotiated that approximates the [high outflow scenario], with a goal of identifying and operationalizing attributes of this scenario that are most beneficial to listed fishes." Requirements to both increase outflow and inflow would theoretically allow the water exporters to divert more water than the status quo even while meeting requirements to increase outflow. | The EIR/EIS include a wide range of alternatives that address different criteria for reservoir releases, diversion criteria, Delta outflow, and reverse flow conditions in the central and south Delta, as described in Section 3.6 of Chapter 3, Description of Alternatives, of the Final EIR/EIS.<br><br>The Proposed Project would enable DWR to construct and operate new conveyance facilities that improve conditions for endangered and threatened aquatic species in the Delta while at the same time improving water supply reliability, consistent with California law (see, e.g., Cal.Wat. Code, § 85001[c]). Implementing the conveyance facilities would help resolve many of the concerns with the current south Delta conveyance system, and would help reduce threats to endangered and threatened species in the Delta, including entrainment south Delta export facilities. For instance, implementing a dual conveyance system would align water operations, and their location, to better reflect natural seasonal flow patterns by creating new water |

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| | | | diversions in the north Delta equipped with State-of-the-art fish screens, thus reducing reliance on south Delta exports during times of the year when listed aquatic species are present and most vulnerable. For more information on mitigation measures to minimize contraction and operational-related impacts to fish species, including Delta and longfin smelt, please see Chapter 11, EIR/EIS. |
| 1672 | 7 | Downsize or phase the new north Delta diversion intakes. The primary reason to consider phasing or downsizing is not the amount of water that could be taken from the proposed north Delta intakes, [footnote 1: Existing infrastructure in the South Delta can already divert as much water as the proposed 9,000 new north Delta facility. The primary constraint is the size of the aqueduct.] but rather the uncertainty about whether the new intakes will function as advertised (i.e., no significant impact on covered species) combined with the massive construction impacts along the Sacramento River between Walnut Grove and Clarksburg - the most scenic part of the entire Delta. The BDCP should consider smaller, tested diversion technology that could be spatially distributed over a larger area and incrementally phased in over time. The EIR/EIS does not consider an adequate range of intake locations and strategies and instead confines the analysis to the unjustified assumption that all north Delta diversion alternatives are limited to one or more 3,000 cfs intakes located between Walnut Grove and Freeport. Why didn't the EIR/EIS consider smaller intake facilities or alternative intake locations upstream of Freeport or downstream of Walnut Grove? | The selection of intake locations is presented in Appendix 3F, Intake Location Analysis, of the Final EIR/EIS. For more information regarding alternatives development please see Master Response 4. |
| 1672 | 8 | Consider a western conveyance alignment and employ a hybrid conveyance approach that improves the ecological performance of the existing south Delta diversion along with creation of a new North Delta diversion. Improvements of S. Delta diversion should be consistent with the Delta Corridors approach to create an entrainment free corridor in Old River during periods when covered species are present. A hybrid approach should also evaluate the potential for diversions from the west Delta, potential use of brackish desalination from the Delta Diablo sanitary district, and adoption of the western conveyance alignment to maintain flexibility to phase in the least harmful diversion infrastructure over time, consistent with point four above. The EIR/EIS does not adequately evaluate intake and conveyance alternatives and completely failed to consider the potential benefits of a hybrid approach that combines the Delta corridors alternative along with a smaller north Delta diversion. | Fifteen alternatives and 3 new subalternatives were analyzed in the EIR/S and the RDEIR/RSEIS respectively. Four major alignments have been included in the EIR/S: Through-Delta, East of the Sacramento River, West of the Sacramento River, and a Tunnel under the Delta. Many additional proposals by public and private individuals and organizations have also been evaluated and described in Chapter 3 of the EIR/S and Appendix 3A, Identification of Water Conveyance Alternatives, Conservation Measure 1.<br><br>Regarding development of alternatives for the EIR/EIS, a description of the process the Lead Agencies followed to develop and screen alternatives is provided in Master Response 4. |
| 1672 | 9 | Expedite and maximize the ecological benefits that could accrue from restoring and or expanding floodplain habitat in the Yolo Bypass and the Lower Sacramento River. As discussed in the Mount Report, floodplain restoration in the Yolo bypass and north of the proposed intakes is the only high certainty strategy for mitigating the impacts of the proposed north Delta diversions. Expansion of the Yolo Bypass, which is planned as part of the Central Valley Flood Protection Plan, is one of the most promising opportunities for increasing the area of floodplain habitat. Other promising ideas for floodplain restoration contemplated by the CVFPP or associated planning efforts include the West Sacramento Southport Project and the Woodlake project along the lower American River. Unfortunately, the EIR/EIS failed to consider how these proposed flood system improvements could be incorporated into BDCP. Although Conservation Measure Two (CM2) does contemplate increasing the frequency of floodplain habitat in the Yolo bypass, completion and operation of CM2 is not scheduled until after the North Delta intakes are operational. | The comment pertains to Alternative 4/BDCP. Please note that as explained in Response to Comment 1672-1, the preferred alternative is now Alternative 4A (California WaterFix Project).<br><br>The originally proposed habitat restoration measures and related Conservation Measures (CMs) (i.e., CM2 through CM21) would not be included as part of the Proposed Action, except to the extent required to mitigate significant environmental effects under CEQA and meet the regulatory standards of ESA Section 7 and California Endangered Species Act (CESA) Section 2081(b). However, restoration actions that are independent of Proposed Action will continue to be pursued as part of existing projects and programs. Examples of these include the 2008 and 2009 USFWS and NMFS BiOps (e.g., Yolo Bypass improvements and habitat enhancements, 8,000 acres of tidal habitat restoration), (2) California EcoRestore, and (3) the 2014 California Water Action Plan.<br><br>Regarding mitigation measures please see Master Response 22. For information on the Yolo Bypass Habitat Restoration and Fish Passage Project please see http://www.water.ca.gov/environmentalservices/yolo_bypass_salmonid.cfm. |

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| 1672 | 10 | Create a new South Delta Bypass in the vicinity of Paradise cut and Fabian Tract to reduce flood risk and increased frequently inundated floodplain habitat in the South Delta. The BDCP does little to improve habitat conditions in the South Delta, particularly for San Joaquin basin salmon species. Creation of a new floodplain corridor in the South Delta, similar to the Yolo Bypass, in combination with the Delta corridors approach identified in point five above, would substantially improve such conditions in the South Delta. | By establishing a point of water diversion in the north Delta and new operating criteria to improve water volume, timing, and salinity, the proposed project is designed to improve native fish migratory patterns and allow for greater operational flexibility.For more information please see Response to Comment 1672-6, 1672-8, and 1672-9. |
| 1672 | 11 | Significantly increase the area of frequently inundated floodplain habitat upstream of the Delta. Floodplain habitat restoration upstream of the Delta is very likely one of the best ways to mitigate the projects' impacts on salmon species and the Delta foodweb. Increased floodplain habitat will result in stronger, fitter juvenile salmon better able to survival their journey to the Ocean and will increase food-web subsidies to the impoverished Delta ecosystem. Prime opportunities include Deer Creek, multiple sites along the Feather River, the lower San Joaquin from the Tuolumne confluence to Mossdale, and the constellation of sites associated with the lower Sacramento and Yolo Bypass discussed in point 6 above. | The existing operation of the SWP and CVP pumps in the south Delta can contribute to reversals in river flows, potentially altering salmon migratory patterns. The new system would reduce the ongoing physical impacts associated with sole reliance on the southern diversion facilities and allow for greater operational flexibility to better protect fish. Minimizing south Delta pumping would provide more natural east–west flow patterns (RDEIR/SDEIS Section 4.1). Overall reductions in OMR reverse flows under all flow scenarios for the proposed project would be beneficial with corresponding increase in net positive downstream flows, during the migration period of Chinook salmon through the interior Delta channels (Appendix B, Supplemental Modeling for Alternative 4A, Section B.7 (RDEIR/SDEIS Section 4.3.7). Operations would still be consistent with the criteria set by the FWS (2008) and NMFS (2009) BiOps and State Water Resources Control Board Water Right Decision 1641 (D-1641), subject to adjustments made pursuant to the adaptive management process as described in the 2008 and 2009 BiOps (RDEIR/SDEIS Executive Summary ES.2.2). Also see Response to Comment 1672-9.<br><br>Please refer to Chapter 3, Description of Alternatives, of the Final EIR/EIS for additional detail about the habitat restoration proposed under Alternative 4A. Please refer to Chapter 11 regarding impacts of Alternative 4A on fish and aquatic species. |
| 1672 | 12 | Provide assurances of sufficient water supplies to meet the needs of wildlife refuges and attain the goals of the Central Valley Habitat Joint Venture for migratory birds. By easing Delta conveyance constraints, BDCP will significantly increase the potential for water transfers from the Sacramento Valley that will diminish agricultural wetlands and tail water habitat for migratory birds. The EIR/EIS does not evaluate this foreseeable future impact or propose suitable mitigation. The BDCP should include dedicated funding necessary to provide habitat and water for migratory birds throughout the Central Valley. | The lead agencies fundamental purpose of the proposed project is to make physical and operational improvements to the SWP system in the Delta necessary to restore and protect ecosystem health, water supplies of the SWP and CVP south of the Delta, and water quality within a stable regulatory framework, consistent with statutory and contractual obligations. The project would help to address the resilience and adaptability of the Delta to climate change through water delivery facilities combined with a range of operational flexibility. In addition to the added water management flexibility created by new water diversions and operational scenarios, the project would improve habitat, increase food supplies and reduce the effects of other stressors on the Delta ecosystem. Please see Master Response 3 for more information on the project's purpose and need. Also refer to Master Response 22 for a discussion of mitigation measures. Regarding water transfers, please refer to Master Response 43.<br><br>Also see Ch. 12, Terrestrial Biological Resources, section 12.2, of the Final EIR/EIS discussing regulatory protections for migratory birds and wetland habitat. |
| 1672 | 13 | Protect Delta levees, particularly western Delta levees necessary to maintain the current relationship between inflow and X2 location. In its current form, the BDCP may conflict with the common pool doctrine that has been the cornerstone of Delta water policy since 1961. To some extent, the proposed new diversion in the North Delta would isolate the projects from the common pool. We believe that the BDCP should commit to: (a) make an appropriate contribution to attain water quality standards for the common pool (including X2), regardless of Delta island failure, or (b) reasonable measures that would substantially reduce the probability of islands failure that would result in the eastward migration of X2. The western Delta conveyance alignment proposed by Peer Swan and referenced in point 6 above would facilitate the stabilization of Sherman Island and thereby substantially reduce the probability of seaward intrusion resulting from Delta levee failure. | DWR will continue participation in levee maintenance and improvement programs for project levees. The State funding for non-project Delta levee maintenance and improvement is entirely dependent upon legislative action to provide the fund source and the authorization for its use in support of the Delta levee system. There are existing grant programs in place to protect State interests in the Delta and these programs have been successfully employed by Delta LMAs to maintain and improve the levees; however, the levees are private property and remain the responsibility of the LMAs. A large portion of the State's interest in the Delta levee system is in conveyance of water, both for relief from floodwater and for beneficial use of fresh water. Even with the tunnels in place, those two needs and the associated State benefits will remain.<br><br>Regarding water quality, please see Master Response 14. For information on water rights, please see Master Response 32. |

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| 1672 | 14 | Realign responsibilities of the permittees and the regulators as necessary to assure effective plan implementation, including adaptive management. The draft plan includes many elements which we support. An Implementation Office will be responsible for day-to-day plan implementation, subject to the exception that DWR and Reclamation will manage project operations as required by the organic statutes for the projects. The permittees will coordinate through an Authorized Entity Group (AEG), and regulators will likewise coordinate through a Permit Oversight Group (POG). A Stakeholder Council will represent other interests. The Implementation Office will propose annual plans for implementation of the conservation strategy. An Adaptive Management Team will propose adaptive management, given the reality that the strategy will necessarily evolve as monitoring results improve our understanding of effectiveness. The AEG and POG will review these several proposals and resolve any disputes through administrative elevation to the highest appropriate authority over a given dispute.<br><br>Notwithstanding our support for much of the overall structure, we believe that certain elements should be revised to assure effective plan implementation in compliance with applicable laws. | The comment pertains to Alternative 4/BDCP. Please note that as explained in Response to Comment 1672-1, the preferred alternative is now Alternative 4A (California WaterFix Project). The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS.<br><br>For information on adaptive management and monitoring, please see Master Response 33. |
| 1672 | 15 | Permittees should propose adaptive management, subject to review and any modification by regulators. The draft plan (including the Implementing Agreement) proposes that the Adaptive Management Team include representatives from regulators and permittees alike. Any proposal which achieves team consensus will be implemented, while any other proposal will be elevated to the Authorized Entity Group (AEG) and Permit Oversight Group (POG) for review, and if necessary, to the highest decisional authority.<br><br>We believe that this structure unduly conflates the fundamental responsibilities under a regulatory permit. Stated simply, permittees should be responsible for plan implementation, and regulators should be responsible for assuring that plan implementation timely occurs and complies with the permits and underlying laws. We recommend that this element should be revised to provide: (a) Implementation Office in concert with AEG would propose adaptive management; (b) the POG would have a specified period to object, and absent objection, a proposal would be implemented; and (c) any other proposal would be subject to dispute resolution followed by decision by the applicable authority, which in nearly all instances would be the regulators. | The Draft Implementing Agreement for the proposed project was made available for public review on May 30, 2014 and the public review period for the DEIR/EIS was extended by an additional 46 days until July 29, 2014, in order to accommodate a 60-day review period consistent with the California Natural Community Conservation Planning Act. Implementing agreements are a requirement under the California Natural Community Conservation Planning Act (NCCPA), and are routinely executed under the ESA Section 10 (HCP) permitting process. Since the current proposed project (Alternative 4A) is no longer a NCCP or HCP, an implementing agreement was not released with the RDEIR/SDEIS or final EIR for the project. For more information on the governance structure of the BDCP and the implementing agreement please see Master Response 5.<br><br>Regarding adaptive management and monitoring for the proposed project, please see Master Response 33. |
| 1672 | 16 | Governance should include all primary regulators of the plan. The draft plan limits governance to the three regulators under the Endangered Species Act (ESA) and Natural Communities Conservation Planning Act (NCCPA). These are: National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Wildlife. This structure, while right under the ESA and NCCPA, is otherwise legally inadequate.<br><br>The plan will be implemented only if approved by other regulators under other laws. For example, the State Water Resources Control Board will review the plan under at least three different authorities: Water Code, with respect to changes in point and method of diversion; Porter-Cologne Act, with respect to water quality standards applicable to this plan and other diversions which affect attainment of water quality standards; and Clean Water Act section 401, with respect to any federal permit (such as a dredge-and-fill permit under CWA section 404) that involves a discharge. Other regulators have other authorities which are pre-conditions for implementation, as well.<br><br>These other regulators cannot lawfully delegate their oversight of plan implementation | The governance structure for Alternative 4 was designed to support the endangered species permits that will be issued by the three state and federal wildlife agencies. Please also see Master Response 5 regarding the adequacy of the governance structure proposed for this purpose in the 2013 public draft BDCP. Additional agencies could be added to the governance structure of the SWP and CVP water operations in the Delta but not until those additional agencies issue permits that define their role in plan implementation.<br><br>Please note that as explained in Response to Comment 1672-1, the preferred alternative is now Alternative 4A (California WaterFix Project).<br><br>For more information regarding permitting please see Master Response 45. Also see response to comment 1672-15 regarding governance structure. |

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| | | (including adaptive management) to the three fish agencies. In turn, it would be unworkable to have different governance structures for ESA and NCCPA, and then for all other purposes. These several laws will overlap substantially in governing Conservation Measure 1 and other essential measures. As a result, we recommend that the governance structure should be expanded to include all primary regulators. | |
| 1672 | 17 | Structure a package of regulatory assurances under all applicable laws. The plan proposes regulatory assurances under ESA and NCCPA, essentially providing that the permittees will not be responsible for additional funding or other resources in response to unforeseen circumstances over the term of these permits. However, the plan does not address whether comparable assurances are available under the other laws which are also pre-conditions for plan implementation. As one example, assurances are more limited under the Water Code, which provides for the State Water Resources Control Board's continuing jurisdiction to protect reasonable and beneficial uses and the public trust.<br><br>We believe that the applicants may reasonably request and expect assurances which are both (a) proportionate to the unprecedented scale and cost of this capital project and (b) allowed under all applicable laws. We recommend that the applicants propose a package of assurances under such laws. | Please refer to Master Response 5 for a discussion of the “beneficiary pays” principle and funding for the BDCP and Alternative 4A. |
| 1672 | 18 | American Rivers respectfully recommends the following next steps to bring the BDCP to successful completion.<br><br>A. Supplement and revise the public drafts of the BDCP, EIR/EIS, and Implementing Agreement. We recommend that the applicants supplement these public documents in response to comments, including our request for modification of certain elements. Such supplement should also include any missing elements, such as the (i) Memorandum which is Reclamation's substitute for the Implementing Agreement and (ii) the exhibits to the Implementing Agreement.<br><br>The supplement would be subject to a further round of public comments. Recognizing the length of the initial round, this would be relatively quick.<br><br>We recommend against proceeding directly to final plan and associated documents. We believe that that alternate procedure would increase litigation risk associated with procedural claims.<br><br>B. Convene a technical conference of primary regulators to establish a regulatory pathway. This plan is subject to review and approval under many laws other than ESA and NCCPA. We recommend that the applicants convene a technical conference of all primary regulators, including the State Water Resources Control Board, to establish a sequence and schedule for such proceedings. We encourage the applicants to maximize coordination between the proceedings.<br><br>C. Cooperate with the SWRCB and other regulators to develop a coordinated approach to the projects and other diversions. Whatever the ultimate fate of the BDCP, the CVP and SWP do not have the physical or legal capacity to attain the co- equal goals for the Delta. Other diversions which are roughly two-thirds of the total in the Delta watershed, and other stressors (such as exotic clams) which are not under the direct control of the projects, must also be managed as necessary to attain those goals. In sum, it's essential that all hands are on deck, as the late Professor Joe Sax said in April 2013. | The comment pertains to Alternative 4/BDCP. Please note that as explained in Response to Comment 1672-1, the preferred alternative is now Alternative 4A (California WaterFix Project). The RDEIR/SDEIS for Alternative 4A was released for public review on July 10, 2015.<br><br>For more information on recirculation please see Master Response 46.<br><br>Regarding the implementing agreement, on May 30, 2014 the U.S. Department of the Interior and the California Natural Resources Agency released the "Draft Implementing Agreement for the Bay Delta Conservation Plan (IA)” for a 60-day public review and comment period consistent with state and federal requirements. The Draft Implementing Agreement was posted to the website and available in hard copy at the NFMS and DWR document repositories.<br><br>As described in the May 5, 2014, posting to the BDCP website, the delayed publication of the draft Implementing Agreement was related to availability of key individuals whose drought response duties required significant time commitments, resulting in delays in finalizing the draft Implementing Agreement.<br><br>Implementing agreements are a requirement under the California Natural Community Conservation Planning Act (NCCPA), and are routinely executed under the ESA Section 10 (HCP) permitting process. Since the current proposed project (Alternative 4A) is no longer a NCCP or HCP, an implementing agreement was not released with the RDEIR/SDEIS or final EIR for the project.<br><br>With respect to the co-equal goals for the Delta, the Delta Plan is currently the subject of litigation which has arisen since the issuance of the 2015 RDEIR/SDEIR and which could affect the legal requirements and/or implementation of the Delta Plan. On June 24, 2016, Sacramento Superior Court Judge Michael P. Kenny ruled that the Delta Plan was invalidated (JCCP 4758), pending the Council’s remedying of three specific deficiencies identified by the Court. Thus, the status of the Delta Plan and the Council’s consistency certification process remain unclear during the pendency of the litigation, including appeals. The proponents of the proposed project intend to fully comply with the Delta Reform Act, to monitor the Delta Plan litigation and future Delta Plan amendments, and to consider filing a certification of consistency at the appropriate time. Refer to Master Response 31, Appendix 3I and Appendix 3J of the Final EIR/EIS. for more information on compliance with the Delta Reform Act. |

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| | | We are mindful of the immense complexity of a coordinated solution, given seniority of other water rights and other legal and physical variables. That said, the wicked problem of the Delta will only become worse if the balkanized regulation which has occurred since 1961 continues -- if the only changes in the status quo arise under the projects. | For a discussion of the project's purpose and need please see Master Response 3. |
| 1672 | 19 | ATT1: Panel Review of the Draft Bay Delta Conservation Plan: Prepared for the Nature Conservancy and American Rivers | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 20 | Do Operations Shift Delta Exports from Dry to Wet Years?<br><br>The BDCP calls for increasing exports in wet years and reducing them in dry years, taking advantage of the increased operational flexibility provided by two points of diversion. This would reduce stress on Delta ecosystems during drier periods. Our analysis of simulation data suggests that while there is some increase in flexibility, export operations are highly constrained by upstream consumptive uses, regulations that cover reservoir operations, and flow and water quality standards. This greatly limits the anticipated benefit associated with operation of the dual facilities. Despite these limitations, as modeled, there is an increase in exports in wet years. In most dry years there are no substantial changes over No Action Alternative conditions. However, significant improvements in outflow and Old and Middle River (OMR) conditions occur in some dry years. We were unable to identify the regulatory or operational requirements that would lead to this. | The Final EIR/EIS includes model results specifically for Alternative 4A, the preferred alternative, as compared to Existing Conditions and No Action Alternative. These results indicate that total Delta exports under Alternative 4A are approximately 6 percent higher in wet years and 3 percent lower in critical dry years as compared to the No Action Alternative. The results also indicate that total Delta exports under Alternative 4A are similar in wet years and 18 percent lower in critical dry years as compared to the Existing Conditions which includes changes due to climate change, sea level rise, and population growth.<br><br>As shown in Appendix 5A of the EIR/EIS, Section C, the Old and Middle River flows under Alternative 4A would be more positive than under the No Action Alternative and Existing Conditions except in April and May except in wet years. The model results indicate that in these months, the increased reverse Old and Middle River flows would range from approximately -119 to -427 cfs under Alternative 4A as compared to the No Action Alternative, and from approximately -72 to -748 cfs as compared to the Existing Conditions which includes the effects due to climate change and sea level rise. The purpose and need of the proposed project was to minimize the effects of the action alternatives as compared to the No Action Alternative, and not to eliminate reverse flows.<br><br>As described in the EIR/EIS, the proposed project will be submitted to numerous state and federal agencies for approval, including to USFWS and NMFS under the Endangered Species Act, State Water Resources Control Board and U.S. Environmental Protection Agency under the Clean Water Act, and Delta Stewardship Council under the Delta Reform Act. The approvals and permits that will be issued by these agencies could result in changes to the proposed project that is presented in the EIR/EIS. However, implementation of the proposed project in accordance with these approvals and permits would be consistent with the related legislation referred to in this comment.<br><br>For more information please refer to Master Response 44 regarding conveyance facility operations and Master Response 28 regarding operational criteria and OMR flows. Regarding the modeling approach taken, please see Master Response 30. |
| 1672 | 21 | Are Impacts of the North Delta Facility Fully Assessed and Mitigated?<br><br>The Plan identifies multiple near- and far-field effects of the new North Delta facility. Based on our review of the Effects Analysis, the Plan appears to have properly identified the most significant effects and uses standard models to assess them. Outmigrating juvenile winter-run and spring-run Chinook salmon will be most heavily affected, leading, in the absence of mitigation, to significant losses. The Plan identifies multiple mitigation strategies, including pulse flow management, predator control, entrainment reduction, non-physical barriers, real-time operations and development of alternative migration pathways (Yolo Bypass). With the exception of benefits from diverting juveniles onto the Yolo Bypass, all of these mitigation approaches have high uncertainties. Done well and successfully, however, they | For more information on mitigation measures please see Master Response 22.<br><br>Regarding the comment on adaptive management, DWR, Reclamation, DFW, USFWS, NMFS, and the public water agencies will establish a robust program of collaborative science, monitoring, and adaptive management. It is assumed the Collaborative Science and Adaptive Management Program (AMMP) developed for Alternative 4A would not, by itself, create nor contributes to any new significant environmental effects; instead, the AMMP would influence the operation and management of facilities and protected or restored habitat associated with Alternative 4A.<br><br>Collaborative science and adaptive management will support the proposed action by helping to address scientific uncertainty where it exists, and as it relates to the benefits and impacts of the construction and |

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| | | appear to offset the losses associated with operation of the North Delta facility. The High Outflow Scenario appears most protective of conditions upstream of the Delta and adjacent to the new facility. However, mitigation actions are unlikely to contribute significantly to recovery of these species. Additionally, successful mitigation is likely to occur only if there is a robust adaptive management and real-time operations program. The Plan provides neither. | operations of the new water conveyance facility and existing CVP and SWP facilities.<br><br>The collaborative science effort is expected to inform operational decisions within the ranges established by the biological opinion and 2081b permit for the proposed action. However, if new science suggests that operational changes may be appropriate that fall outside of the operational ranges evaluated in the biological opinion and authorized by the 2081b permit, the appropriate agencies will determine, within their respective authorities, whether those changes should be implemented. An analysis of the biological effects of any such changes will be conducted to determine if those effects fall within the range of effects analyzed and authorized under the biological opinion and 2081b permit. If NMFS, USFWS, or DFW determine that impacts to listed species are greater than those analyzed and authorized under the biological opinion and 2081b Bay Delta Conservation Plan/California WaterFix permit, consultation may need to be reinitiated and/or the permittees may need to seek a 2081b permit amendment. Likewise, if an analysis shows that impacts to water supply are greater than those analyzed in the EIR/EIS, it may be necessary to complete additional environmental review to comply with CEQA or NEPA.<br><br>Adaptive management is also discussed in Master Response 33. Also see Master Response 44, Decision Tree, regarding real time operations. For more information on mitigation please see Master Response 22. |
| 1672 | 22 | Are In-Delta Conditions Significantly Improved for Smelt?<br><br>We evaluated the modeling results in the Plan and conducted our own modeling to evaluate how changes in conditions would affect delta and longfin smelt. As noted, we are concerned that anomalously positive (or less negative) Old and Middle River flows and high Delta outflows that are modeled during some drier years would not actually occur in real operations. However, if these changes were to occur we find modest to significant improvement in in-Delta conditions for smelt, particularly delta smelt. Improvements in OMR flows under High Outflow Scenario and Low Outflow Scenario result in substantial decreases in entrainment, leading to significant increases in long-term survival percentages for delta smelt. However, increases in spring and fall outflow under HOS lead to small increases in longfin smelt abundance and modest improvements in delta smelt recruitment. | The analysis of effects on delta and longfin smelt are addressed in Chapter 11 of the Final EIR/EIS and Master Response 17 addresses operational criteria and the effects on fish and aquatic resources.<br><br>Also see response to comment 1672-20. |
| 1672 | 23 | Will Pelagic Fishes Benefit from Floodplain and Tidal Marsh Restoration?<br><br>The Plan properly identifies food limitation as a significant stressor on smelt populations in the Delta. The Plan proposes to address this issue by restoring physical habitat to help subsidize pelagic food webs. Based on simple modeling and comparison with other systems, we find that restored floodplains and tidal marshes are unlikely to make a significant contribution to smelt rearing habitat conditions. Tidal marshes can be sinks or sources of food, with most appearing to be sinks for zooplankton. The Plan appears to be too optimistic about the benefits of tidal marsh and floodplain restoration. However, there is likely to be benefit where fishes have direct access to productivity, such as in Cache Slough. In addition, although benefits for listed pelagic fishes are low, there are broad benefits of restoration for many aquatic and terrestrial species covered by the Plan. | The Preferred Alternative is now Alternative 4A/California Water Fix, as explained above in Response to Comment 1672-1. Although Alternatives 4A, 2D, and 5A include only those habitat restoration measures needed to provide mitigation for specific regulatory compliance purposes, habitat restoration is still recognized as a critical component of the state's long-term plans for the Delta. Such larger endeavors, however, will likely be implemented over time under actions separate and apart from these alternatives. The primary parallel habitat restoration program is called California EcoRestore (EcoRestore), which will be overseen by the California Resources Agency and implemented under the California Water Action Plan. Under EcoRestore, the state will pursue restoration of more than 30,000 acres of fish and wildlife habitat by 2020. These habitat restoration actions will be implemented faster and more reliably by separating them from the water conveyance facility implementation.<br><br>Additional priority restoration projects will be identified through regional and locally-led planning processes facilitated by the Delta Conservancy. Plans will be completed for the Cache Slough, West Delta, Consumes, and South Delta. Planning for the Suisun Marsh region is already complete and a process for integrated planning in the Yolo Bypass is underway. The Delta Conservancy will lead the implementation of identified restoration projects, in collaboration with local governments and with a priority on using public lands in the Delta.<br><br>Additionally, Chapter 11 of the Final EIR/EIS addresses the effects of restored habitat on delta smelt (see Impact AQUA-9) and longfin smelt (Impact AQUA-27). |

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| 1672 | 24 | Does the Plan Provide an Effective Governance Structure?<br><br>We reviewed the proposed BDCP governance structure to evaluate its likely effectiveness in meeting the Plan's goals and objectives. Implementation of BDCP would be overseen by an Authorized Entity Group (AEG) comprising the California Department of Water Resources (DWR), the U.S. Bureau of Reclamation (USBR), and the state and federal water contractors if they are issued incidental take permits pursuant to the BDCP. A Permit Oversight Group (POG), consisting of the U.S. Fish and Wildlife Service (USFS), the National Marine Fisheries Service (NMFS), and the California Department of Fish and Wildlife (CDFW), would monitor implementation of the Plan and compliance with the biological objectives and conservation requirements. The draft BDCP includes a 50-year "no surprises" guarantee, as well as other regulatory assurances. We found that, when examined in detail, the draft BDCP blurs the lines between implementation and regulation and grants the permittees unusual decision authority. Additionally, the regulatory assurances in the Plan, especially the "no-surprises" policy, place undue financial responsibilities on the state and federal governments if certain modifications to the Plan become necessary during its 50-year term. Given the complexity of the Delta ecosystem, predicted changes in hydrology, anticipated changes in the Delta not included in the Plan, and significant scientific uncertainties, Plan modifications are likely to be needed in the future. | The plan recognizes that plan modifications may be needed in the future as a result of changes in the environment and scientific uncertainties. Environmental changes are considered as part of “changed circumstances” described in Chapter 6 of the 2013 Public Draft EIR/EIS. If changed circumstances arose, remedial actions would need to be implemented to address those circumstances. Scientific uncertainties are addressed in Chapter 3 of the Final EIR/EIS as part of the adaptive management and monitoring program. This program was designed to address specific scientific uncertainties related to questions of management importance. Both components of the plan allow for changes to occur. If changes are needed that are more substantial than remedial measures or adaptive management, a plan amendment could be developed and submitted for approval by the state and federal fish and wildlife agencies. The plan amendment process is described in the 2013 Public Draft Chapter 6, Section 6.5. Again, as noted in 1672-1, the preferred alternative is now Alternative 4A and no longer includes and HCP. |
| 1672 | 25 | Is There a Robust Science and Adaptive Management Plan for BDCP?<br><br>The Plan is committed to adaptive management in order to address the high uncertainties. Most of the unresolved issues in the Plan are to be resolved at a future date through adaptive management. A "decision tree" approach is proposed to resolve conflicts over starting operations. We found that the governance structure, whereby the Authorized Entity Group may exercise veto authority over changes to the biological objectives and Conservation Measures, is likely to create disincentives for adaptive management. In addition, a proposed consensus-based Adaptive Management Team made up of Permit Oversight Group, AEG [Authorized Entity Group], and scientific community members creates conflicting relationships between decision-makers and providers of key information. The limited information available about the science program suggests that BDCP proposes to develop a wholly new science program that is not integrated, but should be, with existing programs. Finally, our review of the "decision tree" process indicates that it is unlikely to achieve the goal of significantly reducing uncertainties before the north Delta facility is constructed and ready for operation. | This comment addresses Alternative 4/BDCP. The Preferred Alternative is now Alternative 4A/California Water Fix, as explained above in Response to Comment 1672-1 Please see response to comment 1672-21.<br><br>Also see Master Response 33 for more information on adaptive management and monitoring and Master Response 44 regarding the decision tree process under Alternative 4. |
| 1672 | 26 | All parties need to recognize the model uncertainties in BDCP and factor that into decision-making. It is unlikely that actual operations will follow simulated operations. | The basis of the hydrologic and water quality model is the CALSIM II model, which is a monthly model that incorporates assumptions about daily operational changes. These types of models are the most appropriate to analyze potential changes due to different operational assumptions for the SWP and CVP. However, as described in Appendix 5A of the Final EIR/EIS, these models cannot be used in a predictive manner to define absolute values. Rather, they must be used in a comparative manner to indicate basic changes between alternatives or scenarios and understand the sensitivity of changes that could occur from the Existing Conditions and the No Action Alternative.<br><br>For more information on modeling please see Master Response 30. |
| 1672 | 27 | Given the high uncertainty over mitigation for the north Delta facility, all mitigation efforts should be in-place and tested before the facility is completed. This includes completion of the Fremont Weir modifications on the Yolo Bypass as well as large scale, significant experiments in real-time flow management, predator control and non-physical barriers. | Mitigation measures will be implemented to reduce significant environmental effects as they occur based on the resource topic and impact mechanism disclosed in the Final EIR/EIS. In some cases mitigation measures are implemented prior to project construction, such as for some noise and visual resource impacts and in other situations mitigation is required during or after construction and operation of the project. |

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| | | | Please refer to the MMRP for a discussion of the timing of specific mitigation measures. Also, please note that Alternative 4A does not include modifications to Fremont Weir or the Yolo Bypass.<br><br>For more information on mitigation measures, please see Master Response 22. |
| 1672 | 28 | The improvements in long-term survival percentages for delta smelt in response to changes in Old and Middle River (OMR) need to be more rigorously evaluated, particularly in light of uncertainties over operations. If further examination supports these findings, operational rules should be developed that insure that the anomalous, significantly improved drier-period OMR and outflow conditions occur. | Please see Master Response 28 for discussion of uncertainties in operations from modeling. Also see response to comment 1672-20 and response to comment 1672-22. |
| 1672 | 29 | The limited benefit derived from changes in outflow under High Outflow Scenario requires a second look at options for significant increases in outflow, including finding sources of water outside the direct control of BDCP. | The action alternatives only address operations with the existing water rights issued to DWR and Reclamation for operations of the SWP and CVP, in accordance with the Project Objectives and Purpose and Need (see Chapter 2 of the Final EIR/EIS). For more on the project's purpose and need please see Master Response 3. For information on water rights please see Master Response 32. |
| 1672 | 30 | Although we find that marsh and floodplain restoration is unlikely to create the benefits for pelagic fishes described in the Plan, this can only be resolved through experimental restoration projects. These projects need to be designed and implemented rapidly to resolve this issue. | Please refer to Response to Comment 1672-23. |
| 1672 | 31 | Substantial revision of BDCP's governance structure is needed. This includes giving full regulatory authority to the Permit Oversight Group, while limiting their involvement in implementation. | Please refer to Response to Comment 1672-24. Also see Master Response 5 for a discussion of the governance structure proposed in the 2013 public draft BDCP. The role of the Permit Oversight Group is designed to be consistent with, or exceed, their regulatory authority under the ESA and NCCP Act. Note that the preferred alternative no longer includes BDCP or an HCP/NCCP (Alternative 4A). The fish and wildlife agencies have a strong role in providing oversight in water operations. Details of the roles of the SWP/CVP contractors in this process are being developed through the ESA Section 7 process and the state 2081(b) permit process.<br><br>For information on compliance with the Endangered Species Act, please see Master Response 29. |
| 1672 | 32 | To address high uncertainties about project performance and future conditions, instead of a 50-year permit, there should be renewable "no surprises" guarantees issued every ten years based on conditions at the time and prior performance. | Please refer to Response to Comment 1672-24. |
| 1672 | 33 | An adaptive management program needs to be developed that has the capacity and authority to conduct adaptive management experiments and effectively use outcomes to revise and improve future actions. | Please refer to Response to Comment 1672- 21 and Response to Comment 1672-25. |
| 1672 | 34 | A well-funded BDCP science program needs to be developed that is integrated with existing Delta science programs. The best opportunity for integration lies with the current efforts to update the Delta Science Program. | Please see response to comment 1672-21 and response to comment 1672-25 discussing the Collaborative Science and Adaptive Management Program. Also see Master Response 8 regarding the project's independent utility. |
| 1672 | 35 | Chapter 1: The Bay Delta Conservation<br><br>Plan and Charge to the Panel<br><br>Introduction<br><br>The Bay Delta Conservation Plan (BDCP) is being developed to meet Endangered Species Act permit requirements for operations of the Federal Central Valley Project (CVP) and the State Water Project (SWP) within the Sacramento-San Joaquin Delta. The Plan includes proposals | The comment is providing a recount of the past review of the BDCP and meetings held on the BDCP. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS. |

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| | | for new points of diversion in the north Delta, new operations criteria, extensive floodplain and tidal marsh restoration, and new governance, oversight and adaptive management programs. The Plan applicants are seeking Habitat Conservation Plan (HCP)/Natural Communities Conservation Plan (NCCP) permits that will guide water exports and habitat management for 50 years.<br><br>The Bay Delta Conservation Plan is the most complex HCP/NCCP permit application ever attempted. Development of the Plan has been funded principally by state and federal water contractors and has been on-going for more than 5 years. In Spring 2013, select chapters of the Administrative Draft of BDCP were serially released for public review [footnote 1: This report assumes that the reader is familiar with the Sacramento-San Joaquin Delta and on-going efforts to manage water supply and ecosystems to meet the co-equal goals prescribed in the 2009 Delta Reform Act. A summary of conditions in the Delta and other issues can be found at: http://baydeltaconservationplan.com/Home.aspx]. An Administrative Draft of the EIS/EIR for the Plan was released in May of 2013 [footnote 2: http://baydeltaconservationplan.com/Library/DocumentsLandingPage/EIREISDocuments.aspx].<br><br>At the request of The Nature Conservancy California and American Rivers--two non-governmental organizations engaged in the BDCP process--an independent panel of five experts (Text Box 1.1) was assembled to assist in technical review of BDCP documents. The panel was asked to answer a suite of questions about the Plan to help inform decisionmaking by American Rivers and The Nature Conservancy.<br><br>The panel was assembled and managed by Saracino & Mount, LLC, under contract from the S.D. Bechtel, Jr. Foundation Water Program. NewFields, Inc. provided support for the panel, including data retrieval, analysis and presentation. This report summarizes the conclusions of the work of this panel.<br><br>Guiding Questions<br><br>Two planning meetings were held between Saracino & Mount, LLC and staff of American Rivers and The Nature Conservancy. An initial list of more than 40 questions were developed that were germane to decisions that the organizations needed to make about future engagement with BDCP. These questions were distilled into the following six:<br><br>Q.1 Do operations of the dual facilities meet the broader goal of taking advantage of wet and above average years for exports while reducing pressure on below average, dry and critically dry years? What substantive changes in operations (and responses, see below) are there both seasonally and interannually?<br><br>Q.2 Based on operations criteria, does the Plan properly identify ecological impacts likely to occur adjacent to and in the bypass reach downstream of the new North Delta diversion facilities? If there will be direct and indirect harm to listed species by the facilities, does the Plan prescribe sufficient mitigation measures?<br><br>Q.3 Are changes in operations and points of diversion prescribed in the Plan sufficient to significantly improve in-Delta conditions for covered species? The focus is on listed species, including delta and longfin smelt, steelhead, winter and spring run Chinook, and green sturgeon.<br><br>Q.4 Are covered pelagic fish like longfin smelt and delta smelt likely to benefit from | |

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| | | restoration of floodplain and tidal marsh habitat at the scale proposed by the Plan? Given the current state of knowledge, and assuming that all Plan commitments are met, are these efforts likely to result in relaxed X2 and spring outflow standards?<br><br>Q.5 Does the Plan provide achievable, clear and measureable goals and objectives, as well as governance that is transparent and resilient to political and special interest influence?<br><br>Q.6 Is there a robust science and adaptive management plan for BDCP? As described, is the proposed "decision tree" likely to resolve major issues regarding Fall X2 and Spring Outflow prior to initial operations?<br><br>Using these questions as guide, the panel reviewed selected chapters within the Plan. The focus of the review was on the biological goals and objectives for species of fish listed as threatened or endangered (BDCP Chapters 1, 2), the conservation measures proposed to meet the biological objectives (BDCP Chapter 3 and appendixes, see Text Box 1.2), and the analysis of the effects of the project on Delta fish species and communities (BDCP Chapter 5 and appendixes). The panel also examined governance, adaptive management and science programs proposed in the Plan, including the "decision tree" intended to resolve technical disagreements about initial operations (BDCP Chapters 3, 5, 6, 7, 8, 9, 10).<br><br>In addition to reviewing BDCP documents and literature, the panel held two meetings with the consultants who prepared the Plan for the project applicants. The consultants answered questions about analyses contained within the Plan and provided or directed panel members to pertinent sources of modeling data. | |
| 1672 | 36 | ATT1: ATT1: Text Box 1.1: Members of the Review Panel | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 37 | ATT1: ATT2: Text Box 1.2: Conservation Measures Considered by the Panel | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 38 | The Bay Delta Conservation Plan seeks a permit for operation of the SWP and CVP at a future date when new facilities will be constructed. As written, the preferred alternative is to construct a new point of diversion in the North Delta on the Sacramento River near Freeport, with the goal of completion in 2025. This diversion is to have three screened intakes that will divert water into forebays and a pair of tunnels capable of transmitting a maximum of 9000 cubic feet per second (cfs) by gravity feed. These tunnels will link to existing SWP and CVP export facilities located in the South Delta. Permit authority for the construction and combined operations of these facilities--typically referred to as dual facilities--are the foundation of the plan. Construction and operations are paired with extensive conservation measures (see below) to mitigate for impacts of the project and to conserve and recover listed species and their biological communities. | The comment provides a brief summary of the BDCP. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS. |
| 1672 | 39 | One of the many controversies surrounding the Plan is the establishment of an environmental baseline for comparison of alternatives and analysis of the effects of the project on listed species. The requirements of the Biological Opinions (BiOps) issued by the | The comment is related to analysis which includes both the ELT and the LLT time periods for the evaluation of absolute future conditions. The EIR/EIS impact assessment is based upon a comparison of conditions under Alternatives 1 through 9 and the Existing Conditions and the No Action Alternative. It is acknowledged |

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| | | U.S. Fish and Wildlife Service (USFWS) in 2008 and the National Marine Fisheries Service (NMFS) in 2009 constitute the baseline for the Plan. There is considerable debate between the fish agencies (NMFS and USFWS principally) and the permitees over the provisions of these BiOps, particularly in regard to requirements for high Delta outflows to support longfin smelt in the spring and high outflows to achieve Fall X2 (low salinity zone) provisions to support delta smelt. For this reason, there are two Existing Biological Conditions (EBC) considered by the Plan (Table 1.1): EBC1 includes high spring outflow provisions and EBC2, includes both high spring outflow and the new Fall X2 provisions.<br><br>A central requirement of the Plan, and the source of much of its complexity, is to analyze conditions over the 50-year life of the project. The Plan divides future conditions into two classes: Early Long Term (ELT), which captures the initial operating conditions of the project once a new diversion facility has been constructed (approximately 2025), and Late Long Term (LLT) which accounts for full completion of all conservation measures, including restoration of more than 55,000 acres of tidal marsh and floodplain (approximately 2060). Climate change, particularly changes in runoff and sea level, and changes in water demand are incorporated in these projections.<br><br>The controversy over spring and fall outflow needs for conservation and recovery of listed species propagates into the assessments of future conditions. Without-project EBC1 and EBC2 are considered for both ELT and LLT. Evaluated starting operations (ESO) of the preferred project and alternatives are presented for ELT and LLT conditions. Two additional future scenarios are evaluated that purport to provide bookends to project operations that dictate future water exports. The first is a High Outflow Scenario (HOS), which is similar to the outflow standards in EBC2 (high spring and fall outflow). The second is a Low Outflow Scenario (LOS), which has reduced outflow standards for both spring and fall. Both the LOS and HOS are considered in the ELT and LLT, with the latter including completion of habitat restoration. The Plan proposes a "decision tree process" be undertaken during construction of the facility that will reduce uncertainties and guide initial project operations, presumably within the bounds of the HOS and LOS (reviewed in Chapter 9).<br><br>For the purposes of this review, we simplified our comparison of operations and restoration scenarios to just three. Using simulation data provided by BDCP consultants we examined the HOS and LOS scenarios for ELT. We then used a no-project alternative, No Action Alternative early-long term, that commonly appears throughout BDCP documentation, particularly in the EIR/EIS. NAA prescribes a high fall outflow to maintain X2 standards for smelt and D-1641 salinity and flow standards required by the State Water Resources Control Board for the remainder of the year.<br><br>It should be noted that the Panel chose not to review LLT scenarios and conditions beyond the question of whether restoration of marsh is likely to benefit listed fishes. Although it is necessary and useful to consider how the project might operate over the long-term, especially under climate change, the Panel felt that exceptionally high uncertainties made it difficult to offer precise answers within the LLT framework. These uncertainties are associated with our understanding of the Delta, with the models used to simulate future conditions, and with the array of events (biological invasions, floods, droughts, earthquakes, policy changes, lawsuits, etc.) that are likely to occur. | in Chapter 5, Water Supply, and Appendix 5A, Modeling Technical Appendix, in the Draft EIR/EIS that specific projections of climate change conditions are difficult. Therefore, during the preparation of the Draft EIR/EIS, a sensitivity analysis was completed, as presented in Appendix 5A, Section D.3, Climate Change Modeling, to simulate conditions under the No Action Alternative and Alternative 1 under the five climate change scenarios. The operations results from these simulations were analyzed to understand the range of uncertainty in the incremental changes that would occur with a range of climate change scenarios. The sensitivity analysis indicated that Alternative 1 results would change with climate change scenarios; however, the incremental differences between the No Action Alternative under a specific climate change scenario and Alternative 1 under the same specific climate change scenario were consistent. Because the EIR/EIS only evaluates the incremental differences, and not absolute values, between the Existing Conditions and the No Action Alternative and Alternatives 1 through 9, the incremental changes appear to be similar under a range of climate change scenarios.<br><br>For more information on environmental baselines, please see Master Response 1. |
| 1672 | 40 | ATT1: ATT3: Table 1.1. Definitions of existing baseline conditions and project conditions simulated in BDCP. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |

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| 1672 | 41 | A Note About Hydrologic Modeling Tools and Uncertainties<br><br>The basis for the BDCP analysis is hydrologic simulation modeling that provides flow, water elevations, temperature and salinity at various locations throughout the Delta and its upstream areas. Much of the Effects Analysis for aquatic species and all of the export projections are based on outputs from these hydrologic models. BDCP is one of the most complex modeling efforts of its kind and certainly the most complex ever attempted in the Delta. This is a heroic modeling effort.<br><br>There are three general categories of uncertainty in the hydrologic model results:<br><br>Model uncertainties. This includes how the model simulates hydrology and the hydrologic results of operations, including salinity, temperatures and other water quality parameters. The currently available modeling tools are less than ideal to simulate such a long-term record with dramatic changes in conditions such as sea level rise and introduced sub-tidal and inter-tidal land. The principal issues are summarized in Text Box 1.3.<br><br>Future condition uncertainties. There is extensive effort in BDCP to estimate future conditions in the Delta, including sea level rise and changes in temperature and runoff. This is the most comprehensive approach to date. These are described well in Appendix 5A of the Plan and highlight high levels of uncertainty.<br><br>Regulatory and behavioral uncertainty. BDCP models assume that flow and water quality standards will remain static during the life of the project. In addition, the models assume uniform behavior of system operators, ignoring real-time operations and adaptations. All of these are highly unlikely to occur.<br><br>The hydrologic model results of BDCP are presented as if they are a unique solution. Given the compounding uncertainties, BDCP model results should be considered as scenarios rather than specific outcomes. This issue is often lost in the public debates over BDCP. As discussed later in this report, the model uncertainties significantly impact our confidence in some of our results, particularly our analysis of the response of pelagic fishes to changes in South Delta operations. | As described in Appendix 5A of the Final EIR/EIS, these models cannot be used in a predictive manner to define absolute values. Rather, they must be used in a comparative manner to indicate basic changes between alternatives or scenarios and understand the sensitivity of changes that could occur from the Existing Conditions and the No Action Alternative.<br><br>For more information on modeling, please see Master Response 30. Also see Master Response 28, Operational Criteria, for a discussion of operations modeling versus Actual Operations. |
| 1672 | 42 | ATT1: ATT4: Text Box 1.3: Hydrologic Model Uncertainty.<br><br>To adapt existing tools to model future conditions under BDCP consultants developed dispersion coefficients with the 3-dimensional UnTRIM model developed by Michael MacWilliams for sea level rise. A similar process was then followed with a 2-dimensional model developed by Research Management Associates to estimate the additional dispersion for the proposed new open tidal areas. Parameters developed from the multi-dimensional efforts were then incorporated into the 1-dimensional DSM2 planning model developed by DWR to simulate a part of the long-term record incorporating sea level rise and tidally restored acreage. The boundary conditions for the DSM2 model, which operates at time steps as short as 15 minutes, was provided by CALSIM, the 1-dimensional system-wide water operations optimization model. CALSIM output occurs on monthly time steps and had to be disaggregated to provide boundary conditions for DSM2. All the results, including the DSM2 results and artificial neural network salinity results, were then used to train the CALSIM model. The CALSIM model was then used to simulate the entire 82-year record that formed the basis for the Effects Analysis. All of these model exchanges, particularly | Please see response to comment 1672-41. |

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| | | between 1-, 2-, and 3-dimentional models, create error or model bias. To date, there is no assessment of these model biases and how they impact BDCP results. | |
| 1672 | 43 | Chapter 2: An Overview of the Law Governing the BDCP<br><br>Introduction:<br><br>This chapter provides a brief overview of the law that governs the creation and implementation of the Bay Delta Conservation Plan. It also addresses an important question that has arisen during the BDCP negotiations: May the California Department of Fish and Wildlife (CDFW) approve the BDCP as a natural community conservation plan if the BDCP does not provide for full recovery of the endangered and threatened species covered by the Plan?<br><br>Habitat Conservation Planning and Natural Community Conservation Planning Under Federal and California Law:<br><br>The BDCP is a Habitat Conservation Plan (HCP) authorized by section 10(a) of the federal Endangered Species Act (ESA), 16 U.S.C. [Section] 1539(a), and a Natural Community Conservation Plan (NCCP) authorized by the California Natural Community Conservation Planning Act (NCCPA), California Fish and Game Code [Sections] 2800-2835.<br><br>Section 10(a) of the federal ESA allows the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) to issue permits that authorize the taking of endangered or threatened species "if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" and the proposed activity is governed by an approved HCP. Id. [Section] 1539(a)(1)(B) & (2).<br><br>Similarly, under the NCCPA the California Department of Fish and Wildlife (CDFW) may "authorize by permit the taking of any covered species . . . whose conservation and management is provided for in a natural community conservation plan approved by the department." California Fish & Game Code [Section] 2835. [footnote 1: The NCCPA defines "covered species" to include species that are listed for protection under the California Endangered Species Act, California Fish & Game Code [Sections] 2050-2115.5, and nonlisted species that are "conserved and managed under [another] approved natural community conservation plan and that may be authorized for take." Id. [Section] 2805(e).]<br><br>If approved by the three fish and wildlife agencies, the BDCP will be a legally binding document that defines the terms and conditions under which the U.S. Bureau of Reclamation (USBR) and the California Department of Water Resources (DWR) may construct and operate the proposed new water diversion and transport facilities described in the draft Plan. [footnote 2: The complete statutory requirements governing the contents and approval of the BDCP as an HCP and NCCP are set forth respectively in section 10(a)(2)(A) & (B) of the federal Endangered Species Act, 16 U.S.C. [Section] 1539(a)(2)(A) & (B), and sections 2810 and 2820 of the California Fish and Game Code.] The BDCP also will serve as "a comprehensive conservation strategy for the Sacramento--San Joaquin River Delta (Delta) designed to restore and protect ecosystem health, water supply, and water quality within a stable regulatory framework" (BDCP 1-1) [footnote 3: In addition, the BDCP will be the basis for a biological assessment that USBR will submit to the USFWS and NMFS prior to consultation under section 7 of the Endangered Species Act. BDCP 1-6. The BDCP thus will help to inform the federal fish and wildlife agencies' analysis of the new facilities and changes in coordinated CVP/SWP operations proposed in the draft Plan. | Under the federal Endangered Species Act (ESA), an applicant for a Section 10 permit must submit a conservation plan that species, among other things, the steps that will be taken to minimize and mitigate the impact of covered activities on the species covered by the plan. Under the State Natural Community Conservation Planning Act (NCCPA), a conservation plan is required to include measures that collectively provide for the conservation and management of species covered by the plan.<br><br>Specifically, under Section 10(a)(1)(B) of the ESA, USFWS and NMFS may permit the incidental take of listed species that may occur as a result of an otherwise lawful activity. To obtain a Section 10(a)(1)(B) permit, an applicant must prepare a Habitat Conservation Plan (HCP) that meets the following five criteria.<br><br>1) The taking will be incidental to an otherwise lawful activity.<br><br>2) The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.<br><br>3) The applicant will ensure that adequate funding for the Plan will be provided.<br><br>4) The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.<br><br>5) Other measures, if any, which USFWS and NMFS require as being necessary or appropriate for purposes of the Plan will be met (16 USC 1539(a)(2)(A)).<br><br>Under the BDCP, Conservation Measures are defined as those actions that will minimize and mitigate, to the maximum extent practicable, impacts to Covered Species associated with Covered Activities, as well as those actions that contribute to the recovery of those species. Collectively, the BDCP Conservation Measures have been designed to meet the permit issuance requirements of the ESA and the NCCPA.<br><br>The Proposed Project has been developed with the goals of minimizing and avoiding incidental take of listed species to the maximum extent practicable. Chapter 11, Fish and Aquatic Resources, and Chapter 12, Terrestrial Biological Resources, EIR/EIS, describe effects of the proposed project and several alternatives on fish and wildlife species in the Plan Area.<br><br>Section 7 requires that federal agencies, in consultation with the federal fish and wildlife agencies, ensure that their actions are not likely to jeopardize the continued existence of species or result in modification or destruction of critical habitat.<br><br>Where the alternative does not include preparation of an HCP, ESA compliance for construction and operation of water intakes in the north Delta and associated conveyance facilities would be achieved solely through Section 7. For these alternatives, USFWS and NMFS would not issue a permit and would not act as a lead agency for NEPA compliance. Where Section 7 is the ESA compliance strategy, USFWS and NMFS will assume roles as cooperating agencies for purposes of the NEPA review.<br><br>Reclamation would be the lead federal action agency for Section 7 compliance where a non-HCP alternative is selected. Reclamation's Section 7 compliance would be expected to also address the Section 7 compliance needs for the USACE permit actions. In cooperation with DWR, Reclamation would prepare a biological assessment (BA) for submission to USFWS and NMFS requesting formal consultation under ESA Section 7.<br><br>A biological opinion is not required prior to the release of the Draft BDCP/CWF EIR/EIS. For the Proposed Action, the USFWS and NMFS will conduct an internal ESA section 7 consultation prior to issuance of an Section 10(a)(1)(B) permit for the Proposed Action. These federal agencies will coordinate the ESA |

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| | | The agencies then will decide whether the BDCP "is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [the species' critical habitat]." 16 U.S.C. [Section] 1536(a)(2). If the agencies determine that the BDCP is likely to jeopardize a listed species or adversely affect critical habitat, the Biological Opinion that they issue to the Bureau will include "reasonable and prudent alternatives" designed to avoid these consequences, as well as incidental take authorization governing CVP operations. Id. [Section] 1536(b)(3) & (4).]. | consultation process and other environmental review processes, such as the National Environmental Policy Act (NEPA), consistent with federal regulations. In addition, the USFWS and NMFS will consult with the United States Bureau of Reclamation (Reclamation) to complete biological opinions or a joint biological opinion prior to federal action to carry out the proposed project.<br><br>For information on compliance with the Endangered Species Act, please see Master Response 29. For information on project permitting, please see Master Response 45. |
| 1672 | 44 | The BDCP will include "regulatory assurances" that protect the permittees from the financial cost of changes to the BDCP or other regulatory changes needed to protect the species or their habitat [footnote 4: The regulatory assurances will apply to all entities that are issued incidental take permits under the BDCP, including DWR and the CVP and SWP contractors if the contractors become permittees. The "no surprises" assurance will not apply, however, to the Bureau of Reclamation. BDCP 6-29.]. As authorized by federal and state law, these regulatory assurances provide that, if changed circumstances arise that are either unforeseen or not provided for in the Plan, then the fish and wildlife agencies will not require the permittees to devote additional land, water, or financial resources beyond the levels set forth in the BDCP without the consent of the plan participants. Nor will the federal and state regulators impose additional restrictions on project operations without compensating the permittees for the lost water or additional costs. [footnote 5: The USFWS and NMFS adopted the federal "no surprises" policy by rulemaking in 1998. The substantive requirements of these rules may be found at 50 C.F.R. [Section] 17.22(b)(5) & (6) and 50 C.F.R. [Section] 222.307(g), respectively. The state "no surprises" guarantees are set forth in the NCCPA itself. California Fish & Game Code [Section] 2820(f).]<br><br>Both statutes also authorize the fish and wildlife agencies to suspend or revoke the incidental take permits for noncompliance with the terms and conditions of the BDCP or where implementation of the Plan will place the covered species in jeopardy of extinction. [footnote 6: The federal suspension and revocation rules are set forth in the Endangered Species Act, 16 U.S.C. [Section] 1539(a)(2)(C), and in the ESA regulations, 50 C.F.R. [Section] 17.22(b)(8). The state law counterparts may be found in California Fish & Game Code [Section] 2820(b)(3).]<br><br>We consider the regulatory assurances, revocation authority, and other aspects of BDCP governance in Chapter 8. | The comment is noted regarding the proposed regulatory assurances described in the BDCP. Please see response to comment 1672-24. |
| 1672 | 45 | Conservation and Recovery Requirements Under Federal and State Law<br><br>The federal Endangered Species Act and the California Natural Communities Conservation Planning Act differ in their respective conservation and recovery standards. The federal statute provides that the fish and wildlife agencies may not approve the BDCP unless they determine that the incidental take authorized by the permit and HCP "will not appreciably reduce the likelihood of the survival and recovery of the species in the wild." 16 U.S.C. [Section] 1539(a)(2)(B)(iv).<br><br>In contrast, the NCCPA states that Department of Fish and Wildlife may approve the BDCP only if it finds inter alia that the Plan provides for the protection of habitat, natural communities, and species diversity on a landscape or ecosystem level through the creation and long-term management of habitat reserves or other measures that provide equivalent conservation of covered species appropriate for land, aquatic, and marine habitats within the plan area. | Please see Response to Comment 1672-43. |

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| | | California Fish & Game Code [Section] 2820(a)(3) (emphasis added). The Act defines "conservation" as "the use of methods and procedures within the plan area that are necessary to bring any covered species to the point at which the measures provided pursuant to [the California Endangered Species Act] are not necessary." Id. [Section] 2805(d) (emphasis added).<br><br>In other words, the federal Endangered Species Act requires only that habitat conservation plans ensure that the permitted activities do no significant harm to the listed species or to their critical habitats. The California Natural Communities Conservation Planning Act, by comparison, regards proposed projects such as the BDCP as opportunities for more coordinated and cohesive planning to improve the condition of covered species and their habitat, rather than simply being a means to authorize the permitted activities while maintaining the status quo ante.<br><br>The draft BDCP describes its biological goals and objectives in two different ways. At the "landscape level," the goals include restoration or creation of "ecological processes and conditions that sustain and reestablish natural communities and native species" (BDCP 3.3-5). At the "species level," however, the biological goals refer to progress toward the landscape level goal of reestablished and sustainable natural communities and native species. | |
| 1672 | 46 | The primary biological goals for the delta smelt and longfin smelt are "increased end of year fecundity and improved survival of adult and juvenile . . . smelt to support increase abundance and long-term population viability" (BDCP 3.3-13 & 3.3-16). Similarly, the principal biological goal for Sacramento Winter-Run Chinook Salmon is "improved survival (to contribute to increased abundance) of immigrating and emigrating . . . salmon through the Plan Area," (BDCP 3.3-16), and for other species of salmon and steelhead the goal is "increased . . . abundance" (BDCP 3.3-17 to 3.3-19).<br><br>The draft BDCP explains that the process of developing these species level biological goals "did not assume that the BDCP would be solely responsible for recovery of these species, and so the designated biological goals and objectives did not necessarily match the recovery goals, but instead represented the BDCP's potential to contribute to recovery within the Plan Area (BDCP 3.A-14: emphasis added). This decision has become a focal point of debate over the essential purposes and mandates of the NCCPA.<br><br>In a July 10, 2013, letter to the Director of California Department of Fish and Wildlife, three environmental organizations challenged the BDCP's proposed adoption of biological goals that do not provide for full recovery of the species, arguing that this "contribution to recovery" standard violates California law:<br><br>Under the plain text of the NCCPA, conservation means recovery, and a Plan is required to contain measures that are sufficient to achieve recovery within the plan area.<br><br>The Natural Community Conservation Planning Act is the Foundation for a Successful Bay Delta Conservation Plan, Letter to Charlton H. Bonham, Director of the California Department of Fish and Wildlife, from the Defenders of Wildlife, Natural Resources Defense Council, and the Bay Institute, July 10, 2013, at 5 (citing Fish & Game Code [Section] 2805(c)). | While the delta smelt life cycle is carried out entirely within the Plan Area, there are factors and stressors within the Plan Area that BDCP may not address. However, as our understanding of delta smelt, and the stressors affecting them, increases, BDCP has flexibility through monitoring and adaptive management to respond to this increase in our understanding for the benefit of covered species and ensure progress toward recovery is being achieved. For a description of other stressors, please refer to Master Response 23.<br><br>Additionally, the range of most of the covered species extends well beyond the boundary of the Plan Area, making it impossible for BDCP, in-and-of itself, to provide for the full recovery of each of the covered species. External factors, occurring outside the Plan Area boundaries are beyond what BDCP can affect, making it impossible for BDCP to do more than to provide a meaningful contribution to recovery.<br><br>Again, please note that preferred alternative is now Alternative 4A, which no longer includes habitat restoration beyond what is required to mitigate effects of constructing and operating the project. Alternative 4A would not serve as habitat conservation plans/natural community conservation plans (HCPs/NCCPs) under ESA Section 10 and the NCCPA, but rather would achieve incidental take authorization under ESA Section 7 and CESA Section 2081(b). For information on compliance with the Endangered Species Act, please see Master Response 29. |
| 1672 | 47 | The limitations on project operations and other conservation measures set forth in the draft BDCP would not meet the conservation standard proposed by the July 10th letter--viz. full | The commenter offer's their opinion on statements made in a July 10, 2013 letter to Charlton H. Bonham, Director of the California Department of Fish and Wildlife from the Defenders of Wildlife, Natural Resources |

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| | | recovery of the listed species--though they are likely to contribute to species recovery. The letter thus raises a critical legal question that will have to be resolved by the Director of California Department of Fish and Wildlife [(CDFW)], in consultation with the Department's General Counsel and the Attorney General, before the Department decides whether to approve the BDCP.<br><br>The answer to this question is not free from doubt, as the Legislature defined the purposes of the NCCPA [Natural Community Conservation Planning Act] in terms that stand in some tension to one another. For example, section 2801(i) declares that the "purpose of natural community conservation planning is to sustain and restore those species and their habitat . . . that are necessary to maintain the continued viability of those biological communities impacted by human changes to the landscape." California Fish and Game Code [Section] 2801(i) (emphasis added). In contrast, section 2801(g) states that "[n]atural community conservation planning is a mechanism that can provide an early planning framework for proposed development projects . . . in order to avoid, minimize, and compensate for project impacts to wildlife." Id. [Section] 2801(g).<br><br>A careful and integrated reading of the text of the substantive provisions of the statute, however, should lead to the conclusion that the Act authorizes the CDFW to approve the BDCP if it concludes that the Plan would protect listed species from the adverse effects of the projects authorized by the Plan (including full mitigation of those effects) and would promote the recovery of listed species. Stated differently, we do not believe that the Legislature intended to prohibit the Department from approving the BDCP unless it concludes that the Plan--in isolation both from other existing sources of the species' decline and from other state and federal actions to protect listed species--will achieve full recovery of the species. | Defense Council, and the Bay Institute. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS. |
| 1672 | 48 | The interpretation of the statute proposed in the July 10th letter is based entirely on the section of the Act that defines the term "conservation." If the Legislature actually intended to require the California Department of Fish and Wildlife (CDFW) to determine that an NCCP would be likely to achieve full recovery of listed species, it would have included this requirement in Section 2820, which governs the Department's approval of proposed NCCPs.<br><br>Section 2820(a) lists ten separate findings that are prerequisite to CDFW approval, and section 2820(b) contains nine terms that must be included in the implementation agreements that accompany the NCCPs. None of these mandatory findings and terms includes the requirement proposed in the July 10th letter. We do not believe that the Legislature somehow intended to add a twentieth requirement to these lists--that the NCCP and implementation plan must provide for full species recovery--by implication from the definitions section of the Act. | The commenter offer's their opinion on statements made in a July 10, 2013 letter to Charlton H. Bonham, Director of the California Department of Fish and Wildlife from the Defenders of Wildlife, Natural Resources Defense Council, and the Bay Institute. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS. |
| 1672 | 49 | There are two provisions in Section 2820 that expressly link the required conservation measures to the effects of the project authorized by an NCCP [Natural Community Conservation Plan]. Section 2820(a) states that the California Department of Fish and Wildlife may approve an NCCP only if it finds that the plan:<br><br>"contains specific conservation measures that meet the biological needs of covered species and that are based upon the best available scientific information regarding the status of covered species and the impacts of permitted activities on those species." [Id. Section 2820(a)(6)] | The commenter offer's their opinion on statements made in a July 10, 2013 letter to Charlton H. Bonham, Director of the California Department of Fish and Wildlife from the Defenders of Wildlife, Natural Resources Defense Council, and the Bay Institute. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS. |

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| | | Section 2820(b) stipulates that implementation agreements must include provisions:<br><br>"to ensure that implementation of mitigation and conservation measures on a plan basis is roughly proportional in time and extent to the impact on habitat or covered species authorized under the plan. These provisions shall identify the conservation measures . . . That will be maintained or carried out in rough proportion to the impact on habitat or covered species." [Id. Section 2820(b)(9)]<br><br>This pairing of conservation and recovery with references to the "impacts of permitted activities," together with the "rough proportionality" limitation on conservation measures, suggests that the Legislature intended to authorize NCCPs as a means of contributing to other state and federal efforts to recover species, but not significantly in excess of the burdens that the project covered by the plan would impose on the species. [footnote 7: The July 10th letter acknowledges that the NCCPA [Natural Community Conservation Planning Act] contains this "rough proportionality" limitation, but argues that "the concept of 'rough proportionality' is applied only to mitigation measures and not to a plan's conservation measures." Letter to Director Bonham at 7. The text of the Act belies this interpretation, however, as four of the five statutory references expressly apply the "rough proportionality" limitation to the conservation requirements. See California Fish & Game Code Sections 2805(g)(3)©, 2820(b)(3)(B), Section 2820(b)(9) & Section 2820©.] | |
| 1672 | 50 | There is nothing in the text or legislative history of the NCCPA to indicate that the Legislature intended to force the state to bear programmatic and financial responsibility for full species recovery each time the California Department of Fish and Wildlife approves an NCCP. [footnote 8: The July 10th letter recognizes that the entities that receive incidental take permits under the BDCP may not be required to bear all of the costs of recovery of the various listed species: "[W]hen dividing up the costs of the plan's conservation strategy, the individual developers are only responsible for paying for 'mitigation' and the 'conservation' increment above mitigation is the responsibility of the state." Letter to Director Bonham at 7. Thus, if the costs of recovery exceed the mitigation costs that lawfully may be assigned to the permitted entities, the state must make up the difference: "The BDCP cannot limit its conservation measures to address only those impacts from the covered activities and avoid providing conservation measures sufficient to recover covered species." Id. at 8.] Conservation measures required to achieve full recovery may extend far beyond the scope of an individual NCCP. Indeed, a requirement of full recovery would be particularly problematic for plans such as the BDCP that involve multiple species (some of which only partly inhabit the program area), multiple sources of stress, and diverse land and water management and regulatory agencies that each have independent obligations to contribute to species conservation and recovery. We do not believe that the Legislature would have assigned such a Herculean obligation to the Department, or imposed such a potentially large financial burden on state taxpayers, without saying so explicitly in the text of the statute.<br><br>An interpretation of the statute that would require the CDFW to make a determination that all proposed NCCPs provide for full recovery of listed species would likely have the unintended and pernicious consequence of deterring the Department from approving future plans. The CDFW might conclude that the scope of the necessary species recovery effort extends beyond the scope of the proposed project and hence beyond the capabilities of the project restrictions and conservation measures that would be included in the individual NCCP. Or it might be reluctant to approve an NCCP in situations where the costs of full recovery of the listed species covered by the plan--which the state would have to bear-- significantly exceed the project mitigation costs that may be placed on the project | The commenter offer's their opinion on statements made in a July 10, 2013 letter to Charlton H. Bonham, Director of the California Department of Fish and Wildlife from the Defenders of Wildlife, Natural Resources Defense Council, and the Bay Institute. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS. |

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| | | proponents.<br><br>These factors are especially pronounced in contexts such as the Delta ecosystem where there are multiple species (some of whose habitat is only partly within the project area), multiple stressors (many of which are not plan participants), overlapping and sometimes conflicting habitat requirements, and tremendous uncertainty both about the needs of the species and the likelihood of success of recovery strategies. The interpretation of the NCCPA set forth in the July 10th letter therefore poses a significant policy risk of deterring otherwise salutary applications of natural resources conservation planning. | |
| 1672 | 51 | Chapter 3: Water Supply Operations<br><br>Introduction<br><br>The construction of a new North Delta diversion facility, and the coordinated operation of the North and South Delta facilities constitute the first and most prominent conservation measure (CM#1) of the BDCP. While ostensibly a conservation measure, the new facilities are principally an effort to improve the reliability of exports from the Delta. Their operations, in conjunction with all other conservation measures, are intended to mitigate for impacts of the CVP and SWP, avoid jeopardy and/or to contribute to the recovery of covered species (Chapter 2).<br><br>A basic premise of BDCP is that the construction of the new North Delta diversion facility will simultaneously improve water supply reliability while reducing ecosystem impacts. This stems from the increased operational flexibility associated with two points of diversion located in different portions of the Delta. A presumed benefit of this flexibility is the capacity to take advantage of periods of high inflow for exports, allowing for reductions in exports during dry periods when impacts on the ecosystem may be largest. This is consistent with the co-equal goals expressed in the 2009 Delta Reform Act.<br><br>This chapter examines the water supply operations proposed under BDCP to evaluate 1) if there are significant changes in supply reliability associated with the project and 2) how these changes apportion exports in wet vs. dry periods. This description is foundational for the assessment of ecological and species-specific consequences of BDCP as described in subsequent chapters.<br><br>Proposed Facilities and Operations<br><br>There are lengthy descriptions of the design and operation of new and existing water export facilities in the Administrative Drafts of the EIR/EIS and BDCP. The reader is referred to these documents for information. The centerpiece of the plan is the 9000 cfs capacity diversion in the North Delta that conveys water to the SWP and CVP export facilities in the South Delta through two tunnels.<br><br>Regulatory Constraints<br><br>The operational criteria for the export facilities are both complex and highly constrained (Appendix A). | For information on the project's purpose and need please see Master Response 3. For a discussion of operational criteria please see Master Response 28. With regards to the Delta Reform Act, please refer to Master Response 31, Appendix 3I and Appendix 3J of the Final EIR/EIS. |

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| 1672 | 52 | State Water Resources Control Board water rights decision D-1641: this includes standards for minimum monthly Delta outflow, salinity objectives at multiple Delta locations, location of X2 (the position of the 2 ppt salinity near the channel bottom), a maximum export/import ratio objective [footnote 1: BDCP treats the export/import ratio in two ways: 1) counting as "import" all inflows from the San Joaquin and Sacramento Rivers and Delta's tributaries or 2) counting inflows as above, but counting flows below the North Delta facility as inflow. The latter approach seeks to exclude North Delta exports from D-1641 export/import restrictions. From an ecosystem perspective, this makes no sense since the North Delta exports are, in effect, exports from the legal Delta.], closures of the Delta Cross Channel (DCC), placement of a barrier at the head of Old River, and flow standards for the San Joaquin River below Vernalis. These standards vary depending upon months of the year and water year type. | The proposed intakes would only be permitted to operate with regulatory protections, including river water levels and flow, which would be determined based upon how much water is actually available in the system, the presence of threatened fish species, and water quality standards. Flow criteria will be applied month by month and according to water year type. Monitoring for compliance with D-1641 requirements or any future requirements for SWP/CVP water supply operations would be conducted year-round in the future under the proposed project. For more information on the projects effects on water quality see Chapter 8 of the Final EIR/EIS and Master Response 14. For a discussion on water rights, please see Master Response 32. |
| 1672 | 53 | Remanded 2008 U.S. Fish and Wildlife Service Biological Opinion (BiOp): prescribes restrictions for magnitude and timing of reverse flows in Old and Middle River (OMR) in the South Delta, to protect delta smelt. These vary depending upon time of year, water temperature, flows on the San Joaquin River, and proximity of smelt. This BiOp also calls for higher spring and fall outflows that exceed D-1641 standards. These outflow standards vary on water year type. | This is generally an accurate characterization, although only increased fall outflow is explicitly included as a management action under the BiOp, with a resultant change in the position of the low-salinity zone (indexed by X2, for which there are requirements in wet and above normal years); higher spring outflow results from restrictions in south Delta export pumping, intended to limit entrainment of the early life stages of delta smelt, and there is not an explicit target for outflow or X2 in the spring from the BiOp. |
| 1672 | 54 | Remanded 2009 National Marine Fisheries Service BiOp: has different restrictions on OMR flows than the USFWS BiOp. Reductions in reverse OMR flows are scheduled to protect outmigrating salmonids. These vary depending on temperature and inflow. This BiOp increased San Joaquin River flows and set export/San Joaquin River flow ratios that are more restrictive than D-1641. | See response to comment 1672-53. |
| 1672 | 55 | There are other regulatory constraints beyond D-1641 and the two remanded BiOps; however, compliance with these regulations appears to dominate water supply export modeling. Additional constraints are based on proposed operating rules for both the North and South Delta facilities. The most significant include:<br><br>--Maintenance of minimum flows downstream of the North Delta facility (called "Bypass Flows")<br><br>--Restrictions aimed to reduce reverse flows at the confluence between the Sacramento River and Georgiana Slough<br><br>--A tiered, three-level pumping regime for December through June that seeks to protect the initial winter flood pulse and spring pulses that affect juvenile salmon outmigration<br><br>--Flows with sufficient velocity to reduce impingement of salmonids at diversion screens<br><br>--Increased restrictions for reverse Old and Middle River (OMR) flows associated with South Delta exports. | For information on operational criteria please see Master Response 28. |
| 1672 | 56 | Infrastructure and Inflow Constraints<br><br>Infrastructure design and capacity forms another array of constraints. For the purposes of BDCP simulation modeling, south of Delta storage was limited to space within San Luis Reservoir. Operations during wet and above average conditions are often constrained by available space to store water in this facility. Expanding potential storage, particularly groundwater storage, would have created considerably more flexibility in exports, | Please see Master Response 37 regarding why an alternative focused on creating additional storage, either in the Delta or elsewhere, was not included in the project or EIR/EIS. Also refer to Appendix 1B of the Final EIR/EIS.<br><br>Please see Master Response 4 regarding the development of alternatives. |

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| | | particularly during wet years.<br><br>The size of the north Delta facility is also a constraint, principally during periods of sustained high flow on the Sacramento River in wet years. The preferred project has shifted from an initial facility size of 15,000 cfs [cubic feet per second] to 9,000 cfs in the current plan. The export, economic and environmental performance of the 9,000 cfs facility is compared to 14 alternatives in Chapter 3 and 5 of the Draft EIS/EIR. These alternatives vary facility size, location and operations in the comparison. A narrative is presented in the EIS/EIR that describes the rationale for rejecting the 14 alternatives and selecting the preferred project [footnote 2: It is beyond the scope of this review to examine facility size in detail. In general, the analyses offered in the EIR/EIS conclude that the 9,000 cfs facility provides the optimal balance of cost and flexibility. The additional capacity of the 15,000 cfs facility is rarely used in the operations that they modeled, leading to a very modest increase (<250 taf [thousand acre-feet]) in overall exports. The EIS/EIR did examine smaller facilities with capacities of 6,000 and 3,000 cfs. However, the operating criteria used to evaluate these two alternatives are not comparable to those of the preferred alternative, making the comparison moot.]. | |
| 1672 | 57 | Exports are naturally constrained by the timing and volume of inflows, with strong seasonal and interannual variation. One of the larger export challenges faced by BDCP is its location at the bottom of the system where flows enter the Delta.<br><br>Upstream water management and consumptive use dominate inflows to the Delta over most years (Figure 3.1). These abstractions, which consume roughly ¼ of water that would naturally flow to the Delta, are beyond the control of BDCP, yet are the greatest operational influence on Delta inflows. Under BDCP, exports would be roughly equivalent to upstream consumptive use.<br><br>In addition, there are important restrictions on reservoir operations that constrain exports. The United States Army Corps of Engineers has congressionally authorized rule curves that dictate Fall, Winter and Spring operations to maintain flood reserves. More importantly, there are BiOps that dictate flow and temperature requirements to meet the life history needs of covered salmon, steelhead and sturgeon below the dams. Meeting these standards, particularly in drier years and under a warming climate, limits the amount and timing of inflows to the Delta. Oroville Reservoir, which has fewer restrictions on flows, becomes the most important for supporting Delta inflows as a result, particularly during drought conditions.<br><br>Consequences of Constraints<br><br>The above discussion is intended to highlight a conundrum that is not discussed much outside of the BDCP community of experts and is not examined in the Plan: export operations and operations to support conservation are highly constrained. | Please see Master Response 25, which addresses upstream reservoir operations and Master Response 28, which addresses operational criteria. |
| 1672 | 58 | These regulatory, operational and infrastructure constraints limit the ability of BDCP to adaptively manage operations to support co-equal export and ecosystem objectives. For this reason, the anticipated management associated with the new diversion facility is not fully realized.<br><br>This also highlights how flow management in BDCP was developed using system models. As described in Appendix 5C of the Plan, the models sought to meet the requirements of D-1641, the remanded BiOps, reservoir and diversion facility constraints, and south of Delta storage. The objective function was then to maximize Delta exports within those | The EIR/EIS alternatives were developed in accordance with the Project Objectives and Purpose and Need statement (see Chapter 2 of the Final EIR/EIS), and therefore, did not consider multi-management of the Delta.<br><br>For more information regarding operational criteria see Master Response 28 and for information on adaptive management and collaborative science elements of the proposed project, please see Master |

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| | | constraints. Although this seems logical, it highlights how CM1 is not a conservation measure, per se. Rather than doing a bottom-up assessment of ecosystem flow needs, as is typically done when setting environmental flows, the modeling sought to meet current regulatory requirements and flow constraints sought by fish agencies. This illustrates one of the key points made by Lund et al. (2010) and Moyle et al. (2012) that multi-objective management of the Delta is likely to require a comprehensive re-evaluation of flow and water quality standards. | Response 33.<br><br>For a discussion on conservation measures, please see Master Response 22 on mitigation. |
| 1672 | 59 | Att 1: Att 5 Figure 3.1 Proportional Delta water use. Exports constitute roughly 18% of the total unimpaired flow of the Delta in the 1986-2005 hydrology, with upstream consumptive use approximately 24%. From Fleenor et al. (2010). | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 60 | Export Reliability<br><br>A goal of the BDCP project and the current Delta Plan is to improve reliability of water derived from the Delta for consumptive uses3. Using model simulations provided by BDCP consultants, we have evaluated how well BDCP meets the goal of improving export reliability. The most commonly discussed aspect of BDCP average annual export—is summarized in Figure 3.2, and compares the no-project alternative, NAA with the high outflow scenario, HOS and low outflow scenario, LOS (defined in Chapter 1). This modeling suggests that the HOS and NAA would provide roughly equal average exports, with the LOS providing approximately 700 taf more. However, these figures are an average over an 82-year simulation period and offer little information about reliability.<br><br>Exceedance curves (Figure 3.3) give a better indication of reliability. This approach provides the probability that a given export volume will be equaled or exceeded in any given year. For example, for the 50% exceedance probability (meaning one out of every two years), the NAA performs slightly better than the HOS, but much worse than the LOS. Overall, the LOS performs significantly better than NAA in six out of ten years and better than the HOS in eight out of ten. The HOS is outperformed by the NAA in five out of ten years (drier) and appears to only provide significant water supply benefits over the NAA in one out of ten years (wettest). The conclusion is that export reliability for the HOS and NAA are not substantially different, while reliability for the LOS is markedly higher.<br><br>Water supply reliability curves for SWP and CVP customers are presented in Chapter 5 of the Draft EIS/EIR. These curves indicate that south-of-Delta municipal and farm users would realize considerable increases in overall reliability of supply under the LOS, compared to the NAA and HOS, particularly in above average and wet years. North-of-Delta users of CVP water would likely see a decrease in reliability over the long term, principally due to climate change.<br><br>3 In actuality, the most reliable system would provide a given amount of water each year with the smallest deviation from that amount. Instead, BDCP attempts to produce the most water in any given year under the given regulatory and operational constraints. This produces a more resilient water supply systems, whereby the greatest volume is made available, even under the event of catastrophic salinity intrusion into the Delta. The terms resilient and reliable are used interchangeably in BDCP and other documents. | For information on modeling, please see Master Response 30.<br><br>Regarding operational criteria see Master Response 28 and for information on adaptive management and collaborative science elements of the proposed project, please see Master Response 33. |
| 1672 | 61 | Att 1: Att 6 Figure 3.2: Monthly averaged exports for NAA, LOS and HOS under ELT | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not |

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| | | conditions. Based on BDCP CALSIM data. | already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 62 | Att 1 : Att 7 Figure 3.3: Exceedance probabilities for NAA, LOS and HOS exports under ELT conditions. Note that LOS produces higher exports for all probabilities, suggesting that it is the most reliable/resilient of the scenarios | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 63 | Export Timing<br><br>A goal of BDCP and the Delta Plan is to shift exports to wetter years and to reduce pressure on drier years. A comparison of the average exports of no action alternative, low outflow scenario and high outflow scenario for all five year-types is presented in Figure 3.2. Based on the modeling data provided, there appears to be a significant increase in LOS exports in above average and wet years as compared to the NAA, with HOS intermediate between the two. This increase is accomplished through increased use of the North Delta facility during winter and spring periods when old and middle river restrictions most strongly impact South Delta operations.<br><br>Below average, dry and critical dry year performance of BDCP is mixed (Figure 3.2). For LOS, overall exports during the drier years are higher than the NAA, while HOS exports are roughly the same as NAA. Exports, on average, for both the LOS and HOS tend to be higher than the NAA in the winter and early spring, and lower during the summer. This minimal change in exports during dry years stems, in comparison to wet years, from the constraints on North Delta facility operations. As is illustrated below, during dry periods the North Delta facility is used very little, creating pressure on South Delta facilities.<br><br>In sum, although there are many regulatory and infrastructure constraints, BDCP does make use of the dual points of diversion to create modest increases in wet year exports and, depending on which export scenario is evaluated, equal to or greater exports in drier years. BDCP therefore does not achieve the broader goal of reducing pressure on the Delta during dry years by shifting exports to wet years. | The proposed project aims to stabilize water supplies, and exports could only increase under certain circumstances. Water deliveries from the federal and state water projects under a fully-implemented Alternative 4A are projected to be about the same to the average annual amount diverted in the last 20 years. Although the proposed project would not increase the overall volume of Delta water exported, it would make the deliveries more predictable and reliable, while restoring an ecosystem in steep decline.<br><br>For more information regarding operational criteria see Master Response 28. Also see Appendix 3A of the Final EIR/EIS for information on hydrology considerations. Regarding compliance with the Delta Reform Act, please refer to Master Response 31, Appendix 3I and Appendix 3J of the Final EIR/EIS. |
| 1672 | 64 | Drought Performance<br><br>In the draft Plan and EIR/EIS, export performance of BDCP is summarized by presenting averages, typically linked to water year-types based on the Sacramento 40-30-30 index. Averaging fails to fully reflect how the system might be operated, however, because the complex rules governing operation can create significant year-to-year variability in exports (although see concerns over model uncertainties described in Chapter 1). This issue is particularly acute during multi-year droughts, when carryover storage in reservoirs is greatly reduced and demand increases significantly. To better illustrate how this system might perform we examined time series of model outputs during drought periods.<br><br>There were two six-year droughts during the 20th Century that fall within the time period used for hydrologic simulations: water years 1929-34 and 1987-92. We focused on the 1987-92 period of record for evaluation because it has historical export data for comparison and facilities that are comparable to today. As shown in Figure 3.4, overall export timing and magnitude during the six-year drought were roughly the same for the no action alternative, low outflow scenario and high outflow scenario, with LOS performing marginally better for | Please see Master Response 30 on modeling.<br><br>Operations under the 2008 USFWS Biological Opinion and the 2009 NMFS Biological Opinion generally were implemented in 2009 at the time of the Notice of Preparation and Notice of Intent. Therefore, these assumptions were included in the Existing Conditions and the No Action Alternative. For a detailed description related to the consideration of Fall X2, please review the final EIR/EIS, Chapter 4, section 4.2.1.1.<br><br>The proposed intakes would only be permitted to operate with regulatory protections, including river water levels and flow, which would be determined based upon how much water is actually available in the system, the presence of threatened fish species, and water quality standards. Flow criteria will be applied month by month and according to water year type. More information on the ranges of water project diversions, based on water year types and specific flow criteria, can be found in BDCP, Chapter 3, Conservation Strategy.<br><br>Monitoring for compliance with D-1641 requirements or any future requirements for SWP/CVP water supply operations would be conducted year-round in the future under the proposed project. |

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| | | exports throughout the drought4. The significant exception to this pattern is in the one year in that sequence, 1989, where modest inflows to the Delta occurred in the winter. Once bypass flow criteria were met, the flexibility created by the North Delta facility was able to take advantage of these inflows during a period of high restrictions on South Delta pumping to protect smelt.<br><br>4 Figure 3.4 highlights one of the issues not discussed in BDCP documentation. The environmental baseline for the BDCP assessment was determined to be the remanded BiOps, with provisions of one of the BiOps (high fall X2 flows in above normal and wet years) yet to be enacted. By choosing this as a baseline, the plan does not provide a comparison with how the project was actually operated under historic conditions. This administrative decision to only compare proposed operations with the remanded BiOps masks the striking differences between historic export operations and those proposed under BDCP. | For more information regarding the environmental baseline see Master Response 1, for more information regarding operational criteria see Master Response 28, and for information on adaptive management and collaborative science elements of the proposed project, please see Master Response 33. |
| 1672 | 65 | Att 1: Att 8 Figure 3.4: Exports for NAA, LOS and HOS under ELT conditions simulated for the 1987-92 drought, with historical exports are plotted for comparison. Important to note that ELT conditions take into account minor changes in climate and sea level rise by 2025 and cannot be compared specifically with historic conditions. In addition, historic conditions reflect human behavior; simulated conditions are guided by algorithms that do not account for human behavior | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 66 | Role of Reservoirs in Drought Management<br><br>Reservoir storage and operations play a critical role in drought management in California and greatly influence the timing and magnitude of Delta exports. The CALSIM modeling conducted for BDCP manages reservoirs within operational constraints described above and in detail in Chapter 3 of the Plan. The Plan makes it clear that the plan area does not include these reservoirs. Existing and future BiOps will govern their operations, not the terms of the HCP/NCCP permit. Despite this, the plan does envision significant changes to the operations of Oroville Reservoir under BDCP.<br><br>The 1987-92 simulated operations of the three most important reservoirs—Shasta, Oroville and Folsom—are shown in Figure 3.5. These simulations have important biological implications that are covered in later chapters. For water supply reliability, there are several important observations:<br><br>As noted by the BDCP documentation, the no action alternative puts a great deal of pressure on upstream reservoirs to meet flow requirements, with Oroville providing most of the operational flexibility. In comparison to historic operations, the NAA significantly reduces storage, and thus carryover, in Shasta and Oroville, but has limited impact on Folsom, with the exception of the last two years of drought.<br><br>Under NAA all three reservoirs are at or near dead pool for the last two years of the drought cycle. Had water-year 1989 been closer in runoff to the other drought years, dead pool conditions would have occurred for the last three years of the six-year drought. Although a statement of the obvious, dead pool limits flexibility in managing water supply and ecosystem needs, both immediately downstream and in the Delta. This is likely to be of greatest concern for managing flow and temperature needs of winter- and spring-run Chinook salmon, particularly under warming climate conditions. Changes in flow releases to meet the needs of listed salmon are highly likely to impact export operations during dry | The low storage levels and “dead pool” conditions presented in the CALSIM II monthly model in the EIR/EIS occur because the model only calculates and reports SWP and CVP water operations at an average monthly basis. The model cannot simulate changes that occur on a weekly basis by water users and SWP and CVP operations. In addition, the model cannot make decisions that occur in real-time, such as drought operations during the ongoing drought. Instead the model includes average operating criteria for all dry periods, and does not reflect specific changes that would occur during extreme wet or extreme dry periods. It should be noted that CEQA and NEPA analyses would need to be completed to modify operations in these extreme conditions. For consideration of recent drought conditions please refer to Master Response 47.<br><br>For more information regarding operational criteria see Master Response 28 and for information on adaptive management and collaborative science elements of the proposed project, please see Master Response 33. Regarding storage, please see Master Response 37.<br><br>Also see response to comment 1672-64. |

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| | | periods. BDCP recognizes this as a concern but does not analyze the likely effects.<br><br>A surprising result of the simulations is that high outflow scenario drought operating procedures are more protective of reservoir storage than either NAA or low outflow scenario. In an extended drought, storage is more aggressively allocated to either outflow (NAA) or exports (LOS), with both increasing the risk of creating dead pool conditions. This suggests that HOS operating criteria designed to protect smelt, may also do a better job of protecting upstream conditions for salmonids and sturgeon by increasing carryover storage. This, in turn may inadvertently improve water supply resiliency during drought.<br><br>It is important to note that a time series analysis of one extended drought within a single simulation record does not give guidance on how the system is likely to perform in all future droughts. Each drought is different, with different storage (reservoir and groundwater) conditions at the start, different precipitation and temperature patterns, and different regulatory or operational responses. To test the above observations more thoroughly, a range of six-year drought scenarios, should be simulated and analyzed. Given that most climate models prescribe an increase in frequency and duration of drought, this anecdotal assessment highlights an issue that is likely to occur during the life of the project and have significant impacts on supply as well as ecosystem management. | |
| 1672 | 67 | .Att 1: Att 9 Figure 3.5: End of month storage for HOS, LOS and NAA under ELT conditions simulated for the 1987-92 drought. Historical storage (yellow histogram bars)is plotted for comparison. During the latter stages of the drought, dead pool conditions occur on all three reservoirs. Note that ELT conditions take into account minor changes in climate and sea level rise by 2025 and cannot be compared directly with historical conditions | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 68 | Chapter 4: Environmental Flow Performance: Upstream and Inflows<br><br>Introduction<br><br>The focus of the BDCP is principally on the legal Delta and adjacent Suisun Bay and Marsh, where export operations have the most direct impact on covered species. As discussed in Chapter 3, upstream management, including reservoir operations, consumptive uses of water, and flood management, play a critical role in inflow timing and volume. In this chapter, we examine how conservation measures #1 (water operations) and #2 (Yolo Bypass fisheries) meet conservation objectives that impact listed aquatic species.<br><br>The focus of this chapter is on the environmental performance of proposed flow changes in the Sacramento watershed, including the Sacramento, Feather and American Rivers, and inflows to the Delta through the Yolo Bypass and the Sacramento River. Although inflow from the San Joaquin River is important and a determinant of conditions in the South Delta, BDCP does not envision significant changes in flows. For this reason, our analysis is focused only on the Sacramento watershed.<br><br>Performance, as used here, is how well actions proposed by BDCP are likely to meet the goals and objectives of the plan. Although there are many issues discussed in the Plan for the Sacramento system and covered species, there are three central flow performance concerns: changes in reservoir release timing and magnitude and its impact on anadromous fishes; modifications to Fremont Weir and its benefits for floodplain habitat for outmigrating salmonids; and near- and far-field effects of North Delta diversion operations. | Model results show that long-term average Delta outflow under Alternative 4 (scenarios H1 - H4 at LLT) would be similar to that under Existing Conditions and No Action Alternative, with a minor increase in flows during the winter months and a minor reduction in flows during the spring months relative to Existing Conditions due to the shift in system inflows caused by climate change, as well as increased water demand expected in the LLT. In wet water year types, this trend is more evident, while in other water year types, Delta outflow under Existing Conditions and the No Action Alternative is generally within the range of Alternative 4 H1 - H4 scenarios. For more information and specific modeling results for all Alternatives, please refer to Chapter 5, Water Supply, and Appendix 5A, BDCP/California WaterFix EIR/S Modeling Technical Appendix.<br><br>The incremental changes in Delta outflow under Alternative 4A compared to baseline conditions are a function of both the facility and operations assumptions, including north Delta intakes capacity of 9,000 cfs, OMR flow requirements, Fall X2 requirements, and the reduction in water supply availability due to increased north of Delta urban demands, sea level rise, and climate change (the last three assumptions, plus Fall X2 requirements, are included in both the No Action Alternative (ELT) and Alternative 4A, but not in Existing Conditions). Results for the range of changes in Delta outflow under Alternative 4A are presented in more detail in Appendix 5A, BDCP/California WaterFix EIR/S Modeling Technical Appendix. Changes in long-term average Delta outflow under Alternative 4A (ELT) as compared to the No Action Alternative (ELT) and Existing Conditions are shown in Figures 5-37 through 5-39 and Tables 5-10 through 5-12 in Chapter 5. Also See the Final EIR/EIS Chapter 4, Section 4.2.1.1.<br><br>To summarize changes in Delta outflow under Alternative 4A, late-fall and winter outflows remain similar or show minor reductions in Alternative 4A (ELT) compared to No Action Alternative (ELT) and are slightly higher relative to Existing Conditions. In the spring months, outflow would remain similar under Alternative |

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| | | Impaired Flow in an Impaired System<br><br>One of the objectives of BDCP and the Delta Plan—and a concern of many nongovernmental organizations--is to produce a flow regime with attributes that better support the life history stages of covered aquatic and riparian species. This objective is supported by a large body of national and international literature that has demonstrated how creating more natural flow regimes in highly regulated systems improves conditions for native species (see recent summary by Arthington, 2012). This issue has been at the forefront of controversial efforts by the state water resources control board to develop a basin plan that addresses flows (Fleenor et al., 2010).<br><br>A flow regime that mimics natural seasonal variation is also considered by the scientific community in the Delta to be fundamental to better species management (Hanak et al., 2013). Restoring appropriate seasonal and intra-annual variability involves re-establishing flow timing, magnitude, duration, frequency and rates of change that drive key ecosystem attributes that, in turn, support native species (Figure 4.1). | 4A (ELT) as compared to No Action Alternative (ELT), and would be slightly reduced compared to Existing Conditions. In the fall months, outflow under Alternative 4A would increase relative to Existing Conditions, and as compared to the No Action Alternative (ELT), would be similar because of Fall X2 requirements in wet and above-normal years.<br><br>For more information on operational criteria please see Master Response 28. |
| 1672 | 69 | Although restoring elements of the natural flow regime is a worthwhile goal, it should be made clear that in the Delta and its tributaries there is little that remains natural (Bay Institute, 1998; Whipple et al., 2012). Added to these physical changes are profound shifts in biological conditions, including a Delta ecosystem dominated by non-native plants and animals (Lund et al., 2008; Baxter et al., 2010). For this reason, restoring a more naturally variable flow regime in an altered Delta and its watershed, while necessary for improving conditions for covered species, is unlikely to lead, by itself, to their recovery (Mount et al., 2012). | The Proposed Project would enable DWR to construct and operate new conveyance facilities that improve conditions for endangered and threatened aquatic species in the Delta while at the same time improving water supply reliability, consistent with California law (see, e.g., Cal.Wat. Code, § 85001[c]). Implementing the conveyance facilities would help resolve many of the concerns with the current south Delta conveyance system, and would help reduce threats to endangered and threatened species in the Delta, including entrainment. For instance, implementing a dual conveyance system would align water operations, and their location, to better reflect natural seasonal flow patterns by creating new water diversions in the north Delta equipped with State-of-the-art fish screens, thus reducing reliance on south Delta exports during times of the year when listed aquatic species are present and most vulnerable. For more information on mitigation measures to minimize contraction and operational-related impacts to fish species, including Delta and longfin smelt, please see Chapter 11, EIR/EIS. For information on operational criteria and flow please see Master Response 28. For information on adaptive management and monitoring please see Master Response 33.<br><br>The originally proposed habitat restoration measures and related Conservation Measures (CMs) (i.e., CM2 through CM21) would not be included as part of the Proposed Action, except to the extent required to mitigate significant environmental effects under CEQA and meet the regulatory standards of ESA Section 7 and California Endangered Species Act (CESA) Section 2081(b). However, restoration actions that are independent of Proposed Action will continue to be pursued as part of existing projects and programs. Examples of these include the 2008 and 2009 USFWS and NMFS BiOps (e.g., Yolo Bypass improvements and habitat enhancements, 8,000 acres of tidal habitat restoration), (2) California EcoRestore, and (3) the 2014 California Water Action Plan. |
| 1672 | 70 | Att 1: Att 10 Figure 4.1: Unimpaired Sacramento River flow at Freeport for WY 1992-3 based on DAYFLOW data (DWR). This illustrates the range of natural seasonal variability in flow. Reproduction or migration of aquatic and riparian species are tied to timing, magnitude, frequency, duration and rate of change of flows. Flows, particularly winter and spring flood pulses, are necessary for geomorphic processes that support various life history stages. Flow regulation and land reclamation have significantly altered flow regime (see text for discussion). | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 71 | In this chapter we sought to evaluate BDCP's potential impact on flow regimes upstream and into the Delta. It is infeasible—if not inappropriate--to reconstruct natural flow in the Central Valley given the significant changes in the landscape. Instead, we use unimpaired | Please see Response to Comment 1672-69. |

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| | | flow (DWR 2007) as a proxy for a more naturally distributed flow regime1. Unimpaired flow is the volume of water that would flow by a given point if no upstream impoundments or diversions were in place. Estimating unimpaired flow is complicated and imprecise, yet is important in setting flow and water quality targets, particularly by the State Water Resources Control Board. It involves aggregating unimpaired and unregulated runoff from multiple basins that flow to the Delta. Unimpaired flow ignores surface water-groundwater interactions and storage or conveyance of flow in channels, floodplains and wetlands. For this reason, it is not a useful proxy for flow regime on daily time steps, but can be used as an imperfect proxy for annual and monthly flows. We follow that convention in this analysis.<br><br>This simplified approach should not be over-interpreted. It is used to assess whether BDCP meets the overall goal of improving ecological conditions by creating a more natural seasonally variable flow regime. It does not address all issues of concern for listed fishes, such as winter- and spring-run Chinook salmon whose primary limitation is due to loss of upstream spawning and rearing habitat and high temperatures in existing channel habitat (Williams, 2006, 2009).<br><br>1 We focus here principally on the rivers that feed into the Delta rather than the Delta per se. An assessment of changes in outflow that occurs in response to changes in operations is contained in Appendix B. | |
| 1672 | 72 | Main Rivers of the Sacramento Valley<br><br>Multiple biological goals and objectives of BDCP are associated with flow conditions on the Sacramento River and its two main tributaries, the Feather and American Rivers. All anadromous fishes covered by BDCP rely directly on these river systems for spawning, rearing and migration. As noted in Chapter 1, we focus here principally on winter- and spring-run Chinook since the BiOps that cover their life history needs have the greatest impact on water operations.<br><br>With the exception of proposed changes to the Fremont Weir and the Yolo Bypass (CM#2), BDCP does not envision making significant investments in improving physical habitat upstream of the Delta, or addressing other stressors such as hatcheries, contaminants or harvest procedures (see summary in Williams, 2006, 2009). For this reason, most of the impact of BDCP on the Sacramento River and its tributaries upstream of the North Delta facilities will be associated with changes in flow releases from the three major reservoirs: Shasta, Oroville and Folsom.<br><br>Simulated average flow conditions affected by changes in reservoir operations under BDCP are summarized in Figure 4.2A-C, including Sacramento River at Red Bluff, Feather River below Oroville Reservoir, and American River below Folsom. These flows, along with all other tributaries, aggregate to form the Freeport flow (Figure 4.2D) and the Yolo Bypass. These results include no action alternative, low outflow scenario, high outflow scenario flow scenarios and unimpaired flow under the five year-types based on the Sacramento River wetness index. | The originally proposed habitat restoration measures and related Conservation Measures (CMs) (i.e., CM2 through CM21) would not be included as part of the Proposed Action, except to the extent required to mitigate significant environmental effects under CEQA and meet the regulatory standards of ESA Section 7 and California Endangered Species Act (CESA) Section 2081(b). However, restoration actions that are independent of Proposed Action will continue to be pursued as part of existing projects and programs. Examples of these include the 2008 and 2009 USFWS and NMFS BiOps (e.g., Yolo Bypass improvements and habitat enhancements, 8,000 acres of tidal habitat restoration), (2) California EcoRestore, and (3) the 2014 California Water Action Plan.<br><br>Also see Master Response 8, Analysis of the Project as a Whole. For information on mitigation, please see Master Response 22. Also see Chapter 11 of the Final EIR/EIS for information Fish and Aquatic Resources. |
| 1672 | 73 | Att 1: Att 11 Figure 4.2A: Sacramento River at Red Bluff | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |

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| 1672 | 74 | Att 1: Att 12 Figure 4.2B: Feather River | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 75 | Att 1: Att 13 Figure 4.2C: American River. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 76 | Att 1 : Att 14 Figure 4.2D: Flow at Freeport. Figures 4.2A-D. Monthly averages sorted by water year types for HOS, LOS, NAA and unimpaired flow. Unimpaired flow is based on current conditions and HOS, LOS and NAA are ELT conditions. See text for discussion. Data from BDCP CALSIM simulations. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 77 | The constraints on reservoir operations are significant due to temperature and downstream flow requirements, based mostly on the 2009 BiOp. For this reason, the differences between scenarios are not large. However, a comparison of the impaired and unimpaired flow data allows for several general conclusions about the impact of BDCP on key attributes of Sacramento Valley flow regimes:<br><br>Winter Flood Pulse. With the exception of the American River, the winter flood pulse is significantly reduced over unimpaired conditions in the Sacramento Valley. The magnitude of this reduction reflects the size and operations of upstream impoundments relative to the total runoff of the watershed. The most dramatic impairment of winter flood pulses occurs on the Feather River where the pulse is virtually eliminated in most years. There are no substantive differences between Low Outflow Scenario, High Outflow Scenario and No Action Alternative operations for winter flood pulses. The winter flood pulse is marginally higher under NAA at Freeport, but this reflects more frequent flows down the Yolo Bypass.<br><br>Spring Snowmelt Pulse. The rise and gradual recession of flow in the spring is, next to low baseflow conditions in the late summer, the most predictable element of the Sacramento Valley flow regime and is of high biological significance. As shown in Figures 4.2A-D, the spring snowmelt pulse is highly impaired due to impoundments and flow diversions. With the exception of the Feather River, there are no substantive differences between HOS, LOS and NAA impacts on the spring snowmelt pulse in the Sacramento Valley. On the Feather, HOS flow operations designed to improve spring outflow in the Delta, lead to significant improvement in spring conditions in all but dry and critical year types.<br><br>Summer/Fall Baseflow. The timing and magnitude of reservoir releases dominates the summer/fall flow regime of the basin (Figure 4.2A-D). These releases are to meet the complex array of temperature and flow requirements downstream of the dams, irrigation demands upstream of the Delta, inflows to meet export demands, and outflows to meet water quality and habitat standards. Summer/fall baseflow flow regimes are highly altered with flows three to five times higher than unimpaired flows. With the exception of the Feather River, BDCP does not change summer/fall baseflow conditions. Under HOS and LOS simulations, the summer flows on the Feather are reduced, creating marginal improvement in flow regime. | Please note that operations under the new proposed project, Alternative 4A, will be guided by the H3+ operational scenario, which includes Fall X2 requirements consistent with the 2008 USFWS BiOP and spring outflow criteria to minimize and avoid project-related impacts to longfin smelt.<br><br>For more information regarding operational criteria see Master Response 28 and for information on adaptive management and collaborative science elements of the proposed project, please see Master Response 33. |

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| 1672 | 78 | Yolo Bypass Flows<br><br>One of the more prominent conservation measures (CM#2) of BDCP is the modification of the Fremont Weir to promote increases in the frequency of winter and early spring inundation of the Yolo Bypass. A well-established and growing body of evidence, involving monitoring data, field experimentation and, to a lesser extent, life cycle models indicate high benefit of floodplain habitat to foraging juvenile salmon (see BDPC documentation for a full summary). This stems from the use of high value, off-channel habitat by juveniles, who, under optimal bioenergetic conditions and low predation pressures grow at high rates, increasing their survivorship through the Delta. Fish that either forage on the Yolo Bypass and/or use it as a migration corridor will not be impacted by near-field effects of the proposed North Delta diversion facilities. Fish using the Bypass are also less likely to enter the interior of the Delta where predation pressures are high. Finally, juveniles that use the Bypass leave the Delta later in the season, increasing the likelihood of arriving at the ocean during higher upwelling periods with better food availability.<br><br>Currently flow onto the Yolo Bypass from the Sacramento River only occurs when the Verona gauge exceeds 55,000 cubic feet per second (cfs). Modifications to the Fremont Weir would allow 1,000 cfs to flow onto the floodplain when flow at Verona exceeds 25,000 cfs. Flow through the Weir would climb to 6000 cfs when the river approaches 55,000 cfs. Above 55,000 cfs flow into the Bypass would be similar to NAA conditions. In addition to allowing flood flows, the weir would be modified to allow 100 cfs attraction flows to a fish ladder to improve upstream passage of adult salmon, steelhead and sturgeon (passage issues not evaluated here).<br><br>The average annual flow of the Yolo Bypass is approximately 1.5 maf. Under No Action Alternative, High Outflow Scenario and Low Outflow Scenario, this amount would not differ significantly since the majority of flow volume on the Bypass occurs when the Sacramento overtops Fremont Weir and the Sacramento Weir (Figure 4.3). However, the timing, frequency, and duration of floodplain inundation--key elements of the natural flow regime--would change substantially with the proposed modification of Fremont Weir. | Please see response to comment 1672-72 regarding habitat restoration. Also see Master Response 28 for information on operational criteria and flow. |
| 1672 | 79 | ATT1: ATT15: Figure 4.3: Average monthly flows for the Yolo Bypass under High Outflow Scenario, Low Outflow Scenario, and No Action Alternative under Early Long Term conditions for different year types. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 80 | Flood Frequency. The frequency of inundation of the Bypass increases significantly under BDCP. Under current conditions there is a roughly 40% annual probability of flooding on the Yolo Bypass. Under BDCP this increases to more than 70% annual probability (BDCP statistics). The largest change occurs in drier years (Figure 4.3).<br><br>Flood Duration. Multiple studies have shown that flood duration, which allows for nutrient cycling and primary production, is essential for supporting juvenile salmonid foraging (Sommer et al., 2001; Williams, 2006, 2009). Modifications to Fremont Weir increase flood durations with high habitat benefits. Under current operations, flood durations aggregate to an average of 25 days per year. This would not change under No Action Alternative in the Early Long Term (ELT). Under both High Outflow Scenario and Low Outflow Scenario ELT this would increase more than three-fold to an average of 81 days per year.<br><br>Flood Timing. In addition to more frequent, longer-lasting flooding conditions, modifications | The new proposed project, Alternative 4A, no longer includes Conservation Measure 2 (Yolo Bypass Enhancements). Instead, Yolo Bypass Enhancements would be assumed to occur as part of the No Action Alternative because they are required by the existing BiOps. For more information on the potential benefits of Yolo Bypass enhancements to fish species, please see Chapter 3 of the BDCP.<br><br>The California Department of Water Resources' Levee Repairs and Floodplain Management Office is responsible for administering levee programs through evaluation and direct rehabilitation of structural deficiencies in California's levee system. Overall levee repairs and improvement programs administered by DWR will continue with available funding. For additional information on the relationship between the proposed project and Flood protections in the Delta, please see EIR/EIS Appendix 6A BDCP/California WaterFix Coordination with Flood Management Requirements. |

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| | | to the Fremont Weir would expand the flood season, particularly in drier years (Figure 4.3). This expansion helps divert early migrants, such as winter-run Chinook salmon and later migrants, such as spring-run and fall-run Chinook, onto the floodplain. For example, based on BDCP data, we estimate that days of flooding above 1000 cfs on the Bypass will more than double in January and triple in April. | |
| 1672 | 81 | Yolo Bypass performance for listed salmon<br><br>Although CM#2 achieves the broader objective of improving the amount and quality of floodplain habitat, principally by restoring a more natural flow regime, it's effectiveness in supporting federally listed species of salmon (the focus of this review) is somewhat limited. The BDCP consultants modeled the overall benefits of the Yolo Bypass flows to out-migrating and foraging juveniles. For winter-run Chinook salmon, the benefits were modest with an estimate 1-8% increase in escapement. The limited benefit of the Yolo Bypass is, according to the BDCP model results, due to the small percentage of juveniles likely to be diverted onto the floodplain. This stems from the fact that most migration begins in December and January coincident with the first pulse flows of the season and does not coincide with peak inundation periods of the Bypass.<br><br>Greater benefit, albeit still limited, occurs for spring-run Chinook salmon. The bulk of juvenile out-migration takes place during the optimal months for floodplain inundation: February through March. However, two factors reduce the effectiveness of Yolo Bypass for spring-run according to BDCP documents. The majority of spring-run Chinook salmon come from hatcheries in the Feather River. Juveniles leaving the Feather are only diverted onto the Yolo Bypass during rare high flow events, leaving the Sacramento River as their principal migration route to the Delta. Naturally spawned fish in Butte Creek use the Sutter Bypass as their principal migration route. Like Feather River fish, they too only move access the Yolo Bypass during rare high flow events. Naturally spawned spring-run in Battle, Clear, Mill and Deer Creek pass Fremont Weir on their out-migration paths and will benefit most from likely access to the Bypass.<br><br>Second, according to BDCP models, most spring-run juveniles reach the Delta, and presumably the Yolo Bypass, as yearling smolts. In this stage, they are presumed by BDCP consultants to not take full advantage of the high quality foraging conditions of the Bypass, but use it principally as a migration corridor. BDCP consultants estimate that 90% of spring-run Chinook in the Yolo Bypass are migrants, rather than foraging fish. The BDCP consultants readily note that this proportion reflects the split between migrants and foraging characteristics in hatchery fish and may not be indicative of proportions of wild fish. Our consultation with several salmon biologists suggests that the distinction between foragers and migrants is arbitrary and likely does not reflect actual behavior of juveniles on the Bypass. In addition, there is emerging evidence that a high percentage of naturally spawned fish move out as fry and migrate during high winter flows (pers. comm., P.B. Moyle, 2013).<br><br>The BDCP consultants used several approaches to model the effect of the Yolo Bypass on survivorship. They acknowledge that current modeling tools are not well-suited to this kind of analysis. They developed a simple bioenergetic model for floodplain rearing, but told the panel that they felt it did not fully capture the benefits of the Bypass, and that their estimates of survivorship were conservatively low. Despite these limitations the BDCP models along with a growing body of literature suggest that spring-run juveniles as well as winter-run juveniles that access the Bypass are likely to have significantly higher survival | The EIR/EIS analyzes all alternatives, including Alternative 4A. Note that Alternative 4A does not propose any actions in the Yolo Bypass and thus none of the provisions of CM2 would be implemented.<br><br>The existing operation of the SWP and CVP pumps in the south Delta can cause reversals in river flows, potentially altering salmon migratory patterns. The new system would reduce the ongoing physical impacts associated with sole reliance on the southern diversion facilities and allow for greater operational flexibility to better protect fish. Minimizing south Delta pumping would provide more natural east–west flow patterns (RDEIR/SDEIS Section 4.1). Overall reductions in OMR reverse flows under all flow scenarios for the proposed project would be beneficial with corresponding increase in net positive downstream flows, during the migration period of Chinook salmon through the interior Delta channels (Appendix B, Supplemental Modeling for Alternative 4A, Section B.7 (RDEIR/SDEIS Section 4.3.7). Operations would still be consistent with the criteria set by the FWS (2008) and NMFS (2009) BiOps and State Water Resources Control Board Water Right Decision 1641 (D-1641), subject to adjustments made pursuant to the adaptive management process as described in the 2008 and 2009 BiOps (RDEIR/SDEIS Executive Summary ES.2.2). For more on adaptive management, please see Master Response 33. |

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| | | rates to Chipps Island and presumably higher adult escapement [footnote 2: The focus of this chapter is on spring-and winter-run Chinook. There is very significant benefit to other covered species, particularly fall-run Chinook and Sacramento splittail that can take advantage of Yolo Bypass flooding more readily.]. | |
| 1672 | 82 | North Delta Facility Impacts and Mitigation:<br><br>The new point of diversion along the Sacramento River is likely to impact all covered fish that either use the main channel of the Sacramento for migration or rearing, or are indirectly affected by downstream changes in flow volume and timing. These impacts are some of the most difficult to assess due to uncertainties about design and operation of the facilities (no comparable facility exists to calibrate models) and the relationship between downstream actions, such as tidal marsh restoration, and flows. This section assesses BDCP's evaluation of near-field (adjacent to the facility) and far-field (downstream from the facility) effects.<br><br>Near-Field Effects:<br><br>The preferred project involves the construction of three screened intakes, along the left bank of the Sacramento River, in the vicinity of the town of Hood. Each screen will be capable of withdrawing up to 3,000 cubic feet per second [cfs]. In our view, the BDCP consultants have properly identified the two main sources of near-field effects of the facility on out-migrating salmonids: losses due to impingement on the intake screens and losses due to predation near the diversion. However, we are uncertain about the effectiveness of proposed mitigation for these effects.<br><br>To mitigate for impingement potential, the consultants propose real-time management of pumping regimes relative to channel flow in order to maintain approach and sweeping velocities that reduce contact with intake screens. This real-time management would be informed by upstream monitoring of outmigrants. This issue remains a high uncertainty for operations of the facility ("low certainty" in the parlance of BDCP). Conceptually, a good adaptive management and research program coupled with real-time management could reduce impacts. However, as of this writing, the specifics of this program are not provided by BDCP (see discussion in Chapters 8, 9 this report) and we are unable to evaluate how effective it might be.<br><br>A greater near-field effect of the facility is the high likelihood of concentration of predators near the facility, with resulting losses of migrants and foragers due to predation. Predators take advantage of concentrated prey and velocity refugia at physical structures throughout the Delta (Vogel, 2008), and will presumably do the same at the north Delta intake facilities. The BDCP consultants use various modeling approaches to estimate potential predation losses, including comparison with estimates of losses at known structures, such as diversion screens of the Glenn-Colusa Irrigation District. Estimated predation losses for juvenile winter run Chinook that pass the facility vary from as low as 1% to as high as 12% (we did not find statistics for spring-run Chinook salmon losses). The higher predation loss values would have significant population-level impacts on winter-run Chinook and would fail to meet objectives of BDCP. The consultants acknowledge high levels of uncertainty about predation effects at the facility. The solution, as with most issues with high uncertainty in BDCP, is to defer this to adaptive management of the project, including unspecified predator control programs and real time management of flows. Based on our experience in the Delta, we consider this to be a significant, unresolved management issue. | The north Delta intakes will have positive-barrier fish screens that would be designed to established protection standards for salmonids and delta smelt, and would comply with CDFW, NMFS, and USFWS fish screening criteria. Appendix 3F of the EIR/EIS provides details on the development of intakes and fish screening technology, as well as the Conceptual Engineering Reports (CERs). It is proposed that monitoring and research would be conducted to inform the fish screen design, construction, and operation in order to maximize their effectiveness. Dual operations provides for flexibility that will better protect the fish based on real time data. For more information on adaptive management and monitoring please see Master Response 33.<br><br>Environmental Commitment 15 (Localized Reduction of Predatory Fishes) is not intended to entirely remove predators at any location or substantially alter the abundance of predators at the scale of the Delta system. Instead, EC15 proposes to reduce localized abundance of predatory fishes at locations of high predation risk (i.e., predation hotspots) associated with construction and operation of the proposed and existing water conveyance facilities, through active capture methods (boat electrofishing, hook-and-line fishing, predator lottery fishing tournaments, and other means of passive and active capture). A number of studies, cited in the Effects Analysis, provide evidence that predation at such hotspots is of concern to covered fish species. For a more detailed discussion of the existing predation issues in the South Delta, please see BDCP Chapter 3, Conservation Strategy, Section 3.4.1.2, BDCP Appendix 5.F, Biological Stressors on Covered Fish, and Chapter 11 of the RDEIR/SDEIS.<br><br>EC15 would remove predator refuge habitat and reduce predator abundance in the construction areas. At a minimum, EC15 will target the removal of an amount of predator refuge commensurate with the amount that may be created by construction of water conveyance facilities. These measures are expected to fully mitigate any indirect effect on predation rates associated with construction. Because of uncertainties regarding treatment methods and efficacy, implementation of EC15 will involve discrete study pilot projects and research actions coupled with an adaptive management and monitoring program to evaluate effectiveness. |

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| 1672 | 83 | Far-Field Effects:<br><br>The north Delta facility is expected to provide an average of roughly half of the exports from the Delta. As outlined in Chapter 3, operations of the facility are highly constrained by flow and water quality regulations, upstream water use, reservoir operations and hydrology. The simulated operations of the north Delta facility are summarized in Figure 4.4, including a measure of the proportion of channel flow that is diverted.<br><br>There are significant seasonal and interannual variations in operation of the north Delta facility that will drive far-field effects [footnote 3: We did not evaluate the effects of size of the facility and its level of use. However, it is worth noting in Figure 4.4 how often average monthly exports approach facility capacity. Using a monthly average greater than 8,000 cubic feet per second [cfs] as an indicator of periodic use of full capacity. This only occurs in February and March in wet years, and in March of above average years. This is roughly 5% of the total months, suggesting that operational and regulatory constraints, rather than facility size, determine export volumes]. During wet and above average water years, pumping regimes are most aggressive, particularly during the summer and early fall when 25% to as much as 39% of channel flow is diverted. Diversions, as a percentage of channel flow, decline dramatically in below normal, dry and critical years. In addition, pumping regimes are highly protective of channel flow in December, reflecting the restrictions on exports to protect initial pulse flows for winter-run Chinook. As expected, the High Outflow Scenario [HOS], designed to improve Delta outflow, results in the most protective pumping regime for bypass flows at the north Delta facility. | Please see Maser Response 28 regarding operational criteria and Master Response 33 regarding adaptive management. |
| 1672 | 84 | BDCP documents acknowledge that the reductions in bypass flow create multiple far field effects that impact listed salmon. These include reduced attraction flows for migrating adult salmon, increased losses of juvenile salmon migrants and foragers due to longer transit times to the Delta, and diversion into the interior Delta where predation and/or entrainment losses are high. These operations also affect total Delta outflow [footnote 4: Appendix B presents a summary of Delta outflow and the magnitude of impairment of flows from the Sacramento Valley. The latter uses a simplified impairment index.].<br><br>The BDCP consultants use multiple modeling approaches to address the far field effects of the North Delta facility. The main model used is the Delta Passage Model (DPM) that tracks smolt survival through the Delta. This model and others summarized in Appendix 5C of the Effects Analysis all draw the same conclusion: there is an increase in losses of winter-and spring-run Chinook salmon migrants associated with reduced flows in the bypass reach from Hood to Rio Vista. The magnitude of this impact varies depending upon year type (wetter years have reduced losses) and magnitude of flow reduction associated with pumping (up to 35% decreases in flows during some migration periods). These results are not surprising since there is a long-established relationship between transit time and survivorship for smolts leaving the Sacramento River (Newman, 2003; Perry et al., 2010). | Chapter 11 in the Final EIR/EIS analyzes migration effects on salmonids related to reductions in bypass flows downstream of the north Delta intakes. The proposed project includes real-time operations, including north Delta intake transitional criteria to minimize and avoid impacts to salmonids migrating past the north Delta intakes. Please see Chapter 3 for a detailed description of the north Delta intake transitional criteria and real-time operations.<br><br>Also see Master Response 33 on adaptive management and monitoring. For information on the development of operational criteria and the effects on Fish and Aquatic Resources please see Master Response 17. |
| 1672 | 85 | ATT1: ATT16:Figure 4.4 Average monthly export flows of North Delta diversion facility under High Outflow Scenario and Low Outflow Scenario Early Long Term for different year types, and percentage of total bypass channel flow exported. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 86 | BDCP proposes to mitigate the increase in losses of smolts associated with far-field effects through six strategies: | The originally proposed habitat restoration measures and related Conservation Measures (CMs) (i.e., CM2 through CM21) would not be included as part of the Proposed Action, except to the extent required to mitigate significant environmental effects under CEQA and meet the regulatory standards of ESA Section 7 |

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| | | --Tiered pumping regimes to reduce withdrawals during the initial winter flood pulse (described in Chapter 3)<br><br>--Real-time operational changes that reduce export pumping when monitoring indicates that large numbers of migrants have entered the reach upstream of the facility<br><br>--Flow management that reduces tidal reversals at Georgiana Slough, decreasing the likelihood of smolts diverting into the interior of the Delta<br><br>--Non-physical barriers at Georgiana Slough<br><br>--Reductions in entrainment at the South Delta facility due to reduced export pumping<br><br>--Increased diversion of foragers and migrants onto the Yolo Bypass<br><br>--Improved channel margin, floodplain and tidal marsh habitat to support foraging juveniles<br><br>The benefits of the last of these strategies--habitat restoration--are not captured in the survivorship modeling that was completed by BDCP consultants (see chapter 7 for a discussion). In addition, the models do not incorporate real-time operations adjustments since the scope and terms of these operations have yet to be determined. The remaining strategies are incorporated into models used to assess smolt survivorship. Closely examined, BDCP model results indicate that these measures, in combination, roughly offset the losses created by reductions in flows and increases in predation in the bypass reach, meeting the standard of mitigation. There is no indication that these actions would result in substantial improvement in conditions for listed salmon. This includes the Yolo Bypass, which provides significant benefits for other covered species. | and California Endangered Species Act (CESA) Section 2081(b). However, restoration actions that are independent of Proposed Action will continue to be pursued as part of existing projects and programs. Examples of these include the 2008 and 2009 USFWS and NMFS BiOps (e.g., Yolo Bypass improvements and habitat enhancements, 8,000 acres of tidal habitat restoration), (2) California EcoRestore, and (3) the 2014 California Water Action Plan.<br><br>For information on adaptive management, please see Master Response 33. For information on mitigation measures please see Master Response 22. |
| 1672 | 87 | Chapter 5: In-Delta Flow Performance<br><br>Concerns over modeling<br><br>As noted in Chapter 1 of this review, we have concerns over the use and over-interpretation of the modeling data provided to us. In conducting our analysis for this chapter and the following chapter on impacts of outflows on smelt, we have relied on output from CALSIM under various scenarios. Our analysis revealed several apparent anomalies in model output. Although we received clear explanations of the origin of these anomalies from the BDCP consultants, we remain concerned that the model output is unrealistic for projecting actual project operations and the resultant flows. In particular, certain modeled conditions arise through artifact that provide substantial improvements in conditions for delta smelt. Thus, conclusions drawn on the basis of these models rest on an unreliable foundation. These concerns are focused on Delta outflow during fall and southward flow in the southern Delta during winter. These flows have been linked to habitat and survival of delta smelt.<br><br>October<br><br>The U.S. Fish and Wildlife Service Biological Opinion for delta smelt includes a fall X2 standard that applies following wet springs. Flows are usually low during this season so small variations in flow can have substantial effects on the location and area of the low salinity zone, and hence potentially on habitat conditions for smelt.<br><br>For various reasons X2 calculated by CALSIM differs substantially from that determined from outflow as in Jassby et al. (1995). We therefore focused on outflow as determined by | As stated in this comment, the basis of the hydrologic and water quality model is the CALSIM II model which is a monthly model that incorporates assumptions about daily operational changes, and the model results should not be used in a predictive manner to determine absolute values. The electrical conductivity analysis is based upon the DSM2 model that uses the monthly model results from CALSIM II and disaggregates the values using historical patterns for smaller time steps and assumptions for tidal conditions. These types of models are the most appropriate to analyze potential changes due to different operational assumptions for the SWP and CVP. However, as described in Appendix 5A of the EIR/EIS, these models cannot be used in a predictive manner to define absolute values. Rather, they must be used in a comparative manner to indicate basic changes between the action alternatives, and to understand the changes that could occur as compared to the Existing Conditions and the No Action Alternative.<br><br>Additional modeling information is also provided in Appendix B, Supplemental Modeling for New Alternatives in the 2015 RDEIR/SDEIS and Master Response 30. For more information regarding adaptive management and collaborative science elements of the proposed project, please see Master Response 33.<br><br>Operational criteria are discussed on Master Response 28. |

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| | | CALSIM, rather than X2 as provided by BDCP modelers.<br><br>For this analysis we sorted flow data into a ranked series from lowest to highest values of Delta inflow under No Action Alternative. In Octobers of most years in the drier half of the series, outflow under High Outflow Scenario and Low Outflow Scenario is up to twice that under NAA (Figure 5.1; median 77% higher for these 41 years). By contrast, during years of high inflow (right-hand half of Figure 5.1), HOS and NAA outflows roughly track each other, while LOS is much lower because the fall X2 requirement does not apply to that scenario. The anomaly occurring under dry conditions is not balanced by flows in other fall months. A few anomalies like those found in October crop up in November, but otherwise in those months either all three outflows track each other or LOS is lower.<br><br>To our knowledge there is no regulatory or operational requirement for reduced outflow under NAA or increased outflow under HOS or LOS in dry Octobers. Furthermore, there would be no reason to focus such a requirement in only one month if it were meant to benefit delta smelt, since they are present in the low-salinity zone from summer through fall. Outflow in fall can affect delta smelt recruitment so the modeled outflows can result in considerable differences in predicted recruitment under the three modeled scenarios (Chapter 6). We do not find these differences compelling because of a lack of a regulatory or other basis for the high outflows under HOS and LOS in dry Octobers.<br><br>January<br><br>January has been the month of greatest adult delta smelt entrainment historically, so the modeled conditions in January can have large impacts on forecasts of adult survival. The CALSIM modeling included a requirement that Old and Middle River flows during January be zero in wet years, no more negative than -3500 in above-normal and below-normal years, and no more negative than -5000 in dry and critical years. However, no estimates of current year type are possible in January, and rather than presume perfect foresight or use information available up to that point the modelers chose to operate the simulated system for January using the requirements that applied to the previous year type. Because dry Januaries can follow wet years, this resulted in an anomalous condition in which requirements for wet years applied during dry Januaries.<br><br>As a result of this anomaly, the modeled scenarios (Low Outflow Scenario and High Outflow Scenario) called for reductions in export flows in Januaries following wet years, which substantially increased OMR during many Januaries at the dry end of the historical range for that month (Figure 5.2). This is unrealistic for several reasons. First, the actual values don't conform to the model requirements of 0, -3500 or -5000 cfs, depending on previous year type; instead they are quite variable and achieve zero rarely. Thus, there is no clear regulatory basis for these flows.<br><br>Second, the reduction in export flows was sometimes accomplished through increased outflow rather than reduced reservoir releases or increased exports from the North Delta (Figure 5.2). Thus, many January outflows during dry periods were much greater than the corresponding flows of the No Action Alternative.<br><br>Consequences<br><br>The anomalies discussed above seem to arise through the application of rules and constraints designed in some cases for real-time operations, using a model with a monthly time step. We understand and appreciate the difficulty in modeling such a complex system | |

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| | | and the problems that would arise in attempting to mimic variation on a daily time scale. Furthermore, we trust that the modeling team has made every effort to produce output that conforms to the constraints and the modeled hydrology. Nevertheless, the specific model outputs we focus on above seem unrealistic, particularly since these anomalies are largely confined to October and January. We do not think the system is likely to be operated in real time to achieve the flows shown in model output.<br><br>Thus, discussions in this and the next chapter should be accompanied with this caveat: these apply only if the system were actually to be operated to achieve the flows indicated by the models. If rules are not in place to ensure these flows are achieved, the benefits to delta smelt (and presumably other species) will not be realized. | |
| 1672 | 88 | ATT1: ATT17: Figure 5.1. Net Delta outflow in October under the three scenarios sorted by inflow as determined by CALSIM under NAA; i.e., sequence 1 is the lowest inflow and 82 the highest. The gray arrow points out the region of interest where outflow under HOS and LOS is as much as double that under NAA. Outflow is plotted on a log scale to show proportional differences among scenarios especially at low flows, and because X2 can be modeled as a function of the log of outflow. The highest two outflows have been cut off to focus the figure on the lower values. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 89 | ATT1: ATT18: Figure 5.2. January flow conditions compared between the two modeled scenarios (LOS, top; HOS, bottom) as the differences from the flows under NAA. The colors show the range of NAA inflow. Under the LOS there were many Januaries when inflow was low but the outflow and OMR flow were increased by about the same amount over NAA. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 90 | Analysis of flows<br><br>Construction of a new export facility will not by itself achieve the goals of restoring more natural flow patterns in the Delta; the effects of such a facility are entirely dependent upon its operational rules. We assessed how much the modeled operational scenarios (High Outflow Scenario and Low Outflow Scenario) achieve the goals of restoring net natural flow directions within the Delta. In recent years, the Biological Opinions for delta smelt and salmonids have directed attention to net flows in Old and Middle River (OMR), which are the main channels carrying Sacramento water to the export facilities in the south Delta. OMR flows show relationships with salvage of some fish species at the fish facilities and are presumed to reflect entrainment risk to fish in the Delta, the direct effects of the projects. In earlier years, focus was on net flows in the lower San Joaquin River (QWEST) as a more general measure of the impacts of water management on net flows in the Delta, which were believed to cause indirect effects on fish populations.<br><br>OMR and QWEST flows are two measures for the effectiveness of CM#1 in restoring more seaward flows in the Delta (see Chapter 6 for an estimate of effects of the modeled flows on delta smelt entrainment). Here we examine both the changes in seaward flows and the degree of negative flows as predicted from CALSIM models.<br><br>A north Delta diversion will increase the frequency of positive net OMR and QWEST flows and reduce negative values to the extent that exports from the north Delta reduce exports from the south Delta. However, BDCP calls for continued use of south Delta diversion facilities and greatly restricts the operation of the north Delta diversion, particularly in dry periods and early winter. Thus, restoration of seaward flows in the Delta must be viewed in | For more information regarding operational criteria see Master Response 28 and for more information on adaptive management and collaborative science elements of the proposed project, please see Master Response 33. |

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| | | the context of the timing and conditions when the north Delta diversion can be used.<br><br>We describe how LOS and HOS alter the incidence and degree of reverse flows during the seasons of sensitivity for the covered fish. For each season of sensitivity, we group results by quartiles of outflow to assess how changes in flows occur under drier vs. wetter conditions. Low flows in the winter and spring are when concern over reverse flows is greatest for most species. | |
| 1672 | 91 | Direct effects<br><br>Direct effects are entrainment, or the number of fish diverted into the facilities. This number is not known for any species because substantial numbers of fish are lost in the waterways leading to the fish facilities and through the louvers at the fish facilities. Salvage is therefore a poor measure of entrainment effects, but there are no other direct measures. Estimates of entrainment as a proportion of total population of delta smelt are presented in Chapter 6. Such an analysis has not been developed for any other species of concern. Therefore, to broaden the analysis to all species we examined changes in modeled flow in Old and Middle River (OMR). This measure has been used in both Biological Opinions. OMR flow is both calculated by models and measured in the field; it is roughly equal to San Joaquin River inflow minus total exports. Because San Joaquin inflows are less than total exports under all but flood conditions, OMR flows are usually negative. We assume OMR is the primary focus of CM#1's goal to "reduce the incidence of reverse flow". To broaden the question we also assess the degree to which flows are made less negative by the alternatives. | The proposed project would enable DWR to construct and operate new conveyance facilities that improve conditions for endangered and threatened aquatic species in the Delta while at the same time improving water supply reliability, consistent with California law (see, e.g., Cal.Wat. Code, § 85001[c]). Implementing the conveyance facilities would help resolve many of the concerns with the current south Delta conveyance system, and would help reduce threats to endangered and threatened species in the Delta, including entrainment at south Delta export facilities. For instance, implementing a dual conveyance system would align water operations, and their location, to better reflect natural seasonal flow patterns by creating new water diversions in the north Delta equipped with State-of-the-art fish screens, thus reducing reliance on south Delta exports during times of the year when listed aquatic species are present and most vulnerable. For more information on mitigation measures to minimize contraction and operational-related impacts to fish species, including Delta and longfin smelt, please see Chapter 11, of the Final EIR/EIS.<br><br>Also see Master Response 22 regarding mitigation. |
| 1672 | 92 | Incidence of reverse flow<br><br>Because 'incidence' is a measure of frequency, the "Incidence of reverse flows" is the frequency with which Old and Middle River (OMR) is changed from negative under No Action Alternative (NAA) to zero or positive (northward) under the proposed alternatives; because model output is available by month, we examined frequency on a monthly basis (Table 1). The distribution across months of the change in net OMR direction implies that effects on each species will depend on its season of sensitivity.<br><br>The results below are consistent with the goal of CM#1 of achieving a greater frequency of positive net flows in Delta channels by shifting exports to the north Delta diversion site.<br><br>This is true more for High Outflow Scenario (HOS) than Low Outflow Scenario (LOS) operations.<br><br>LOS effects. The LOS reduced the incidence of negative flows by 5% overall (50 months out of the 984 months modeled; Table 1). Under NAA 110 months had positive (northward) OMR flows while 160 months had positive flows under LOS. Positive or zero OMR flows under LOS coincided with negative flows under NAA in all months save August, but most frequently in January to March. There were 21 months when OMR flows were positive under NAA but negative under LOS in April and May (Table 1).<br><br>The shift to positive OMR flows under LOS was sometimes quite large (about 6000 cfs) and occurred almost solely under higher river inflows during December through June. The occasions when NAA alone produced positive OMR flow occurred only in April and May and the change in OMR flows between NAA and LOS were small (<1000 cfs). | The existing operation of the SWP and CVP pumps in the south Delta can cause reversals in river flows, potentially altering salmon migratory patterns. The new system would reduce the ongoing physical impacts associated with sole reliance on the southern diversion facilities and allow for greater operational flexibility to better protect fish. Minimizing south Delta pumping would provide more natural east–west flow patterns (RDEIR/SDEIS Section 4.1). Overall reductions in OMR reverse flows under all flow scenarios for the proposed project would be beneficial with corresponding increase in net positive downstream flows, during the migration period of Chinook salmon through the interior Delta channels (Appendix B, Supplemental Modeling for Alternative 4A, Section B.7 (RDEIR/SDEIS Section 4.3.7). Operations would still be consistent with the criteria set by the FWS (2008) and NMFS (2009) BiOps and State Water Resources Control Board Water Right Decision 1641 (D-1641), subject to adjustments made pursuant to the adaptive management process as described in the 2008 and 2009 BiOps (RDEIR/SDEIS Executive Summary ES.2.2). |

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| | | HOS effects. The HOS had a more substantial effect on the incidence of negative flows than LOS (Table 1). There were only 13 instances when positive OMR flows under NAA were negative under the HOS, and the differences were very small in those cases. As with LOS, the changed OMR status happened in all months save August. The most noticeable difference between HOS and the other two alternatives was in September and November when HOS was northward about a third of the time while NAA was always southward and LOS northward only a few times. The low frequency of northward flows under HOS in October may be related to the anomalies in outflow identified above, but the reasons for the otherwise high frequency of positive OMR flows in fall under HOS are obscure, as they are not called for by regulations and no fishes of concern are vulnerable to export entrainment at that time. | |
| 1672 | 93 | ATT1: ATT19: Table 1. Frequency by month of northward (including a few zero flows) or southward flows under NAA vs. LOS, and NAA vs. HOS. Columns in italics indicate those years and months when the direction of flow differed between NAA and the selected scenario. For example, in April there were 47 years when NAA flow was northward, in 5 of which LOS was southward, and 35 years when both flows were southward, out of a total of 82 years. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 94 | Magnitude of negative OMR flows<br><br>Entrainment rates are a function of population distribution and abundance, season of occurrence in the Delta, and flow conditions including export rates (or Old and Middle River conditions). The months of vulnerability for each species of concern were taken from the BDCP documents. For adult longfin and delta smelt the season of vulnerability is from December through March. For juvenile delta smelt the season is from March through June.<br><br>The effects of overall flow conditions, i.e. how relatively wet or dry it is, were assessed by grouping the months of vulnerability for all 82 modeled years into quartiles of outflow in the No Action Alternative; e.g., for adult delta smelt which are considered vulnerable during December-March, there were 82 months in each quartile of outflow. We examined conditions of OMR, river inflow and outflow under several operational scenarios. We examined differences under four levels of wetness for each month using outflow in the month as a measure of wetness. Historically fish are more often salvaged under drier conditions than under.<br><br>In Figure 5.3 we present comparisons of the High Outflow Scenario and Low Outflow Scenario for each quartile of outflow (under the NAA scenario to ensure comparison of the same years in each graph).<br><br>Under the HOS and LOS alternatives, OMR differs from NAA during the seasons of sensitivity for adult delta smelt (Dec-Mar) and juvenile delta smelt (April-June).<br><br>Three patterns can be seen:<br><br>1. In the season of vulnerability for adult smelt (December-March), HOS and LOS both show about a 1000-5000 cfs increase toward positive in OMR under all quartiles of outflow, but all OMR values are strongly negative except in the wettest quartile of the data. Exports in December and January can be high and the use of a north Delta diversion can improve OMR (but see "Concerns over modeling" above). For juvenile smelt, the increase in OMR flow under LOS and HOS is smaller and less consistent. In all cases the level of OMR flow is | For information regarding operational criteria and OMR flows see Master Response 28. For more information regarding adaptive management and collaborative science elements of the proposed project, please see Master Response 33. |

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| | | much less negative than in December-March.<br><br>2. The HOS and LOS alternatives differ only slightly except during the drier periods when OMR flow is slightly less negative under HOS than under LOS.<br><br>3. Under wetter conditions all alternatives produce median OMR flows in the range targeted as protective in the Biological Opinions (more positive than -5000, but see Modeled Impacts on Delta Smelt in Chapter 6). The use of NDD under high-flow conditions allows the HOS and LOS to avoid the extreme negative OMR values that occur under NAA because of the high south Delta export rates that are possible then.<br><br>Thus, in summary, model results suggest that reverse flows in the south Delta become more positive under both LOS and HOS for all quartiles of outflow. These changes can be seen both in the frequency and in the distribution of flows in the two seasons of vulnerability and the four quartiles of NAA outflow. In wetter months the north Delta diversion does not fully replace south Delta exports until river inflows are relatively high, so that OMR remains negative in most months of smelt vulnerability. Changes in OMR during the period of vulnerability of young delta smelt are smaller than those during December-March because all alternatives are constrained by the Biological Opinions to a much higher baseline OMR flow. | |
| 1672 | 95 | ATT1: ATT20: Figure 5.3. Values of OMR under the three alternatives for BDCP shown for quartiles of outflow under the No-Action Alternative. Boxes show first and third quartiles with the median as a white bar. The whiskers encompass points within 1.5 times the interquartile range, and the short lines are outliers. Top, period when adult longfin and delta smelt are vulnerable (Dec-March). Bottom, period when juvenile delta smelt are vulnerable (March-June). | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 96 | Indirect effects<br><br>Net or tidally-averaged flow on the lower San Joaquin River at Jersey Point is parameterized as QWEST. This flow can be negative (i.e., eastward), which is considered an indicator of flow conditions unfavorable to fish. Negative QWEST could alter the speed or path of fish migrating through the Delta, thereby prolonging their migrations or making them susceptible to adverse conditions in the Delta. No field estimates of indirect effects have been made and they are conceptually difficult because the biological effects are difficult to define and because the net flows in the lower San Joaquin River are small compared to tidal flows. Nevertheless, regulatory agencies, particularly the California Department of Fish and Wildlife and the National Marine Fisheries Service, have long expressed concern that negative values of QWEST due to project operations present fish with impediments to their effective migration.<br><br>The "east-west flow pattern in the San Joaquin River" referred to in the justification for CM#1 is apparently QWEST. QWEST is calculated in the Dayflow water balance program (http://www.water.ca.gov/dayflow/) as: QSJR + QCSMR + QMOKE + QMISC + QXGEO -QEXPORTS -QMISDV -0.65 (QGCD - QPREC), i.e., the sum of inflows from San Joaquin River, eastside streams, and the Sacramento River via the Cross-Delta Channel and Georgiana Slough, minus south Delta exports, miscellaneous diversions in the Delta, and a fraction of the difference between precipitation and consumptive use within the Delta. However, for CALSIM modeling Delta consumptive use (QGCD), Delta precipitation (QPREC), and | For more information regarding operational criteria see Master Response 28 and for more information on adaptive management and collaborative science elements of the proposed project, please see Master Response 33. |

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| | | Delta miscellaneous diversions (QMISDV) are unavailable so the above equation simplifies to:<br><br>QWEST = QSJR + QMOKE + QCSMR + QXGEO - QEXPORTS.<br><br>QXGEO increases with Sacramento River flow and also depends on DCC gate operations. Specifically, QXGEO changes as 13.3% of Sacramento River flow with both DCC gates closed and 29.3% with both gates open (Dayflow documentation cited above). Sacramento River flow into the Delta will decrease by the amount diverted in the north Delta. Thus, among the flows controlled under BDCP, QWEST decreases by 100% of south Delta export flows and 13.3% or 29.3% of north Delta diversion flows depending on DCC gate positions.<br><br>There are many covered species of fish that migrate through or reside in the central Delta (Table 5.2). At least one of these species is present in the Delta during every month but August. Conditions in the central Delta are important for migratory species that spawn in the San Joaquin or Mokelumne Rivers because the entire population must pass through the central Delta. By contrast, only a fraction (unknown) of Sacramento fish enter the central Delta during migration. To cover the species that would be most affected by changes in flows in the San Joaquin River, we limit discussion to outmigrating salmonid juveniles (February - April) and upmigrating San Joaquin salmon (September - November). | |
| 1672 | 97 | Juvenile salmon<br><br>The occasional high springtime flow requirements of High Outflow Scenario (to benefit longfin smelt) coincide with the smolt emigration season (February- April). In drier conditions (the drier two quartiles) there is very little difference between No Action Alternative and Low Outflow Scenario (Figure 5.4). The occasional occurrence of high flow requirements in HOS produce some differences between LOS and HOS scenarios, but mostly in the second quartile when the high flows are more likely to be triggered than in the driest quartile. All project scenarios diverge from the NAA under the wetter scenarios as more water is diverted from the north Delta and substitutes for high south Delta exports (Figure 5.4). The several thousand cfs differences in wetter months are occurring against baseline flows in the realm of 20000 cfs and greater, whereas the changes in flows in drier conditions are very small because limited North Delta diversion operations at low flows do not affect broad indices of Delta flow such as QWEST. | Under CM1, dual conveyance operations will allow for modifications of the south Delta diversions, and potentially those of the Delta Cross Channel, that will reduce the frequency and magnitude of flows that cause migrating fish to enter the interior Delta. These reductions will, in turn, allow juvenile out-migrants to follow a downstream course into more tidally-influenced portions of the estuary, thereby allowing for more rapid migration and briefer exposure to predation. These modifications to the south Delta diversion will also result in a reduction of the proportion of fish entering the interior Delta, where survival of juvenile Chinook salmon (and presumably other salmonids) is lower (Baker and Morhardt 2001; Brandes and McLain 2001; CALFED Bay-Delta Program 2001; Perry and Skalski 2009; Perry et al. 2010). Reducing the reliance on through-Delta conveyance via the Delta Cross Channel and intakes in the south Delta will also substantially reduce the effects of existing flow anomalies, such as weak flows or reverse flows on salmonids in the San Joaquin River system and tributaries, Mokelumne River, and other eastside tributaries. Although there would be some increased entrainment exposure for Sacramento River salmonids due to the presence of the new north Delta diversions, these effects would be minimized by fish screens, sweeping and approach velocity criteria, and other operational parameters.<br><br>For more information regarding operational criteria see Master Response 28 and for more information on adaptive management and collaborative science elements of the proposed project, please see Master Response 33. |
| 1672 | 98 | ATT1: ATT21: Table 5.2. Species of fish covered by BDCP that occur within the Central Delta for specific life history stages and the season of sensitivity to changes in flow conditions due to project operations (from various sources). | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 99 | ATT1: ATT22: Figure 5.4. Feb-April QWEST flow for NAA and 3 alternative operational scenarios, grouped by quartiles of outflow. Two outliers for each scenario in Quartile 4, with values of 52,000 - 98,000 cfs, were cut off to allow better resolution of the lower values. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |

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| 1672 | 100 | Adult San Joaquin fall-run salmon<br><br>Upmigrating salmon adults to the San Joaquin River pass through the south Delta and the lower San Joaquin River during September - November. In the fall there is very little difference among the alternatives that is not dwarfed by occasional high inflows due to flood releases or early winter storms (Figure 5.5). However, all alternatives show a general increase in QWEST compared to values for No Action Alternative because the use of the North Delta Diversion is much less restricted and can more often substitute for south Delta diversions that are often operating at maximum flow under NAA.<br><br>In summary, project scenarios have small effects on QWEST in any season; changes in QWEST are smaller than those in Old and Middle River (OMR) because use of the North Delta diversion does not translate into direct increases in flow, as it can for OMR. This is true for both the spring and fall. The high flows in HOS produce increases in QWEST in months around median wetness. | Operation of the north Delta intakes is expected to reduce reliance on through-Delta conveyance via the Delta Cross Channel and diversions in the south Delta. As such, this will reduce the occurrence and magnitude of flow changes driven by the south Delta diversions on salmonids and sturgeon in the San Joaquin River system and tributaries, Mokelumne River, and other east-side tributaries. Such artificial flow patterns are thought to confuse the upstream migration cues of adults, thereby reducing the probability that they will enter the eastside tributaries or minimizing delay in migration.<br><br>For more information regarding operational criteria see Master Response 28 and for more information on adaptive management and collaborative science elements of the proposed project, please see Master Response 33. |
| 1672 | 101 | ATT1: ATT23: Figure 5.5. QWEST flows for the September-November season grouped by quartile of outflow. One outlier for each scenario in Quartile 4, with values of 22,000 - 30,000 cfs, was cut off to allow better resolution of the lower values. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 102 | Chapter 6: Estimated Effects of BDCP Flows on Smelt<br><br>Introduction<br><br>This chapter takes the model projections for three scenarios discussed in Chapter 5 (No Action Alternative (NAA), High Outflow Scenario (HOS), and Low Outflow Scenario (LOS)) and uses various simple statistical models to estimate the potential effects of these flows on delta and longfin smelt. The principal flows of interest are:<br><br>--Winter and spring flows in Old and Middle Rivers, which affect adult and larval to juvenile delta smelt, respectively<br><br>--Fall outflow, which may influence extent of habitat and therefore subsequent recruitment of delta smelt<br><br>--Spring outflow, which has a statistical relationship with subsequent abundance of young-of-the-year longfin smelt<br><br>We did not consider export effects on longfin smelt, for which there is no available statistical model and therefore no method to estimate losses without additional analysis beyond the scope of this review.<br><br>In making the calculations presented here we were constrained to use the CALSIM model output for the various flows by month and year. The concerns expressed in Chapter 5 apply here: we do not believe that the system will actually be operated to obtain monthly patterns of flow like those in the CALSIM output. This is particularly true in January and October, when wild swings in flows from one year to the next indicate a situation that would be very unlikely in the real system.<br><br>Direct Losses of Delta Smelt | The preferred alternative includes a suite of initial operating criteria to meet the purpose and need as defined in the EIR/EIS. These are the criteria that will be used to govern operations of the project. Additionally, the Adaptive Management Program and the ability to make real time adjustments will allow project operations to maximize water supply and minimize impacts to fish. The models used to assess the operational effects represent the best available information.<br><br>For information on operational criteria, please see Master Response 28. Regarding adaptive management, please see Master Response 33. Also see Master Response 17 discussing the development of operational criteria and the effects on fish and aquatic resources. |

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| | | Flows in Old and Middle River are related to salvage of delta smelt and other fish at the south Delta fish facilities. Annual salvage in turn is generally assumed to be a small fraction of entrainment losses, particularly for young (small) fish, because of various other losses attributed to export pumping, including predation in the waterways leading to the facilities and inefficient capture of delta smelt by the facilities.<br><br>Here we present estimates of export entrainment losses as a fraction of the population of delta smelt during the adult stage and the larval to early juvenile stage, only a small fraction of which is salvaged (Kimmerer 2008). The calculations were based on results of Kimmerer (2008) as amended for adult delta smelt by Kimmerer (2011). The general procedure was to determine a relationship for each of these two life stages between survival and flow variables that were available from CALSIM. Flows used were Old and Middle River flow (OMR) for adults, and net inflow (i.e., inflow less north Delta diversion flow, NDD) and export flow in the south Delta for larvae and juveniles combined.<br><br>We modeled the entire period of CALSIM analysis (WY 1922-2003) for the BDCP scenarios, and the historical period (1955-2003) for comparison. We calculated losses as described in Appendix C for the BDCP scenarios for both time periods, and for the historical period using Dayflow variables and Old and Middle River (OMR) flows from U.S. Geological Survey monitoring.<br><br>The principal assumptions were:<br><br>--The relationships used to calculate survival or recruitment accurately reflected the corresponding population parameters; that is, the confidence intervals of the predictions were assumed to include the true values of the population parameters with 95% probability. Note that these analyses (Kimmerer 2008, 2011) have not been repeated by any analysts, although Miller (2011) provided a detailed critique. This is rather worrisome, because both the BiOP and several published modeling studies rely on the accuracy of those analyses (Maunder and Deriso 2011, Rose et al. 2013a, b).<br><br>--Changes due to BDCP actions were cumulative such that each factor could be examined in isolation from the others, and its effect considered separately from the others.<br><br>--The only changes considered were those due to the entrainment effects of flow. Long-term changes in sea level, tidal prism, temperature, salinity, and physical configuration of the Delta were neglected, despite their likely influence on the exposure of the smelt population to export entrainment. Exceptions to this were the influences of these factors on flows modeled by CALSIM.<br><br>--The flow time-series produced by CALSIM accurately reflected the influence of the various changes (but note concerns expressed above and in previous chapters).<br><br>--The broad spatial distributions of delta smelt will not differ substantially from those existing when the above analyses were made. This may not be true if the fraction of the population in the north Delta is higher now and in the future than when the analyses were made (Miller 2011, Kimmerer 2011).<br><br>Losses of adult delta smelt were calculated as a linear function of OMR flows. Annual percent loss under each of the three scenarios was similar for the historical and modeled time periods (Figure 6.1). The estimated proportion of adults lost to entrainment was slightly lower for the NAA than for the historical period, reflecting overall lower export flows | |

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| | | presumably because some operating rules were not in force during the historical period. The High-and Low-Outflow scenarios (HOS and LOS) both had proportional losses that were ~ half of those under the NAA, or a net change in loss of about 3%/year.<br><br>Losses of larval + juvenile smelt were modeled as a function of exports from the south Delta and inflow to the Delta less diversions from the North Delta facility. The patterns for young smelt were somewhat similar to those for adults but with larger differences among scenarios. The NAA had substantially lower losses than the historical condition over the historical period (Figure 6.2). Flows projected for both the HOS and LOS resulted in much lower losses than for the NAA, with losses under the HOS reduced to ~2%/year on average.<br><br>We combined results for adults and larvae + juveniles within each calendar year by first calculating the proportion of the population that would remain after 20 years at the mean values in Figures 6.1 and 6.2, then multiplying the proportions remaining to get the influence of these scenarios over both life stages. This is effectively a long-term survival percentage. These are not predictions, and are useful only for examining differences among scenarios. The resulting percentages were 38% for the HOS, 23% for the LOS, and 2% for the NAA (Table 6.1). In other words, the two scenarios with a north Delta diversion resulted in 19-and 11-fold increases in survival over a 20-year period.<br><br>These numbers are highly uncertain, since the value for NAA is so small and variable (Table 6.1). There are indications that losses have been overestimated, especially given the potentially large subpopulation of young delta smelt that may be resident in the Cache Slough complex, where they are immune from effects of export pumping in the south Delta (Miller 2011). Using the upper confidence limits of the projected population size at the end of 20 years (i.e., the lower 95% confidence limits of the loss estimates) the ratios of population remaining after 20 years would have been 14 for HOS and 9 for LOS. These confidence limits do not account for any upward bias in loss estimates, and the loss estimates can and should be refined to reflect current understanding.<br><br>Nevertheless, the results of this analysis show a substantial improvement in long-term survival of delta smelt under HOS and to a lesser extent LOS, provided the water projects are operated in ways that result in flows similar to those in the simulation. Taken at face value the mean difference in losses between NAA and either of the other scenarios would have roughly sufficed to reverse the decline in delta smelt during the early 2000s. | |
| 1672 | 103 | ATT1: ATT24: Figure 6.1. Annual percentage of adult delta smelt lost to export pumping for three scenarios and the historical time series. Symbols give means (see text) and error bars give the 95% confidence limit calculated as quantiles of the 1000 simulated samples of the respective distributions. Top panel, percent annual loss for 1922-2003 (filled symbols) and for 1980-2003 (open symbols) including the historical data. Bottom panel, differences between pairs of model scenarios. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 104 | ATT1: ATT25: Figure 6.2. As in Figure 6.1 for losses of juvenile delta smelt. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 105 | ATT1: ATT26: Table 6.1. Percent of delta smelt population remaining for each of three BDCP scenarios after 20 years of losses at the rates estimated and shown in Figures 1 and 2. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not |

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| | | Values given with 95% confidence intervals. | already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 106 | Outflow Effects<br><br>Two time periods are considered for effects of changed outflow: fall for delta smelt and spring for longfin smelt. These effects are typically cast in terms of X2. For this analysis we calculated X2 from outflow as determined by CALSIM, using the monthly relationship in Jassby et al. (1995), as has been done for all previous analyses of relationships of X2 to abundance indices or habitat of fish (e.g., Feyrer et al. 2007, Kimmerer et al. 2009). CALSIM also produces X2 but it is for the previous month and is somewhat different from that used previously, particularly since it is said to account for sea-level rise and the effects of additional tidal prism due to marsh restoration. Since we were focused on the early long-term (ELT), we elected for now to neglect these considerations and use an X2 value that reflected the anticipated outflows in the same way as in the analyses of X2 effects on fish. | The commenter describes methodology used to analyze the CALSIM II model output. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS.<br><br>For information on modeling used for the proposed project, please see Master Response 30. |
| 1672 | 107 | Fall X2 Effects on Delta Smelt<br><br>The U.S. Fish and Wildlife Service Biological Opinion (BiOP) for delta smelt proposes to use X2 in the September-December period as a management tool. The principal basis for this action is the analyses of fall habitat indices (Feyrer et al. 2007, 2011) and an unpublished analysis relating the Summer Townet index to the previous fall Midwater Trawl index and X2:<br><br>[see letter for equation]<br><br>(6.1)<br><br>where TNS is the summer townet index, MWT the fall midwater trawl index, y is year, ε is error, a, b, and c are fitted parameters, and the time frame was restricted to after 1987 to account for the changes in the foodweb resulting from the introduction of the clam Potamocorbula amurensis (See Chapter 7 regarding food limitation of delta smelt).<br><br>This model assumes that the main effect of fall X2 on delta smelt is through a combination of survival and growth and therefore population reproduction in the following spring, resulting in effects on abundance in the following summer. Equation 6.1 is somewhat illogical in modeling TNS as an additive function of MWT and X2, and it is also strongly influenced by the data point from 1998, the wettest fall among those included in the analysis. Removing that point weakens that relationship somewhat, although it remains strong. Nevertheless, we fitted an alternative model:<br><br>[see letter for equation]<br><br>(6.2)<br><br>which is more in keeping with the form of the other X2 models (Jassby et al. 1995). This model was fitted to all the data since 1987 using a robust regression method to allow for | The analysis presented represents an alternative approach to the analysis used in the BDCP public draft, which focused on the fall abiotic habitat index (see Appendix 5.C, sections 5C.4.5.2 and 5C.5.4.5.1). The results of this analysis are consistent with the analysis from the BDCP public draft and reflect the fact that the NAA (i.e., EBC2_ELT) and HOS (i.e., HOS_ELT) scenarios both include the fall X2 action from the USFWS BiOp, whereas the LOS scenario (i.e., LOS_ELT) does not. Regarding the comment "This peculiar pattern arose from the patterns of outflow in the CALSIM output (see Chapter 5). We have very low confidence that these patterns reflect how the system would really be operated", please see Master Response 28 on operational criteria. |

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| | | some over-dispersion in the residuals (function rlm, Venables and Ripley 2003). The regression coefficients were a=2.7, b= 0.62 ± 0.22, and c= 0.061 ± 0.55, R2=0.68, and diagnostic plots revealed that this model was appropriate for the data (Figure 6.3). In particular 1998, and unusually wet year, did not have a strong influence on this relationship.<br><br>We extrapolated from this model to the BDCP scenarios using the CALSIM-modeled outflows. The target was the summer townet index, which we examined as a ratio to that predicted under No Action Alternative. In contrast to earlier analyses, we did not attempt to relate this to long-term population growth.<br><br>The modeled monthly outflow values were converted to X2 according to the monthly equation in Jassby et al. (1995), with the initial value (October 1921) set to the equilibrium X2 for the modeled flow. This was combined with historical monthly mean X2 values and all were averaged over September-December. Equation 6.2 was then used to predict the summer townet index from the mean fall midwater trawl index from 1988 to 2011 and X2 for the three scenarios.<br><br>Results showed High Outflow Scenario to have, on average, a slightly higher summer townet index than under NAA (Figure 6.4). The ratio of townet indices determined under HOS to that under NAA was 1.02, i.e., a 2% greater index under HOS, with 10th and 90th percentiles of 0.89 and 1.10 respectively. About a third of the values had lower confidence limits below zero, indicating low confidence that a real increase would be achieved under these conditions.<br><br>By contrast, the predicted ratio of townet index for Low Outflow Scenario:NAA was about the same as that for HOS:NAA about half of the time, and the other half of the time it was much lower, with large confidence intervals related to the uncertainty in the prediction from the model. The calculated ratio had a median of 0.98 with 10th and 90th percentiles of 0.60 and 1.10. This peculiar pattern arose from the patterns of outflow in the CALSIM output (see Chapter 5). We have very low confidence that these patterns reflect how the system would really be operated, and therefore suggest these results be considered as conditional on proposed operational rules. | |
| 1672 | 108 | ATT1: ATT27: Figure 6.3. Fitted and measured summer townet index (TNS) with a 1:1 line. Values were fitted using Equation 6.2. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 109 | ATT1: ATT28: Figure 6.4. Ratios of predicted TNS index by year from HOS (top) and LOS (bottom) to those from NAA. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 110 | Spring Outflow/X2 Effects on Longfin Smelt<br><br>Longfin smelt has the strongest relationship of abundance index to X2 of any fish (Jassby et al. 1995). The index for a given level of X2 has declined, but the response to flow has not changed. We updated the latest published version of this relationship (Kimmerer et al. 2009) by adding two step changes in time: one in 1987-1988 corresponding to the spread of the clam Potamocorbula amurensis, and the other in 2003-2004, the POD decline (Thomson | The analysis in the commenter's attachment is an alternative calculation to that included in the BDCP public draft (see sections 5C.4.5.1 and 5C.5.4.5.2), based on similar data, although with slightly different regression terms and X2 calculated from outflow as opposed to using the CalSim estimate of outflow from the previous month. Both analysis methods gave similar results: the mean fall midwater trawl abundance index under the HOS (i.e., HOS_ELT) scenario was 5% greater than the mean abundance index under the NAA (i.e., NAA_ELT) scenario (compared to a mean ratio of abundance indices of 1.05, i.e., 5% greater under HOS, for the analysis in the commenter's attachment), whereas the public draft BDCP showed a 5% lower mean |

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| | | et al. 2010). The statistical model used was<br><br>[see letter for equation]<br><br>6.3<br><br>Where LFS is the annual index of longfin smelt abundance from the fall midwater trawl survey, y is year, X2 is monthly values averaged over either January-June (as in Jassby et al. 1995) or March-May, and ε is error. Fitting parameters are a, which takes one of three values by year group, and b, the slope of the X2 relationship.<br><br>The resulting relationship (Figure 6.5) shows both the effect of X2 and the two step-changes in abundance index. Diagnostic statistics showed that the model was appropriate. Since we were interested in the difference between the two alternative flow scenarios and NAA, the only parameter that concerned us here was b, which had a value of -0.054 ± 0.005 km-1, essentially identical to previously published values. Averaging X2 over March-May gave a slope of -0.049 ± 0.005 km-1, and the fit was slightly inferior to that of the January-June model.<br><br>The months selected in the original analysis were based on the assumption that the (unknown) X2 mechanism operated during early life history of longfin smelt, which smelt experts linked to this period. Autocorrelation in the X2 values through months means that statistical analysis provides little guidance for improving the selection of months. A better understanding of the mechanism(s) underlying the relationship would probably allow this period to be narrowed and focused, but for now there is little basis for selecting a narrower period for averaging X2.<br><br>The predictions from the above model were then applied to the X2 values calculated from the CALSIM projections of outflow for the 82-year period. We did not attempt to propagate prediction error because it is small compared to variability in outflow. Applying the January-June value for the three selected scenarios resulted in scant differences in predicted abundance indices (Figure 6.6). The median log10 ratio of indices for High Outflow Scenario (HOS):No Action Alternative (NAA) was 1.00 (mean 1.05) with 10th and 90th percentiles of 0.91 and 1.27. Corresponding values for Low Outflow Scenario (LOS):NAA were median 0.92 (mean 0.92) and percentiles of 0.83 and 1.00.<br><br>Thus, changes in outflow resulting from the CALSIM projections of spring outflow were small, particularly on the scale of the high variability with X2. HOS provided a minuscule increase in the mean but the median did not change from NAA, indicating that half of the years had higher, and half lower, values under HOS than under NAA. LOS gave values that were ~8% lower than those under NAA.<br><br>Although it would be desirable to link such calculations to a population-dynamics model, no such model is available; furthermore, previous analyses have shown that abundance of longfin smelt is highly predictable from X2 and, more recently, groups of years as done above. This does not mean that stock-recruit relationships are unimportant; an alternative analysis models a recruitment index, the log of the ratio of Fall Midwinter Trawl Index (MWT) to the MWT value 2 years earlier, as a function of X2 (Nobriga and Rosenfield, in | abundance index under LOS (i.e., LOS_ELT) than NAA (compared to a mean ratio of abundance indices of 0.92, i.e., 8% less under LOS, for the analysis in the commenter's attachment). The public draft BDCP focused on the estimated changes in the LLT, for which the mean abundance index under HOS (i.e., HOS_LLT) was 12% greater than under NAA (i.e., NAA_LLT); this was concluded to be a low positive change (see section 5.5.2.1.1 in Chapter 5 of the public draft BDCP). |

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| | | prep.). However, it is unlikely this analysis would indicate a stronger effect of X2 on longfin smelt under BDCP. | |
| 1672 | 111 | ATT1: ATT29: Figure 6.5. Abundance index of longfin smelt vs. X2 averaged over January-June, with step changes between 1987 and 1988 and between 2002 and 2003. Colors of points and lines indicate the time period. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 112 | ATT1: ATT30: Figure 6.6. Predicted abundance from the model in Figure 6.3 for the three BDCP scenarios. The intercept for the third time period (2003-2012) was used to calculate these indices. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 113 | Chapter 7: Likely Response of Listed Fishes to Physical Habitat Restoration<br><br>Introduction<br><br>This Chapter focuses on the proposed restoration of physical habitat in the Delta and Suisun Marsh. Because of time constraints we have focused on the potential benefits of floodplain and marsh restoration to delta and longfin smelt. These benefits are postulated to occur through expanded physical habitat for the fish, or through export of food from the restored areas to smelt habitat.<br><br>Summary of Assessment<br><br>The BDCP proposes to restore 55,000 acres of subtidal to intertidal habitat [footnote 1: "Habitat" means the location and conditions in which a population of a species lives; here we follow the BDCP document in using the term to mean a physical space. We likewise use "restore" to mean to prepare that space for the potential occupation of one or more species, irrespective of the previous condition of the space.] of which 20,600 acres is to be allocated among various Restoration Opportunity Areas (ROAs) in the Delta and Suisun Marsh and the remainder to be allocated later. If completed this restoration will substantially increase the inundated portion of the Plan Area; for example if all 7000 acres assigned to Suisun Marsh were restored it would roughly triple the area exposed to tidal action.<br><br>The ROA's include Suisun Marsh, Cache Slough, and the eastern, southern, and western Delta. The documentation is unclear on the depth profiles of these areas and for calculations below we have assumed that about half of each will be intertidal and the remainder subtidal with a mean depth of 2 meters. The document lists the aquatic and terrestrial species expected to benefit from these actions, but here we focus only on their likely effects on the two smelt species.<br><br>Our results to date lead to the following preliminary conclusions:<br><br>--Delta and longfin smelt are usually food-limited, meaning that population levels would rise if there were more zooplankton in their rearing areas. This limitation is probably stronger in spring-fall than in winter.<br><br>--The BDCP is overly optimistic about the likely benefits of tidal marsh restoration to the | As already mentioned the preferred alternative is now Alternative 4A and no longer includes an HCP.<br><br>The originally proposed habitat restoration measures and related Conservation Measures (CMs) (i.e., CM2 through CM21) would not be included as part of the Proposed Action, except to the extent required to mitigate significant environmental effects under CEQA and meet the regulatory standards of ESA Section 7 and California Endangered Species Act (CESA) Section 2081(b).<br><br>Although Alternatives 4A, 2D, and 5A include only those habitat restoration measures needed to provide mitigation for specific regulatory compliance purposes, habitat restoration is still recognized as a critical component of the state's long-term plans for the Delta. Such larger endeavors, however, will likely be implemented over time under actions separate and apart from these alternatives. The primary parallel habitat restoration program is called California EcoRestore (EcoRestore), which will be overseen by the California Resources Agency and implemented under the California Water Action Plan. Under EcoRestore, the state will pursue restoration of more than 30,000 acres of fish and wildlife habitat by 2020. These habitat restoration actions will be implemented faster and more reliably by separating them from the water conveyance facility implementation.<br><br>Proposition 1 funds and other state and public dollars will be directed exclusively for public benefits unassociated with any regulatory compliance responsibilities.<br><br>Additional priority restoration projects will be identified through regional and locally-led planning processes facilitated by the Delta Conservancy. Plans will be completed for the Cache Slough, West Delta, Cosumnes, and South Delta. Planning for the Suisun Marsh region is already complete and a process for integrated planning in the Yolo Bypass is underway. The Delta Conservancy will lead the implementation of identified restoration projects, in collaboration with local governments and with a priority on using public lands in the Delta. |

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| | | smelt species, particularly the extent of food production.<br><br>--A review of the literature suggests that tidal marshes may either import or export phytoplankton and zooplankton.<br><br>--Under highly favorable assumptions about production and export of plankton, restored tidal marshes could make at most a modest contribution to extant plankton production.<br><br>--The subpopulation of delta smelt that inhabit the Cache Slough complex through summer may benefit from additional physical space in that area. The same could be true in Suisun Marsh although current use by smelts is low.<br><br>--The high level of uncertainty about outcomes points to the use of moderate-to large-scale experimental restoration projects to determine whether the proposed restoration will achieve the food-production goals and, if so, how to design them optimally. | |
| 1672 | 114 | The BDCP anticipates many benefits to delta and longfin smelt. Although the documentation is unclear on the expected magnitudes of these benefits, it is uniformly optimistic that they will contribute substantially to recovery of the species. Here we focus on two potential benefits to the smelts from the restoration of tidal habitats. First, the restored habitats are expected to provide a food supply that will enhance the food supply available to the smelts. Second, the restored habitats are expected to provide additional physical space, resulting in an increase in smelt abundance. Neither of these proposed benefits is well developed in the documentation, and the literature cited seems to have been selected to support the claims made. The BDCP documentation furthermore contains factual errors and misinterpretations that cast doubt upon the projections that are made, however qualitative. We therefore conducted a reasonably thorough analysis of these specific claims, within the constraints of time available.<br><br>The first outcome requires two conditions: 1) that the smelt populations are currently food-limited, meaning that an increase in concentration of food organisms would result in a higher abundance of smelt; and 2) that the restored marshes will produce and export enough food organisms to make a difference to the population status of the smelts.<br><br>BDCP Appendix 5E uses "prod-acres" to index the expected productivity of phytoplankton in the restored areas. However, this index is conceptually flawed in two ways. First, it uses an estimate of growth rate rather than production of phytoplankton, which is the product of growth rate and biomass. Second, it assumes implicitly that all phytoplankton growth is available as food for the zooplankton consumed by the smelt species, but analyses published on the San Francisco Estuary and elsewhere show that most of the production is consumed by benthos and by microzooplankton such as ciliates (e.g., Lopez et al. 2006, Lucas and Thompson 2012, Kimmerer and Thompson submitted).<br><br>The smelt species are expected to occupy some of the restored habitats. This may provide benefits in the form of increased opportunities for individual fish to find suitable conditions such as spawning substrate, food patches, or shelter from predators. A potential benefit is to diversify the locations in which the smelt species occur, in an attempt to increase resilience of the populations to local perturbations such as high-temperature periods or toxic spills. | Please see response to comment 1672-113 regarding habitat restoration. The lead agencies fundamental purpose of the proposed project is to make physical and operational improvements to the SWP system in the Delta necessary to restore and protect ecosystem health, water supplies of the SWP and CVP south of the Delta, and water quality within a stable regulatory framework, consistent with statutory and contractual obligations. The project would help to address the resilience and adaptability of the Delta to climate change through water delivery facilities combined with a range of operational flexibility. In addition to the added water management flexibility created by new water diversions and operational scenarios, the project would improve habitat, increase food supplies and reduce the effects of other stressors on the Delta ecosystem.<br><br>Alternative 4A does not have the same contribution to recovery commitment as the BDCP. The analysis of Alternative 4A effects on Delta smelt are presented in Chapter 11 of the Final EIR/EIS. |
| 1672 | 115 | Analysis of components | Chapter 11 of the Final EIR/EIS addresses the indirect and cumulative effects of the project on aquatic resources. Also see Master Response 17 on biological resources. Please see response to comment 1672-113 |

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| | | For effects of food production and export we assessed the evidence for food limitation of the smelt populations, and for the amount of food (zooplankton) that restored marshes would export to waters where the smelt species occur. For physical habitat we examined current patterns of occurrence to determine the likely effect of additional physical habitat on the smelt species.<br><br>We do not address other potential indirect impacts of marsh restoration, or interactions with other proposed projects. Restoration of extensive areas of marsh will increase the tidal prism in the restored area. This will affect tidal currents and elevations both locally and all the way to Carquinez Strait, and therefore affect salinity penetration and the movement of sediments. The effects on salinity have been included in the modeling presented in BDCP documents, but we did not review this. The U.S. Army Corps of Engineers has proposed a project, now on hold, to deepen the Sacramento Deep-Water Ship Channel, which is currently an important part of the habitat of delta smelt. This and other non-BDCP projects should be taken into account when considering impacts of BDCP. | regarding habitat restoration. |
| 1672 | 116 | Are smelt species food-limited?<br><br>What is the evidence for and against food limitation in delta and longfin smelt? By food limitation we mean a situation in which an increase in concentration of food organisms would result in a higher abundance of smelt. This does not require that all or even most fish have depressed growth or reproductive rates, only that at least some of them do. Substantial food limitation would require the following to be true:<br><br>1. The density of food organisms is too low to support the maximum growth rate of the fish.<br><br>2. Therefore some fish are in poorer condition or grow more slowly than under food satiation.<br><br>3. Either or both of the following:<br><br>a. Survival over a life stage depends on condition and therefore food supply<br><br>b. Reproductive rate of an adult varies with growth rate during development through its effect on maturity or total eggs per female.<br><br>4. Higher reproduction leads to a larger population, all else being equal. We assume this condition must be true as a straightforward consequence of population dynamics.<br><br>Food limitation could occur at one or more life stages, which may occupy different parts of the estuary. During spawning and early life delta smelt are mostly in freshwater. During the late larval stage (~July) until the pre-spawning migration in December, part of the population is in the low-salinity zone (LSZ, salinity ~0.5-5), and part is in the Cache Slough-Liberty Island complex in the North Delta (Sommer et al. 2011). Longfin smelt also spawn in freshwater but move earlier and further seaward (Rosenfield and Baxter 2007, Kimmerer et al. 2009). We refer to fish between metamorphosis from the larval stage to their spawning migration as juveniles (i.e., including all fish caught in the fall midwater trawl survey). Both smelt species consume available plankton in their habitat, with the size of prey related to that of the fish.<br><br>Food limitation is surprisingly difficult to demonstrate in a fish population. Nearly all | The commenter provides a summary of information on food limitation. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS. |

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| | | populations must be food limited to some degree. However, food limitation of individual fish can be difficult to detect. The prey and the fish are spatially patchy and temporally variable, so the degree of food limitation is sporadic and patchy. Great differences among individuals in feeding success result in differences in growth and survival, such that the survivors are those that have been well fed. Feeding success also interacts with other influences such as predation risk and physiological stress.<br><br>The analysis of food limitation relies on a variety of direct and indirect evidence (Details in Appendix D). Some studies suggest food limitation inferred from correlations of abundance or length with measures of food availability, indices of gut fullness and physiological condition of field-caught smelt, and laboratory-derived estimates of feeding rate in relation to food concentration. A few other studies do not support food limitation in these species. However, the weight of evidence suggests that food is limiting the populations of both smelt species. | |
| 1672 | 117 | Export of food from shallow restored areas<br><br>One purported benefit to smelts of restored shallow areas is that elevated food production in these areas will be exported as a subsidy to open waters where the smelts are abundant. The implicit conceptual model is that these shallow areas will produce an excess of phytoplankton and zooplankton that will then be exported by stream flow or tidal currents. A subsidy of phytoplankton could stimulate zooplankton production in the open waters, since the zooplankton in this estuary are chronically food-limited in their growth or reproduction (Müller-Solger et al. 2002, Kimmerer et al. 2005). However, grazing by clams is likely to prevent such a subsidy from having much effect on zooplankton production. The alternative subsidy is that of zooplankton grown within the restored areas, including larger forms such as mysids that are consumed by juvenile longfin smelt and adult delta smelt.<br><br>The magnitude of any subsidy depends also on the transport process. Where the transport is mediated by tidally-driven currents, the subsidy will be related to the tidal exchange and the difference in biomass between the restored area and the open water. Where it is mediated by river flow, the subsidy will depend on the net flow and the biomass in the restored area.<br><br>Here we examine the literature on subsidies from marshes, use a simple model to estimate the magnitude of such a subsidy of either phytoplankton or zooplankton, and estimate the proportional flux from the Suisun Marsh to Suisun Bay using output from a particle-tracking model as a measure of the extant subsidy. Our conclusions are:<br><br>--The literature does not support a confident assertion that marshes will subsidize zooplankton of the open waters.<br><br>--Calculated subsidies of phytoplankton and zooplankton are modest under optimistic assumptions about in-marsh production and design of restoration sites.<br><br>--A subsidy of zooplankton from Suisun Marsh to Grizzly Bay cannot be very large under current conditions, and is unlikely to be much larger with the proposed extent of restoration. | The commenter provides a summary of information related to restoration of shallow areas. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS. |
| 1672 | 118 | Do shallow areas export phytoplankton or zooplankton?<br><br>Marshes can be major producers of organic matter because of their extensive vegetated | The commenter provides a summary of available information related to the export of phytoplankton and zooplankton. The comment does not raise any environmental issue related to the 2015 RDEIR/SDEIS or the |

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| | | surface exposed to sunlight, shallow waters leading to light penetration through all or most of the water column, and the continual supply of nutrients from the open waters and from land (Figure 7.1). This appears to be true even for recently restored marshes (Howe and Simenstad 2011). Over the long term, mass must balance, so production in excess of respiration by organisms within the marsh must be either buried or exported as organic matter or organisms to adjacent estuarine waters.<br><br>Export of organic matter from marshes to adjacent estuarine waters was first considered as the "outwelling hypothesis" (Odum 1980, Nixon 1980). This hypothesis holds that the export of labile organic matter provides an important subsidy to nourish adjacent waters of the estuary or continental shelf.<br><br>The outwelling hypothesis originated in studies of extensive, rich marshes on the east and Gulf coasts, but even there, quantitative demonstrations of its importance to estuarine or coastal foodwebs were few (Dame et al. 1986). Much of the difficulty arises from the technical challenge of measuring a small net flux in a large tidal signal with high variability (Dame et al. 1986). In addition, dissolved and particulate organic matter produced by rooted vegetation can be highly refractory and therefore largely unavailable to estuarine pelagic foodwebs, which are usually fueled mainly by phytoplankton (Sobczak et al. 2002, 2005).<br><br>Marshes can be sites of high productivity by benthic or planktonic microalgae because they are shallow, so waters are well-lit. Therefore a marsh could export organic matter as living phytoplankton. However, the extent of this export depends on consumption within the marsh, including consumption of phytoplankton by benthic grazers in shallow waters, as illustrated for flooded islands in the Delta by Lopez et al. (2006). Often overlooked in attempts at a mass-balance of phytoplankton is the high rate of consumption by microzooplankton, which typically consume about 60% of the production by phytoplankton in estuaries (Calbet and Landry 2004, York et al. 2011). Thus, the production actually available for consumption by mesozooplankton, and for export, is considerably lower than would be expected from estimates of primary production.<br><br>For zooplankton the magnitude and direction of the flux depends on behavior and on size-and taxon-specific patterns of mortality. In particular, visual predation by fish can exert strong control on the size distributions, and therefore species distributions, of zooplankton (Brooks and Dodson 1965). Vertical movements of zooplankton and hatching or settlement of larvae can lead to spatial patterns of abundance that do not reflect tidal transport (Houser and Allen 1996). Consumption of zooplankton by small fish that seek food and shelter in shallow areas can reduce zooplankton abundance near shore, and shift the size distribution toward smaller forms, in lakes (Brucet et al. 2005, 2010), lagoons (Badosa et al. 2007), and marshes (Cooper et al. 2012). The outcome can be net fluxes into shallow areas (Carlson 1978, Kimmerer and McKinnon 1989), and marshes can be simultaneously sinks for copepods and areas of aggregation for bottom-oriented larvae (Mazumder et al. 2009).<br><br>Thus, marshes may act either as net sources or sinks for plankton in the adjacent waters, depending on the availability of habitat for small fish and the degree of colonization by benthic grazers such as clams. The exact details of the exchange processes depend on the physical configuration of the marsh including permanence of inundation (Brucet et al. 2005), residence time of the water (Lucas and Thompson 2012), and the biological composition, i.e., the kinds and abundance of producers and consumers within the marsh including transient organisms (Kneib 1997). If the excess organic matter is being transported by fish as in some east coast marshes (Kneib 1997), little benefit would accrue to planktivorous fish in | 2013 DEIR/EIS. |

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| | | the open waters such as the smelts.<br><br>Few of these aspects have been examined in marshes of the San Francisco Estuary. Long-term studies of Suisun Marsh have revealed a lot about fish assemblages (e.g., Matern et al. 2002, Feyrer et al. 2003) and medusae and some zooplankton (Wintzer et al. 2011, Meek et al. 2013), and some detailed studies of exchange processes have been undertaken (Culberson et al.2004). Zooplankton abundance is highest in small sloughs of long residence time (P. Moyle, UC Davis, personal communication).<br><br>Foodwebs in diverse marshes of the San Francisco Estuary are supported more by local plant production than by estuarine phytoplankton (Howe and Simenstad 2007, 2011). This implies a division of organic-matter sources between those supporting littoral and marsh foodwebs and those supporting pelagic foodwebs (Grimaldo et al. 2009).<br><br>Lehman et al. (2010) estimated the fluxes of various substances in and out of Liberty Island, a flooded island in the Cache Slough complex in the northern Delta. They found large seasonal shifts in the magnitude and direction of fluxes. In particular, seasonal chlorophyll flux was into Liberty Island in spring and out in fall, based on point measurements, and into the island in all seasons but more so in spring and summer, based on the continuous measurements. Fluxes of copepods were out during spring and fall, and in during summer, based on a total of six sampling days. Although Lehman et al. (2010) linked fluxes into Liberty Island with storage within the island, it was equally likely to have been a function of consumption, particularly since high inward fluxes of chlorophyll and zooplankton occurred in summer when biological activity would have been high.<br><br>A few other marshes and restoration sites in the estuary have been investigated for their potential links to open waters. The South Bay Salt Ponds, which began to be reconnected to the tidal action of the Bay in 2006, are highly productive and may export organic matter to nearby estuarine waters (Thebault et al. 2008). A marsh at China Camp in San Pablo Bay was a net sink for mysids, probably through predation within the marsh (Dean et al. 2005). | |
| 1672 | 119 | ATT1: ATT31: Figure 7.1. Conceptual model of the production of food for pelagic fish in a low-order tidal marsh channel. Because the water is shallow (and may be clearer than in adjacent channels) light penetration is good and growth of phytoplankton and benthic microalgae is high.<br><br>Losses of phytoplankton occur through benthic grazing and by pelagic grazing, chiefly by microzooplankton but also by larger zooplankton such as copepods that can be consumed by fish. Benthic grazers filter a certain volume of water every day, so the shallower the water the more intensive the grazing on the plankton of the marsh. Small planktivorous fish such as Mississippi silversides seek shelter in the shallowest and vegetated areas; thus consumption of zooplankton is also more focused and more selective for larger organisms in shallow water. Tidal exchange of water with the adjacent higher-order (larger) channel transports nutrients, organic matter, and plankton between marsh and channel, but the direction of transport for zooplankton may be in or out of the marsh depending on the outcomes of the various production and consumption processes. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 120 | Calculated subsidies<br><br>Here we assume that the restored areas will actually produce an excess of phytoplankton or zooplankton over adjacent waters, and ask what additional level of food availability to the smelt would result. This is based on a very simple model using data from Interagency | The commenter highlights the uncertainty associated with food export from restored areas. Please see response to comment 1672-113 regarding habitat restoration. |

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| | | Ecological Program monitoring, described in detail in Appendix E (See Figure 7.2). The basis of this model is to calculate the subsidy based on high levels of biomass and growth rate in a 2500-acre marsh that is closely connected to smelt habitat and has an optimum rate of exchange with the open water. We assume smelt habitat is represented by the Low-Salinity Zone (LSZ), which has a volume of about 0.5 km.<br><br>A subsidy is maximized by a large marsh close to the smelt habitat, with tidal exchange close to but not above the net population growth rate of the plankton (Figure 7.3). The subsidy is degraded or even reversed by consumption (clams, planktivorous fish) within the marsh. Water depth may have a positive or negative effect on the subsidy.<br><br>The simple model in Appendix E shows that under an extremely favorable set of conditions both within and outside of the marsh, a modest subsidy of phytoplankton is possible.<br><br>Phytoplankton input to the Low Salinity Zone (LSZ) could amount to 16%/day, or about half of the daily net production in the LSZ. However, smelt species do not eat phytoplankton, and the conversion of phytoplankton to zooplankton depends on factors in the open water such as grazing. The direct subsidy of zooplankton would be about 3%/day, also under unrealistically ideal conditions. Although this is not negligible, any reduction in this value would effectively eliminate the subsidy to open water. | |
| 1672 | 121 | ATT1: ATT32: Figure 7.2. Schematic diagram of a subsidy of zooplankton (yellow circles) from a restored tidal marsh or other shallow area to an existing estuarine area. Zooplankton move by dispersion (double-sided arrows) between the restored and existing areas, and within the existing area from the outlet of the restored area to other regions of the estuary including smelt habitat. Advection may alter the flow of zooplankton, for example, if the restored area is on a creek that produces a net flow into the existing area. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 122 | Zooplankton export from Suisun Marsh<br><br>One of the proposed restoration areas is in the northern end of Suisun Marsh. We estimated the subsidy of copepods to the Low Salinity Zone (LSZ) from this region using Interagency Ecological Program monitoring data and using a particle-tracking model to estimate exchange rate (Appendix E). If the copepods behaved as passive particles, this subsidy would amount to about 2%/d of the population in the LSZ. This is unlikely to produce a noticeable increase in copepod biomass, as their potential population growth rates are on the order of 10%/d. However, particles that migrate to the bottom tidally or remain near the bottom, as most zooplankton do in the estuary (Kimmerer et al. 2002), were essentially trapped within the northern marsh. Behavioral responses to tidal currents, consumption within the marsh, the distance from the mouth of the marsh to the habitat of the smelts, and the operations of the salinity control gate on Montezuma Slough would all reduce or even eliminate this subsidy.<br><br>The real world<br><br>Several features of the actual restoration site would alter the subsidy to open waters from the analyses above. First, the enlarged restoration area will alter the tidal prism and therefore the exchange rate. The proposed restoration for Suisun Marsh would increase the inundated area 2-3-fold, with a corresponding increase in tidal currents. Since most of the exchange will be mediated by tides, this could substantially increase the exchange rate. Whether this would increase or decrease the subsidy would depend on the net population growth rate achieved in the marsh in relation to the exchange rate. Resolving the change in | The commenter highlights the uncertainty in the efficacy of habitat restoration that is discussed in the public draft BDCP. Please also see response to comment 1672-113. |

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| | | residence time would require a 3D model with very accurate bathymetry throughout the region. It is impossible to tell with available information whether the stronger tidal connections would result in a greater subsidy from Suisun Marsh, or whether this would be offset by zooplankton behavior or by consumption within the marsh. Such calculations could be done using a hydrodynamic and particle tracking model and some reasonable assumptions about zooplankton behavior.<br><br>The BDCP documents acknowledge (but then mostly ignore) that grazing by clams that settle in or near restored subtidal areas may remove all or most of the phytoplankton production and some of the zooplankton. Grazing by clams and zooplankton (including microzooplankton) removed all of the phytoplankton production in the LSZ nearly all the time from late spring through fall during 1988 - 2008 (Kimmerer and Thompson submitted.). Whether clams settle in the newly restored areas is critical in determining whether the area can export any phytoplankton (Lucas and Thompson 2012). At present clams are not abundant in Suisun Marsh except for the larger Suisun and Montezuma Sloughs, where they probably remove a substantial fraction of the phytoplankton and small zooplankton that would otherwise enter Grizzly Bay.<br><br>Zooplankton organisms are not passive, and undergo tidal migrations in Suisun Bay (Kimmerer et al. 1998, 2002). It is very likely that they will do so also in marsh channels, which would greatly lengthen the residence time for copepods produced in the marsh, particularly in the far northern area of Suisun Marsh. In addition, several studies have shown that zooplankton organisms may also be consumed by various planktivorous fish within a marsh, resulting in a net flux of zooplankton into the marsh (see literature review above).<br><br>Finally, some of the proposed restoration sites are far from the centers of distribution of delta and longfin smelt. Travel times from these sites to where the fish are may be on the order of weeks to months in the dry season or when the North Delta diversions are operating (Kimmerer and Nobriga 2008). A plankton population can double or halve its biomass in a few days depending on local food supply and predation. Thus, any export of zooplankton from a restored area should be assumed to subsidize only the local area.<br><br>All of these considerations are based on rather crude models of exchange and population processes. That is appropriate given the level of specificity of the BDCP design.<br><br>Nevertheless, this analysis raises significant questions about the putative subsidy from restored areas to estuarine foodwebs. To address this uncertainty, long before any actual restoration takes place a program of analysis, modeling, and experimental restoration should be undertaken. | |
| 1672 | 123 | Likely use of restored areas:<br><br>Like other fish, smelt use a variety of habitats and appear to explore their environment to find suitable places for spawning, growth, and development. As pelagic fish, their principal habitat is open waters of the estuary, either in freshwater during the larval to early juvenile stages in spring to early summer, or in the low-salinity zone until winter. The low-salinity zone during summer-fall is generally in the western Delta and Suisun Bay, including the channels of Suisun Marsh. Delta smelt appear to be surface-oriented, which would allow them access to shallow areas (Aasen 1999).<br><br>The fundamental problem for both smelt species in the open-water, brackish regions of the | The commenter provides a summary of available information. Monitoring would assess the presence of smelts in restored areas, which as the commenter notes, is uncertain to occur in some areas, but seems more likely in others. Please also see response to comment 1672-113. |

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| | | estuary is the low food supply (discussed above) and possibly also the decreasing turbidity (Kimmerer 2004). Those trends may be difficult to reverse, spelling trouble ahead for the smelts. However, in recent years some proportion of the delta smelt population has remained in freshwater in the Cache Slough complex, despite high temperature there (Sommer and Mejia 2013). This may provide an alternative habitat in which the smelt population can either avoid poor conditions in the LSZ, or hedge its bets on future conditions. Longfin smelt are apparently not very abundant in Cache Slough.<br><br>Delta and longfin smelt have been collected in the Suisun Marsh fish survey (Matern et al. 2002). Delta smelt are not common in Suisun Marsh during summer-fall but were formerly common in winter to early spring (Matern et al. 2002) when the fish are migrating and spawning. About 0.7% of 3291 otter trawl samples from the Suisun Marsh survey during May-October of 1982 - 2009 and about 3% of 3320 samples during November - April contained delta smelt, mostly maturing juveniles and adults. The low catches in summer were not due to small size of the fish, since young-of-the-year longfin smelt of the same size range were captured frequently in that program. Temperature in the larger sloughs is ~1 degree C higher than in Grizzly Bay in July and August, based on Interagency Ecological Program and UC Davis monitoring data, but if smelt avoid the warmer water in summer it does not explain the low catches for all of May-October. Longfin smelt are much more abundant in the Suisun Marsh channels than delta smelt, occurring in 8% of samples in May-October and 12% of samples in November-April with no obvious differences among the various sloughs.<br><br>The 20mm survey catches smelts during spring-summer in Montezuma Slough in Suisun Marsh and in central Suisun Bay including one station in Grizzly Bay near the major western entrance to the marsh. A graphical comparison of catch per trawl in these locations did not reveal a consistent difference for either species. A similar comparison of catch per trawl between Montezuma Slough and Grizzly Bay in the Fall Midwater Trawl survey also did not reveal a consistent difference, except that delta smelt were somewhat less abundant in the slough than in Grizzly Bay during September. Thus, it appears Delta and longfin smelt are roughly as abundant in the larger sloughs of Suisun Marsh as in the open water of the estuary.<br><br>The key question for this aspect of restoration is whether additional physical habitat would result in larger populations of smelt. Abundance of delta smelt is related to an index of habitat availability based on salinity and turbidity (Feyrer et al. 2007, 2011, Nobriga et al. 2008). However, the size of the LSZ (volume or area) does not seem to be strongly related to the abundance of either smelt species (Kimmerer et al. 2009, in press). This may be because the LSZ is a contiguous stretch of water whose physical features are ephemeral, and the fish can move around readily within that region. In contrast, shallow tidal areas may offer enough physical structure to provide a wealth of sub-habitats with variable conditions. In that case, having more habitat area could lead to a greater abundance of fish. Note that a relationship between the quantity of habitat and the size of a fish population need not rely on a density-dependent relationship between habitat and the survival or reproduction of individual fish, which seems unlikely for delta smelt at current population levels.<br><br>Thus, we are cautiously optimistic that restoration of habitat may result in colonization and subsequent population expansion of delta smelt in the Cache Slough area including the Sacramento Ship Channel (Moyle 2008, Sommer and Mejia 2013). Longfin smelt seem unlikely to benefit from this. We cannot determine whether either species would benefit from similar restoration in the Suisun Marsh or the western Delta. The other restoration | |

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| | | sites are too remote from the current population centers to offer much reason for optimism about their colonization by either smelt species. | |
| 1672 | 124 | Floodplain<br><br>The BDCP proposes to alter the Fremont Weir at the upstream end of the Yolo Bypass so that the Bypass would flood at lower stages of the Sacramento River. We consider here only the likely effects on the smelt species.<br><br>Review of conceptual basis<br><br>Although the smelt species do not use floodplain as habitat, elevated production of plankton on the floodplain may provide a subsidy to smelt habitat. This situation differs slightly from that of the potential subsidy from marshes discussed above. First, the floodplain is a flow-through system so that increased biomass of plankton will be transported by the mean, river-derived flow rather than by tidal flow. Second, residence time on a floodplain varies with flow conditions, from hours to a few days under high-flow conditions to effectively infinite in ponds remaining after the floodplain stops draining.<br><br>Analysis of components<br><br>Apart from its suitability as habitat for fish and other species, the Yolo Bypass may also support foodwebs within the estuary. The mechanism for this would be higher phytoplankton and zooplankton production because of shallow depth and better light penetration than in river channels, as well as higher temperature (Lehman et al. 2007). Whether this translates to zooplankton is uncertain; zooplankton abundance on the Bypass was similar to that in the Sacramento River during 1998-2001 (Sommer et al. 2004). Plankton biomass on a floodplain may increase late in the season as residence time increases and fish switch to larger prey (Grozholz and Gallo 2006), but that was not observed on the Yolo Bypass in most years (Sommer et al. 2004).<br><br>At very high flows residence time on the Bypass is probably too short to allow for a buildup of biomass, while at lower flows such a buildup may occur but the rate of export may be low (Schemel et al. 2004). This implies that, as with tidal exchange in marshes (Figure 7.3), there is an intermediate range of flow that maximizes export of plankton.<br><br>A subsidy from the Yolo Bypass may be more or less direct to delta smelt habitat, notably in the Cache Slough complex at the southern end of the Bypass. In addition, it may subsidize the low-salinity habitat used by both smelt species in late spring through fall.<br><br>In Appendix F we examine the evidence for a subsidy of zooplankton to the open water of the estuary under the current configuration using existing zooplankton data. We do not actually calculate the magnitude of the subsidy, since several factors would intervene to alter conditions. In particular, the Bypass could be flooded later in the year than is now the case, and the greater light penetration and higher temperature would provide for greater plankton production than now occurs. Furthermore, Bypass flow would represent a greater proportion of total inflow to the Delta later in the year, resulting in less dilution of the plankton coming off the Bypass.<br><br>Our analysis shows no evidence that the open waters of the estuary receive a detectable subsidy of phytoplankton or zooplankton. If anything, plankton abundance is inversely related to Yolo Bypass flow, either during the month of sampling between flow during the | The commenter provides a summary of information. Please see response to comment 1672-113 for background on the change in the proposed project. Alternative 4A does not include Yolo Bypass improvements (CM2). |

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| | | winter and zooplankton abundance in the following summer. | |
| 1672 | 125 | ATT1: ATT33: Figure 7.3. Relative magnitude of phytoplankton flux from a tidal marsh as a function of exchange rate, scaled to the growth rate of the phytoplankton. The model is based on a balance among import of nutrients to the marsh, uptake of nutrients to support growth of phytoplankton, and export of phytoplankton. All nutrient uptake is by phytoplankton, there is no consumption, and the phytoplankton concentration in the receiving water is zero. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 126 | Regulatory Oversight<br><br>Introduction<br><br>The draft BDCP vests primary responsibility for implementing the Plan in a Program Manager, who shall "ensure that the BDCP is properly implemented throughout the duration of the Plan" (BDCP 7-2). The Program Manager's authority is broad and includes protection and restoration of habitat, reduction of ecological stressors, management of conserved habitat, coordinated operation of the CVP and SWP, and development of the new facilities authorized by the Plan (BDCP 7-3). [footnote 1: The Program Manager also will have responsibility over the Implementation Office, which will assist the Program Manager in all aspects of implementation of the Plan, BDCP 7-4 to 7-5, and the Science Manager and Adaptive Management Team as described in Chapter 9 of this report.]<br><br>The Program Manager's implementation of the BDCP is subject to oversight by the Authorized Entity Group, which will be comprised of the Director of the California Department of Water Resources as operator of the SWP, the Regional Director of the U.S. Bureau of Reclamation as operator of the CVP, and one representative each of the CVP and SWP contractors if the contractors are issued permits under the Plan (BDCP 7-8). [footnote 2: A question has arisen whether the fish and wildlife agencies legally may grant incidental take permits to the CVP and SWP contractors under the federal Endangered Species Act and the California Natural Community Conservation Planning Act. We address this question in the Appendix G.] The BDCP also covers certain diversions of water that are not part of CVP or SWP operations and recognizes that these water supply operators may seek incidental take permits under the terms and conditions of the BDCP. If this occurs, these water projects would become Authorized Entities, but would not be members of the Authorized Entity Group (BDCP 7-8).<br><br>The Authorized Entity Group's authority over the BDCP also is broad and multifaceted. The draft BDCP states:<br><br>The Authorized Entity Group will provide oversight and direction to the Program Manager on matters concerning the implementation of the BDCP, provide input and guidance on general policy and program-related matters, monitor and assess the effectiveness of the Implementation Office in implementing the Plan, and foster and maintain collaborative and constructive relationships with the State and federal fish and wildlife agencies, other public agencies, stakeholders and other interested parties, and local government throughout the implementation of the BDCP (BDCP 7-8 to 7-9).<br><br>This oversight structure means that the Authorized Entity Group will exercise significant authority over both the coordinated operation of the CVP and SWP and implementation of the BDCP itself. Indeed, the draft Plan declares that the Program Manager "will report to the | The commenter summarizes information from the 2013 public draft BDCP. There is no comment to respond to. Please see Master Response 5 regarding the adequacy of the governance structure proposed for the 2013 public draft BDCP. Please see Master Response 31. |

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| | | Authorized Entity Group, and act in accordance with the group's direction" (BDCP 7-2). | |
| 1672 | 127 | The draft Plan vests regulatory responsibility within the BDCP in a "Permit Oversight Group," which is composed of the Regional Director of the U.S. Fish and Wildlife Service, the Regional Administrator of the National Marine Fisheries Service, and the Director of the California Department of Fish and Wildlife (BDCP 7-11). It then states that the three agencies "are expected to issue regulatory authorizations to the Authorized Entities" pursuant to the federal Endangered Species Act and the California Natural Community Conservation Act (BDCP 7-11).<br><br>The draft Plan also provides that, "[c]onsistent with their authorities under these laws, the fish and wildlife agencies will retain responsibility for monitoring compliance with the BDCP, approving certain implementation actions, and enforcing the provisions of their respective regulatory authorizations" (BDCP 7-11). This means that, although the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Wildlife will work together as members of the Permit Oversight Group for the purpose of supervising implementation of the BDCP, each agency will retain its independent regulatory powers over the CVP, SWP, and other water users under the federal and state Endangered Species Acts. [footnote 3: This independent regulatory authority is subject, however, to an important caveat--the draft Plan's requirement of consistency between future section 7 consultations and the BDCP--as described below. See pp. 7-8 to 7-9.]<br><br>This structure is consonant with both the Endangered Species Acts and the California Natural Community Conservation Planning Act, because it separates the regulatory oversight responsibilities of the federal and state fish and wildlife agencies from the operational responsibilities of the Program Manager and the Authorized Entity Group. This structural delineation is undermined, however, by the draft Plan's more detailed definition of the "function" of the Permit Oversight Group, which blurs the distinction between implementation and regulation. It also is undermined by provisions in the draft Plan that grant the Authorized Entity Group--rather than the regulatory agencies--veto authority over changes to the conservation measures, biological objectives, and adaptive management strategies, as well as over amendments to the BDCP itself. | As described in the 2013 public draft BDCP in Chapter 7 and summarized in Table 7-1, the fish and wildlife agencies have the final authority regarding adaptive management decisions on conservation measures or biological objectives, contrary to the comment. The veto ability of the Authorized Entity Group regarding plan amendments relates to whether to propose an amendment. Plan amendments must be initiated by HCP/NCCP permittees, not the regulatory agencies. The decision of whether to approve or deny a plan amendment, once submitted, rests with the regulatory agencies. As noted in Table 7-1, the Permit Oversight Group has the final authority to make a decision regarding a plan amendment.<br><br>Where the alternative does not include preparation of an HCP, ESA compliance for construction and operation of water intakes in the north Delta and associated conveyance facilities would be achieved solely through Section 7. For these alternatives, USFWS and NMFS would not issue a permit and would not act as a lead agency for NEPA compliance. Where Section 7 is the ESA compliance strategy, USFWS and NMFS will assume roles as cooperating agencies for purposes of the NEPA review.<br><br>Reclamation would be the lead federal action agency for Section 7 compliance where a non-HCP alternative is selected. Reclamation's Section 7 compliance would be expected to also address the Section 7 compliance needs for the USACE permit actions. In cooperation with DWR, Reclamation would prepare a biological assessment (BA) for submission to USFWS and NMFS requesting formal consultation under ESA Section 7.<br><br>A biological opinion is not required prior to the release of the Draft BDCP/CWF EIR/EIS. For the Proposed Action, the USFWS and NMFS will conduct an internal ESA section 7 consultation prior to issuance of an Section 10(a)(1)(B) permit for the Proposed Action. These federal agencies will coordinate the ESA consultation process and other environmental review processes, such as the National Environmental Policy Act (NEPA), consistent with federal regulations. In addition, the USFWS and NMFS will consult with the United States Bureau of Reclamation (Reclamation) to complete biological opinions or a joint biological opinion prior to federal action to carry out the proposed project.<br><br>For more information please see 1.1.5.2 of Section 1 Introduction of the RDEIR/SDEIS.<br><br>For more information on compliance with the Endangered Species Act please see Master Response 29. For information on adaptive management please see Master Response 33. |
| 1672 | 128 | Regulatory vs. Programmatic Responsibilities: Implementation<br><br>The draft Plan grants the Permit Oversight Group a significant role in implementing the conservation goals and adaptive management strategies of the BDCP:<br><br>The Permit Oversight Group will be involved in certain decisions relating to the implementation of water operations and other conservation measures, actions proposed through the adaptive management program or in response to changed circumstances, approaches to monitoring and scientific research (BDCP 7-11).<br><br>It then provides that the Permit Oversight Group "will have the following roles, among others, in implementation matters":<br><br>--Approve, jointly with the Authorized Entity Group, changes to conservation measures or biological objectives proposed by the Adaptive Management Team.<br><br>--Decide, jointly with the Authorized Entity Group, all other adaptive management matters for which concurrence has not been reached by the Adaptive Management Team. | The comment is noted regarding the recommended changes of the structure of the governance and decision-making process proposed in the 2013 public draft BDCP. Please also see Master Response 5 regarding the adequacy of the governance structure.<br><br>For information on adaptive management please see Master Response 33. |

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| | | --Provide input into the selection of the Program Manager and the Science Manager.<br><br>--Provide input and concur with the consistency of specified sections of the Annual Work Plan and Budget with the BDCP and with certain agency decisions.<br><br>--Provide input and concur with the consistency of the Annual Delta Water Operations Plan with the BDCP.<br><br>--Provide input and accept Annual Reports.<br><br>--Provide input and approve plan amendments [footnote 4: The draft Plan also contains a placeholder "function," which states that the Permit Oversight Group also may play a role in "decision-making regarding real-time operations, consistent with the criteria of CM1 Water Facilities and Operation and other limitations set out in the BDCP and annual Delta water operations plans." As the details of this role as still under negotiation, we do not address it here except to note that the role of the Permit Oversight Group should be clearly defined and limited to regulatory oversight as explained in the text.] (BDCP 7-11 to 7-12: emphasis added).<br><br>These definitions are poorly drafted, and they assign programmatic authority to the fish and wildlife agencies that may undermine their regulatory responsibilities. We therefore recommend that the draft BDCP be revised in two ways:<br><br>First, where the parties to the negotiations want to grant the Permit Oversight Group authority to determine whether certain actions or documents are consistent with the BDCP, the Plan should define its responsibilities more clearly and precisely than does the current language--e.g., "provide input and concur"; "provide input and accept"; and "provide input and approve." Thus, the draft Plan should be revised to state:<br><br>The Permit Oversight Group shall have exclusive authority to determine whether the Annual Work Plan Budget and Annual Delta Operations Plan are consistent with the BDCP. If the Permit Oversight Group does not issue a determination of consistency, the document in question shall be revised and resubmitted to the Permit Oversight Group for approval or further remission and revision.<br><br>Second, the Permit Oversight Group's role should be limited to regulatory oversight. The "functions" listed in the draft Plan conflate the Permit Oversight Group's regulatory responsibilities with the programmatic implementation duties that are best left with the Program Manager and the Authorized Entities Group. Although there is some practical value in collaboration among the regulators and the regulated--e.g., having the fish and wildlife agencies give their "input" during the drafting of annual operations plans--it is better policy to maintain the exclusive regulatory role of the Permit Oversight Group. A regulatory agency that has a stake in the creation of the program and policy decisions that it must ultimately review will not be able to bring its independent judgment to bear in evaluating those same decisions for consistency with the Plan and other applicable laws.<br><br>The conflation of regulatory and programmatic responsibilities is especially dangerous in the case of revisions to the biological objectives, conservation measures, and other adaptive management strategies. As currently written, the draft Plan grants the Authorized Entity Group an effective veto over proposed changes to the these programs, even if the Adaptive Management Team, the Science Manager, the Program Manager, and the Permit Oversight Group have concluded that changes are needed to ensure programmatic compliance with | |

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| | | the BDCP or to fulfill the requirements of the federal and state Endangered Species Acts (BDCP 7-11).<br><br>A better course would be to revise the draft Plan to allow the Science Manager and Adaptive Management Team--subject to oversight and approval from the Program Manager and Authorized Entity Group--to make revisions to the biological objectives, conservation measures, and other adaptive management strategies. These changes then would be submitted to the Permit Oversight Group for review and approval or remission. The Permit Oversight Group also should have independent authority to revise the biological objectives, conservation measures, and other adaptive management strategies if it concludes that the existing programs are inadequate to comply with the BDCP or other governing law. | |
| 1672 | 129 | Regulatory vs. Programmatic Responsibilities: Policy Modifications and Amendments to the BDCP<br><br>A similar problem exists for modifications to the BDCP itself. The draft Plan recognizes that "Plan modifications may be needed periodically to clarify provisions or correct unanticipated inconsistencies in the documents" (BDCP 6-45). It then identifies three types of plan modifications: administrative changes, minor modifications, and formal amendments. Only the latter two concern us here.<br><br>The draft Plan defines "minor modifications" as including transfers of acreage between Restoration Opportunity Areas or conservation zones and "[a]djustments of conservation measures or biological objectives . . . consistent with the monitoring and adaptive management program and intended to enhance benefits to covered species" (BDCP 6-46). It then describes "formal amendments" as including, but not limited to:<br><br>--Changes to the geographic boundary of the BDCP.<br><br>--Additions of species to the covered species list.<br><br>--Increases in the allowable take limits of covered activities or the addition of new covered activities to the Plan.<br><br>--Substantial changes in implementation schedules that will have significant adverse effects on the covered species.<br><br>--Changes in water operations beyond those described under CM1 Water Facilities and Operations. (BDCP 6-47).<br><br>The "minor modifications" and "formal amendments" thus include all aspects of BDCP implementation that will be vital to the success or failure of the BDCP. Yet, the draft Plan expressly provides that the Authorized Entities may veto any such changes. [footnote 5: Please note that the draft BDCP states that the Authorized Entities--not the Authorized Entity Group—hold this veto power. This may be a typographical error, as the Authorized Entities are not granted implementation decisionmaking authority (except through the Authorized Entity Group) any other place in the document. If it the BDCP negotiators in fact intend to vest veto authority in the Authorized Entities, however, this is especially problematic as the Authorized Entities potentially include water users other than those that comprise the Authorized Entity Group. BDCP 7-8.] For minor modifications, the draft BDCP states: "If any Authorized Entity disagrees with the proposed minor modification or revision for any reason, the minor modification or revision will not be incorporated into the BDCP" | The commenter's concerns are noted. Please see Master Response 5 regarding the adequacy of the governance structure for the BDCP. |

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| | | (BDCP 6-46). [footnote 6: By contrast, if any of the fish and wildlife regulatory agencies disagrees with a proposed minor modification, its rights are limited to insisting that the proposal be treated as a formal amendment to the Plan. BDCP 6-46.] The draft Plan similarly declares that formal amendments "will be subject to review and approval by the Implementation Office and the Authorized Entities." [footnote 7: At least in the case of formal amendments the draft Plan recognizes a relative parity in the rights of the regulators and the regulated, acknowledging that such amendments "will require corresponding amendment to the authorizations/ permits, in accordance with applicable laws and regulations regarding permit amendments." BDCP 6-47. It also states, however, that the "fish and wildlife agencies will use reasonable efforts to process proposed amendments within 180 days." BDCP 6-46.] | |
| 1672 | 130 | The BDCP is fundamentally a set of terms and conditions that allow the principal regulatory agencies--the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Wildlife--to authorize the construction and operation of physical improvements to the Delta that will facilitate more reliable (and, one may hope, more environmentally sustainable) exports of water by the CVP and SWP. Although the motivating purpose of the BDCP is to facilitate this water development, the regulatory agencies' foundational responsibility is to ensure that the project does not jeopardize the continued existence of the species that are listed for protection under the federal and state Endangered Species Acts.<br><br>To accomplish this essential obligation, the fish and wildlife agencies must both insist on an initial set of biological objectives, conservation measures, and conditions on coordinated project operations that will fulfill this purpose; and they must have the means of ensuring that the implementation of the BDCP will continue to achieve that goal throughout its fifty year term.<br><br>We do not believe that the draft Plan satisfies this second requirement, as it vests veto authority over necessary changes in the biological objectives, conservation measures, adaptive management strategies, and the terms and conditions of the BDCP itself, not in the regulatory agencies, but in the regulated entities that comprise the Authorized Entity Group. We therefore recommend revision of the draft Plan to require that all "minor modifications" and "formal amendments" to the BDCP be subject to review and approval by the Permit Oversight Group.<br><br>As explained above, we also recommend that the draft Plan be revised to authorize the Permit Oversight Group itself to initiate and make changes to the biological objectives, conservation measures, and other adaptive management strategies that the fish and wildlife agencies conclude are needed to ensure the protection and recovery of the species listed under the federal and state Endangered Species Acts. This unilateral authority must extend to all of the identified "minor modifications" and to at least one of the defined "formal amendments"--viz. "substantial changes in implementation schedules that will have significant adverse effects on the covered species" (BDCP 6-47). [footnote 8: The governance structure set forth in the current draft Plan also may jeopardize the likelihood that the BDCP will be incorporated into the Delta Plan. See California Water Code [Section] 85320-85322. The Delta Reform Act provides:<br><br>The BDCP shall include a transparent, real-time operational decisionmaking process in which fishery agencies ensure that applicable biological performance measures are achieved in a timely manner with respect to water system operations. [Id. [Section] 85321 (emphasis | Please see response to comment 1672-127 and response to comment 1672-128. |

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| | | added).]<br><br>The Authorized Entity Group's veto authority over changes to the biological objectives, conservation measures, and adaptive management strategies means that the fish and wildlife agencies would not have the power to ensure that the biological measures will be achieved. The draft Plan therefore violates this statutory mandate, and the CDFW and the Delta Stewardship Council consequently would likely be precluded from incorporating the BDCP into the Delta Plan.]<br><br>The other listed "formal amendments"--which include alteration of the geographic boundaries of the Plan and the addition of new species and covered activities--are different, as they include possible changes to the scope and structure of the BDCP, rather than adaptive changes to the implementation and achievement of the goals of the existing BDCP. The draft Plan therefore properly states that formal amendments "will involve the same process that was required for the original approval of the BDCP"--i.e., approval of both the Authorized Entities and the Permit Oversight Group (BDCP 6-47). [footnote 9: The draft Plan also provides that, "[i]n most cases, an amendment will require public review and comment, CEQA and NEPA compliance, and intra-Service Section 7 consultation," and it requires the fish and wildlife agencies to use "reasonable efforts to process proposed amendments within 180 days." BDCP 6-47. 180 days is probably insufficient time, however, to allow for section 7 consultation, internal agency analysis of the effects of proposed formal amendments on listed species and their habitat, and the drafting, public review, and completion of a new or supplemental EIS/EIR.<br><br>It is also worth noting that even this limited "bilateral" approval process for structural amendments to the BDCP may not be consistent with federal law. The ESA rules provide that all incidental take permits "are issued subject to the condition that the National Marine Fisheries Service reserves the right to amend the provisions of a permit for just cause at any time during its term." 50 C.F.R. [Section] 222.306(c).] | |
| 1672 | 131 | Regulatory assurances and the "No Surprises" policy.<br><br>Introduction<br><br>The draft Plan proposes to create two types of "regulatory assurances." First, it seeks to eliminate the uncertainties associated with consultation under Section 7 of the federal Endangered Species Act (ESA) for coordinated CVP and SWP operations, by stipulating that future Biological Opinions (Bos) shall be consistent with the terms and conditions of the BDCP. Second, it offers "No Surprises" guarantees, both for deviations between the Bos and the BDCP, and for future changes to the BDCP itself. In addition, the draft Plan places difficult scientific, legal, and political burdens on the state and federal governments' power to terminate the Incidental Take Permits (ITP) and to rescind the BDCP.<br><br>In our judgment, these regulatory assurances compound the risks described in the preceding section, because they severely constrain the fish and wildlife agencies' ability to respond to inadequacies in the Bos, Conservation Measures (CM), and other adaptive management strategies -- even apart from the veto authority that the draft Plan vests in the Authorized Entity Group.<br><br>Section 7 Consultation and the BDCP<br><br>According to the draft Plan, once the facilities authorized by the BDCP are constructed, the | Please see response to comment 1672-24. Also see response to comment 1672-127. |

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| | | Plan will largely displace the existing Section 7 consultation requirements applicable to coordinated CVP and SWP operations -- "On the basis of the BDCP and the companion biological assessment, it is expected that the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) will issue a new joint Biological Opinion (BiOp) that would supersede BiOps existing at that time as they relate to SWP and CVP actions addressed by the BDCP" (BDCP 4-2). The draft Plan then requires that the new BO (as well as any subsequent Bos issued during the 50-year term of the BDCP) be consistent with the terms and conditions of the BDCP itself.<br><br>The BDCP is intended to meet the requirements of the ESA and provide the basis for regulatory coverage for a range of activities identified in the Plan. Unless otherwise required by law or regulation, in any Section 7 consultation related to a covered activity or associated federal action and covered species, USFWS and NMFS will each ensure that the resulting Bos are consistent with the integrated BO for the BDCP (BDCP 6-44).<br><br>We do not necessarily object to this consistency directive. An important goal of the BDCP is to provide all parties -- especially the Authorized Entities -- with a measure of regulatory and operational certainty that will enable them both to invest in the new facilities and to make water management decisions in their respective service areas in reliance on water deliveries from the CVP and SWP. To the extent that future Section 7 consultations conform to the terms of the BDCP, that certainty is enhanced. We also note the first clause of the second sentence quoted above, which expressly reserves the authority of USFWS and NMFS to issue Bos that depart from the terms of the BDCP, if necessary, to comply with the governing law. This law, of course, includes Section 7(a)(2) of the federal ESA, which requires all consulting agencies to ensure that their actions are "not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat" [16 U.S.C. Section 1536(a)(2)].<br><br>We do believe, however, that the proposal to substitute the BDCP for Section 7 consultation as the principal means of applying the federal ESA to the CVP, SWP, and other Authorized Entities reinforces our recommendations from the preceding section -- viz. that the Permit Oversight Group must maintain the independent regulatory prerogatives that the fish and wildlife agencies currently possess, and must have authority to approve or to deny proposed changes in the Bos, CMs, and other terms and conditions of the BDCP, as required to protect and recover the species covered by the Plan. Our support for the BO/BDCP consistency directive should be read with this caveat. | |
| 1672 | 132 | "No Surprises"<br><br>The draft Plan contains two "no surprises" guarantees. The first applies to changes in coordinated CVP and SWP operations or water supply capabilities that may be required by future Biological Opinions that do not conform to the BDCP. The second is a more general "no surprises" commitment that protects the Authorized Entities from certain changes to the BDCP itself [footnote 10: As noted in chapter 2, USBR is not covered by the "no surprises" assurance. BDCP 6-29.].<br><br>According to the draft Plan, "Ecological conditions in the Delta are likely to change as a result of future events and circumstances that may occur during the course of the implementation of the BDCP" (BDCP 6-30). The draft then lists seven "Changed Circumstances Related to the BDCP"--levee failures, flooding, new species listings, wildfire, toxic or hazardous spills, nonnative invasive species, and climate change (BDCP 6-31). For each of these "reasonably foreseeable" changes, the draft Plan describes the "planned | Please see response to comment 1672-24. |

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| | | responses" that BDCP administrators will undertake (BDCP 6-31 to 6-42). [footnote 11: The Implementation Office is charged with identifying the onset of a changed circumstance, working with the Permit Oversight Group to fashion a response, and for implementing and monitoring the responsive actions (BDCP 6-31).] The draft Plan states that the responses "have been designed to be practical and roughly proportional to the impacts of covered activities on covered species and natural communities, yet sufficient to effectively address such events" (BDCP 6-30). The BDCP budget will include funds to cover the costs of implementing some of the planned responses to "reasonably foreseeable" changed circumstances (BDCP 6-30). [footnote 12: This funding process is described in Chapter 8 of the draft BDCP. See BDCP 8-60 to 8-64. The draft states generally that, to "allow for the ability to respond to changed circumstances should they occur, the Implementation Office should maintain a reserve fund for covering costs of changed circumstances" (BDCP 8-61). The draft Plan explains that this is because "the risk of some changed circumstances--e.g., failure of levees attached to tidal marsh and floodplain restoration--and cost of remedial measures increases as greater portions of the conservation strategy are implemented." Id.<br><br>The draft BDCP only includes levee failure and wildfire damage to preserved lands as possible "changed circumstances for which responses are expected to result in additional implementation costs." Id. It omits "changed circumstances related to climate change, flooding, failure of water operations infrastructure, nonnative invasive species, new species listings, and toxic or hazardous spills," explaining that the response costs for these are accounted for in the initial BDCP funding, will be paid by the state and federal governments under the "no surprises" guarantees, or would be the responsibility of a third party. BDCP 8-61 to 8-62.] | |
| 1672 | 133 | The draft Plan recognizes that "unforeseen circumstances" may require changes to the biological objectives, conservation measures, adaptive management strategies, or the terms and conditions of the BDCP itself. It defines unforeseen circumstances as "changes in circumstances that affect a species or geographic area covered by an HCP that could not reasonably have been anticipated by the plan participants during the development of the conservation plan, and that result in a substantial and adverse change in the status of a covered species" (BDCP 6-42 citing 50 C.F.R. [Section] 17.3 & 50 C.F.R. [Section] 222.102). The draft Plan contains a similar definition of "unforeseen circumstances" under state law. These are "changes affecting one or more species, habitat, natural community, or the geographic area covered by a conservation plan that could not reasonably have been anticipated at the time of plan development, and that result in a substantial adverse change in the status of one or more covered species" (BDCP 6-43 citing California Fish & Game Code [Section] 2805(k)).<br><br>The draft Plan then sets forth the following regulatory assurances under federal and state law:<br><br>Under ESA regulations, if unforeseen circumstances arise during the life of the BDCP, U.S. Fish and Wildlife Service and/or National Marine Fisheries Service may not require the commitment of additional land or financial compensation, or additional restrictions on the use of land, water, or other natural resources other than those agreed to in the plan, unless the Authorized Entities consent (BDCP 6-42).<br><br>In the event of unforeseen circumstances, California Department of Fish and Wildlife will not require additional land, water, or financial compensation or additional restrictions on | The comment summarizes information from the BDCP. There is no comment to respond to.<br><br>For more information please see response to comment 1672-24. Regarding the Endangered Species Act please see Master Response 29. The implementing agreement is discussed in Master Response 5. |

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| | | the use of land, water, or other natural resources without the consent of the plan participants for a period of time specified in the Implementation Agreement (BDCP 6-43). [footnote 13: The draft Plan notes that, under California law, "such assurances are not applicable in those circumstances in which CDFW determines that the plan is not being implemented in a manner consistent with the substantive terms of the Implementation Agreement." BDCP 6-43 (citing California Fish & Game Code [Section] 2820(f)(2)).]<br><br>As noted above, for federal agencies that are subject to section 7 consultation (including consultation for coordinated CVP/SWP operations) | |
| 1672 | 134 | The draft Plan contains an additional "no surprises" pledge if new Biological Opinions contain operational or water supply restrictions that differ from those set forth in the BDCP:<br><br>Furthermore, U.S. Fish and Wildlife Service and National Marine Fisheries Service will not require additional land, water, or other natural resources, or financial compensation or additional restrictions on the use of land, water, or other natural resources regarding the implementation of covered activities beyond the measures provided for under the BDCP, the Implementing Agreement, the incidental take permits, and the integrated BiOp (BDCP 6-44).<br><br>The purpose of these regulatory assurances is to exempt the Authorized Entities from any of the costs of complying with the federal and state Endangered Species Acts except as defined in (and funded pursuant to) the terms of the BDCP. These "no surprises" guarantees therefore may place the financial burden of some future changes to the BDCP and project operations exclusively on state and federal taxpayers.<br><br>Although both federal Endangered Species Act regulations and the California Natural Community Conservation Planning Act authorize "no surprises" guarantees, we believe, given the uncertainties outlined in the previous chapters, that there is a significant risk that the costs of compensating the projects and their contractors for future "unforeseen" hydrologic, engineering, and operational changes will be excessive. More importantly, we are concerned that the state and federal governments' assumption of liability may deter the fish and wildlife agencies from making changes to future Biological Opinions or to the BDCP itself that the agencies believe are necessary to protect and recover listed species. | The commenter's concerns are noted. For more information please see response to comment 1672-24. Regarding the Endangered Species Act please see Master Response 29. |
| 1672 | 135 | The following example focusing on the "reasonably foreseeable" changed circumstance of climate change illustrates our concerns.<br><br>The draft Plan defines climate change as "[l]ong-term changes in sea level, watershed hydrology, precipitation, temperature (air or water), or ocean conditions that are of the magnitude or effect assumed for the effects analysis and that adversely affect conservation strategy implementation or covered species are considered a changed circumstance" (BDCP 6-41). It then provides that the "occurrence of this changed circumstance will be determined jointly by the Implementation Office and fish and wildlife agencies" (BDCP 6-41). [footnote 14: We reiterate here the problems that we identified in the preceding section: conflation of the fish and wildlife agencies' regulatory and programmatic roles and the granting of an effective veto to the regulated entities through the Implementation Office.]<br><br>According to the draft Plan, however, alterations in the ecosystem and threats to listed species caused by climate change will not trigger any management or regulatory responses beyond those set forth in the BDCP. "Because the BDCP already anticipates the effects of | For information on climate change and the proposed project, please see Master Response 19. Also see response to comment 1672-127. |

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| | | climate change, no additional actions will be required to remediate climate change effects on covered species and natural communities in the reserve system" (BDCP 6-41). Rather, the Adaptive Management Team will monitor these changes and the Implementation Office will "continually adjust conservation measures to the changing conditions in the Plan Area as part of the adaptive management program" (BDCP 6-42).<br><br>The draft Plan also states that all responses to climate change "will be made as part of the adaptive management and monitoring program. Measures beyond those contemplated by the adaptive management and monitoring program are not likely to be necessary because the conservation strategy was designed to anticipate a reasonable worst-case scenario of climate change. A change in conservation measures in response to climate change beyond that considered in Chapter 3, Conservation Strategy, and through the adaptive management and monitoring program is considered an unforeseen circumstance." (BDCP 6-42: emphasis added). | |
| 1672 | 136 | There are two serious problems with this changed circumstances strategy:<br><br>First, although the "biological goals and objectives [of the BDCP] have been established at the landscape level to take climate change into account during conservation strategy implementation," and the "conservation strategy, monitoring and research program, and adaptive management and monitoring program already include responses to anticipate climate change effects at the landscape, natural community, and species scales" (BDCP 6-42), the draft Plan correctly anticipates that the biological objectives, conservation measures, and other adaptive management strategies are likely to be modified over time as required to respond to the changed conditions brought about by climate change. Yet, as described previously, all such modifications are subject to approval by the Authorized Entities (BDCP 6-46). The fish and wildlife agencies consequently lack independent authority to determine the appropriate policy and management responses to climate change, even within the confines of the defined responses set forth in Chapter 3 of the BDCP.<br><br>Second, changes in conservation measures that differ from the defined responses are "unforeseen circumstances," which trigger the "no surprises" guarantee. Again, while the draft Plan anticipates a broad array of ecological changes likely to be caused by climate change, and lays out a detailed set of programmatic responses, it is folly to believe that the BDCP scientists and negotiators have correctly identified all of the hydrologic changes, biotic responses, and risks to the ecosystem that will in fact occur over time. As one recent interdisciplinary study of California water policy emphasized:<br><br>New approaches to ecosystem management under changing conditions will require continued, large-scale experimentation aided by computer modeling. This task is complex, because experiments, especially on a large scale, often yield ambiguous results. Also, as with hydrology, the past is not always a good predictor of the future with many ecosystems. Linking human and natural systems, combined with changes in climate and influxes of alien species, creates novel, dynamic ecosystems with no historical analog. Thus, efforts to restore ecosystem functions and attributes involve hitting a moving, only partially visible target. Finally, ecosystem changes are often nonlinear and interrelated. Declines in habitat quality or abundance reduce ecosystem resiliency, with the result that even small changes in conditions can lead to abrupt system collapse and reorganization to a new state. Such thresholds or tipping points are difficult to predict. Taken together, these factors suggest that efforts to improve conditions for California's native aquatic species will necessarily involve trial and error, and that success is far from guaranteed. | The Lead Agencies acknowledge that uncertainty is inherent in any planning effort of this geographic and temporal scale. However, DWR strived to use the best available science throughout the effects analysis, consistent with the requirements of the ESA. Additionally, the official public review process for the proposed project provides an opportunity for formal public comment on the proposed project and project alternatives. Public and agency comments on the public draft have led to further refinement of the proposed project, as evidenced in the RDEIR/SDEIS.<br><br>Please see response to comment 1672-135. |

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| | | * * *<br><br>The difficulty is compounded by the high uncertainty of success for specific actions, given ecosystem complexity, gaps in knowledge of how to manipulate many key processes, and, most important, continuing change in climate, invasive species, and other conditions in California. As a result, a flow regime or water quality target that seems adequate today may not provide the same services in 20 to 30 years. Aiming at a moving target in semi-darkness means that there will be many misses. (From: Hanak et al., 2011: emphasis added).<br><br>The potential consequences of the "no surprises" guarantee in this context are troubling. Fisheries biologists generally agree that diminished seasonal outflow and warming water temperatures place several listed species at risk of extinction (see Cloern et al., 2011; Moyle et al., 2013). The projects that would be authorized by the BDCP should reduce some of the sources of stress on these species by reducing entrainment and predation and by creating substitute habitat, but they will not address several other important stressors such as diminished summer and fall outflow and rising water temperatures. | |
| 1672 | 137 | Sometime during the 50-year term of the BDCP, it may be necessary to construct additional upriver storage (e.g., by increasing the capacity of Shasta Reservoir) to enable more sustained cold-water releases to protect salmon spawning and out-migration.<br><br>Yet, under the draft Plan, this action would constitute an "unforeseen circumstance," because it falls outside the defined responses to climate change set forth in the BDCP. The consequence would be that the state and federal taxpayers would have to bear all of the costs of constructing and operating the new or expanded storage, even though the fish and wildlife agencies determined that this action is needed to protect one or more listed species from extinction (while maintaining reservoir releases and exports at the levels and timing authorized by the BDCP).<br><br>Alternatively, if funding were not available to construct the new storage capacity, and the fish and wildlife agencies made jeopardy findings and issued new Biological Opinions that altered reservoir release requirements in a manner that reduced water supply or export capacity, the state and federal governments would have to compensate the Authorized Entities for the value of the lost water or the cost of replacement supplies. [footnote 15: During the July 23, 2013, meeting with DWR Director Mark Cowin and California Department of Fish and Wildlife Director Chuck Bonham, Director Cowin stated that it was not the parties' intent to apply the "no surprises" policy to actions taken outside the plan area that may be required to address the effects of climate warming or other changed conditions on listed species. Although we were pleased to learn this, we retain the concerns described in the text for two reasons: First, the draft Plan does not state that new infrastructure or operational changes needed to ensure the survival of species covered by the BDCP are exempt from the "no surprises" guarantee if they are located outside the plan area. Rather, the draft links CVP and SWP facilities and water supply operations upstream of the plan area to the conservation measures that may be required to protect covered species and their downstream habitat (BDCP 1-20). Without an explicit limitation on the "no surprises" guarantee to new, "unforeseen" conservation measures undertaken within the plan area, we believe that there is an unacceptable risk that the Authorized Entities could raise a plausible claim that the "no surprises" policy exempts them from liability for new facilities and operational changes upstream of the plan area that are needed to protect covered species within the plan area.<br><br>Second, the draft Plan expressly extends the "no surprises" assurance for future section 7 | Regarding storage and the proposed project please see Master Response 37. For a discussion on compliance with the Endangered Species Act please see Master Response 29. Master Response 33 discusses adaptive management and monitoring for the project. For information on the project's independent utility please see Master Response 8. Also see response to comment 1672-24. |

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| | | consultations over new facilities and other changes in CVP operations that are outside the plan area and not part of the BDCP covered activities. The draft Plan stipulates that "USFWS and NMFS will further ensure that the terms of any BiOp issued in connection with projects that are independent of the covered activities and associated federal actions do not create or result in any additional obligation, cost, or expense to the Authorized Entities" (BDCP 6-44).<br><br>If the parties to the BDCP negotiations do not intend for the "no surprises" guarantee to cover new construction and project operational changes outside the plan area, then they should revise the draft Plan to say so explicitly and clearly. We also recommend that the sentence quoted above, which exempts the Authorized Entities from all costs associated with section 7 consultations to project facilities and operations other than BDCP covered activities be deleted.] | |
| 1672 | 138 | We do not believe that the 50-year "no surprises" guarantees are wise or prudent policy. We understand that the Authorized Entities seek to protect their capital investment and obtain maximum security of their water service capabilities, and that a relatively fixed set of biological objectives, conservation measures, and operational constraints help to achieve these goals (BDCP 1-26). But a 50-year commitment is ill-advised in an ecosystem as complex, variable, and scientifically inscrutable as the Delta. As our colleague Peter Moyle has observed, in the Delta Ecosystem, "[o]ver-negotiation of details in advance is unlikely to enable adequate responsiveness and flexibility" and "even the most well-informed, scientifically based management will encounter surprises and make mistakes" (From Moyle et al., 2012).<br><br>The parties to the BDCP negotiations therefore should consider separate "no surprises" guarantees--one governing construction of the BDCP projects, and a series of operational "no surprises" commitments that would be reevaluated every ten years based on current information on the appropriateness of the biological objectives, the success or failure of the conservation measures, species survival and recovery, overall ecosystem health, climate change, invasive species, discharges, the effects of authorized project operations, other stressors, and regulatory compliance.<br><br>We have chosen ten years for the recommended length of renewable "no surprises" assurances because a ten-year period is likely to include a variety of different types of water years and thus will be sufficiently lengthy to enable BDCP managers and regulators to evaluate how well the biological objectives and conservation measures perform across a spectrum of hydrologic conditions. At the same time, ten years is short enough to minimize the risk that the terms and conditions of the BDCP become antiquated and ineffective in light of the inevitable and unpredictable changes to the ecosystem. Indeed, a series of renewable ten-year "no surprises" guarantees could create a constructive incentive for the parties to the BDCP to monitor progress and achievement of the biological objectives and conservation measures and to make adaptive management changes as required to sustain and recover the covered species and their habitat. [footnote 16: There is nothing in federal or state law that requires that the term of a "no surprises" guarantee be coextensive with the term of the HCP/NCCP. Indeed, the California Natural Communities Conservation Planning Act requires that the duration of all regulatory assurances be based on a careful assessment of the limits of scientific understanding of the covered species and their habitat. California Fish & Game Code Section 2820(f) states that the California Dept. of Fish and Wildlife's "determination of the level of assurances and the time limits specified in the implementation agreement for assurances may be based on localized conditions and shall | The commenter's concerns are noted. Please see response to comment 1672-24. For information on adaptive management and the proposed project please see Master Response 33. |

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| | | consider":<br><br>A. The level of knowledge of the status of the covered species and natural communities.<br><br>B. The adequacy of analysis of the impact of take on covered species.<br><br>C. The use of the best available science to make assessments about the impacts of take, the reliability of mitigation strategies, and the appropriateness of monitoring techniques.<br><br>D. The appropriateness of the size and duration of the plan with respect to quality and amount of data.<br><br>* * *<br><br>(H) The size and duration of the plan.] | |
| 1672 | 139 | Revocation of Incidental Take Permits and the BDCP<br><br>Many of our concerns about the rigidities of the draft Plan and the scope and length of the regulatory assurances would be lessened if there were an effective means of revoking the incidental take permits and thus rescinding the BDCP. But there is not. | The Proposed Project has been developed with the goals of minimizing and avoiding incidental take of listed species to the maximum extent practicable. Chapter 11, Fish and Aquatic Resources, and Chapter 12, Terrestrial Biological Resources, EIR/EIS, describe effects of the proposed project and several alternatives on fish and wildlife species in the Plan Area.<br><br>Please see response to comment 1672-127. |
| 1672 | 140 | The "Permit Revocation Rule," adopted in 2004, allows the federal fish and wildlife agencies "to nullify regulatory assurances granted under the No Surprises rule and revoke the Section 10 permit only in specified instances, including where continuation of a permitted activity would jeopardize the continued existence of a species covered by an HCP and the impact of the permitted activity on the species has not been remedied in a timely manner" (BDCP 6-48: quoting 69 Fed. Reg. 7172 (Dec. 10, 2004)). The draft Plan states, however, that the "U.S. Fish and Wildlife Service or National Marine Fisheries Service will begin the revocation process only if it is determined that the continuation of a covered activity will appreciably reduce the likelihood of survival and recovery of one or more covered species and that no remedy [other than revocation] can be found and implemented" (BDCP 6-49). | Please see response to comment 1672-139. |
| 1672 | 141 | Under the California Natural Communities Conservation Planning Act, the Department of Fish and Wildlife may revoke the state incidental take permit "if necessary to avoid jeopardizing the continued existence of a listed species" (BDCP 6-49: citing California Fish & Game Code [Section] 2820(c)). [footnote 17: Section 2820(c) actually addresses a more limited violation of the terms of an NCCP, providing for suspension or revocation if a plan participant fails to "maintain the proportionality between take and conservation measures specified in the implementation agreement and does not either cure the default within 45 days or enter into an agreement with the department within 45 days to expeditiously cure the default." California Fish & Game Code [Section] 2820(c). The more general revocation standard is set forth in section 2820(b)(3)(A)-(D) of the Act.] The federal and state fish and wildlife agencies also may revoke the permits if the Authorized Entities fail to fulfill their obligations under the BDCP, but only following the dispute resolution process set forth in the Implementing Agreement and "providing the Implementation Office and Authorized Entities with a reasonable opportunity to take appropriate responsive action" (BDCP 6-49). | The commenter is summarizing information from the BDCP. There is no information to respond to. For more information please see response to comment 1672-139. For information on the implementing Agreement please see Master Response 5. |
| 1672 | 142 | Before the fish and wildlife agencies may revoke the incidental permits, they must follow a variety of procedures and substantive standards. These include determining, in concert with the Implementation Office, "whether changes can be made to the conservation strategy to | The commenter is summarizing information from the BDCP. There is no comment to response to. |

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| | | remedy the situation" and whether "there are additional voluntary implementation actions that the Authorized Entities could undertake to remedy the situation." | |
| 1672 | 143 | The draft Plan requires the federal fish and wildlife agencies to determine whether they or some other agencies can take actions to ensure the survival of the listed species, rather than imposing such burdens on the parties to the Authorized Entities:<br><br>The U.S. Fish and Wildlife Service or National Marine Fisheries Service will determine whether the fish and wildlife agencies or other state and federal agencies can undertake actions that will remedy the situation. The determination must be based on a thorough review of best available practices considering species population status and the effects of multiple federal and nonfederal actions. It is recognized that the fish and wildlife agencies have available a wide array of authorities and resources that can be used to provide additional protection for the species, as do other state and federal agencies (BDCP 6-48 & 6-50: emphasis added).<br><br>The draft Plan thus makes it difficult for the fish and wildlife agencies to revoke the incidental take permits if the biological objectives, conservation measures, and adaptive management changes do not achieve their primary goal of protecting and recovering the listed species. Procedural and substantive rigor is not in and of itself reason to doubt this last line of defense against extinction. | Please see response to comment 1672-127. |
| 1672 | 144 | Two additional facts lead us to the conclusion that permit revocation is not likely to be a credible means of ensuring the survival of the species if the BDCP fails its most essential task.<br><br>First, neither the federal fish and wildlife agencies nor the California Department of Fish and Wildlife have ever revoked an incidental take permit. Indeed, there is only one case in which a federal incidental take permit has been suspended, and that was for the permittee's violation of the terms and conditions of the habitat conservation plan, rather than because of changes in ecological conditions or the permittee's failure to agree to amendments to the biological objectives and conservation measures [footnote 18: See U.S. Fish and Wildlife Service Letter to Victor Gonzales, President of WindMar Renewable Energy, Feb. 2, 2012 (decision of partial suspension of incidental take permit).]. Revocation of the incidental take permits covered by the BCDP therefore would be an unprecedented event.<br><br>Second, a decision to revoke the incidental take permits would not be simply a scientific determination that the BDCP--as written today and implemented at some future date during its 50-year existence--is not adequate to ensure the conservation and recovery of the listed species. Although the BDCP assigns the authority to revoke the state incidental take permit to the Director of the California Department of Fish and Wildlife (BDCP 6-50), it stipulates that "[a]ny decision to revoke one or both federal permits must be in writing and must be signed by the Secretary of the Interior or the Secretary of Commerce, as the case may warrant" (BDCP 6-49). [footnote 19: This would change the process for permit revocation set forth in the federal ESA rules, which vest revocation authority in the Director of the U.S. Fish and Wildlife Service. 50 C.F.R. [Section] 17.22(b)(7).] In our judgment, this poses an undue risk that the revocation decision would be based on science and political considerations. Indeed, there would seem to be no other purpose for elevating the revocation authority from the fish and wildlife agencies to the two Cabinet-level Secretaries.<br><br>For these reasons, we do not believe that the state and federal authority to revoke the | The commenter’s concerns are noted. Please see response to comment 1672-127. |

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| | | incidental take permits compensates for the deficiencies in the draft BDCP described above. | |
| 1672 | 145 | Governance and Implementation of Adaptive Management<br><br>BDCP envisions that its adaptive management program will be organized and run by its Implementation Office. The office will be run by a Program Manager who will be hired by the Authorized Entity Group (AEG). The AEG will be made up of DWR, Reclamation, and the state and federal water contractors. The Program Manager selects and supervises a Science Manager, who takes on the responsibilities of running the adaptive management programs and coordinating, in unspecified ways, all science and monitoring activities.<br><br>The Science Manager will chair and manage an Adaptive Management Team (AMT) made up of a broad array of regulators, regulated entities, and science programs. These include representatives appointed by members of the AEG, the Permit Oversight Group (POG: California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, National Marine Fisheries Service), the Interagency Ecological Program (IEP), Delta Science Program (DSP), and NOAA Southwest Fisheries Science Center. This group will receive input from a Technical Facilitation Subgroup, part of a Stakeholder Council made up of multiple of stakeholder groups, regulated entities, and regulating entities.<br><br>The AMT, led by the Science Manager, will have the responsibility for designing, administering and evaluating the BDCP adaptive management program, including the development of performance measures, monitoring and research plans, synthesis of data, solicitation of independent review, and developing proposals to modify biological goals and objectives as well as conservations measures.<br><br>The AMT is to operate by consensus only, meaning all members must agree to all actions. Where consensus cannot be reached the matter is elevated to the AEG and POG for resolution. As a matter of course, all changes in conservation measures and biological goals and objectives must be approved by the POG and AEG. The entity responsible for decisionmaking (for example, NMFS regarding changes in biological goals and objectives for salmon) will decide the issue. However, as discussed in Chapter 8, any member of the AEG or POG may request review of the decision at the highest level of the relevant federal department or state, up to the appropriate department secretary or the Governor of California (BDCP Chapter 7, Section 7.1.7). | Please see Master Response 5 for a discussion of the governance structure proposed in the 2013 public draft BDCP.<br><br>A detailed description of the Collaborative Science and Adaptive Management Program is included in Chapter 3, Description of Alternatives, of the Final EIR/EIS. For more information on adaptive management and the proposed project, please see Master Response 33. |
| 1672 | 146 | An essential goal of the adaptive management program--seeking consensus for all decisions from all regulated and regulating entities as well as key providers of science--is understandable and, if it could be achieved, laudable. However, for several reasons this is unlikely to be successful.<br><br>First, as discussed in Chapter 8, this structure confuses the roles of regulators and regulated entities. It gives exceptional decision power to regulated entities, particularly those with a great financial stake in outcomes (state and federal water contractors). We are skeptical that difficult, perhaps costly decisions could be achieved in an efficient and effective manner since any member of the Authorized Entity Group or Permit Oversight Group can, in effect, elevate any decision, no matter how trivial, to the highest levels of government. This is likely to have a chilling effect on decisionmaking, making all parties cautious and risk-averse. These traits--caution and fear of taking risks--are antithetical to the principles of adaptive management by which all management decisions are viewed as experimental and inherently risky. The most likely outcome from this approach to governance of adaptive management is that preliminary decisions made during the initial phases of the plan are, | Please see Response to Comment 1672-145. |

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| | | through sheer inertia, likely to remain permanent, rendering the concept of adaptive management moot.<br><br>Second, the Adaptive Management Team is made up of a mix of regulators, regulated entities, and scientific providers such as Interagency Ecological Program and Delta Science Program. This places the science providers in the position of being decisionmakers, creating clear conflicts of interest. Most importantly, as discussed below, this eliminates one of the most important aspects of science in support of adaptive management: scientific independence. | |
| 1672 | 147 | Adaptive Capacity<br><br>The Adaptive Management Team, with approval from the Permit Oversight Group, Authorized Entity Group or higher federal and state authorities, will oversee implementation of the adaptive management program, presumably through the Science Manager. A central issue likely to arise when finalizing BDCP is the adaptive flexibility available. All such programs have a natural tension between wanting to provide assurances--such as how much water will be exported from the Delta--and needing flexibility in amount and timing of exports to test and implement adaptive management programs. The current BDCP documents offer little to no guidance on adaptive capacity. This is likely to play a major role in how adjustments are made in conservation measures and, more importantly, how real-time operations (an element of adaptive management) are implemented. BDCP has sought to defer this decision, both within the document and to its Decision Tree process (discussed below). | Please see Response to Comment 1672-145. Regarding operational criteria please see Master Response 28. For more information on the BDCP's decision tree process, please see Master Response 44. |
| 1672 | 148 | Science Program<br><br>Science should underpin the discussions and information needed to make and implement adaptive management decisions. The extensive literature on adaptive management cites a strong, well-funded, and well-organized science and monitoring program as essential for adaptive management. The BDCP documents do not provide extensive information about science to support adaptive management, other than a solid commitment to build and support a strong science program and, in the EIR/EIS, a significant funding commitment. As currently described, the science program would be run by the Science Manager under the direction of the Program Manager and the Authorized Entity Group. The role of the science manager would be to fund an array of activities, guide synthesis and analysis, and coordinate with the numerous public and private institutions working on the Delta. Beyond this, there are few specifics. | Please see Master Response 33 for a discussion of the adaptive management program. The funding commitment for the adaptive management and monitoring program is described in the 2013 public draft BDCP in Chapter 8. Specifics of the adaptive management and monitoring program are described in the biological goals and objectives in Chapter 3 of the Final EIR/EIS. Alternatives that include BDCP were revised to include more details on the adaptive management and monitoring program in Appendix 11F of the Final EIR/EIS. |
| 1672 | 149 | BDCP's current efforts on science have come in for extensive criticism from several entities, including the National Research Council (2012), the Delta Independent Science Board (Memo to Delta Stewardship Council dated May 20, 2013) and the Public Policy Institute of California (Hanak et al., 2013, Gray et al., 2013). To be fair, the project proponents recognize that the BDCP science program is a work in progress and likely to change before the public draft of the plan is released.<br><br>However, several significant issues will need to be resolved:<br><br>--Integration: the National Research Council in its review of Delta science was highly critical of the lack of integration of scientific efforts in the Delta. The NRC and others have pointed out that coordination is less effective than integration. BDCP is a once-in-a-generation opportunity to reorganize science in the Delta to make it more integrated and more | Please see Response to Comment 1672-145. By establishing a point of water diversion in the north Delta and new operating criteria to improve water volume, timing, and salinity, the proposed project is designed to improve native fish migratory patterns and allow for greater operational flexibility |

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| | | effective for addressing the major issues of the day. As structured, BDCP builds a new stand-alone science program that seeks to coordinate with other programs, such as Interagency Ecological Program and Delta Science Program, rather than to integrate them. This is unlikely to prove successful.<br><br>--Independence: as noted above, the Adaptive Management Team blurs the distinction among decision-makers, regulated entities, and the providers of science and technical advice. In addition, the BDCP science program is, in effect, run by the regulated entities and lacks independence. This creates the potential for bias in the selection of what science gets funded and what is ultimately made available to the public. Given that most major disputes in the Delta come down to differences of opinion in court about the best available science, demonstrating scientific integrity and transparency should be the highest priority.<br><br>--Oversight: as currently structured, there is no independent oversight of the BDCP science program. There is a commitment to promoting peer-review of scientific work products and plans. In addition, there is mention of coordinating with the existing DSP and the Delta Independent Science Board. But oversight, which is essential for creating public assurances that the best available science is being utilized in decision-making, is currently absent from the plan. | |
| 1672 | 150 | Funding: science is expensive, and for a program this large and complex, it is likely to be very expensive. There are no discussions regarding budget in the BDCP plan documents. However, in the administrative draft EIR/EIS there are substantial commitments to funding a science program. There are categories of funding (monitoring, research, etc.), but little information as to how it would be distributed, organized and administered. Still, this level of commitment is significant and necessary. | The budget for Alternative 4 is presented in Chapter 8 of the 2013 Public Draft. This cost estimate includes substantial biological monitoring and research to support the adaptive management and monitoring program.<br><br>For more information regarding funding sources please see Master Response 5. |
| 1672 | 151 | To be effective, during revision of the plan documents, BDCP will have to address the considerable weaknesses in science governance, integration with other programs, independence and transparency, oversight and funding. Notably, there is a parallel process underway, led by the Delta Stewardship Council, to develop a comprehensive plan for science in the Delta. This "One Delta, One Science" effort is essential for the success of BDCP. It seems to us that BDCP's science effort should be fully integrated with the Delta Science Plan, if not led by the DSP. However, to date, BDCP has had limited involvement with this planning process. | Please see Master Response 5 for discussions of the governance structure proposed in the 2013 public draft BDCP and the adequacy of the funding strategy for the purposes of the requested regulatory authorizations.<br><br>For information on compliance with the Delta Reform act please refer to Master Response 31, Appendix 3I and Appendix 3J of the Final EIR/EIS.<br><br>Additionally, a detailed description of the Collaborative Science and Adaptive Management Program is included in Chapter 3, Description of Alternatives, of the Final EIR/EIS. For more information on adaptive management and the proposed project see Master Response 33. |
| 1672 | 152 | Decision Tree<br><br>Earlier chapters of this review note that most controversial decisions, or decisions with high scientific uncertainty, are proposed to be resolved through adaptive management (i.e., deferred). One of the most important decisions will involve initial operations of the dual export facilities approximately ten years after issuance of the HCP/NCCP permit. The operations are to be based on the best available science on how to meet the co-equal goals of ecosystem benefit and water supply, with the goal of meeting the HCP/NCCP conservation standards.<br><br>A fundamental tension exists between two competing hypotheses regarding BDCP. The first, controlling hypothesis is that better management of existing export volumes with the dual | The Lead Agencies acknowledge that uncertainty is inherent in any planning effort of this geographic and temporal scale. However, DWR strived to use the best available science throughout the effects analysis, consistent with the requirements of the ESA. Additionally, the official public review process for the proposed project provides an opportunity for formal public comment on the proposed project and project alternatives. Public and agency comments on the public draft have led to further refinement of the proposed project, as evidenced in the RDEIR/SDEIS.<br><br>Please see Master Response 44 regarding the decision tree process and how it is intended to work.<br><br>Regarding operational criteria please see Master Response 28. |

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| | | facility, coupled with significant investments in floodplain, channel margin, and tidal marsh habitat to improve food webs, will improve conditions for covered species sufficiently to meet the HCP/NCCP standards. The second, embedded within the agency red flag comments and "progress reports", is that these steps are insufficient and that lower exports (higher outflow) will be needed to meet these standards. This issue is a paramount concern since it directly affects the economic viability of water supplied from the project. | A detailed description of the Collaborative Science and Adaptive Management Program is included in Chapter 3, Description of Alternatives, of the Final EIR/EIS. For more information on adaptive management and monitoring please see Master Response 33.<br><br>Regarding compliance with the Delta Reform Act, please refer to Master Response 31, Appendix 3I and Appendix 3J of the Final EIR/EIS.<br><br>Please see table of comments for responses to specific agency comments. |
| 1672 | 153 | As part of CM#1, BDCP will use a decision tree to address initial starting operations. As a starting point, BDCP embodies the two competing hypotheses in the Low Outflow Scenario and High Outflow Scenario operating criteria, viewing them as brackets on the potential range of operations. The goal of the decision tree is to conduct a series of detailed studies and experiments to develop specific flow criteria, particularly for spring outflow (longfin smelt) and Fall X2 (delta smelt), in the decade before operation of the export facility begins.<br><br>The decision tree is the first, and probably most important, element of the BDCP adaptive management program. Much of the success of the adaptive management program will be tied to this element, since the original adaptive management and science infrastructure will presumably be built around addressing the competing hypotheses. | Please see response to comment 1672-152. |
| 1672 | 154 | The decision tree approach to addressing starting operations is, in our view, laudable and appropriate. It makes no sense to wait until all uncertainties over this issue are resolved (a course of action proposed by diverse stakeholder groups).<br><br>Experience says this issue will never be resolved to everyone's satisfaction and will require constant (and contentious) adaptive management. This is a necessary and appropriate step. Regrettably, there is little information given in the BDCP documents about how the decision tree would be implemented, including who would fund it, how it would be structured, how decisions would be made, what science experiments would be conducted, etc. The lack of detail about the decision tree in the BDCP documents raises several key concerns:<br><br>--It takes time to develop and implement a large, complex scientific undertaking of the kind envisioned by the decision tree approach. The Pelagic Organism Decline crisis in the mid-2000's and the mobilization of the scientific community to address it is an example of a successful approach. But that still took considerable time and many issues addressed by the POD effort remain unresolved.<br><br>--To inform the potential placement and design of habitat restoration efforts to support food webs, new approaches to numerical modeling will be needed that better represent how these habitats function. Finding and funding the technical teams for this kind of work will take time and resources. A particular concern is whether contracting will be run through existing state and federal agencies who are notoriously slow at developing contracts.<br><br>--In addition, field experiments will be needed to inform and calibrate these models. This involves identifying locations to conduct experiments, modeling and designing actions, acquiring land or easements, implementing pre-project monitoring programs, implementing actions, monitoring responses, and incorporating results into system models. All of these actions take time and resources, but as is well-known by anyone working on ecosystem restoration in the Delta, the rate-limiting step is inevitably the length of time it takes to secure permits (see recent review in Hanak et al., 2013). | Please see Master Response 5 for a discussion of the governance structure proposed in the 2013 public draft BDCP.<br><br>Also see response to comment 1672-152. |

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| | | --Because any decision made regarding flow and habitat will have multiple, competing constituencies and regulatory interests, an extensive and often contentious public engagement effort will be needed. The history of the Delta suggests that all such significant decisions are litigated, further slowing this process.<br><br>These four concerns, as well as others, make us skeptical that the decision tree is likely to achieve the goal of resolving operations issues within a 10 to 15 year time period. We cannot say with certainty that it will not be successful. A committed, well-funded, well-managed effort on the part of all parties may yield useful conclusions. However, given that this is the less likely outcome, it seems imperative that BDCP negotiate export operations criteria that, in the absence of a successful decision tree process, will be implemented at the start of the project.<br><br>Our work in previous chapters has cast doubt on the viability of the controlling hypothesis that underpins BDCP. To this end, we think it prudent to, at minimum, adopt the High Outflow Scenario (HOS) operating criteria as the starting condition if the decision try fails to identify operating procedures. In addition, if BDCP is truly committed to adaptive management and the use of best available science, it is not appropriate to set artificial boundaries--HOS and Low Outflow Scenario (LOS)--on the decision tree process. It is our view that the decision tree research effort should seek to define best operating procedures rather than being forced to operate within the HOS and LOS range. There is a reasonable chance that the decision tree process may ultimately determine that the HOS flow criteria are not protective enough. | |
| 1672 | 155 | Operations<br><br>Do operations of the dual facilities meet the broader goal of taking advantage of wet and above average years for exports while reducing pressure on below average, dry and critically dry years? What substantive changes in operations (and responses, see below) are there both seasonally and interannually?<br><br>We analyzed the CALSIM data on export operations under No Action Alternative (NAA), High Outflow Scenario (HOS) and Low Outflow Scenario (LOS) for Early Long Term conditions. We note that the modeling of flows under BDCP has three compounding uncertainties: uncertainty over system understanding and future conditions, model uncertainties associated with CALSIM, DSM2 and UnTrim, and behavioral/regulatory uncertainty, where the model cannot fully capture operational flexibility. For this reason, model outputs should be viewed as approximations useful for comparing different scenarios rather than as a predictor of future conditions. This issue influences all of our conclusions.<br><br>Based on our review we conclude:<br><br>--The array of existing and projected flow regulations significantly constrains operations in BDCP. The assumed operational flexibility associated with new North Delta facility is limited.<br><br>--HOS and LOS operations promote greater export during wet periods through increased use of North Delta diversions during the winter and spring. During dry and critical years, there is not much difference in average exports compared to NAA. For this reason, BDCP generally fails to meet the broader objective of reducing pressure on the Delta during dry periods.<br><br>--In some dry periods regulatory controls on Old and Middle River (OMR) flows and North Delta diversions lead to significant increases in outflow and OMR flows over NAA. These | The CALSIM II, DSM2, and CVHM modeling tools are prospective and not predictive modeling tools. These tools are to be used to compare alternatives, and not to identify absolute values, as described in Chapter 5 of the EIR/EIS. Therefore, the Draft EIR/EIS uses the model outputs for the impact analysis that compares conditions under Alternatives 1 through 9 to conditions under the Existing Conditions and the No Action Alternative.<br><br>Additional modeling information is also provided in Appendix B, Supplemental Modeling for New Alternatives in the 2015 RDEIR/SDEIS and Master Response 30. For more information regarding operational flows see Master Response 28 and for more information on adaptive management and collaborative science elements of the proposed project, please see Master Response 33. |

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| | | unexpected results are the consequence of stricter flow requirements for HOS and LOS and operations being tied to previous water-year type in the fall and early winter. We are unsure if the project would actually be operated this way under these conditions.<br><br>--We evaluated how NAA, HOS and LOS performed during extended droughts. Of the three scenarios, HOS appears to be most protective of both supply and ecosystems by reducing the frequency and duration of dead pool conditions on Sacramento Valley reservoirs and assuring higher spring and fall outflows.<br><br>Recommendations: caution must be used in interpreting CALSIM model results for both export and environmental performance of BDCP due to compounding uncertainties. However, modeling results suggest that overall flow conditions are improved over NAA. | |
| 1672 | 156 | Impacts of north Delta facility:<br><br>Based on operations criteria, does the Plan properly identify ecological impacts likely to occur adjacent to and in the bypass reach downstream of the new north Delta diversion facilities? If there will be direct and indirect harm to listed species by the facilities, does the Plan prescribe sufficient mitigation measures?<br><br>We reviewed the Conservation Measures and Effects Analysis of BDCP, including supporting appendices to evaluate conditions upstream of the north Delta facility, as well as near-and far-field effects of the facility itself. Our focus was on winter-and spring-run Chinook salmon, rather than all covered species. Based on this review we conclude:<br><br>--The BDCP consultants have appropriately identified the range of impacts on listed salmon likely to be associated with the operations of the north Delta facility. These include near-field effects such as impingement on intake screens and high predation losses at the facility, to far-field effects such as reduced survivorship of juvenile salmon due to higher transit times and redirection into the interior Delta. Using multiple modeling approaches, they have created reasonable estimates of losses due to operation of the facility.<br><br>--Mitigation for take associated with the new facility includes restricting diversion flows during initial pulse flows in the river, predator control, non-physical barriers, real-time operations to protect outmigrants, and modification of the Fremont Weir to divert fish onto the Yolo Bypass. With the possible exception of benefits from Fremont Weir modifications the uncertainties over mitigation actions are all high.<br><br>--We see high potential value in the Yolo Bypass for mitigating the effects of north Delta diversions on juvenile salmon, particularly in drier conditions. Therefore, existing adaptive management programs on the Bypass must be supported, with accelerated pilot studies, monitoring and ecological modeling, to ensure success of any modifications of the Bypass.<br><br>--Mitigation is hampered by the lack of a viable adaptive management plan or real-time management plan in the current BDCP for the north Delta facility. Still, even with these uncertainties, if managed well, fully implemented and functioning as described in the plan, the actions appear to mitigate for losses associated with the north Delta facilities.<br><br>--These mitigation efforts alone are unlikely to lead to significant increases in salmon populations, and extinction risk remains high for winter-and spring-run Chinook salmon, particularly during extended drought and warm periods when reservoirs are low. However, | Please see Master Response 22 regarding mitigation measures. Master Response 29 discusses compliance with the Endangered Species Act. For information on impact analysis please see Master Response 9 and Master Response 10. Additionally, for information on upstream reservoir effects please see Master Response 25. Adaptive management and monitoring is discussed in Master Response 33 and operational criteria are discussed in Master Response 28. |

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| | | reservoir management is not within the scope of BDCP.<br><br>Recommendations: given the uncertainties over mitigation for the North Delta facility, we recommend that all mitigation actions be evaluated and completed prior to initiating operations the north Delta facility. Of highest priority is to bolster and complete adaptive management activities in progress on the Yolo Bypass. Additionally, we recommend establishing an adaptive management and real-time management program with the capacity to conduct significant experiments in flow management, predator control, and non-physical barrier implementation prior to initiating facility operation. These should be conditions of the HCP/NCCP take permit. | |
| 1672 | 157 | In-Delta Conditions<br><br>Are changes in operations and points of diversion prescribed in the Plan sufficient to significantly improve in-Delta conditions for covered species? The focus is on listed species, including Delta and longfin smelt, steelhead, winter and spring run Chinook, and green sturgeon.<br><br>American Rivers focused our analysis on in-Delta conditions that may affect Delta smelt and Longfin smelt. We reviewed the effects analysis and supporting documentation and conducted our own modeling based on CALSIM output. Based on this work we conclude:<br><br>--The CALSIM output we used showed conditions that appeared anomalous based on our understanding of how the system would actually be operated. Although we have been assured that these conditions were logical consequences of model design and operation to meet flow requirements, we remain unconvinced that they reflect actual future operations under the hydrologic conditions simulated. We therefore caution that the conclusions below are contingent upon the actual operations of the system resembling those in the model output. They are also contingent on the biological models accurately reflecting responses of the species to flow conditions.<br><br>--Roughly half of the export from the Delta will go through the North Delta facility. In addition, Old and Middle River (OMR) flow regulations are more restrictive (protective) under High Outflow Scenario (HOS) and Low Outflow Scenario (LOS) scenarios than No Action Alternative (NAA). Thus the incidence of positive OMR flows rose from 11% under NAA to 16% under HOS and LOS conditions. HOS and LOS are consistently more protective of smelt than NAA under these modeling assumptions.<br><br>--OMR flow regulation under HOS and LOS for October through January is governed by previous water year type. This leads to anomalously high (positive) OMR flows and corresponding outflow during some dry periods, creating apparent benefits for delta smelt. We are uncertain if this would manifest in real operations.<br><br>--Entrainment results in fractional population losses of delta smelt that can be calculated from modeled flow conditions. Based on these calculations, we estimate that HOS and LOS reduced fractional population losses by half compared to NAA. If actual operations were similar to the model results, they would lead to significant decreases in entrainment.<br><br>--Estimates of relative differences in long-term survival percentages (not predictions) showed a 19-fold increase for HOS and 11-fold increase for LOS over NAA, albeit with large uncertainty. A difference of this magnitude over the last 20 years would have reversed the | The commenter's recommendation is noted. Please see Master Response 28 for information on operational criteria and flows. Also see Master Response 17, Biological Resources. Additional information on the effects of the proposed project on both fish and aquatic resources can be found in Chapter 11 of the final EIR/EIS. For more information on modeling, please see Master Response 30. |

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| | | decline of delta smelt in the 2000s.<br><br>--Increases in spring outflow are projected by the models to produce only a very small increase in longfin smelt abundance index under HOS compared to NAA, and a comparable decrease under LOS.<br><br>--Increases in fall outflow under HOS are projected to produce a small increase in recruitment by the following summer, and under LOS a modest decrease, but because of high variability in the data used to make these predictions, these values are very uncertain.<br><br>Recommendations: we remain uncertain about significant reduction in fractional population losses of delta smelt under the new HOS and LOS operating criteria. We recommend investment in resolving these uncertainties before operations are finalized. If these relationships are supported, then operational rules need to be refined to protect the benefits of these improvements over a broad range of conditions. | |
| 1672 | 158 | Benefits of Habitat Restoration<br><br>Are covered pelagic fish like longfin smelt and delta smelt likely to benefit from restoration of floodplain and tidal marsh habitat at the scale proposed by the Plan? Given the current state of knowledge, and assuming that all Plan commitments are met, are these efforts likely to result in relaxed X2 and spring outflow standards?<br><br>A fundamental hypothesis embedded in the BDCP goals and objectives is that improvements in physical habitat, particularly floodplain and tidal marsh, will improve conditions for covered fishes. We focused our assessment on the relationship between habitat restoration and longfin and delta smelt. Based on this analysis we conclude:<br><br>--BDCP correctly identifies food limitation as a significant stressor on delta and longfin smelt, particularly in spring through fall. Increasing food availability in smelt rearing areas would likely lead to increases in population.<br><br>--Tidal marshes can be sources or sinks for phytoplankton and zooplankton. Most appear to be sinks, particularly for zooplankton. There is high on-site consumption of productivity within marshes.<br><br>--Even under the most highly favorable assumptions, restored marshes would have at best a minor contribution to plankton production in smelt rearing areas.<br><br>--Smelt can benefit by having direct access to enhanced productivity. This is likely the case for the subpopulation of smelt that reside in Cache Slough.<br><br>--BDCP is too optimistic about benefits of tidal marsh and floodplain restoration for smelt, particularly the extent of food production. These optimistic views are indirectly guiding the LOS outflow criteria. There is no clear connection, however, between the two and investments in marsh restoration are unlikely to lead to reduced demand for outflows.<br><br>Recommendations: it is possible but unlikely that marsh restoration will materially improve conditions for smelt, although other ecosystem and species benefits of marsh restoration are much more likely. Only moderate-to large-scale experimental restoration projects are likely to resolve this uncertainty and to help in designing future efforts. BDCP should design and describe a specific program to resolve this issue. Until this uncertainty is resolved flow | Please see response to comment 1672-113 regarding habitat restoration. Additionally, Chapter 11 of the Final EIR/EIS addresses the effects of restored habitat on delta smelt and longfin smelt. |

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| | | management will remain the principal tool to mitigate project impacts. | |
| 1672 | 159 | Governance<br><br>Does the Plan provide achievable, clear and measurable goals and objectives, as well as governance that is transparent and resilient to political and special interest influence?<br><br>We analyzed the proposed governance structure of BDCP, including the responsibilities and authorities of new entities such as the Authorized Entity Group (AEG), the Permit Oversight Group (POG), the Adaptive Management Team (AMT), Implementation Office, Program Manager and Program Scientist. Based on this review we conclude the following:<br><br>--The governance plan, as structured, blurs the responsibilities between implementation and regulation. It grants AEG final decisionmaking power over actions that should be solely within the authority of the permitting agencies. It also involves the permitting agencies too heavily in implementation of the project.<br><br>--As written, the plan grants the AEG veto authority over proposed changes in the program, including any changes in biological goals and objectives or conservation measures.<br><br>--The AEG has the power to veto any minor modification, revision or amendment to the Plan that may be necessary to manage listed species.<br><br>--The regulatory assurances set forth in the draft Plan severely constrain the fish agencies' ability to respond to inadequacies in biological objectives.<br><br>--Given the high uncertainties inherent in BDCP, it is very likely that unforeseen circumstances will require significant changes in biological goals and objectives and conservation actions. Under the 50-year "no surprises" guarantee, the fish agencies assume financial responsibility for many significant changes. This liability could deter needed regulatory changes to BDCP and CVP/SWP operations.<br><br>--The procedural hurdles necessary to revoke the incidental take permit of BDCP are so great that revocation is unlikely to occur over the 50-year life of the permit. Indeed, permit revocation and termination of the BDCP would be unprecedented under both state and federal law.<br><br>Recommendations: The POG should be granted exclusive regulatory authority to determine whether budgets and workplans are consistent with the permit and to approve revisions to the biological goals and objectives or amendments to the plan. It should have the authority to initiate changes needed to insure protection of the covered species. The POG's functions should be limited to regulatory oversight rather than direct involvement in implementation. There should be a "no surprises" guarantee for construction of the project. Upon completion of the project, there should be renewable "no surprises" guarantees every ten years. These renewals should be based on conditions at the time of renewal and appropriateness of biological goals and objectives. This approach creates an incentive for all parties to adapt to changes in conditions to sustain covered species, rather than simply fulfilling obligations on conservation measures. | Please see Master Response 5 for a discussion of the governance structure proposed in the 2013 public draft BDCP. Also see response to comment 1672-24 regarding changes.<br><br>A detailed description of the Collaborative Science and Adaptive Management Program is included in Chapter 3, Description of Alternatives, of the Final EIR/EIS. More information on adaptive management can also be found in Master Response 33. |
| 1672 | 160 | Science and Adaptive Management<br><br>Is there a robust science and adaptive management plan for BDCP? As described, is the proposed "decision tree" likely to resolve major issues regarding Fall X2 and Spring Outflow | Please see Master Response 5 for a discussion of the governance structure proposed in the 2013 public draft BDCP. For more information on the Decision Tree please see Master Response 44. Please also see Master Response 33 for a discussion of the adequacy of the adaptive management program. |

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| | | prior to initial operations?<br><br>We reviewed the science and adaptive management plans in both the plan and EIS/EIR documents. Most issues with high uncertainty or controversy in the Plan are relegated to resolution through an adaptive management process. Based on the documentation, we conclude:<br><br>--Given the major uncertainties facing BDCP a robust, well-organized and nimble adaptive management plan will be necessary. The current plan adheres to and strongly promotes the principles of adaptive management and science.<br><br>--The requirement of unanimous consent for all decisions by the Adaptive Management Team, and veto power of any member of the Authorized Entity Group and Permit Oversight Group is a barrier to adaptive management.<br><br>--There is a blurring of the responsibilities between regulators and those responsible for implementation of adaptive management that has the potential to create conflicts. There is a conflicting relationship between AMT decisionmaking and the scientific organizations providing support for decisonmaking.<br><br>--The plan recognizes the importance of adaptive capacity, meaning flexibility in operations and actions that allow for learning. Yet it does not describe this capacity in a meaningful way.<br><br>--There is almost no description of a science program. What is provided lacks evidence for integration with existing programs, transparency, independence from bias and influence, and structured oversight. These are all necessary for success.<br><br>--The decision tree process to establish initial operating conditions is appropriate. Done well, it can resolve many issues. However, it is unlikely to resolve the central issue over starting conditions in time to implement them.<br><br>--Although difficult decisions are relegated to a future adaptive management program, actually implementing such a program on such a scale will be very difficult and will require careful design. BDCP does not provide information sufficient to determine whether it will be effective. We remain skeptical that it will.<br><br>Recommendations: many of the recommendations for changes in governance made previously will go a long way toward improving the adaptive management program, including the separation of regulators from implementation efforts. However, the plan still needs a complete description of how its adaptive management program would function. The AMT, in whatever form it takes, should be advised by a science program, without scientists responsible for decisionmaking. The science program should be integrated with existing Delta science programs, rather than inventing a new parallel program. The best opportunity for integration is the current efforts to establish a Delta Science Plan through the Delta Science Program and Delta Stewardship Council. Given that the decision tree is unlikely to fully reduce uncertainties in time, coupled with our concerns over how the project would be operated rather than modeled, we recommend that default starting operating conditions be negotiated that approximates the HOS scenario, with a goal of identifying and operationalizing attributes of this scenario that are most beneficial to listed fishes. | A detailed description of the Collaborative Science and Adaptive Management Program is included in Chapter 3, Description of Alternatives, of the Final EIR/EIS. |

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| 1672 | 161 | ATT1: ATT34: Appendix A: Operational rules for the proposed North Delta Facility (from Draft Administrative Bay Delta Conservation Plan) | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 162 | ATT1: ATT35: Table 3.4.1-2. Flow Criteria for North Delta Diversion Bypass Flows from December through June. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 163 | Appendix B: Impaired flows into an impaired estuary<br><br>The Sacramento River watershed is the main source of inflow to the Delta and is integral to current operations of the SWP and CVP. The construction of a new North Delta facility will not change the reliance on the Sacramento watershed very much. However, in conjunction with limited changes in reservoir operations and modifications to the Yolo Bypass, it will alter the timing of inflows to the Delta.<br><br>One of the goals of BDCP and the Delta Plan is to create a more natural flow regime. As noted in Chapter 4, there is little natural about the landscape, and humans are fully integrated into the ecosystem. Still, returning more natural seasonal flow changes will help in managing species whose life history traits are tied to flow cues.<br><br>The projected changes in outflow under BDCP are presented in Figure 3.1. These monthly averages are compared to current (not Early Long Term) unimpaired outflow from the Delta, an imperfect measure of outflow under unregulated conditions that can be used for comparison of BDCP scenarios. All alternatives, including the no-project alternatives, do little to alter the significant changes in Delta outflow regime. The winter flood pulse associated with high runoff from mixed rain/snow storms has been greatly reduced in all but wet years. More significantly, the spring snowmelt pulse is attenuated, and largely missing in most of the drier years. Only late summer/early fall baseflow seasons have flows that are equal to or larger than unimpaired conditions.<br><br>Since the Sacramento outflow is a dominant signature for estuarine conditions (second to tides), we examined the magnitude of change in inflow from the Sacramento and compared it to unimpaired flow conditions. We used two simple methods to illustrate the magnitude of change overall and relative changes between ELT scenarios. The first involves calculating a monthly impairment index, I, where:<br><br>I = (scenario flow)-(unimpaired flow)/(unimpaired flow)<br><br>Where I approaches 0, the scenario flow is less impaired, where I > 0 scenario flows exceed unimpaired flows and where I < 0, scenario flows are less than unimpaired flows. The magnitude of I is a simple way of describing the magnitude of seasonal impairment. These results are summarized in Figure 3.2 for all water year types.<br><br>The impairment index is strikingly similar in pattern for all year types, with high negative impairments during the winter and spring and high positive impairments for the summer and early fall. This result is surprising because there are only subtle differences between year classes. The only significant variation between year classes occurs in the late | Please see Master Response 3 regarding the project's purpose and need. For information on compliance with the Delta Reform Act please refer to Master Response 31, Appendix 3I and Appendix 3J of the Final EIR/EIS.<br><br>Operational criteria are discussed in Master Response 28. |

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| | | summer/early fall when Fall X2 outflow rules predominate.<br><br>This broad similarity in impairment highlights how uniform the hydrology of the Delta has become: an issue raised in Lund et al., 2007 and Hanak et al, 2011 as contributing to the regime change in Delta ecosystems. It also shows how little effect the High Outflow Scenario and Low Outflow Scenario are likely to have on Sacramento inflows to the Delta.<br><br>A second approach can be used to characterize total impairment of individual year types. In this, we have plotted unimpaired vs. impaired flow for each scenario and each year type, and fitted a line and calculated r2. The deviation of the slope of the line from 1 (impaired = unimpaired) illustrates the overall magnitude of impairment, while r2 is a measure of variation in relative impairment. These results are shown in Figures 3.3-3.5.<br><br>The results of impairment scatterplots shows that in general, the magnitude of impairment, as measured by slope, and the magnitude of variation from unimpaired flow, as measured by r2, are least in wet years and maximum in drier years. This reflects the dominance of water use and operations on Delta hydrology during dry years when the capacity for water alteration is greatest. In addition, there appears to be no substantive difference between the scatterplots of the different scenarios. | |
| 1672 | 164 | ATT1: ATT36: Delta outflow under High Outflow Scenario, Low Outflow Scenario, and No Action Alternative Early Long Term in comparison to unimpaired outflow. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 165 | ATT1: ATT37: Figure 3.2: Sacramento River impairment index for High Outflow Scenario, Low Outflow Scenario and No Action Alternative Early Long Term. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 166 | ATT1: ATT38: Figure 3.3. Scatterplot of No Action Alternative Delta outflows vs. estimated unimpaired flows for Early Long Term conditions. Higher slope and lower r2 provide a relative measure of impairment. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 167 | ATT1: ATT39: Figure 3.4: Scatterplot of High Outflow Scenario alternative Delta outflows vs. estimated unimpaired flows for Early Long Term conditions. Higher slope and lower r2 provide a relative measure of impairment. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 168 | ATT1: ATT40: Figure 3.5. Scatterplot of High Outflow Scenario alternative Delta outflows vs. estimated unimpaired flows for Early Long Term conditions. Higher slope and lower r2 provide a relative measure of impairment. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 169 | Appendix C: Effects of changes in flow conditions on entrainment losses of delta smelt<br><br>This Appendix describes the methods and results of analyses of flows in the South Delta and | The methods described here represent an alternative to the methods used in the public draft BDCP (see Appendix 5.B, sections 5.B.5.5.1 and 5.B.6.1.5), which were the same as used in the USFWS (2008) BiOp. |

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| | | their potential effects on delta smelt. The general procedure was to determine a relationship between survival or recruitment during some life stages of delta smelt, and calculate the expected response based on conditions modeled using CALSIM and using historical data. CALSIM results were available for 1922-2003 for three BDCP scenarios: NAA, HOS and LOS. Historical data were used for inflow, export flow, and outflow during 1955-2003, and Old and Middle River flows from 1980 to 2003.<br><br>The calculations were based on results of Kimmerer (2008) as amended for adult delta smelt by Kimmerer (2011). Miller (2011) pointed out some potential biases in that analysis. Young delta smelt may be more abundant in the northern Delta than previously believed, which would mean that the proportional losses calculated by Kimmerer (2008) were too high (Miller 2011); however, this potential bias was not considered amenable to quantitative analysis with the available data (Kimmerer 2011). Nevertheless, the estimates of entrainment losses and reductions in losses herein may actually be somewhat overestimated.<br><br>The principal assumptions for this analysis are stated in Chapter 6. For the analyses of export losses we used a resampling method to account for uncertainty in the underlying statistical relationships between flow and entrainment. The error distributions from these models were sampled 1000 times to arrive at uncertainty estimates. The same 1000 samples were used for each year and scenario. This allowed us to include variability due to model uncertainty, and to allow direct comparisons among scenarios. The calculation was repeated for each year to provide the variability due to the hydrological conditions modeled under each scenario. Confidence limits were estimated as quantiles of the resulting set of simulated values for each parameter. | For more information on modeling for the proposed project please see Master Response 30. |
| 1672 | 170 | Losses of adult delta smelt:<br><br>Losses as a proportion of the population of adult delta smelt had been estimated from salvage density, catches in the Spring Kodiak and Fall Midwater Trawl surveys, and flows in the south Delta (Kimmerer 2008, 2011). We related these estimates to total southward flow in Old and Middle Rivers:<br><br>[see letter for equation]<br><br>where QSD is mean flow in the South Delta during December-March, and QOM is monthly mean or modeled flow in Old and Middle Rivers.<br><br>Estimated annual proportional losses PL were related to QSD by linear regression for each year during which data were available (water years 1995-2006),<br><br>[see letter for equation]<br><br>where a=-0.03 and b= 0.0082 ± 0.0034 are regression coefficients. PL was calculated using a revised estimate of the scaling factor Θ which accounts for<br><br>(2)<br><br>uncertainty in the calculation of PL; Θ has a mean of 22 and standard deviation of 5.2 (Kimmerer 2011). | The results for the method described here gave qualitatively similar results (less entrainment under the BDCP) to the methods used in the public draft BDCP (see Appendix 5.B, sections 5.B.5.5.1 and 5.B.6.1.5), which were the same as used in the USFWS (2008) BiOp. However, this analysis suggested a relatively greater difference between the NAA (EBC2_ELT) and BDCP scenarios than was suggested by analysis presented in the BDCP public draft, reflecting the different regression coefficients. For more information on modeling for the proposed project please see Master Response 30. |

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| | | Because PL is a mortality we calculated means for a 20-year period by converting these values to survival, calculating geometric means, and converting back to proportions lost:<br><br>[see letter for equation]<br><br>where the overbar indicates a mean, N is the total number of years, and PLi is the proportional loss for each year. The 20-year period was somewhat arbitrary but is roughly the timescale for the decline in abundance of delta smelt. To examine differences between pairs of the three scenarios we calculated the arithmetic means of differences for each pair.<br><br>There was little difference in mean PL values between the full time series used in the analysis and the reduced time series that included the historical period (1980-2003). The No-Action Alternative (NAA) had a slightly lower percent annual loss than the historical period. The High and Low-Outflow scenarios (HOS and LOS) had similar values that were slightly below half of that of the NAA, or a net change in loss of about 3%/year. | |
| 1672 | 171 | Losses of juvenile delta smelt:<br><br>Losses as a proportion of the population of juvenile delta smelt had been estimated from the spatial distribution of fish in the 20mm survey and flows in the south Delta supplemented by particle-tracking results (Kimmerer and Nobriga 2008, Kimmerer 2008). We related these estimates to total inflow to the Delta and export flow, noting that these results may vary depending on the proportion of inflow that is from the San Joaquin River. As with adults, CALSIM output was averaged over March - May for each year and scenario.<br><br>Annual proportional loss was calculated from a regression originally derived from particle-tracking data and applied to estimated losses of young smelt:<br><br>[see letter for equation]<br><br>where a=-3, b= 0.36 ± 0.17, c= 0.90 ± 0.24, and d= -0.10 ± 0.03 are regression coefficients (Kimmerer 2008).<br><br>PL values were accumulated and plotted as above (see Figures in Chapter 6). The annual means for the No Action Alternative were somewhat lower than the historical values, reflecting overall lower export flows than in the historical period. Both of the alternative scenarios resulted in substantial decreases in loss rates from about 14%/year to 3-5 %/year, and the Low Outflow Scenario showed about a 2%/year higher loss rate than the High Outflow Scenario. | The methods described here represent an alternative to the methods used in the public draft BDCP (see Appendix 5.B, sections 5.B.5.5.1 and 5.B.6.1.5), which were the same as used in the USFWS (2008) BiOp. The results differed somewhat between the methods because of the regression terms used in the modeling (and possibly because the method from the public draft used a slightly longer averaging period, i.e., March-June): there was little overall difference in estimated larval/juvenile delta smelt entrainment loss between the BDCP (i.e., ESO_ELT and LOS_ELT scenarios) and NAA (i.e., EBC2_ELT) from the public draft BDCP (see sections 5.B.6.1.5 and 5.B.6.5.2), reflecting the inclusion of terms for Old and Middle River flows (negatively related to entrainment, and less negative under BDCP) and X2 (positively related to entrainment, and greater under the ESO_ELT and LOS_ELT scenarios); under the HOS_ELT scenario (which has greater spring outflow in some years) entrainment slightly less than under the other scenarios. For the analysis included in the commenter's attachment, the terms included in the analysis were south Delta exports and Delta inflow (minus north Delta intake exports) plus the interaction of the two, which may have accounted for the considerably lower estimates of entrainment under the BDCP than for NAA. For more information on modeling for the proposed project please see Master Response 30. |
| 1672 | 172 | Appendix D: Evidence for food limitation of the smelt species<br><br>Delta smelt larvae consume mainly early life stages of copepods, switching to adult copepods as soon as they are able to catch and ingest them (Nobriga 2002, Hobbs et al. 2006, L. Sullivan, SFSU, pers. comm.). Juvenile delta smelt feed mainly on adult copepods (Moyle et al. 1992, Lott 1998, Nobriga 2002, Hobbs et al. 2006), although they consume other zooplankton such as cladocerans in freshwater. The diets of adults include larger organisms such as mysids and amphipods (Bippus et al. poster 2013; Johnson and Kimmerer 2013 talk).<br><br>Evidence in favor of food limitation (numbers in parentheses indicate the steps in the logic | This comprehensive summary generally agrees with the conclusion of the BDCP with respect to the critical importance of food (specifically zooplankton) as a constraint to the smelts (see sections 5.5.1.1.2 and 5.5.2.1.1 in Chapter 5 of the BDCP public draft). The analysis of Alternative 4A effects on Delta smelt are presented in Chapter 11 of the Final EIR/EIS. |

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| | | chain in Chapter 7)<br><br>Both smelt species<br><br>1. (1) Following the spread of the overbite clam Potamocorbula in 1987, sharp declines occurred in phytoplankton biomass and productivity, diatom production, and abundance of copepods and mysids, which are the principal prey of both species (Alpine and Cloern 1992, Kimmerer et al. 1994, Orsi and Mecum 1996, Kimmerer and Orsi 1996, Kimmerer 2005, Winder and Jassby 2011)<br><br>2. (1) At around the same time abundance indices of several fish species declined, notably anchovy, longfin smelt, and striped bass (Kimmerer 2002, 2006, Kimmerer et al. 2009), indicating an overall response of estuarine fish populations to the decline in food abundance. The decline in anchovy abundance in brackish waters (but not in high salinity) was particularly sharp and closely tied in time to the 1987 decline in phytoplankton biomass.<br><br>Delta smelt<br><br>3. (1) Gut fullness of delta smelt larvae was positively related to copepod density (Nobriga 2002). This suggests that when there is more food the smelt larvae eat more.<br><br>4. (1) Feyrer et al. (2003) found that delta smelt guts averaged about 40% full in Suisun Marsh before Potamocorbula arrived. This was similar to the gut fullness of most other fish species. It suggests that if there were more food the fish would have eaten more, or that there is some other limit to gut fullness.<br><br>5. (1) The functional response of larval delta smelt from laboratory experiments shows that the feeding rate saturates at a prey concentration well above that seen in any zooplankton samples in the smelt habitat during May --July of 1993-2011 (L. Sullivan, SFSU, unpublished; see Figure A7.1).<br><br>6. (2) Glycogen was depleted in 30% of fish in summer and 60% of fish in fall of 1999 (Fig. 28C in Bennett 2005) which could be interpreted as evidence of poor nutrition either because of a food shortage or because of some toxic effect; however the frequency of toxic damage was <10% in these fish.<br><br>7. (2) Mean lengths declined in either 1989 (Bay Study) or 1993 (FMWT study; Fig. 29 in Bennett 2005). The latter year is when the copepod Pseudodiaptomus forbesi shrank back from the LSZ in summer-fall, presumably because of the combined effects of clams and the introduction of other copepods. Bennett (2005, Figure 30) also showed positive relationships between mean length of delta smelt and copepod density (Bennett Fig. 30).<br><br>8. (3a) Copepod biomass is correlated with an index of survival from summer to fall (Kimmerer 2008).<br><br>9. (3a) Abundance data show evidence for density dependence between summer and fall when the early years are included (Bennett 2005 Fig. 17). A likely cause of density dependence is food limitation, although other mechanisms are also possible.<br><br>10. (1-4) Several model analyses show strong effects of food supply on the population rate of increase (Maunder and Deriso 2011, Rose et al. 2013a, b, Kimmerer and Rose, in prep). Note, however, that these models are incomplete and can only show effects based on what | |

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| | | is in them.<br><br>11. A multivariate autoregressive (MAR) model (Mac Nally et al. 2010) showed weak support for a positive link between calanoid copepod abundance and delta smelt abundance index.<br><br>Longfin smelt<br><br>12. (1) Longfin smelt prey mainly on mysids after summer (Feyrer et al. 2003). Mysids declined sharply after 1987 (Orsi and Mecum 1996, Winder and Jassby 2011).<br><br>13. (Overall) Abundance of longfin smelt declined sharply after the introduction of Potamocorbula, when the strong effect of freshwater flow is taken into account (Kimmerer 2002, Kimmerer et al. 2009). Striped bass, which also feed on mysids (Feyrer et al. 2003), also declined at that time.<br><br>14. A multivariate autoregressive (MAR) model (Mac Nally et al. 2010) showed weak support for a positive link between calanoid copepod abundance and longfin smelt abundance index.<br><br>Evidence that does not support food limitation or is missing<br><br>15. The abundance of delta smelt did not change when Potamocorbula arrived or 1993, which were the two times of greatest change in calanoid copepod abundance in the low-salinity habitat of delta smelt.<br><br>16. A changepoint model (Thomson et al. 2010) showed no link between abundance of various zooplankton and abundance indices of either smelt species.<br><br>17. Sampling for zooplankton is at too coarse a scale to represent the prey abundance that the smelt perceive, and the spatial distribution of prey cannot be replicated in the laboratory. Therefore it may be misleading to extrapolate functional responses from the laboratory to the field.<br><br>18. There is no direct evidence for effects of food on survival, maturity, or fecundity. | |
| 1672 | 173 | Appendix E: Model of plankton subsidy from marsh to estuary<br><br>Here we assume that the restored areas will actually produce an excess of phytoplankton or zooplankton over adjacent waters, and ask what additional level of food availability to the smelt would result. This is based on a very simple model and some calculations using data from Interagency Ecological Program monitoring, as noted below. These calculations are unpublished except where a citation is given; details of calculations are available on request.<br><br>The additional zooplankton biomass available to the open-water areas as a result of production in restored shallow subtidal areas depends on the excess production in the restored areas, the resulting gradient in biomass, the tidal exchange rate between the restored areas and open waters, and the net population growth rate of the zooplankton in the open waters. The benefit of that additional supply to the smelt species depends on the proximity of the restored area to the population centers of the smelt (Fig. 7.2).<br><br>A simple model of this subsidy is: | Please see related response to comment 1672-120. |

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| | | [see letter for equation]<br><br>where F (d-1)is the subsidy as a daily proportion of plankton biomass in the receiving water, B is biomass per unit volume, V is volume, BR and VR are biomass and volume in the restored area, and X is exchange rate as a daily proportion of the volume of the restored area (d-1). Biomass and volume units cancel out.<br><br>It is clear from Equation 1 that the subsidy is maximized when the restored area is large, the zooplankton biomass in the restored area is well above that in the open water, and exchange rate is high. However, there is an interplay among biomass BR, volume VR, and exchange rate X. First, water depth has three competing effects: 1) Phytoplankton growth rate is highest in shallow water where light penetration is high; 2) For a given area of restoration, volume is inversely related to water depth; 3) any bivalve grazing consumes phytoplankton and zooplankton in inverse proportion to depth. Second, as the exchange rate X increases, net population growth rate within the restored area decreases as organisms are removed by the exchange. If there is no exchange there is no subsidy, but at high levels of exchange there is also no subsidy because the zooplankton are being mixed rapidly compared to their internal growth processes (see Figure 7.3). Cloern (2007) showed that the efficiency of conversion of phytoplankton to zooplankton in a linked shallow-deep system was maximized when the tidal exchange rate X was equal to the net population growth rate of the primary consumers.<br><br>It is beyond our scope to model explicitly the growth and other processes and consequent biomass levels. However, it is possible to constrain the total phytoplankton and zooplankton biomass within a marsh using available data. During strong blooms nutrients are converted to phytoplankton biomass, but conversion is incomplete because some is lost to other foodweb components such as detritus, bacteria, and zooplankton. Thus, the total amount of dissolved inorganic nitrogen (DIN, comprising nitrate, nitrite, and ammonium) can set an upper limit to total phytoplankton biomass.<br><br>We used data from the IEP water quality and zooplankton monitoring programs from 1975-2012. Data used were from May to October to avoid the high variability of winter flows, and to focus on the dry season when the smelt species may be most constrained by food supply. Data were taken from the low-salinity zone, extended to a salinity of 0.5 -- 10, about the range of salinity where delta and longfin smelt are abundant in their first summer, and averaged by year and month.<br><br>Chlorophyll was converted to phytoplankton C using a carbon:chlorophyll ratio of 50, under the assumption of high light availability. To examine bloom conditions, we used only data for which phytoplankton biomass exceeded 200 mgC/m3. From these data, we determined the zero-intercept of a linear model of phytoplankton carbon vs. dissolved inorganic nitrogen (DIN), under the assumption that this represented the maximum conversion of DIN to phytoplankton biomass. This corresponded to about 900 mgC/m3 (about 40% of the sum of phytoplankton C and DIN converted to C using a molar ratio of 6.6:1). We used that value as the upper limit for phytoplankton C in a marsh. Calanoid copepod C for adults and copepodites was estimated to be about 2.5% of actual phytoplankton C, and we assumed that this proportion would apply to the maximum phytoplankton C, or about 23 mgC/m3. Using the same data the median phytoplankton and calanoid copepod C in the open water during 1994 -- 2011 were 73 and 3 mgC/m3 respectively.<br><br>The optimum exchange rate was calculated separately for phytoplankton and for zooplankton. For calculation we assume a mean depth of 2m and an area of 1000 ha (2500 | |

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| | | ac) in the restored area. From Lopez et al. (2006) the growth rate of phytoplankton in a shallow area can be modeled as<br><br>[see letter for equation]<br><br>where H is water depth. At a water depth of 2m, this evaluates to 0.86 d-1, which we use although a similar model using data from the LSZ in 2006-2007 gave a growth rate that was about 25% lower. We assume that benthic grazing in the restored area is negligible, but cannot neglect grazing by microzooplankton. This can be modeled either as:<br><br>[see letter for equation]<br><br>based on experimental results from the Low-Salinity Zone in 2006-2007 (York et al. 2011), or<br><br>g = 0.6 µP (<br><br>from a review of microzooplankton grazing estimates, using values for estuaries (Calbet and Landry 2004). These yield growth rates of 0.5 and 0.35 d-1 respectively. The latter value is probably more generally representative of a wide range of conditions and for this analysis gives a higher net phytoplankton growth rate.<br><br>Using an exchange coefficient X set to be close to the net phytoplankton growth rate less grazing of 0.35 d-1 and using the volume of the LSZ of 0.5 km3 as V in Equation 1, we get:<br><br>[see letter for equation]<br><br>or about 0.16 d-1. This is about half of phytoplankton growth, and about twice the (negative) net of growth less grazing by microzooplankton and clams in the LSZ based on field measurements during 2006-2008, which is now subsidized by mixing from other areas of the estuary. Thus, the extremely ideal conditions proposed above would lead to a substantial subsidy of phytoplankton to the LSZ. However, this assumes nearly perfect tuning of the exchange, ideal growth of the phytoplankton with no benthic grazing within the restored area, and perfect mixing of the discharged phytoplankton into the LSZ, which is unlikely because of its tidal movement in relation to the outlet of any marsh.<br><br>For calanoid copepods the equivalent calculation to that above is<br><br>[see letter for equation]<br><br>or about 0.03 d-1. As before, this represents an upper limit of the likely subsidy to LSZ zooplankton. This corresponds to a turnover time of about a month, considerably longer than the population turnover time of the copepods. As with phytoplankton, this is an upper limit of the potential subsidy of copepods, which would be reduced by behavioral resistance to movement such as vertical migration, and by excess predation in the marsh compared to the adjacent open waters. Both of these reductions are likely to be very large. | |
| 1672 | 174 | Zooplankton export from Suisun Marsh<br><br>One of the proposed restoration areas is in the northern end of Suisun Marsh. Biomass of calanoid copepods in the southern part of the marsh was about 2□□that of the adjacent Grizzly Bay, based on a short-term field study and long-term monitoring data (Kimmerer and Marcal 2004). Biomass in the smaller sloughs to the north is apparently higher although | Please see related response to comment 1672-120. |

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| | | nothing has been published on that (J. Durand, UC Davis, pers. comm.).<br><br>We used output from the UnTRIM hydrodynamic model (MacWilliams et al. in prep., Kimmerer et al. in press) and the FISH-PTM particle tracking model (Kimmerer et al. in prep.) to examine the residence time of particles within Suisun Marsh during the dry season. The hydrodynamic model simulates the entire estuary including marsh channels and bathymetry, but is not specifically set up to replicate flows in the marsh and therefore the results should be considered preliminary. For the entire network of channels it should give acceptable results, but to model the smaller sloughs would require a finer grid for that area.<br><br>The Particle Tracking Model was run for 45 days in a dry period in the historical data set (starting 1 July 1994) to examine the influence of vertical movement on retention in the estuary. The model was started with particles released throughout the northern estuary in a pattern similar to the distribution of the copepod Eurytemora affinis, the most abundant LSZ resident zooplankton species before Potamocorbula was introduced. Over 9000 particles were released for each run at approximately the same number per unit volume throughout the marsh. Residence time was estimated as the rate of decline of the log of total particles remaining in the marsh.<br><br>For neutrally-buoyant (i.e., passive) particles, the residence time of the marsh was about 28 days, and particles continuously left the marsh during the 45-day run.<br><br>Particles that either sank or migrated tidally (down on the ebb and up on the flood) had a more complex pattern but generally the particles in the northern part of the marsh did not leave the marsh during the 45-day run.<br><br>Taking the passive case first and using available bathymetric data for the volumes of the marsh and Suisun Bay, Equation 1 can be reduced to the following:<br><br>[see letter for equation]<br><br>Based on the existing data cited above for Suisun Marsh, this flux would provide an additional 2%/d of copepods to Suisun Bay if the copepods behaved as passive particles. This is unlikely to produce a noticeable increase in copepod biomass, as their population growth rates are on the order of 10%/d. Any tidal migration or tendency to remain near the bottom (which can be common among zooplankton in shallow, well-lit waters) would greatly reduce or even eliminate the net flux from the marsh to the open waters. | |
| 1672 | 175 | Appendix F: Effects of floodplain inundation<br><br>This Appendix explores available data on the response of phytoplankton and zooplankton biomass to flooding of the Yolo Bypass. This is to provide a basis for anticipating effects on the estuarine foodweb from floodplain inundation at lower flows in the Sacramento River.<br><br>One assumption underlying BDCP plans for increased inundation of the Yolo Bypass is that it would provide a source of phytoplankton and zooplankton to the open waters of the estuary. If so, the much larger floods that occasionally inundate the Bypass now should produce measurable increases in phytoplankton and zooplankton at monitoring stations in the estuary.<br><br>The basis for this analysis was to use the Interagency Ecological Program monitoring data to try to detect an influence of inundation of the Bypass on phytoplankton biomass as | The evaluation of the effects of Alternative 4A are included in the RDEIR/SDEIS, with specific acknowledgement, that real-time monitoring and associated triggers would allow for adjustments to the North Delta Diversion operations to minimize and avoid impacts to migrating fish. The potential impacts and benefits to fish are described for each alternative in the impact discussion section in Chapter 11 of the Final EIR/EIS. For more information on adaptive management and monitoring please see Master Response 33. For information on operational criteria please see Master Response 28. |

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| | | chlorophyll concentration, and zooplankton biomass calculated from abundance. IEP data were obtained from six stations in the western Delta to eastern Suisun Bay.<br><br>Chlorophyll concentration has been determined since 1976 in the zooplankton survey. Abundance of zooplankton has been determined since 1972 by species and gross life stage. We used data on adult and juvenile calanoid copepods, which are common in the diets of delta smelt and other fishes. Abundance data were converted to biomass using carbon mass per individual by species and life stage (see Kimmerer 2006 for details; carbon estimates have been updated).<br><br>Neither chlorophyll nor copepod biomass showed any effect of inundation of the Bypass. This lack of response is clear for copepod biomass in Fig. F.1, which shows that under high flows in the Bypass the biomass was generally lower than when flows were lower. The data have been stratified by groups of years separated by the time that the clam Potamocorbula amurensis was introduced. During both periods biomass was generally higher when the Bypass was dry than when it was flowing at a low rate (< 500 m3s-1). Biomass increased slightly in a handful of times when the Bypass was flowing at a higher rate, but even with this increase biomass still did not match that at the lowest flows. The difference in biomass between the pre-and post-clam period is notable at low Bypass flows.<br><br>Most of the high flows in the Bypass occurred during winter when zooplankton biomass is at its seasonal low. Inundation of the Bypass later in spring at a lower stage of the Sacramento River than is now necessary might provide conditions for higher productivity, but the lack of response of the current system at lower Bypass flows is not promising. | |
| 1672 | 176 | ATT1: ATT41: Figure F.1. Copepod biomass as a function of flow in the Yolo Bypass for two time periods. Symbol shapes and colors show the sampling stations from the IEP zooplankton monitoring survey. Green line is from a generalized additive model with a loess (locally-weighted) smoothing function applied to the pre-1987 period and shown in the lower graph for comparison. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1672 | 177 | Appendix G: Can incidental take permits be issued to water contractors?<br><br>Do the federal Endangered Species Act and the California Natural Community Conservation Planning Act allow the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Wildlife to issue incidental take permits to the Central Valley Project and State Water Project contractors?<br><br>This question is significant, because the draft BDCP provides that the Authorized Entity Group shall be comprised of the Director of the California Department of Water Resources as operator of the SWP, the Regional Director of the U.S. Bureau of Reclamation as operator of the CVP, and one representative each of the CVP and SWP contractors if the contractors are issued permits under the Plan. BDCP 7-8. If we correctly understand the premise of this question, it is that only the owners and operators of the two projects--the U.S. Bureau of Reclamation and the California Department of Water Resources--are eligible to hold the incidental take permit that would govern construction and operation of the facilities authorized by the BDCP.<br><br>Although there is no definitive answer to this question, we conclude that the CVP and SWP contractors may receive incidental take permits. We base this conclusion on four factors: (1) There is nothing in either the federal Endangered Species Act or the California Natural Community Conservation Planning Act that prohibits the fish and wildlife agencies from | The Proposed Project has been developed with the goals of minimizing and avoiding incidental take of listed species to the maximum extent practicable. Chapter 11, Fish and Aquatic Resources, and Chapter 12, Terrestrial Biological Resources, EIR/EIS, describe effects of the proposed project and several alternatives on fish and wildlife species in the Plan Area. Please see Master Response 31.<br><br>Please see Master Response 1672-127.<br><br>The 2013 public draft BDCP was written under the assumption that the state and federal fish and wildlife agencies would each issue jointly-held permits to DWR and all participating state and federal water contractors, as co-permittees.<br><br>. |

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| | | issuing incidental take permits to entities such as the CVP and SWP contractors who receive water service from (and therefore are beneficiaries of) the permitted project operators. (2) The text of both statutes allows for the grant of incidental take permits to persons or entities other than the owners and direct operators of the projects governed by an HCP and NCCP. (3) There is precedent for the inclusion of both government entities and private landowners and resource users within a single HCP/NCCP. (4) There are good reasons both for the CVP and SWP contractors to seek the protections of an incidental take permit and for the fish and wildlife agencies to include the contractors within the management structure of the BDCP. It is therefore likely that the courts would defer to the agencies' decision to issue incidental take permits to the contractors.<br><br>The incidental take permitting and HCP provisions of section 10 of the federal ESA authorize the taking of individual members of a listed species that otherwise would be prohibited by section 9(a)(1)(B) of the Act. 16 U.S.C. [Section] 1538(a)(1)(B). The take prohibition of section 9 applies to "any person subject to the jurisdiction of the United States." Id. [Section] 1538(a)(1). The statute defines "person" as meaning an individual, corporation, partnership, trust, association, or any other private entity; or any officer, employee, agent, department, or instrumentality of the Federal Government, of any State, municipality, or political subdivision of a State, or of any foreign government; any State, municipality, or political subdivision of a State; or any other entity subject to the jurisdiction of the United States. [Id. [Section] 1532(13).]<br><br>This definition expressly includes the CVP and SWP contractors, which are comprised primarily of instrumentalities of the state (and, in the case of the CVP, includes some individuals). The statute thus extends eligibility for (limited and conditional) exemption from the take prohibition of section 9 to the project contractors, and it contains no exclusion from this eligibility based on the fact that the contractors do not themselves own or operate the project.<br><br>The California Natural Community Conservation Planning Act addresses this question even more directly. In its articulation of the purposes of the statute, the Legislature stated:<br><br>Natural community conservation planning is a cooperative process that often involves local, state, and federal agencies and the public, including landowners within the plan area. The process should encourage the active participation and support of landowners and others in the conservation and stewardship of natural resources in the plan area during plan development using appropriate measures, including incentives. [California Fish & Game Code [Section] 2801(j).]<br><br>The Act also declares that "Any person, or any local, state, or federal agency, independently, or in cooperation with other persons, may undertake natural community conservation planning." Id. [Section] 2809.<br><br>Indeed, the fish and wildlife agencies approved this type of multiparty, multijurisdictional, cooperative approach in the Orange County HCP/NCCP for the protection of the coastal gnatcatcher, other target species, and their habitat. The cooperating and individually permitted entities include the County of Orange, the cities of Anaheim, Costa Mesa, Newport Beach, Irvine, Laguna Beach, Orange, and San Juan Capistrano, as well as other participating public and private landowners and water users, such as Southern California Edison, the Metropolitan Water District, Irvine Ranch Water District, the Irvine Company, UC Irvine, the California Department of Parks and Recreation, and transportation corridor agencies. COUNTY OF ORANGE, FINAL NATURAL COMMUNITY CONSERVATION PLAN AND | |

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| | | HABITAT CONSERVATION PLAN, CENTRAL AND COASTAL SUBREGION (1996), document available at http://www.naturereserveoc.org/documents.htm. Although this situation does not precisely mirror the relationship between the CVP and SWP and their contractors, it does serve as precedent for creation of an HCP/NCCP that includes both land and resource management agencies and public/private land and resource users as incidental take permit holders.<br><br>Finally, it makes sense for the CVP and SWP contractors to seek the protections of the incidental take permits governing operation of the facilities authorized by the BDCP, as it is their uses of project water that would potentially violate the federal and state take prohibitions. The contractors thus would benefit both from the security provided by the incidental take permits and from participation in the decisions that would shape implementation and compliance with the terms and conditions limiting coordinated CVP/SWP operations set forth in the BDCP. Concomitantly, it is in the fish and wildlife agencies' interest to have the contractors participate as permittees so that disputes between the contractors and USBR and DWR as project operators may be resolved within the forum of the Authorized Entity Group, rather than outside the purview and procedures of the BDCP. Under these circumstances, we believe that it is likely that the courts would defer to the fish and wildlife agencies' reasonable interpretation of the statutes as authorizing the grant of incidental take permits to the CVP and SWP contractors. See Chevron U.S.A. v. Natural Resources Defense Council, 467 U. S. 837 (1984); American Coatings Ass'n. v. South Coast Air Quality Dist., 54 Cal.4th 446 (2012). | |
| 1673 | 1 | As a leading water advocate for San Francisco Bay, Baykeeper supports solutions aimed to restore the health of the Bay-Delta and achieve sustainable freshwater diversions. Current proposals for the Bay Delta Conservation Plan (BDCP), however, fail to ensure basic protection of existing natural resources, while uncertainty regarding restoration of native fisheries is far too great to gain widespread support from the environmental community and other stakeholders. Public suspicion of the BDCP has undermined passage of any water bond, let alone one which advances the BDCP by financing mitigation projects through public debt.<br><br>Given the grave uncertainty of whether restoration will be successfully accomplished; the absence of feasible alternatives involving export reductions; the lack of adequate analysis in the EIS/EIR; and the lack of transparency regarding whether adequate flows shall be ensured through the Bay-Delta, Baykeeper cannot support the BDCP.<br><br>Stakeholders have already expressed numerous concerns with the BDCP EIS/EIR. Baykeeper supports comments submitted by the Environmental Water Caucus and we incorporate by reference their comment letter dated June 11, 2014. This supplemental letter serves to address particular issues of concern to Baykeeper and our 2,000 members. | Alternative 4A, also known as California WaterFix, has been developed in response to public and agency input and is the new CEQA Preferred Alternative. Alternative 4A is also the NEPA Preferred Alternative, a designation that was not attached to any of the alternatives presented in the 2013 Public Draft EIR/EIS. Alternative 4 remains a potentially viable alternative and is being carried forward in this RDEIR/SDEIS because it represents the original habitat conservation plan/natural community conservation plan (HCP/NCCP) alternative approach, and because it provides an important reference point from which the Alternative 4A, 2D, and 5A descriptions and analyses were developed. If the Lead Agencies ultimately choose the alternative implementation strategy and select an alternative presented in the RDEIR/SDEIS after completing the CEQA and NEPA processes, elements of the conservation plan contained in the alternatives in the 2013 Public Draft EIR/EIS may be utilized by other programs for implementation of the long term conservation efforts.<br><br>The proposed project is the result of more than seven years' collaboration and consultation with numerous stakeholders, agencies, public water agencies and environmental organizations. The organizations that have participated in the Steering Committee, public meetings or written letters to provide input on the Plan include: American Rivers, Bay Institute, Defenders of Wildlife, The Endangered Species Coalition, Environmental Defense Fund, The Golden Gate Salmon Association, National Audubon Society, Natural Resources Defense Council, the Nature Conservancy, and Planning and Conservation League. The feedback was used to guide the development and subsequent revisions of the Proposed Project and its associated EIR/EIS to reflect concerns addressed from the various groups. All of the documents, studies, administrative drafts, and meeting materials have been posted online since 2010 in an unprecedented commitment to provide public access and government transparency.<br><br>Although the RDEIR/SDEIS, EIR/EIS and much of the proposed project has been drafted by scientists working for a private consulting firm (ICF) working for the Lead Agencies, the Agencies' scientists have been intimately involved, and their judgments are reflected throughout the EIR/EIS and the proposed project itself. The State is most interested in putting forth the best project that meets the goals of ecosystem improvement and water supply reliability. To the degree that the current Plan is endorsed by some |

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| | | | environmental organizations serves as confirmation that the proposed plan protects species, habitats and the Delta ecosystem in a way that is compatible with their goals. The website includes correspondence from agencies and NGOs received prior to the start of the formal comment period. Comments received during the comment period are to be included in the Final EIR/EIS.<br><br>For more information on public outreach efforts, please see Master Response 40. For further information on alternatives development see Master Response 4.<br><br>In response to public comments, analysis of effects of the proposed projects on sediment loading and concentrations of constituents downstream of the Plan Area (i.e., in San Francisco Bay) were added to the RDEIR/SDEIS. See Chapter 8, Water Quality, and Chapter 11, Fish and Aquatic Resources, in the Final EIR/EIS. See also Appendix 8O in the Final EIR/EIS for San Francisco Bay analysis. For more information on the BDCP effects analysis and funding please see Master Response 5.<br><br>The lead agencies acknowledge the commenters opposition to the Bay Delta Conservation Plan and their support for the comment submitted by the Environmental Water Caucus on June 11, 2014. All comments received during the 2013 and 2015 public comment period are included in the Final EIR/EIS. Please refer to the table of commenters to locate the letter of interest. |
| 1673 | 2 | Failure to include San Francisco Bay within the geographic scope of the BDCP<br><br>Despite the 2011 finding by the National Research Council that failure to analyze effects on San Francisco Bay within the BDCP environmental review represents a critical gap in the scope of the analysis, the EIR/EIS fails to analyze any effects downstream of the Plan Area. [footnote 1: National Research Council (NRC). 2011. A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan. Panel to Review California's Draft Bay Delta Conservation Plan; National Academy of Sciences, National Academies Press, Washington, DC. 100 pp.] Many species known from the Delta and Suisun Bay also rely on habitats downstream in San Pablo Bay and other subembayments of San Francisco Bay. [footnote 2: Feyrer, F and Nobriga M. 2007. Multi-decadal trends for three declining fish species: habitat patterns and mechanisms in the San Francisco Estuary, California, USA. Canadian Journal of Fisheries and Aquatic Sciences 64:723-734.] And sediments passing through the Delta are critical to the formation and maintenance and protection of wetlands, beaches, and urban infrastructure in downstream areas. [footnote 3: Barnard PL, Foxgrove AC, Elias EPL, Erikson LH, Hein JR, McGann M, Mizell K, Rosenbauer RJ, Swarzenski PW, Takesue RK, Wong FL, Woodrow DL. 2013. Integration of bed characteristics, geochemical tracers, current measurements, and numerical modeling for assessing the provenance of beach sand in the San Francisco Bay Coastal System. Marine Geology 345:181-206.] Comprehensive analysis of BDCP effects requires expansion of the Study Area to include San Pablo and San Francisco Bays.<br><br>In recent comments to the Draft EIR/EIS, the Delta Independent Science Board (ISB) explained how consequences of BDPC actions undertaken within the Plan Area will extend downstream to affect San Pablo and San Francisco Bays. [footnote 4: Parker A, Simenstad C, George TL, Monsen N, Parker T, Ruggerone G, Skalski J. 2013. Delta Science Program Independent Review Panel Report BDCP Effects Analysis Review, Phase 3. Prepared for the Delta Stewardship Council, Delta Science Program.] These consequences include changes in sedimentation, shifting circulation patterns, and impacts on fish health and ecology. Notably, while the Effects Analysis recognizes suspended sediment loads through the Delta have been declining and that new diversions would result in additional load reductions, the EIR/EIS makes no mention of downstream sediment effects on San Pablo or San Francisco | As described in response to comment 1673-1, Alternative 4A no longer includes an HCP; however, Alternative 4 remains a potentially viable alternative and is being carried forward in this RDEIR/SDEIS because it represents the original HCP/NCCP alternative approach. See Chapter 8, Water Quality, and Chapter 11, Fish and Aquatic Resources, in the Final EIR/EIS. See also Appendix 8O in the Final EIR/EIS for San Francisco Bay analysis. For more information on the BDCP effects analysis and funding please see Master Response 5. Please see also responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | Bays.<br><br>Sediment loss associated with BDCP actions must be assessed with respect to likely impacts on wetland restoration projects and the capacity of existing wetlands to adapt to sea level rise throughout the San Francisco Estuary. Hydrodynamic modeling and water quality effects analyses should encompass the entire Bay-Delta system to assist in this effort, consistent with comments by the 'fish agency', as well as the ISB and National Research Council.[footnote 5: CA Department of Fish and Wildlife. April 2012. BDCP EA (Ch. 5) Staff "Red Flag" Review Comprehensive List. Available at http://baydeltaconservationplan.com/] [footnote 6: , Parker A, Simenstad C, George TL, Monsen N, Parker T, Ruggerone G, Skalski J. 2013. Delta Science Program Independent Review Panel Report BDCP Effects Analysis Review, Phase 3. Prepared for the Delta Stewardship Council, Delta Science Program.] [footnote 7: National Research Council (NRC). 2011. A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan. Panel to Review California's Draft Bay Delta Conservation Plan; National Academy of Sciences, National Academies Press, Washington, DC. 100 pp.] | |
| 1673 | 3 | Effects on fish populations must be analyzed, at a minimum, to include those residing in or migrating through San Pablo Bay. San Pablo Bay hosts 11 listed species on a resident or migratory basis that are known also from the Study Area. And fish abundance within the Suisun and San Pablo Bays are both correlated with freshwater outflow. [footnote 8: Swanson C. 2011. State of San Francisco Bay 2011, Appendix F: Living Resources - Fish Indicators and Index Technical Appendix. Available at http://sfep.sfei.org/] Failure to analyze effects within downstream embayments defies recommendations by seasoned experts and the intent of CEQA/NEPA. | For impact on fisheries please see Chapter 11, Fish and Aquatic Resources and associated appendices in the Final EIR/EIS. For additional discussion of the BDCP effects analysis please see Master Response 5. See also response to comment 1673-1. |
| 1673 | 4 | BDCP fails to quantify methylmercury production and threatens methylmercury Total Maximum Daily Load<br><br>Impacts associated with enhanced methylmercury production resulting from wetland restoration actions of the BDCP are expected to be significant and unavoidable. Particular effects associated with Impact WQ-14: Effects on Mercury Concentrations Resulting from Implementation of CM2- CM22, however, were deemed too speculative. And as a result, efforts were not made to even estimate methylmercury production associated with the BDCP and associated restoration efforts. Modeling conducted in support of the mercury effects analysis (Appendix 8I) failed to incorporate anticipated increases in methylmercury production, thereby undermining the entire analysis. | The originally proposed habitat restoration measures and related Conservation Measures (CMs) (i.e., CM2 through CM21) would not be included as part of the Proposed Action (see response to comment 1673-1), except to the extent required to mitigate significant environmental effects under CEQA and meet the regulatory standards of ESA Section 7 and California Endangered Species Act (CESA) Section 2081(b). However, restoration actions that are independent of Proposed Action will continue to be pursued as part of existing projects and programs.<br><br>See Chapter 8, Water Quality, and Appendix 8I of the Final EIR/EIS. Please see also Master Response 14 and Master Response 5. |
| 1673 | 5 | Baykeeper is supportive of wetland restoration in the Delta, regardless of BDCP outcomes, yet the public must be informed whether methylmercury objectives established in the 2010 Total Maximum Daily Load (TMDL) are feasible following BDCP implementation. [footnote 9: Central Valley Regional Water Quality Control Board. 2010. Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin River Delta Estuary (Attachment 1 to Resolution No. R5-2010-0043).] Will BDCP actions result in unacceptable impacts to birds and aquatic life and could human health risks be exacerbated due to mercury exposure? Are viable mitigation strategies available to reduce these risks? The effectiveness of those potential strategies defined in the EIR/EIS to reduce methylmercury production or exposure is largely untested and unknown.<br><br>Restoration efforts in the San Francisco Estuary have in recent years been accompanied by | See responses to comment 1673-1 and 1673-4. |

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| | | studies related to methylmercury production and bioaccumulation. [footnote 10: Ackerman, JT, Marvin-DiPasquale M, Slotton D, Eagles-Smith CA, Herzog, A Hartman MP, Agee JL, Ayers S. 2013. The South Bay mercury project: using biosentinels to monitor effects of wetland restoration for the South Bay Salt Pond Restoration Project. Report prepared for the South Bay Salt Pond Restoration Project and Resources Legacy Fund, 227p.] [footnote 11: Yee D, Collins J, Grenier L, Takakawa J, Tsao-Melcer D, Woo I, Schwarzbach S, Marvin-DiPasquale M, Windham L, Krabbenhoft D, Olund S, DeWild J. 2008. Mercury and Methylmercury Processes in North San Francisco Bay Tidal Wetland Ecosystems (CalFed ERP02D-P62 Final Report). Prepared for the California Bay- Delta Authority Ecosystem Restoration Program, 67p.] This includes studies which have taken place within the Plan Area to specifically support restoration efforts aligned to the BDCP. [footnote 12: Windham-Myers, L, Fleck JA, Ackerman JT, Marvin-DiPasquale M, Stricker CA, Helm WA, Bachand PAM, Eagles-Smith CA, Gill G, Stephenson M, Alpers CN. 2014. Mercury cycling in agricultural and managed wetlands: A synthesis of methylmercury production, hydrologic export, and bioaccumulation from an integrated field study. Science of the Total Environment. v.484:221-231.] [footnote 13: Windham-Myers L, Marvin-DiPasquale M, Kakouros E, Agee JL, Kieu LH, Stricker CA, Fleck JA, Ackerman JT. 2013. Mercury cycling in agricultural and managed wetlands of California, USA: Seasonal influences of vegetation on mercury methylation, storage, and transport. Science of the Total Environment. v.484:308-318.] [footnote 14: Windham-Myers L, Marvin-DiPasquale M, Fleck J, Alpers CN, Ackerman J, Eagles-Smith C, Stricker C, Stephenson M, Feliz D, Gill G, Bachand P, Brice A, Kulakow R. 2010. Methylmercury cycling, bioaccumulation, and export from agricultural and non-agricultural wetlands in the Yolo Bypass. Prepared for the Central Valley Regional Water Quality Control Board.] [footnote 15: Alpers, CN., JA. Fleck, M Marvin-DiPasquale, CA Stricker, M Stephenson, HE Taylor. 2014. Mercury cycling in agricultural and managed wetlands, Yolo Bypass, California: Spatial and seasonal variations in water quality. Science of the Total Environment. v.484:276-287.] The results of these studies enable modeling of methylmercury loads from the BCDP Plan Area and associated mitigation strategies to minimize impacts to the entire San Francisco Estuary, including downstream portions of San Francisco Bay. | |
| 1673 | 6 | Magnitude and likelihood of impacts associated with sea level rise inadequately assessed<br><br>Sea level rise (SLR) related impacts identified in the EIR/EIS include salinity intrusion, impacts to water storage capacity and State Water Project (SWP)/Central Valley Project (CVP) deliveries, water transfer effects, levee failure, and other flood impacts. These impacts, however, are generally discussed conceptually and no effort is made to quantify the magnitude and likelihood of SLR-related impacts at various SLR scenarios. Where SLR was modeled this information was not conveyed within a risk assessment framework of use to decision makers and the public. The public therefore has no opportunity to judge the economic, social or environmental risks of SLR placed upon BDCP assets or mitigation projects.<br><br>California deserves to be informed of the likely and potential risks to proposed conveyance infrastructure and ecosystems associated with SLR, increased storm surge, and shifting climate patterns - and how these risks may shift following implementation of the BDCP. Such impacts are within the capabilities of existing modeling strategies and have already been assessed within the Plan Area in some instances. [footnote 16: Cloern JE, Knowles N, Brown LR, Cayan D, Dettinger MD, Morgan TL, Schoellhamer DH, Stacey MT, van der Wegen M, Wagner RW, Jassby AD. 2011. Projected Evolution of California's San Francisco Bay-Delta-River System in a Century of Climate Change. PLoS ONE 6(9): e24465. | As described in Final EIR/EIS Chapter 29, Climate Change, the California Ocean Protection Council and other scientific bodies have projected that sea level rise along the California coast will not reach 55 inches until approximately the year 2100. Best available information suggests a range of potential sea level rise from 17 to 66 inches (42 to 167.24 centimeters) by 2100 (National Research Council 2012). Given the inherent variability in anticipated 25 future scenarios, a broad range of potential sea level changes (from 6 to 55 inches) was analyzed. The Final EIR/EIS analyzed projected conditions in Years 2025 and 2060 with the sea level rise projections based on research available during the analysis and a 55-inch sea level rise for the year 2100, as described in Appendix 5A, Section A, Modeling Methodology, and in Appendix 5A, Section D.3, Climate Change Modeling.<br><br>As described in Appendix 5A, Section B, CALSIM II and DSM2 Modeling Simulations and Assumptions, the CALSIM II model included assumptions that water would be released from the SWP and CVP reservoirs under the No Action Alternative and Alternatives 1 through 9 to counter the salinity intrusion due to sea level rise and maintain the water quality requirements under State Water Resources Control Board Decision 1641 to the extent possible based upon the availability of SWP and CVP water rights. These actions would result in reductions to SWP and CVP water contract deliveries. The effects due to sea level rise, climate change, and projected increased water demands in the Delta watershed can be determined by the comparison of conditions under the No Action Alternative as compared to the Existing Conditions in the environmental resource chapters, including Final EIR/EIS Chapter 8 (Water Quality), Chapter 5 (Water |

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| | | doi:10.1371/journal.pone.0024465] [footnote 17: Mount J and Twiss R. 2005. Subsidence, sea level rise, and seismicity in the Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science, 3(1).] [footnote 18: Suddeth RJ, Mount J, Lund JR. 2010. Levee Decisions and Sustainability for the Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science, 8(2)] [footnote 19: Medellín-Azuara J, Howitt RE, Hanak E, Lund JR, Fleenor WE. 2014. Agricultural Losses from Salinity in California's Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science, 12(1)] If the BDCP project or associated mitigation strategies will prove ineffective or uneconomic in a matter of decades as a result of SLR, Californians should know. | Supply), and Chapter 16 (Socioeconomics). |
| 1673 | 7 | Effects analysis inadequately addresses impacts from increased selenium concentrations<br><br>Selenium concentrations in the San Francisco Estuary are reasonably expected to increase under the BCDP during some conditions, since northern intakes will reduce freshwater available to dilute selenium enriched waters of the San Joaquin River. Authors of the EIR/EIS used a selenium bioaccumulation model developed by leading selenium scientists to arrive at the conclusion that Alternatives 1-5 '…would result in essentially no change in selenium concentrations throughout the Delta' and that impacts are considered less than significant, requiring no mitigation. This is because fish tissue guidelines for selenium are already exceeded for listed sturgeon under Existing Conditions and these Alternatives would result in less than 10% increase in Se concentrations in fish tissue, compared to Existing Conditions. Impacts associated with Alternatives 6-9 are considered significant, given an expected 20-23% increase in sturgeon tissue concentrations. | See Chapter 8, Water Quality, and Appendix 8M of the Final EIR/EIS. Please see also Master Response 14 and Master Response 5. |
| 1673 | 8 | Although research cited in the EIS/EIR draws differing conclusions to those found in the Effects Analysis, regarding the potential impacts and role played by freshwater outflows and export volumes, the EIR/EIS fails to discuss the findings of renowned experts in the area of selenium risks in the Bay-Delta. Statements found outside the realm of scientific papers include frank warnings by Dr. Sam Luoma regarding selenium risks associated with the BDCP, such as "It's clearly a serious problem and it could get worse', and "We're trading clean Sacramento River water and in return we're getting low-quality San Joaquin River water". An EPA scientist was quoted in the same article saying "we shouldn't be adding any more selenium into the system". [footnote 20: Taugher M. Environmental Toxins in San Francisco Bay could increase with Delta Water Plan. Contra Costa Times. 15 September 2011. Accessed online on 24 July 2014.] While the BDCP may not result in increased selenium loads, increased concentrations pose serious risks to wildlife and human health.<br><br>Recent research by U.S. Geological Survey and UC Davis researchers states the San Francisco Bay-Delta Regional Ecosystem Restoration Implementation Plan (DRERIP) Ecosystem-Scale Selenium Model indicates selenium bioaccumulation and toxicity concerns for higher trophic level species. Risks are exacerbated by increased water diversions. Researchers noted that enough is known to adequately characterize the distribution of Se through the Bay-Delta ecosystem, though the available data from which to validate the outcomes is dated and does not include conditions within low flow conditions. Although the EIR/EIS cited this paper, the issue of data quality is not discussed in the EIR/EIS, nor are other key concerns cited in Presser and Luoma (2013). | See Chapter 8, Water Quality, and Appendix 8M of the Final EIR/EIS. Please see also Master Response 14 and Master Response 5. |
| 1673 | 9 | Model results suggest that a fish tissue guideline of 5 ug/L for sturgeon (the current regulatory guideline) would ultimately require elimination of all enriched Se inputs to the Bay under existing conditions, including Se from the San Joaquin River with agricultural origins. [footnote 21: Presser TS and Luoma SM. 2013. Ecosystem-scale Selenium Model for | See Chapter 8, Water Quality, and Appendix 8M of the Final EIR/EIS. Please see also Master Response 14 and Master Response 5. Please see also response to comment 1673-1. |

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| | | the San Francisco Bay-Delta Regional Ecosystem Restoration Implementation Plan. San Francisco Estuary and Watershed Science, 11(1)] Separate modeling efforts found that increased flows from the San Joaquin River during low flow conditions (e.g. November) results in elevated concentrations of dissolved selenium (5.0 nmol/L-1) in the Northern Reach of San Francisco Bay. [footnote 22: Meseck SL and Cutter GA. 2006. Evaluating the biogeochemical cycle of selenium in San Francisco Bay through modeling. Limnol. Oceanogr. 51(5): 2018-2032] This concentration approximates levels recorded in the 1980s and 1990s, prior to mandated reductions in selenium dischargers from Bay Area oil refineries. [footnote 23: Cutter GA and Cutter LS. 2004. Selenium biogeochemistry in the San Francisco Bay estuary: Changes in water column behavior. Estuar. Coast. Shelf Sci. 6: 463-476.] The BCDC EIR/EIS fails to recognize the range of effects on listed species or adequately recognize efforts by U.S. Environmental Protection Agency to develop site-specific fish and wildlife Se criteria for federally listed species and designated critical habitat affected by Se in California. [footnote 24: U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration National Marine Fisheries Service. 2000. Final Biological Opinion on the effects of the U.S. Environmental Protection Agency's "Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. U.S. Fish and Wildlife Service and National Marine Fisheries Service. 323 p.] [footnote 25: U.S. Environmental Protection Agency. 2011. Update on California Toxics Rule and Endangered Species Act (September, 2011): Selenium. San Francisco, (CA): U.S. Environmental Protection Agency, Region 9. Available from: http://www.epa.gov/region9/water/ctr/ Accessed 20 June 2014.] | |
| 1673 | 10 | Selenium bioaccumulation is complicated by multiple factors and risks vary by sub-region within the San Francisco Estuary. Scientists have the ability, however, to quantify these risks. Given that a fundamental objective of the BCDP is to protect and restore natural communities and ecosystems, the EIR/EIS must incorporate at least some of the numerous reports and peer- reviewed papers related to selenium impacts in the Bay-Delta and determine options for mitigating existing risks, in addition to those anticipated under BDCP implementation. | See Chapter 8, Water Quality, and Appendix 8M of the Final EIR/EIS. Please see also Master Response 14 and Master Response 5. Please see also response to comment 1673-1 |
| 1673 | 11 | ATT1: Delta Science Program Independent Review Panel Report<br><br>BDCP Effects Analysis Review, Phase 3<br><br>Dated March 2014<br><br>A report to the Delta Science Program | This comment describes an attachment to the comment letter. Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 12 | Four broad themes emerged from the Delta Science Program Independent Scientific Review Panel's review of the BDCP Effects Analysis. Firstly, the long, highly detailed document was difficult to review and comprehend. The vastness of the Effects Analysis report and appendices are both its strength and weakness. Although highly improved from the documents that the Panel reviewed during Phase 2, Chapter 5 continues to be fragmented in its presentation and sometimes inconsistent with the technical appendices. While the sheer scope of the analysis is impressive, the inefficient organization and incomplete cross-referencing among sections within the Effects Analysis (e.g., the 8 supporting appendices, totaling~4500 pages) as well as with the larger BDCP planning documents make interpretation of anticipated net effects of BDCP implementation difficult at best. The 745-page Chapter 5: Effects Analysis does not represent a stand-alone document and it relies extensively on the associated appendices and other chapters for the presentation of | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | scientific information, with insufficient guidance for the reader. As concluded from the Phase 2 report, the Panel universally believes that by itself, Chapter 5: Effects Analysis inadequately conveys the fully integrated assessment that is needed to draw conclusions about the Plan, in part because of incomplete information on factors affecting the covered species. | |
| 1673 | 13 | The theme in the Delta Science Program Independent Scientific Review Panel's review is an apparent disconnect between the assessments of the levels of scientific uncertainty presented in Chapter 5 versus what is characterized in the technical appendices. In many cases, the Panel felt that there was appropriate characterization of high uncertainty within the technical appendices but Chapter 5 did not sufficiently acknowledge or articulate this reality, especially when using professional judgment to reach overall net effects of the BDCP on key species. In particular, the Panel observed that the critical uncertainties associated with presumed beneficial effects of tidal wetland restoration were not recognized in the Chapter 5 summary. Given the magnitude of the BDCP, the inherent natural and anthropogenic complexity in the Bay-Delta ecosystem, and the long time horizon for BDCP implementation and rehabilitated community development, most of the potential BDCP effects carry a relatively high level of uncertainty. For these reasons, the Effects Analysis must provide clear guidance for conceptual models, monitoring, metrics that assess underlying ecosystem processes, explicit thresholds and triggers, alternative hypotheses, special studies to address critical information gaps, and structured decision making in the form of a rigorously institutionalized adaptive management process. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 14 | A major theme of this Delta Science Program Independent Scientific Review Panel review is the lack of an integrated or quantitative assessment of net effects. The Panel acknowledges that considerable effort has been made in documenting the complex information used to determine net effects. However, in the case of covered species, effects could not be quantified and only two of the sixteen existing life cycle models were deemed to be relevant to BDCP. For these and other reasons, a systematic approach to synopsize the overall net effect on each species was not used. Instead, professional judgment was used instead of a ranking approach to quantify a synthesis of cumulative effects and associated certainty in the projected outcome. Finally, in one paragraph, Chapter 5 accurately portrayed the anticipated BDCP effects: "These expectations represent a working hypothesis of the relationship between actions, stressors, and biological performance". However, this statement was not emphasized throughout the document. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 15 | A major theme reflected on the need to address the extensive uncertainties associated with the assumptions and predictions of the beneficial effects of the BDCP conservation measures. While the Phase 2 Effects Analysis accurately reflected the detailed process and implementation structure to apply an adaptive management approach to resolve uncertainties, the Delta Science Program Independent Scientific Review Panel was concerned that it defaulted to rather "passive learning" instead of a rigorous, institutionalized adaptive management process that resolved effects on covered species and their requisite ecosystems through an active, experimental approach.<br><br>Together with background obtained during Phase 1 and 2 of the BDCP Effects Analysis review, the Panel provides the following synopsis of the Panel's responses to their General Charge Questions; further responses to specific issues and the adequacy of supporting documents are provided in the body of the report. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| 1673 | 16 | How well does the Effects Analysis meet its expected goals?<br><br>The Phase 3 review-version of the Effects Analysis is a much improved and impressive compilation of background material and scientific and technical knowledge about the Bay-Delta that provides a plausible basis for the conservation measures. The Delta Science Program Independent Scientific Review Panel concluded that much of the available data and arguments for the rationale behind the Effects Analysis assumptions and conclusions are contained within the BDCP documents. However, we suggest that the Effects Analysis (Chapter 5) itself is still poorly substantiated and leaves too much to appendices and other BDCP chapters without explicit cross-references. The lack of accessibility to information within the chapter or clear reference to supporting detail inhibits rather than elucidates comprehension of the findings and thus conveys an unsatisfying "trust us" message.<br><br>Our conclusion of the Effects Analysis is that many of the critical assumptions in modeling effects and justifications behind the supposed benefits of the conservation measures are highly uncertain. Much of the conservation measures center around restoration activities and management actions to improve current conditions. Our impression, therefore, is that the foundation of the BDCP is weak in many respects and the default burden to ensure covered species benefit, if not recovery, depends on adaptive management. The adequacy of the BDCP therefore rests not in the intent and development of the conservation measures, but in the rigor and application of adaptive management to ensure that the critical uncertainties are addressed and strategically incorporated into a progressively refined Plan. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 17 | How complete is the Effects Analysis; how clearly are the methods described?<br><br>Chapter 5 provides a comprehensive overview of the spatial and temporal scope of the analysis, definitions of project baselines that differ depending on regulatory authority, recognition of climate change information, identification of a variety of models used to evaluate effects, treatment of viable salmon population criteria, and the approach to determining net effects on fish and wildlife. As might be expected, with the size of the Effects Analysis task, the quality of the assessments ranged in scientific rigor based on the amount of available data and best available science. Some aspects of the assessment, such as water quality and flow, were quantitatively assessed using sophisticated mathematical models. Some aspects of the Chinook salmon assessments were also based on empirical data and process-based models. However, for many of the other fish species and their potential stressors, conceptual models supported by the scientific literature were the only recourse. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 18 | Is the Effects Analysis reasonable and scientifically defensible? How clearly are the net effects results conveyed in the text, figures and tables?<br><br>The approach to net effect conclusions needs to be reconsidered and revamped. The Effects Analysis assessment of net effects, particularly for covered fish, tries to incorporate information on potentially beneficial or detrimental effects covering 12 different stressors, 32 attributes, and multiple life stages using best available information and science. Only a perfect life-cycle model with perfect information on all the effects and their interactions could possibly weight the results correctly and draw unambiguous conclusions. A serious limiting factor of the current consolidation of Net Effects is a near complete absence of any weighting of the biological importance to particularly sensitive life history stages of the many attributes under consideration. As a result, whether and how any critical life stages or | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | attributes are being adversely affected by the BDCP is generally unclear. The net effects conclusions for a fish species needs to therefore take into account the relative importance of the various life history stages, make them explicit, and interpret Plan effects within that context on a species-by- species basis. Similarly, the simple summation of the number of acres of suitable habitat that are removed or restored for each species by the conservation measures does not consider landscape-level effects such as connectivity and patch size, nor does it take into account variation in habitat quality. | |
| 1673 | 19 | The net effects analysis tends to overreach conclusions of positive benefits for covered fish species, given the inability to quantify the over-all net effects and the realization of high uncertainty. In particular, it does not adequately defend conclusions regarding the net effects of habitat restoration. Restoration of tidal wetlands (and other communities) is highly uncertain and at least an extremely long process. The Effects Analysis does not adequately justify the critical assumption of the benefit of tidal wetland restoration as a food web subsidy for covered pelagic fish given the uncertainties of tidal wetland restoration itself. A critical issue is the implicit expectation that restoration activities will result in increases in abundance of lower trophic levels, but it is uncertain whether the resulting increased production will result in food web pathways supporting covered species. The presentation of phytoplankton-based and tidal wetland macrophyte detritus-based food webs as alternative ecosystem processes, rather than as an integrated system, also significantly complicates the interpretation of the potential benefit of BDCP restoration. For foraging salmonids, the Effects Analysis did not evaluate the reduced extent to which salmonids would have access to rehabilitated habitat when the north Delta intakes are operating and flows are reduced.<br><br>Only one configuration of Restoration Opportunity Areas (ROAs) were modeled by the hydrodynamic models and the locations of these assumed Restoration Opportunity Areas are not available. Some details of the hydrodynamic modeling, especially where 1D and 2D models did not agree or situations where counter-intuitive results were reported, could not be evaluated due to the limited information provided. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 20 | How well is uncertainty addressed? How could communication of uncertainty be improved?<br><br>A broad consensus exists among the Delta Science Program Independent Scientific Review Panel that Chapter 5 does not adequately acknowledge the extensive uncertainty associated with the BDCP's assumptions and predictions. In its current form, at the level of detail conveyed, in the models used, and in the verbal assessments and conclusions, the level of uncertainty is often downplayed. Within appendices sometimes more explicit discussion of uncertainties can be found, but there is a disconnect between the summary pages with the conclusions drawn in Chapter 5. In situations in which an array of outcomes may be possible, only the more beneficial outcomes are used in conclusions about the BDCP. Communication of uncertainty would be improved by consideration of a range of potential outcome values in models. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 21 | How well does the Effects Analysis describe how conflicting model results and analyses in the technical appendices are interpreted?<br><br>The Delta Science Program Independent Scientific Review Panel found models describing salmonid Delta passage and habitat suitability for terrestrial species to be appropriate and any conflicting results adequately explained. Because hydrodynamic models are sensitive to how the open water regions are represented and how they are connected to the adjacent | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | channels, and because the panel was not provided the bathymetric configuration of the ROAs or the order in which the Restoration Opportunity Areas were established, it is not feasible for the Panel to evaluate the sensitivity of the models to the placement of the Restoration Opportunity Areas.<br><br>Overall, the Panel found the Chapter 5 text describing the two life cycle models (IOS and OBAN), which provide alternative views of BDCP effects compared with other analyses, to be complicated and somewhat confusing. It was not clear whether or not the models were appropriately applied to evaluate a portion of the BDCP attributes.<br><br>The Effects Analysis modeling of salmon sensitivity to water temperature during egg incubation in the Sacramento River is not clear, given that the BDCP has no effect on upstream conditions according to some sections of Chapter 5. The Chapter 5 evaluation needs clarification, including a clear description of how the BDCP might affect flow and temperature in this area. | |
| 1673 | 22 | How well does the Effects Analysis link to the adaptive management plan and associated monitoring programs?<br><br>While both the need for and operative structure of adaptive management is identified considerably more in the Phase 3 review version of the Effects Analysis, it remains characterized as a silver bullet but without clear articulation about how key assumptions will be vetted or uncertainties resolved to the point that the BDCP goals and objectives are more assured. The concept of adaptive management is appropriately described and allocated a prominent role in the implementation structure. However, the commonly acknowledged process of adaptive management is easily misunderstood and misapplied, often resulting in a loss of rigor and commitment in application. Because of the extensive uncertainties surrounding the assumptions and predictions of the BDCP, the Panel strongly emphasizes institutionalizing an exceedingly rigorous adaptive management process. This is critical in order to avoid the high risk associated with ecological surprises that will be difficult or impossible to reverse once they have occurred. BDCP must make a commitment to the fundamental process, and specifically the required monitoring and independent science review, not just the concept of adaptive management. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 23 | Recommendation 1: Analysis of biological effects needs more consistency and specificity<br><br>In some respects, the current draft of the Effects Analyses lacks even more specificity than before, although it may be that sections were moved to other chapters. The 'multi- author' problem is apparent in the variation in assessments found in different locations. Most biological objectives for covered fishes were not fully evaluated in Chapter 5 because information was deemed to be insufficient (Table 5.2.8). Requests for full aquatic food webs were followed and a reasonable conceptual food web was provided, but it was incomplete. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 24 | Recommendation 2: Net Effects Analysis needs greater objectivity<br><br>Regardless of the degree of uncertainty and the number of linkages without analyses, the conclusion is often overstated as the most beneficial result. Many biological models were analyzed without any sensitivity analyses; consultants would say, 'there's no data,' but they could have said, 'what if we were just 90% correct here, or 60% correct', or 'what if the benefits of restoring wetlands are delayed 10-15 years over our most positive perspective' - but none of those alternative scenarios were considered. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| 1673 | 25 | Recommendation 3: Increase consistency of stressor analysis across covered species, and provide more detail.<br><br>Chapter 5 identified a ranking approach that addressed: 1) importance of attribute to the population; 2) effect of stressor on individuals; and, 3) certainty of 1 & 2. However, the analysis did not transparently follow through with this approach. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 26 | Recommendation 4: Chapter 5 must be a "stand alone" document<br><br>The synthesis quality of the Effects Analysis was improved. But reference to specific sections of technical appendices and other supporting documentation could be improved in many sections. Given uncertainty in effects analysis, more description of monitoring and adaptive management would be worthwhile to show that the BDCP would adequately address the uncertainty. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 27 | Recommendation 5: Clarify the baseline<br><br>The baseline(s) was described, although the baselines vary with regulatory agency. This complicated an already very complicated and lengthy Effects Analysis. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 28 | Recommendation 6: Provide systematic understanding and planning for conservation actions, especially restoration<br><br>Achieving beneficial conservation measures requires understanding limiting factors, ecosystem processes, sequencing, adaptive management responses, thresholds for certain actions, and interactions and other consequences of these actions. Otherwise, this isn't a conservation plan, but rather a conservation menu that generally fails to describe how major uncertainties will be resolved. For instance, while the Effects Analysis recognizes that suspended sediment has been declining in the Sacramento River and that the new diversions would remove an additional 8-9%, all analyses used a high and constant amount with no mention of downstream sediment effects on either Suisun or San Francisco Bay. Similarly, the uncertainty about being able to remove Egeria or other invasive species is not directly addressed in Chapter 5. Egeria is certainly poorly considered in the context of the aquatic food webs. Bivalves are not incorporated into aquatic food web analyses, although they're mentioned as 'uncertainties'. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 29 | While the conceptual model of food web enhancement support of covered species through restoration of tidal wetlands is more thoroughly covered, potential changes in the contributions of different food web sources and subsidies are still treated as disparate. Discussion of the Delta's potential food web structure and dynamics under BDCP conservation measures still fails to treat the Delta as a system, with spatially and temporally integrated sources of phytoplankton-based and detritus-based secondary production. There remains the need to provide a synthetic view of the potential benefit of restoration to the covered species that represents the integrated ecosystems and processes that fuel that food web, and potentially enhance it under the BDCP.<br><br>No additional detail has been provided for the Restoration Opportunity Areas (ROAs), other than their general locations. There is very little mention of how they will be connected, interact or be sequenced. What criteria have been developed to provide that guidance, or is it entirely dependent on opportunity (real estate costs, availability, public land, etc.)? Ultimately, adaptive management incorporating an extensive management structure and large representation of stakeholders will need to be implemented in order to resolve issues | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | and uncertainties. There is a tremendous trust embodied in an ill- defined adaptive management process. | |
| 1673 | 30 | Recommendation 7: Include indirect effects of contaminants as part of Appendix 5.D: Contaminants<br><br>Indirect effects of contaminants on covered species via food web effects (i.e., contaminant effects on the microorganisms that make up the food web that covered species depend on) are almost certainly important. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 31 | Recommendation 8: Accurately characterize food resources and food webs<br><br>While there is now more comprehensive assessment of both phytoplankton- and detritus-based food web pathways proposed to be enhanced by BDCP conservation measures, the Effects Analysis still leaves the impression that phytoplankton and macrophyte (e.g., tidal marsh) production are separate, almost "opposing" alternative food webs. Only a simple depth model is used for phytoplankton production, nothing else incorporated. Many things are now mentioned in the text, no analyses incorporated, no discussion of potentially modified planktonic composition, etc. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 32 | Recommendation 9: The hydrodynamic modeling needs to capture the entire domain of effects<br><br>1. New guidelines will need to be put in place to regulate tidal (and maybe tidally averaged reverse flows) in the north Delta channels including Steamboat, Sutter, and Georgiana Sloughs. The operation of the Delta Cross Channel also needs to be rethought. These new guiding regulations need to be in place before exports start to occur in the system.<br><br>2. The current Effects Analysis does not consider the influence of shifting timing of withdrawals on San Francisco Bay circulation patterns and ecology. This is a significant omission with ecologically important implications. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 33 | Recommendation 10: Incorporate life cycle models for all species, as quantitatively as possible<br><br>Appendix 5.G identified a number of life cycle models, but eliminated all but two to be used in the effects analysis. The Panel questioned whether some models were inappropriately dismissed. The two models used in Chapter 5 both involved winter Chinook salmon. Thus, the large majority of covered species were not evaluated with life cycle models. The Panel asks why the BDCP did not develop life cycle models when beginning the process. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 34 | Recommendation 11: Consider salmonids at stock and life history scale<br><br>This aspect of the Effects Analysis was also improved. Each salmonid stock was evaluated. "Forager" versus "migrant" life histories were compared and evaluated, but proportions of each life history type did not seem to be considered in the analysis of net effects. Furthermore, the relative proportion of wild versus hatchery fish contributing to each life history type was not considered. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 35 | Recommendation 12: Identify analytical tools that need to be developed to address the extremely high uncertainty involved with calculating sediment supply and turbidity | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | Multiple statements within Chapter 5 and Appendix 5.C indicate that turbidity distribution is largely unknown. | |
| 1673 | 36 | Recommendation 13: Levels of uncertainty are not adequately addressed<br><br>The Effects Analysis provides an improved recognition of uncertainty, but there's not better resolution of uncertainty than in previous drafts and the more complete discussion of uncertainty is often buried in the appendices. As a result, Chapter 5 reflects the lowest common denominator in terms of uncertainty. The level of uncertainty was often mentioned when evaluating the effect of a stressor on a species. Uncertainty was also mentioned when estimating net effects. However, conclusions regarding covered fish often overstated potential beneficial effects while not adequately addressing the lower-end effects. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 37 | Recommendation 15: Include sensitivity analyses and model validation in the effects analysis for covered fish species<br><br>While sensitivity analyses would have informed the Effects Analysis in the case of some of the biological models, this recommendation was generally not followed. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 38 | Recommendation 16: Provide more detail about the specific approaches that will be used when implementing adaptive management<br><br>Given the tremendous levels of uncertainty associated with critical assumptions and predictions inherent in the Effects Analysis, the burden of sustaining or enhancing covered species will seemingly fall almost entirely on adaptive management, particularly "active" adaptive management where explicit interventions may be required. However, it remains unclear how many of the critical uncertainties can or will be addressed as explicit experiments. While the Adaptive Management Plan is appropriately, and often effectively, designed to specifically address the major uncertainties, thresholds, triggers and alternative measures need to be explicitly derived from conceptual and numerical models. In some cases, metrics or success criteria have yet to be identified (e.g., Table 3.D.2). Furthermore, the critical monitoring that would be required for effective decision making and adjustments are often relegated to research actions rather than mandated effectiveness monitoring, which presents potential lack of commitment or delay in timely resolution of critical uncertainties. Given the critical importance of monitoring and adaptive management to BDCP success, it would be worthwhile to have an explicit section within Chapter 5 that specifies how monitoring and adaptive management has been designed and implemented to address specific uncertainties, test critical assumptions and predictions and sequenced to improve the chance of success. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 39 | Recommendation 17: Ensure a declining fish population (e.g., longfin smelt) does not decline further while waiting for possible beneficial effects of habitat restoration<br><br>The key assumption is that food production will be the primary benefit to longfin smelt from habitat restoration measures. Winter-spring flow is also believed to be key factor affecting abundance. Chapter 5 states that the key question is the extent to which abundance can be increased through improved food production and how these improvements interact with the spring outflow-abundance relationship. Recognition of the length of time needed to restore habitats and increase food production for longfin smelt could be strengthened in Chapter 5. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| 1673 | 40 | Accessibility of Effects Analysis elements<br><br>The Delta Science Program Independent Review Panel recognizes that the complexities involved in the process to develop and the ultimate structure of the BDCP are enormous, and as a consequence reviewing one component such as the Effects Analysis can be inhibited by lack of clear knowledge of the other components, expanded detail or underlying rationale. Furthermore, the Panel found it difficult to readily track down key information in the 745 page Effects Analysis (Chapter 5), which was supported with eight appendices containing an additional 4,500 pages. In general, in spite of its length, we often found assumptions or conclusions stated in the Effects Analysis to be lacking in sufficient detail to stand alone without links to Effects Analysis appendices or other BDCP chapters that provided the necessary detail or background. Although outside the charge of the Panel, we often found after digging further into the BDCP documents that the Effects Analysis was supported with some information. We recommend that for recognition of the voluminous and detailed information supporting the Effects Analysis, and ease of migrating through it, a simple system of (appendix/chapter and page-line number) cross referencing be employed to point the reader to that supporting information. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 41 | How well does the Effects Analysis meet its expected goals?<br><br>Summary<br><br>Compared to the initial development of the BDCP Effects Analysis, the Delta Science Program Independent Review Panel consensus is that the latest version is a much improved and impressive compilation of background material and scientific and technical knowledge about the Bay-Delta that provided a plausible basis for the conservation measures. The Panel concluded that all of the available data and arguments for the rationale behind the Effects Analysis assumptions and conclusions are contained within the BDCP documents, although we suggest that the Effects Analysis (Chapter 5) itself is still poorly substantiated and leaves too much to appendices and other BDCP chapters without explicit cross references. The lack of accessibility to information conveys a "trust us" message.<br><br>Evaluation of BDCP effects was typically systematic in that it attempted to identify key attributes affecting Covered Species and described, to the extent possible, the importance of that attribute, the potential effect of the BDCP on the attribute, and uncertainty regarding the evaluation. Findings from multiple approaches taken to assess potential effects were described and strengths and shortcomings were identified when possible. However, this level of detail, which sometimes included conflicting information, inhibits rather than elucidates comprehension of the findings.<br><br>The tenuous conclusion drawn from the Effects Analysis is that many of the critical justifications behind the supposed benefits of the conservation measures are highly uncertain. Other than the impression that the foundation of the BDCP is weak in many respects, the default burden to ensure Covered Species benefit, if not recovery, rests on adaptive management. The adequacy of the BDCP therefore rests not in the intent and development of the conservation measures, but in the rigor and application of adaptive management to ensure that the critical uncertainties are addressed and strategically incorporated into a progressively refined Plan. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 42 | There is great potential in the area of decreasing invasive aquatic vegetation (IAV) abundance. Control of extremely invasive IAV, such as Egeria densa (Brazilian waterweed) and Eichhornia crassipes (water hyacinth), could be substantial and effective if the Plan | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. Please refer to Master Response 14. |

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| | | follows through on its actions. The prospects of success with predator control appear marginal and then only if hotspot actions are followed through year after year. The effects of water withdrawals by the Plan may lead to expanded populations of the non-indigenous, invasive clams Potamocorbula amurensis and Corbicula fluminea without further direct actions to control their population growth. The fate of Microcystis aeruginosa is also not promising. Between trends in climate warming and planned water withdrawals, the prospects for Microcystis blooms appear to remain unchanged or slightly worse under the Plan, although the direction of these potential outcomes is highly uncertain. | |
| 1673 | 43 | The Effects Analysis develops a robust conceptual model of aquatic food webs and the diverse linkages that may impact the net production of food for covered fish species. Yet, the Effects Analysis contains a number of assumptions, some of which are inappropriate (such as the magnitude and location of invasive clam depression of phytoplankton production), and others highly uncertain. Uncertainties are mentioned, but no effort was made to include conservation efforts reaching only a portion of the biological objectives and goals. Thus the analysis of effects further assumes only the most beneficial potential results, but doesn't incorporate other possibilities. Other aspects of food webs in aquatic habitats are described but remain unanalyzed, some of which may enhance, while others may inhibit achievement of biological objectives. While the overall conceptual model is adequate, integration and synthesis is lacking. Consequently the conclusions and net effects are not appropriate given the gaps in analyses and the uncertainties. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 44 | For terrestrial communities and covered species, the Effects Analysis provides a simple accounting of the number of acres of natural communities and suitable habitat that will be removed and restored but very little information is provided about the management actions that will be implemented to maintain them over the duration of the conservation plan.<br><br>Recommendations<br><br>-Provide detailed cross-referencing and indexing between Chapter 5 and the associated technical appendices as well as other chapters of the BDCP, especially the Adaptive Management Plan.<br><br>-Improve reporting of uncertainty levels within Chapter 5 Effects Analysis, including within the Executive Summary.<br><br>-Identify the most relevant monitoring indicators necessary to evaluate the trajectory of outcomes with respect to the biological objectives,<br><br>-Complete work on biological objectives.<br><br>-Provide triggers for adaptive management<br><br>-Guide the scientific community by highlighted research priorities to address critical information gaps.<br><br>-Improve on the systematic approach for integrating net effects for Covered Species.<br><br>-Develop life cycle models for each of the Covered Species in order to evaluate BDCP effects | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 45 | The length and detail of the text and accompanying tables indicate considerable effort to document information used to determine the net effects. However, this level of detail, | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | which sometimes included conflicting information, inhibits rather than elucidates comprehension of the Effects Analysis findings.<br><br>Overall, the BDCP and the 22 conservation measures have the goal to enhance fish and wildlife species in the Plan Area. Twenty-one of the conservation measures involve actions intended to restore habitat and benefit Covered Species. Conservation Measure 1 (Water Facilities and Operation) also has the goal to benefit covered species but this specific action involves activities that may adversely impact species (e.g., water removal and construction activities) while also benefiting some species (e.g., reduced entrainment at the south Delta pumps). Therefore, a key goal of the BDCP Effects Analysis is to determine whether the overall positive effects of the conservation measures outweigh the adverse effects of water removal and project construction, and if so, to what degree.<br><br>The Effects Analysis attempted to evaluate the effects of the BDCP on each covered fish species in an open, unbiased manner. Sixteen life-cycle models for Covered Species were examined for applicability to the BDCP, but only two were deemed to be relevant. It was not clear why life cycle models were not developed for the specific purpose of evaluating BDCP effects on each of the Covered Species. Quantitative effects could not be described, rather effects of each attribute were ranked as zero, low, moderate, or high effect. A systematic approach to synopsize the overall net effect on each species was not used even though a ranking approach that could have been used in a systematic roll-up was described. Instead, professional judgment was used to assess the overall net effect. | |
| 1673 | 46 | If there is one area of general scientific consensus among the Delta Science Program Independent Review Panel about the implementation of the Bay Delta Conservation Plan is that its outcomes remain highly uncertain. As such, one would expect that the Effects Analysis would reflect this general conclusion by stressing a high level of uncertainty around all of its conclusions. There is also general consensus among stakeholders that the high level of uncertainty should not be an impediment to any action in the restoration of the Bay Delta ecosystem. The only way to address the highly uncertain outcomes of BDCP implementation is through rigorous monitoring and adaptive management. The BDCP Effects Analysis should better integrate where uncertainty exists, identify the most relevant monitoring indicators necessary to evaluate the trajectory of the outcome, provide triggers for adaptive management and guide the scientific community by highlighted research priorities to address critical information gaps. On these points the Effects Analysis as a stand-alone document falls short. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 47 | Table 5.2-8 identifies the biological objectives for each of the covered fish species and whether or not the Effects Analysis was able to assess the likelihood of the BDCP achieving the objectives. Some of the biological objectives were quantitative, thereby providing a specific metric that could be evaluated both prior to BDCP implementation and after implementation. For example, for winter-run Chinook originating in the Sacramento River, the objective is to achieve a 5-yr geometric mean survival through the Delta of 52% by year 19 (from an estimated 40% at present), to 54% by year 28, and to 57% by year 40. Although the table notes that this objective is interim and subject to possible change as new data are collected, the Delta Science Program Independent Review Panel complements the BDCP team for developing quantitative biological objectives to be achieved within specific time periods. Ideally, the Effects Analysis should evaluate likelihood of the BDCP achieving each biological objective.<br><br>The inability to fully evaluate the likelihood of achieving each biological objective at this | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | time highlights the need for a rigorous monitoring and Adaptive Management Plan. Chapter 5 seems to recognize this need in light of the incomplete evaluation of biological objectives. The Panel was not tasked with reviewing monitoring and adaptive management plans. Nevertheless, monitoring efforts should be designed to quantify whether or not the biological objectives are being achieved. The adaptive management plan needs to be linked to monitoring with identified trigger points and actions to steer the effort towards achievement of the biological objectives. | |
| 1673 | 48 | For terrestrial communities and covered species, the Effects Analysis, for the most part, provides a simple accounting of the number of acres of natural communities and suitable habitat that will be removed and restored but very little information about the management actions that will be implemented to maintain them over the duration of the conservation plan. The estimates of habitat restoration assume that restoration targets for the different habitats will be achieved with certainty, an assumption that unlikely to be met. In addition, the contribution of natural community restoration to species habitat restoration is estimated by multiplying the percentage of modeled habitat comprising the natural community by the total acres of natural community restoration in the plan area. This approach, however, confounds the spatially explicit nature of many of the species distributions within the Plan Area. For instance, only the riparian woodland south of Highway 4 within the Plan Area is considered potential riparian woodrat habitat which makes sense given their current distribution. The riparian woodland in this region currently comprises approximately 12.1% of the riparian woodland in the entire Plan Area. It is inappropriate to apply this percentage the estimate the amount of restored habitat in the Plan Area that will be available to riparian woodrats. If none of the restored habitat occurs south of Highway 4 then none of it will be potentially available to riparian woodrats. It makes much more sense to identify only riparian woodland restored south of Highway 4 as potential riparian woodrat habitat. Because the distribution of many of the species in the Plan Area is limited by their current distribution and dispersal abilities, the potential for colonization of restored areas should be identified using spatially explicit information. In the case of the riparian brush rabbit and riparian woodrat, a specified number of acres of riparian woodland should be restored within their potential range in the Plan Area.<br><br>The issue of the management of terrestrial communities and covered species is addressed in very broad terms in Chapter 5. In some cases there is mention of maintaining communities in a successional state that will make it suitable for a particular species (e.g., early successional riparian forest for riparian brush rabbits and western yellow-billed cuckoo), but many of the uncertainties surrounding long-term management of species and habitats are subsumed into adaptive management. Adaptive management is unlikely to succeed unless clear targets and thresholds for alternative management approaches are identified. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 49 | The vastness of the Effects Analysis report and appendices is both its strength and weakness. In order to draw conclusions regarding effects of individual stressors or net effects on a species, it was often necessary in the report to draw on information from a number of appendices or other sections of the report. In many cases, these sections were not referenced or the specific findings of those sections not restated. This leaves the reader to hunt for the pertinent facts. It also appears at times that conclusions are based on a select subset of the facts that influence both the strength and certainty of the conclusions.<br><br>Because the variety of topics that the BDCP covers, how clearly the methods are described varies between topics. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| 1673 | 50 | Covered Fish<br><br>Approximately 72% of the objectives for covered fish could not be fully evaluated at this time due to insufficient information. The overall net effects conclusion for each species seemed to be based on the judgment of the authors, rather than a systematic ranking of attribute importance, change in response to the BDCP, and uncertainty in the rankings. Sixteen life cycle models for Covered Species were examined for applicability to the BDCP, but only two were deemed to be relevant, although the Panel is concerned about the exclusion of some life-cycle models. A systematic approach for synthesizing the net effect on each Covered Species was not used even though a ranking system was described that could have been used as a semi-quantitative scoring approach. Instead, professional judgment was used to assess the overall net effect.<br><br>In section 5.5, the text describes a numeric ranking for evaluating the importance of the attribute to the species, and the effect of the BDCP action on the attribute. The summary table (e.g., Fig. 5.5.1-5) was extremely difficult to read, used text to describe the effect (zero to high) and color to describe certainty. A small, essentially illegible "-" sign identified negative rankings. This summary table needs to be redesigned to improve readability.<br><br>No major omissions for the scientific literature or failure to use best available data were found in the Effects Analysis. However, the Effects Analysis did not develop new methods when gaps in assessment capabilities were encountered. For example, no attempt was made to modify any of the existing delta smelt models for the express purpose of this assessment.<br><br>An inevitable risk in using any mathematical model is extrapolation outside the range of the model. This extrapolation is likely whenever projecting to environmental conditions that have not yet occurred such as the changes that could be brought about by the BDCP. It is imperative that model-based assessments clearly state when such extrapolation is occurring and the potential direction of bias that might likely arise. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 51 | Hydrodynamics<br><br>The coupling of the multi-D, DSM2, and CALSIM II models is not a standard method that would naturally be understood by the reader. The documentation for this coupling is part of the EIS documentation, not part of the BDCP documentation. A short summary of the method should be included in Chapter 5. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 52 | Terrestrial species<br><br>The methods for the terrestrial species are adequately described in the various appendices (but see specific comments on the description of the methods for the habitat restoration in Appendix 5.J.B).<br><br>Recommendations<br><br>Over-arching recommendations<br><br>-Include a table of cross-references for each section or appendix referenced in the Net Effects.<br><br>-Add formal comparisons of model results in the Effects Analysis and appendices. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | -Include within the Net Effect sections, discussions of contradictions or non-supportive facts in order to better capture some of the uncertainty in the conclusions.<br><br>-Emphasize the following Effects Analysis statement: "These expectations represent a working hypothesis of the relationship between actions, stressors, and biological performance." | |
| 1673 | 53 | Covered fish<br><br>Model-based assessments should clearly state when extrapolation is occurring and the potential direction of bias that might likely arise.<br><br>Redo the format of the effects on attributes summary tables (e.g., Fig. 5.5.1-5) to improve readability. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 54 | Hydrodynamics<br><br>A short summary of the method to inter-link multi-D hydrodynamic models, 1-D (DSM2) models, and CALSIM II should be included in Chapter 5. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 55 | Hydrodynamics<br><br>One of the issues that had to be worked through with the hydrodynamic models for the Effects Analysis was how to use hydrodynamic models that were designed for the current bathymetric configuration of the Delta and the watershed. The CALSIM II model is a watershed optimization model that has operational criteria based on salinity intrusion into the Delta. Changing main point of diversion in Conservation Measure 1, adding ROAs in Conservation Measure 3, and factoring in climate change (especially sea level rise), all change the circulation patterns in the Delta and the associated salinity intrusion. It is necessary to use the physically based multi-dimensional hydrodynamic models to first calculate hydrodynamic parameters (stage and flow) and salinity throughout the system. Because the multi-dimensional models are computationally intensive to run, the results of the multi-dimensional models are used to calibrate the DSM2 (1-D) model. The DSM2 (1-D) model is then used to create the relationship between salinity intrusion and river input flows. This river inflow-salinity intrusion relationship is what CALSIM II needs for optimization.<br><br>The coupling of the multi-D, DSM2, and CALSIM II models is not a standard method that would naturally be understood by the reader. The documentation for this coupling is part of the Environmental Impact Statement documentation, not part of the BDCP documentation. A short summary of the method should be included in Chapter 5. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 56 | Overall approach to determine net effects<br><br>The Effects Analysis, particularly for covered fish, tries to incorporate information on potentially beneficial or detrimental effects covering 12 different stressors, 32 attributes, and multiple life stages using best available information and science. Only a perfect life cycle model with perfect information on all the effects and their interactions could possibly weight the results correctly and draw unambiguous conclusions. Any and all actual effects analyses are far from that measure of perfection, including the BDCP. The effect summary figures (e.g., Figure 5.5.2-5) attempt to illustrate the multidimensional aspects of the assessment process and, along with the Net Effect narratives, try to convey an overall | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | assessment conclusion. A serious limiting factor of the current cumulative Net Effects is a near complete absence of any explicit weighting (in summary tables) of the biological importance of the many attributes under consideration (e.g., Figure 5.5.1-5). Size and direction of anticipated effects on the attributes is provided in the summary figures, along with color coding levels of certainty. Even though summary tables show values for each life stage, what cannot be discerned is whether any critical life stages or attributes are being adversely affected by the BDCP. Consequently, it is also unclear whether the Net Effects conclusions are correctly taking critical life stages into account when deriving overall Net Effects conclusions.<br><br>The approach to net effect conclusions needs to be reconsidered and revamped. The net effect summary figure (e.g., Figure 5.5.2-5) does not include the relative importance of the categories (e.g., food, entrainment, etc.). Without incorporating their relative importance in the summary figure, net effect conclusions are potentially meaningless and uncertainty cannot be characterized. The net effect conclusions for a fish species need to therefore take into account the relative importance of the various categories, make them explicit, and interpret Plan effects within that context on a species-by- species basis. | |
| 1673 | 57 | Covered Fish<br><br>The Effects Analysis does not adequately defend conclusions regarding the net effects of the BDCP, including habitat restoration. Habitat restoration certainly has the potential to increase the productivity of species such as salmonids, but the literature contains relatively few studies documenting the population response of salmonids to habitat restoration. The conclusion statements from Chapter 5 (and/or the Executive Summary) tend to overstate the beneficial effects of BDCP for many different fish populations (e.g., salmonids, delta smelt, green and white sturgeon). The net effects analysis tends to over-reach conclusions of positive benefits for covered fish species, given the inability to quantify the overall net effect and the realization of high uncertainty.<br><br>Key issues/questions that still need to be address for covered fish include:<br><br>1. The importance of interactions between BDCP flows and habitat restoration.<br><br>2. Will the migrant life history sufficiently benefit from conservation measures to offset moderate negative impacts related to reduced spring flows? Migrant salmonids may benefit less from conservation measures, and may experience a negative net effect.<br><br>3. To what extent is foraging habitat and exposure of foraging salmonids to predators affected by reduced spring flows?<br><br>4. The text does not distinguish between hatchery versus wild salmonids in the analysis. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 58 | Conceptual Models<br><br>In general, the conceptual models for dissolved oxygen and contaminants are well developed, although consideration of nutrient form and nutrient ratios (e.g., Glibert et al. 2011) would be a nice addition given the interest and recent publications on these topics. Also, algal toxins could be an attribute for monitoring to reduce uncertainty in contaminants and food web conceptual models.<br><br>Although there are good synthetic conceptual models developed for the Bay-Delta longfin | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | smelt population encapsulated in the Effects Analysis (e.g., Baxter 2010; Rosenfield 2010), the conceptual model is still constrained by the lack of a life-history model that would elucidate the role of prey composition and abundance in population dynamics. | |
| 1673 | 59 | Food Webs<br><br>Restoration of tidal wetlands (and other communities) is highly uncertain and at least an extremely long process. The Effects Analysis does not adequately justify the critical assumption of the benefit of tidal wetland restoration as a food web subsidy for covered pelagic fish given the uncertainties of tidal wetland restoration itself. The conceptual model of the food web appears to include many of these processes. However, within the narrative current understanding as well as the implications of inherent uncertainties are not fully explored. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 60 | Organic matter subsidies to the Delta Food Web<br><br>There is an expectation that restoration activities will result in increases in abundance of lower trophic levels but the structure of the lower food web will be critical in whether this increased production can support covered species. Not only quantity, but also quality of the primary production that is supported by restoration activities is important. Water residence time within Restoration Opportunity Areas and other characteristic transport timescales for Delta channels are not the only factors to consider. The type of phytoplankton primary production that is stimulated is highly uncertain and likely dependent upon water temperature, nutrient concentrations, vertical mixing and grazing. In addition, an increased residence time may promote toxigenic cyanobacteria (Microcystis aeruginosa). | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. Please refer to Master Response 14. |
| 1673 | 61 | Hydrodynamics and physical changes at export facilities<br><br>For hydrodynamic modeling, only one set of Restoration Opportunity Areas (ROAs) were modeled. Because the locations of these assumed ROAs are not being presented to the public, there are details of the hydrodynamic modeling that cannot be factored into the Panel's evaluation of the Effects Analysis.<br><br>Conservation Measure 1 now includes significant modifications to Clifton Court Forebay. This region has been identified as a predation hot spot by multiple studies. Reduction in predation hot spots should be considered in the physical design. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 62 | Terrestrial species<br><br>The Effects Analysis for terrestrial species focuses almost exclusively on a simple summation of the number of acres of suitable habitat that are removed or restored for each species by the conservation measures. The simple accounting approach does not consider landscape-level effects such as connectivity and patch size nor does it take into account differences in habitat quality.<br><br>Recommendations<br><br>Overall approach to determine net effects<br><br>-Clearly indicate on effect summary figures (e.g., Figure 5.5.2-5) both beneficial (+) and detrimental (□)effects.<br><br>-In order to incorporate biological importance into the Net Effects process, the rows (i.e., | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | categories, attributes) of the effects figures (e.g., Figure 5.5.21-5) could be ranked or rearranged in clusters according to biological importance for the specific species (e.g., high, medium, low). In this way, it would be easier to assess whether any biologically important attributes are likely to be negatively impacted and at what level of impact. It will also allow readers to discern whether any biologically important attributes also have high levels of uncertainty assigned to them.<br><br>-From the August 2013 Covered Fish workshops, it would be valuable to include in the Net Effects summary, what fraction of the attendees agreed with the Net Effects conclusions (i.e., direction, amplitude and level of certainty). | |
| 1673 | 63 | Covered fish<br><br>Examine and re-write conclusion statements about population net effects in both Chapter 5 and the Executive Summary to objectively express the range in anticipated population effects.<br><br>Evaluate effects of conservation measure attributes on species while considering all other potentially interacting conservation measures.<br><br>Consider relative abundance of salmon life histories when evaluating net effects on each species.<br><br>"Wild" salmonids should be considered separately from hatchery fish whenever possible. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 64 | Conceptual Models<br><br>Consideration of nutrient form and nutrient ratios (e.g., Dugdale et al. 2007; Glibert et al. 2011) would be a nice addition to food web models given the interest and recent publications on these topics.<br><br>Algal toxins could be an attribute for monitoring to reduce uncertainty in contaminants and food web conceptual models. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 65 | Food Web<br><br>A simple surface area versus water volume calculation would provide a first-order estimate of potential food subsidy to open water habitats of the low salinity zone.<br><br>Evaluate and compare the magnitude and temporal and spatial variation in the multiple organic matter subsidies to the Delta food web.<br><br>Incorporate into the Effects Analysis the idea that tidal wetland restoration may mitigate some of the nutrient loading into Delta by acting as a nutrient sink through emergent vegetation production, phytoplankton production as well as fluxes to the atmosphere via denitrifcation.<br><br>Estimate the potential food web subsidy attained based on the degree to which habitats are connected hydraulically to Suisun and Grizzly Bays. These areas could serve as "proof of concept" for other, unidentified Restoration Opportunity Areas. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 66 | Hydrodynamics and physical changes at export facilities | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | When Conservation Measure 3 is implemented, the details of the connection between the Restoration Opportunity Areas and the adjacent channels and the order in which the Restoration Opportunity Areas are established need to be top design criteria.<br><br>Since Conservation Measure 1 is proposing significant physical changes be made to Clifton Court Forebay, the identified predation hot spots within Clifton Court Forebay should be considered in the re-design. | |
| 1673 | 67 | Terrestrial species<br><br>Landscape-level effects should be considered. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 68 | Effects on Covered Fishes<br><br>A Comprehensive Summary Figure Would Be Useful. For specific actions affecting covered fishes, the Effects Analysis summarizes findings of multiples investigations when available and often qualifies the findings with opinion statements of how important the attribute might be and how certain the finding is. This assessment by the authors of the Effects Analysis is often compared with a summary of conclusions, including a statement of uncertainty, developed from a workshop with agency personnel in August 2013. This approach is reasonable given the information available, but improvements could be made to systematically summarize 1) the relative importance of the attribute, 2) the level of change caused by BDCP implementation, and 3) the certainty of this evaluation. The relative importance of an attribute was often provided within the narrative of Chapter 5, but a comprehensive table or figure summarizing this metric was not presented along with the effect of the BDCP on the attribute and the certainty associated with the rankings. A comprehensive summary figure is a key step leading to the overall net effect determination for each species. This figure would also enhance transparency in the final professional judgment of net effects. Furthermore, some sections of the Effects Analysis did not seem to reach a conclusion or describe the certainty about the findings, e.g., text description of Feather River flow effects on spring Chinook | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 69 | Salmonid Life History Increases Uncertainty. Salmonids have a variety of juvenile life history types that result in differential use of Delta habitats over time. The Effects Analysis characterized these life history types as foragers and migrants. Foraging juvenile salmonids are younger, smaller and typically inhabit shallower habitats compared with larger, older yearling salmonids that pass through the Delta relatively quickly. Recognition and consideration of these two life history strategies in the BDCP Effects Analysis (e.g., Fig. 5.5.3-4) is important. However, as noted below, the complex life history of salmonids, including life history differences between wild and hatchery origin fish, leads to greater uncertainty in the overall net effect of the BDCP actions on salmonid populations. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 70 | Literature Shows Major Restoration Needed to Improve Fish Populations. The Effects Analysis does not adequately defend conclusions regarding the net effects of the BDCP, such as habitat restoration, on fish species. Habitat restoration certainly has the potential to increase the productivity of species such as salmonids, but the literature, including published papers and technical reports, contains relatively few studies documenting the population response of salmonids to habitat restoration (see reviews by Roni et al. 2008, 2011). Findings in the literature on the response of salmonid populations to habitat restoration was not adequately addressed in the Effects Analysis when describing the net effect of each species, although the methods section (5.2.7.10.3) did provide a reference by | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | National Marine Fisheries Service stating that quantitative linkages between specific habitat actions and viable salmonid population criteria is difficult. The difficulty in documenting population responses to habitat restoration should be recognized and addressed with large and strategic habitat restoration projects and detailed monitoring. For example, in a comprehensive evaluation of salmon responses to habitat restoration in Puget Sound, Roni et al. (2011) concluded:<br><br>"Given the large variability in fish response (changes in density or abundance) to restoration, 100% of the habitat would need to be restored to be 95% certain of achieving a 25% increase in smolt production for either species. Our study demonstrates that considerable restoration is needed to produce measurable changes in fish abundance at a watershed scale." | |
| 1673 | 71 | Conclusions Often Overstate Beneficial Effects. The Panel believes that the net effects analysis tends to over-reach conclusions of positive benefits for covered fish species, given the uncertainty and inability to quantify the overall net effect. Given the findings of Roni et al. (2011), it may be inappropriate to extend an uncertain but potentially positive effect conclusion to statements about species conservation, especially under future climate scenarios. For example, the following grand conclusion statements from Chapter 5 (and/or the Executive Summary) tend to overstate the beneficial effects of BDCP:<br><br>"The magnitude of benefits for winter-run Chinook salmon at the population level cannot be quantified with certainty. Nonetheless, the overall net effect is expected to be a positive change that has the potential to increase the resiliency and abundance of winter-run Chinook salmon relative to existing conditions."<br><br>Statements about increased resiliency and abundance are inappropriate given the high uncertainty expressed in the initial sentence. The statements tend to focus on the upper end of beneficial effects rather than a balanced analysis that might capture the range in net effects. The Panel underlined the questionable text.<br><br>"The BDCP should help conserve the species in the Plan Area and help it cope with expected climate change…." The term "conserve" implies a large beneficial population effect for salmon that may help the population recover from Endangered Species Act listing. Maybe the BDCP will lead to a positive effect, but the magnitude of the effect is uncertain, as stated above, so it seems inappropriate to imply the BDCP would eliminate attributes in the Delta that cause lower population viability. The life cycle models suggested climate change effects would overwhelm the evaluated BDCP actions on winter Chinook salmon.<br><br>The following conclusion for delta smelt overstates and over-emphasizes the potential for significant beneficial effects (by emphasizing great potential) while also noting the conflicting conclusion of high uncertainty in the net effect: "While there is great potential for large benefits for delta smelt, there is a high level of uncertainty regarding the resulting effects. However, combined with the Fall X2 decision tree, the BDCP will have at least a minor beneficial effect on the species, but a great potential for larger benefits depending on actual food production and location of delta smelt population in relation to restored areas." The high-end benefit is emphasized in the BDCP text. Perhaps there is higher certainty for a positive versus negative net effect but there is high uncertainty for the net effect of actions on the delta smelt population, ranging from little to high population effect. This evaluation would benefit by the removal of "great".<br><br>For green and white sturgeon, the BDCP concluded: "Therefore, the BDCP is expected to | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | conserve both species in the Plan Area through improvements in abundance, productivity, life history diversity, and spatial diversity." The term "conserve" implies a large beneficial population effect that was not supported by the evaluation. The conclusion statement also implies and therefore overstates measureable positive changes to four population viability criteria. These benefits may reflect the goals of the BDCP, but the uncertain magnitude of benefits to sturgeon should not be described as improving abundance, productivity, life history diversity, and spatial diversity. | |
| 1673 | 72 | Interactions between conservation measures. Interactions between BDCP flows and habitat was not adequately addressed in the report. For example, Table 5.5.3-4 shows that habitat units typically increased for foraging salmonids in response to habitat restoration, but the habitat analysis did not appear to consider whether salmonids would have access to the habitat during reduced flows under the BDCP scenarios (see Table 5.E.4-1). For example, flows were expected to be ~15% to 20% lower during January to April when many foraging salmonids are rearing in the Delta area. In other words, how much rearing habitat is available and what is the habitat quality for foraging salmonids when flows have been reduced 10-20%? The Cache Slough region is one example where key habitat restoration sites might be affected by reduced river flows. Perhaps tidal fluctuations overwhelm river flows in some of the lower habitats, but this should be stated in the report. For foraging salmonids, do reduced flows of the BDCP negate the reported habitat gains from some restoration activities? Recommendation: evaluate effects of conservation measure attributes on species while considering all other potentially interacting conservation measures. This approach was taken for some measures (e.g., Delta Passage Model evaluations) but not all. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 73 | Migrant salmonids may benefit less from conservation measures and may experience a negative net effect. The effect of each attribute on migrant versus forager salmonids was examined in Chapter 5, but summary Figure 5.5.3-2 did not capture differences in the assumed relative abundances of these life histories among the species. Plan area flows were typically ranked as a moderate negative effect on migrant salmonids in the Sacramento River and a low negative effect on foragers. However, this attribute was ranked the same for each salmonid species regardless of the proportion migrants versus foragers assumed in the population. The negative impact of reduced plan area flows should have been greater on Sacramento River species such as spring Chinook and steelhead that are dominated by migrant life histories.<br><br>Migrant life histories are less likely to benefit from habitat restoration activities, which are a key focus of the BDCP conservation measures. This implies that spring Chinook and steelhead may experience less benefit from BDCP actions than other salmonid species, or they may even experience a negative net effect in response to reduced spring flows. The key question, which deserves more attention in the BDCP, is whether the migrant life history will sufficiently benefit from conservation measures to offset moderate negative impacts related to reduced spring flows. This question is key for spring Chinook and steelhead that are composed mostly of migrant life histories.<br><br>Characterize uncertainty in plan area flow effects on salmonid life history types. The Delta Passage Model (DPM) is a key tool for this evaluation because it predicts survival of migrant salmonids while considering river flows, passage into interior areas, entrainment to pumps, and passage into the Yolo Bypass. The survival model is largely based on Chinook salmon exceeding 140 mm in fork length, therefore the DPM does not represent foragers or smaller | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | migrants, which are the target of the habitat restoration activities.<br><br>The Effects Analysis states that it was assumed with moderate certainty that flow has high importance to foraging winter Chinook salmon, then notes that the moderate level of uncertainty reflects the relative lack of investigation on the influence of flows on smaller salmonids (Page 5.5.3-24, line 39-41). Moderate uncertainty is quite different from moderate certainty, which is also concluded in each salmonid summary figure (e.g., 5.5.3-4). If there is no information on how flows affect survival of smaller foraging salmonids in the Delta, it is difficult to accept a moderate level of certainty associated with the low negative impact of flows on foraging juveniles salmonids, especially when data suggest flow has a significant effect on larger salmonid (migrant) survival (Fig. 5C.5.3-4). To what extent is foraging habitat and exposure of foragers to predators affected by reduced spring flows? For winter Chinook and fall Chinook, the forager life history is the dominant type, indicating less certainty about the net effect of BDCP flows on these species compared with species dominated by migrant life histories that have been tagged and analyzed, e.g., Fig. 5C.5.3-4. | |
| 1673 | 74 | Hatchery versus "wild" origin salmonids. The presence of hatchery salmonids is typically noted in the introductory descriptions of each salmonid species in Chapter 5. The degree to which hatchery salmonids contribute to the two life history types was not described, though hatchery fish are released as migrants. For example, 80% of juvenile spring Chinook were assumed to be migrants. To what extent was this due to the release of migrants from hatcheries given that some of the natural population produces primarily foragers? The text does not otherwise distinguish between hatchery versus wild salmonids in the analysis. Although some hatchery stocks are protected by the Endangered Species Act, it would seem that wild salmonids would have a higher priority than hatchery- produced salmonids, even though hatchery runs provide important role in the Central Valley and ocean fisheries. Perhaps resolution of effects and uncertainty inhibit analyses specific to wild salmonids. Nevertheless, wild salmonids should be considered independently from hatchery salmonids when possible. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 75 | Do habitat actions only affect salmonid capacity and not productivity? Fig. 5.5.3-2 shows BDCP effects on productivity of each salmonid species by attribute. No effect is shown for habitat attributes such as channel margin, floodplain, riparian, etc. In contrast, these attributes are scored in other Figures for each species, e.g., Fig. 5.5.3-4. Does this reflect an opinion that these habitat actions only increase the capacity of the habitat to support salmonids rather than habitat quality? | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 76 | Obtain more information from life cycle models. Life cycle simulations were only performed for winter-run Chinook salmon using the OBAN and IOS models. Comparison of through-delta survival and adult returns by management scenario (Table 5.G-2) was very useful. One way to compare and evaluate the two models is to assess consistency in the management scenario rank (best to worst) for the various response variables. For instance, if the same management scenario always ranks first, then that would indicate high level of consistency and support for that conclusion. On the other hand, if management scenario rankings varied greatly between assessments then conclusions would have high degrees of uncertainty (See Table 1, below).<br><br>Some life cycle models inappropriately excluded. Appendix 5G excluded delta smelt life cycle models in the Effects Analysis without adequate justification. Based on the premise of using the "best available science," it is unclear how none of the delta smelt models could have reached that level of acceptance. One justification was that none of the models used | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | zooplankton data; however, the BDCP Net Effects assessment indicated zooplankton was only of moderate importance to delta smelts (Figure 5.5.1-5). It would therefore seem that some assumptions about zooplankton could have been made, allowing life-cycle modeling to be performed. Robustness studies could have accompanied the modeling process. Furthermore, if the BDCP team felt none of the delta smelt models to be adequate, why was there no investment made in model development for such an important species of interest? | |
| 1673 | 77 | Net Effects<br><br>The Net Effects summary figures (e.g., Figures 5.5.1-5, 5.5.2-5, etc.) are very useful for synopses for each fish species, but they are incomplete. It would be visually helpful to explicitly include both positive (+) and negative (-) signs for each combination of life stage and category. There continue to be discrepancies between conclusions regarding certainty and level of effect between the text and summary tables. The quantitative scoring method described on page 5.5.1 seems to be largely ignored. Instead, a qualitative ocular assessment of the summary tables seems to be applied separately to the certainty and level of effect dimensions. For salmonid species, weighting is discussed for migrant vs. foraging forms, but this too is seemingly ignored (or at least not mentioned) in the Net Effect conclusions.<br><br>The approach to Net Effects conclusions needs to be reconsidered and revamped. The Net Effects summary figures (e.g., Figure 5.5.2-5) do not include the relative importance of the categories (e.g., food, entrainment, etc.). Without incorporating their relative importance, Net Effects conclusions are potentially meaningless and uncertainty cannot be characterized. Levels of uncertainty have different weight depending on the importance of the various categories. An assessment might have high uncertainty for all low importance categories and still have high overall certainty if all the important categories carry with them high certainty. Conversely, the overall assessment would have low certainty, if one or more of the high importance categories carry high uncertainty. The Net Effects conclusions for a fish species needs to therefore take into account the relative importance of the various categories, make them explicit, and interpret Plan effects within that context on a species-by-species basis. Uncertainty plus uncertainty is more uncertainty. Uncertainty never averages or cancels out uncertainty; any more than noise plus noise is less noise. One graphical approach to conveying importance of the various categories and attributes is to order or group the rows of the figures according to their importance for a particular fish species. It would then be possible to see if any detrimental effects of the BDCP are associated with any important biological processes or not. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 78 | Life-cycle simulations were only performed for winter-run Chinook salmon (i.e., models OBAN and IOS). Comparison of through-Delta survival and adult returns by management scenario (Table 5.G-2) was very useful. One way to characterize model consistency is to assess how consistent the management scenarios rank (best to worst) across the models and different response variables. For instance, if the same management scenario always ranks first, then that would indicate a high level of consistency and support for that conclusion. On the other hand, if management scenario rankings varied greatly between assessments, conclusions would have a high degree of uncertainty. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 79 | Restoration of tidal wetlands (and other communities) is highly uncertain or at least an extremely long process<br><br>Restoration of tidal wetlands is considered in detail in the section on aquatic food webs | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | (Question 12). In general, tidal wetland restoration of biological function is quite difficult with respect to ecosystem processes beyond tidal flux and especially with respect to ecological equivalency to comparable natural wetlands. This has been reviewed in a number of studies and conclusions have remained consistent over the past two or three decades (e.g., Kentula 1996, Simenstad and Thom 1996, Zedler and Callaway 1999, BenDoer et al. 2009, Moilanen et al. 2009). | |
| 1673 | 80 | Lack of specificity in Restoration Opportunity Areas limits conclusions of many aspects of Effects Analysis<br><br>For the hydrodynamic modeling, only one set of Restoration Opportunity Areas were modeled. (See discussion of implementation of models in Question 2.) Because the locations of these Restoration Opportunity Areas are not being presented to the public, there are details of the modeling that cannot be factored into the Panels evaluation of the Effects Analysis. As examples: 1) in Panel Question 7, the placement of the Restoration Opportunity Areas influences reverse flows in Georgiana Slough, 2) the calibration of the 1-D model based on the 2-D model results is sensitive to Delta Cross Channel operations, which could be the result of Restoration Opportunity Areas representation in the system. (See question 5 Restoration Opportunity Areas modeling discussion.) When Conservation Measure 3 is implemented, the details of the connection between the Restoration Opportunity Areas and the adjacent channels and the order in which the Restoration Opportunity Areas are established need to be top design criteria. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 81 | Clifton Court Forebay physical changes need more evaluation before implementation because of its reputation as a predation hotspot<br><br>Conservation Measure 1 now includes significant modifications to Clifton Court Forebay. These modifications include building a wall in Clifton Court Forebay to create two separate regions, the north region would receive water from the North Delta pump facilities and the south region would receive water from the existing south Delta channels. In addition, the current size of the Clifton Court Forebay would also be enlarged by flooding an adjacent tract of land to the south. Based on the public panel discussion with ICF and the Fish agencies on January 29, 2014, the philosophy behind the modifications is that the water coming from the North Delta facilities will have already been pre-screened for critical fish species. Therefore, there would be significant savings in not filtering north Delta diversion (NDD) water through the south Delta fish screening facility.<br><br>ICF acknowledged that this is a newer element of the design for Conservation Measure 1. There was no documentation in Appendix 5.H (Aquatic Construction and Maintenance Effects) regarding this construction. The building of a dam in the center of Clifton Court Forebay and dredging another tract should be considered in Appendix 5.H.<br><br>Clifton Court Forebay has been identified as a predation hot spot by multiple studies. The Fish Predation science panel (Grossman et al. 2013) stated in their final report that: "Clifton court Forebay (CCFB) has been identified by multiple sources as an inhospitable location for salmonids. Within CCFB several areas are particularly hazardous including: 1) the deep scour hole just inside CCFB by the radial gates; 2) the trash gates in front of the Tracy Fish Collection Facility; and 3) section of Old River adjacent to the radial gates." Since Conservation Measure 1 is proposing significant physical changes be made to Clifton Court Forebay, these predation hot spots should be considered in the re-design. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| 1673 | 82 | Delta Food Web<br><br>5.3.38 Cache Slough and Suisun Marsh Restoration Opportunity Areas are suggested as areas of substantial increase in Prod-Acres. Given that these Restoration Opportunity Areas are defined, some work could be done to estimate the potential food web subsidy attained based on the degree to which habitats are connected hydraulically to Suisun and Grizzly Bays. These areas could serve as "proof of concept" for other, unidentified Restoration Opportunity Areas. An interesting outcome of such an exercise would be a determination of the potential for export and trophic transfer (a positive outcome) versus localized cultural eutrophication, increased biochemical oxygen demand and dissolved oxygen sags in tidal sloughs (negative outcome).<br><br>The discussion of water residence time throughout the Delta (Section 5.3.36) suggests an increase of 3 to 4 days as compared to the current configuration. But this analysis is also site-specific. The approach used to calculate residence time is also of concern. The residence time in each Restoration Opportunity Areas is a function of bathymetry, the exchange between the Restoration Opportunity Area and the adjacent channels. The 1- D DSM2 model does not have the capability to calculate this parameter. In addition, because the specific locations and configurations of the Restoration Opportunity Areas are not presented in the Effects Analysis, the panel has no basis to comment on the validity of the approach. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 83 | The phytoplankton productivity model that results in Prod-Acres is limited in terms of prediction or certainty in outcomes. Again, it comes down to a question not only of quantity but also quality of the primary production that is supported. The result of longer residence time is likely to increase phytoplankton primary production (i.e., "slower is greener") this may not hold when invasive clams are introduced to the system (Lucas and Thompson, 2012). Additionally, the type of phytoplankton primary production that is stimulated is highly uncertain and likely dependent upon water temperature, nutrient concentrations, vertical mixing and grazing. Lehman et al. (2013) suggested that increased residence and warmer water temperatures in excess of 19 - 20° C will promote toxigenic cyanobacteria including Microcystis aeruginosa. It should be recognized that Microcystis is only one potentially important toxigenic cyanobacteria in the Bay-Delta - Aphanizomenon was abundant in 2011 and 2012 in the Bay-Delta (Karobe et al. 2013). | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. Please refer to Master Response 14. |
| 1673 | 84 | Tidal wetland restoration may mitigate some of the nutrient loading into the Delta by acting as a nutrient sink through emergent vegetation production, phytoplankton production as well as fluxes to the atmosphere via denitrifcation. These ideas are not considered within the Effects Analysis. The decay of large amounts of invasive aquatic vegetation (a result of control measures) also has the potential to increase biochemical oxygen demand and inorganic and organic nutrient supply; this may shift phytoplankton community composition and promote local eutrophication. This issue is raised in a single bullet point on page 5.F-130, line 26 | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 85 | Terrestrial Species<br><br>Rather than using current estimates of habitat occupancy within the Plan Area to estimate occupancy of restored habitat, we recommend using spatially explicit occupancy models (see comments under question 4). In addition, the minimum width and maximum distance of riparian habitat corridors should be identified for terrestrial mammals that are restricted to riparian habitats (riparian woodrat and riparian brush rabbit). Persistence of these | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | species in the Plan Area requires riparian habitat patches that are sufficiently large to support stable populations as well as riparian corridors that will allow movement between suitable habitat patches. Both the minimum patch size and minimum corridor parameters (width, distance, overstory cover) should be specified to ensure long-term occupancy of restored riparian habitat. | |
| 1673 | 86 | How well is uncertainty addressed? How could communication of uncertainty be improved?<br><br>Summary<br><br>A broad consensus exists among the Delta Science Program Independent Scientific Review Panel that Chapter 5 does not adequately address uncertainty. In its current form, at the level of detail conveyed, in the models used, and in the verbal assessments and conclusions, the level of uncertainty is downplayed. Within appendices sometimes more explicit discussion of uncertainties can be found, but a disconnect exists between the summary pages with the conclusions drawn in Chapter 5. In situations in which an array of outcomes may be possible, only the more beneficial outcomes are quantitatively assessed or used in conclusions about the BDCP. Communication of uncertainty would be improved by consideration of a range of potential outcome values in models.<br><br>The Panel cannot determine whether the conclusions about covered fish species or other species in the BDCP are accurate. Detailed monitoring is needed to evaluate the BDCP conclusions, in addition to the outcomes for the biological objectives that could not be fully evaluated at this time in the BDCP. The BDCP effects analyses are qualitative and conclusions regarding net effects on each species typically reflect professional opinion. Therefore, the Effects Analysis does not lend itself to evaluation of chained statistical uncertainties. The tremendous length of the documents did not reduce the uncertainty in the overall net effects.<br><br>Recommendations<br><br>-Unknowns and research needs should be incorporated into the BDCP as explicit conservation measures, in other words, as a required part of the BDCP.<br><br>-Monitoring needs, timing and intensity also need more explicit incorporation into the BDCP. While often well explicated in an appendix (e.g., within Appendix 5.F- Biological stressors on covered fish), they are frequently absent within the material discussed in Chapter 5 or treated as an uncertainty.<br><br>-Research needs are often mentioned as sections within appendices. These should be consolidated within Chapter 5. This would help guide future research priorities for the Delta. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 87 | Effects on Covered Fishes<br><br>For covered fishes, when evaluating the importance of an attribute to a species and evaluating the effect of the BDCP on that attribute, the Effects Analysis was typically careful to describe the level of certainty associated with this evaluation. The evaluation of certainty was typically a judgment by the BDCP authors rather than a quantitative measure of certainty (e.g., standard deviation), therefore estimates of certainty have their own level of uncertainty. The Effects Analysis did not lend itself to evaluation of "chained statistical uncertainties" as identified in the charge questions addressed to the Panel because the effects analyses were not quantitative. Nevertheless, the judgments of certainty have value, | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | though they could be improved upon (see below).<br><br>Judgments of certainty were also compared with judgments provided by California agency scientists at the August 2013 workshops. However, identification of agency certainty seemed to be the interpretation by the BDCP authors of the agency response rather than a systematic evaluation of certainty scores. At the January 2014 Effects Analysis Panel meeting, ICF noted that they did not think it was possible to consistently document variability in Effects Analysis evaluations by agency personnel at the August 2013 workshops. As a result, evaluation of certainty of BDCP effects on attributes of each species is limited to the interpretation of the BDCP authors.<br><br>Please see discussion above on the overall net Effects Analysis for each species. Although conclusion statements typically stated high uncertainty in the overall net effects, they also tend to ignore uncertainty when highlighting the potential benefits to conservation without also stating the lower end of the effects range. | |
| 1673 | 88 | Monitoring and Research<br><br>As an example of the high uncertainty in the BDCP to achieve biological goals and objectives, many of the sections of appendices have sections on monitoring and research needs. These often highlight impacts of conservation measures in which the outcomes may have a range of positive to negative impacts. The unknowns and research needs should be better incorporated into the analyses of biological impacts of the BDCP. At a minimum they should be required as an explicit conservation measure. In a number of instances, especially in Appendices, for example Appendix 5.F, needs are highlighted for a robust monitoring and evaluation program, coupled with a detailed, prescriptive adaptive management plan. BDCP success will depend on monitoring and evaluations and responding to issues as they emerge. Furthermore, high uncertainty in the outcomes for the covered species means that budgets for monitoring and adaptive management must be developed with uncertainty in mind. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 89 | Disconnect between uncertainty and BDCP conclusions<br><br>Frequently, explicit modeling is reduced to small portions of conceptual models. When a range of potential outcomes may result from uncertainties in multiple conditions, only the most beneficial outcome is considered when coming up with a conclusion or summary. Some of these are discussed in other sections of this report. One example can be found in Appendix 5.F. When considering the impacts of some of the conservation measures, for example, Conservation Measure 13, removal of Egeria is discussed with multiple potential effects (Appendix 5.F, p. 5.F-48 and following), some beneficial, such as removing habitat for predators of covered fish, while others may exacerbate populations problems for covered fish, such as cascading effects through the food chain of the loss of some invertebrates that feed on Egeria, shifts in aquatic web linkages, and the rapid replacement of Egeria by other invasive submerged aquatic vegetation. Nonetheless, these uncertainties are simply ignored when it comes to conclusions, where it is determined that only the beneficial results of control invasive aquatic vegetation will result from the BDCP (pp. 5.F-48-49). To be fair, occasionally the poorer results dominate conclusions; for example, Microcystis may increase due to management activities inside and outside the region but these conclusions fail to emerge in the discussion of the aquatic food webs within Chapter 5.<br><br>The discussion of the aquatic food webs is based on a good conceptual model, but the dynamics of the food web are ignored and only a single component, phytoplankton | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. Please refer to Master Response 14. |

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| | | productivity, is modeled as a result of restoration efforts in the relatively near- and far-term. Detrital contributions could also enhance food webs, but are not considered in any detail. Phytoplankton productivity is unrealistically modeled, and assumed to essentially be consumed along linkages that connect directly to covered fish. Chapter 5 does mention invasive bivalves, but fails to incorporate their potential as direct competitors for plankton within the food web, even though that potential is discussed. In other words, the BDCP is inconsistent in how models and analyses handle uncertainty and model assumptions, making it difficult to complete assessment. | |
| 1673 | 90 | Restoration<br><br>There is great uncertainty associated with the restoration of the wide range of ecosystems slated for restoration. Many of these systems have a poor record of achieving restoration, especially in short-to-moderate time periods. This range of ecosystems also varies considerably in the degree of difficulty of restoring functions. Nonetheless, the outcomes for conservation measures and their interaction and effectiveness are glossed over and uncertainties are not apparent in conclusions and summary discussions. For example, wetland restoration will require considerable input of sediment in the short-term to meet the outcomes described in the BDCP. Yet Chapter 5 models tidal wetland restoration with a constant concentration of suspended sediment, even though the document discusses the fact that sediment has been declining over the past decades, and further that the operations of the north Delta pumps may remove 8-9% more. In other words, there is considerable inconsistency between a discussion of uncertainty and how uncertainty is incorporated into the conclusions.<br><br>Similarly, restoration of many of the terrestrial habitats for other covered species also involves considerable uncertainty, especially as to the rate at which function will return that will be recognized by covered species. Consequently uncertainty of the occupancy targets for terrestrial species are not addressed. In all cases, a single value of number of acres that will be occupied is provided. No estimates of the uncertainty of achieving stated restoration goals nor uncertainty of the proportion of the restored habitat that will be occupied are included. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 91 | North Delta Diversion<br><br>In addition, the validity of the primary assumption that there will be no entrainment of fish at the north Delta diversion (NDD) should be evaluated. In reality, there will be some fish lost at the transfer point; therefore, the empirical relationship would be altered including this additional transfer point. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 92 | Water Clarity and Suspended Sediments<br><br>Section 5.3-24 (lines 31-38) correctly identifies a low level of certainty around changes in water clarity but does not include the potential positive or negative implications for changes in water clarity.<br><br>Suspended sediment is one of two key components driving the development of tidal wetlands in the Delta, especially under sea level projections, yet Delta inflow has been experiencing a decline in suspended sediment and operations of the NDD may remove 8-9% more. BDCP indicates there may not be sufficient sediment for marsh restoration (Chap. 5, p. 109). | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | The NDD operations should factor in suspended sediment into the operational criteria. Adaptive management should consider the possibility operating the NDD such that the first flush, which contains a large sediment load, is not exported. | |
| 1673 | 93 | Hydrodynamics<br><br>Hydrodynamic models are sensitive to how the open water regions are represented and how they are connected to the adjacent channels. Because the panel was not provided the bathymetric configuration of the Restoration Opportunity Areas or the order in which the Restoration Opportunity Areas were established, it is not feasible to evaluate the sensitivity of the models to the placement of the Restoration Opportunity Areas. DSM2 (1-D) and RMA/TRIM (mult-D) hydrodynamic models represent Restoration Opportunity Areas is differently. This could be a significant source of error, especially when Delta Cross Channel gates configuration is open. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 94 | Life cycle models: winter Chinook salmon<br><br>No formal comparison of output from the OBAN and IOS models was provided, either on an absolute scale or relative scale. It should be acknowledged that adult escapement differs between models by a factor of 5. Through-Delta survival projects were also fractionally different between models. In neither case was an explanation for the discrepancy provided. The relative ranking of the different BDCP scenarios (Table 5.G-2) between models should be provided in the report, and certainly should be assessed, in part, based on the degree of consistency in predictions of the BDCP scenario ranks between models. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 95 | Salmonids: Delta Passage Model<br><br>For salmonids, the Delta Passage Model Salvage Estimates and the Salvage Density methods produced reasonably consistent estimates. Variance calculations need to be corrected. There appear to be analytical errors in expressing uncertainty. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 96 | Salmonids: Temperature Model<br><br>The text is not clear how the models predict these changes associated with the BDCP during egg incubation, if the BDCP has no effect on upstream conditions, as reported in sections of Chapter 5. In spite of these conflicting results, Figure 5.5.4-1 shows that there would be zero effect on eggs in the Sacramento River with moderate to high certainty in this conclusion. This evaluation needs clarification and should be consistent with the Appendix. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 97 | Terrestrial Species<br><br>Suitable habitat for each species in the Plan Area was based on expert opinion and therefore there are no model results to interpret. The plan adequately addresses conflicting estimates of the number of sandhill cranes that may be killed by collisions with powerlines. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 98 | Covered fish<br><br>-A direct comparison of the output from competing models should be presented.<br><br>-Clarify confusing and conflicting text related to salmon models.<br><br>-Explanation for the large discrepancies in predictions in adult returns (i.e., factor of 5) should be provided and possible consequences to Effects Analysis. Use of relative effects | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | does not eliminate systematic biases of models. | |
| 1673 | 99 | Hydrodynamics<br><br>-Identify which Restoration Opportunity Areas are represented differently between the DSM2 and the RMA/TRIM models, especially in the Mokelumne system, which is sensitive to Delta Cross Channel operations.<br><br>-Publications from that CASCaDE (http://cascade.wr.usgs.gov/index.shtm) would be resources to guide the evaluation of propagation errors in the BDCP Effects Analysis. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 100 | Life-cycle models<br><br>When discussing IOS and OBAN life cycle modeling results, the Effects Analysis stated:<br><br>"The results of both models suggest future climate change effects would dominate changes in adult winter-run Chinook salmon escapement in the future, which is of appreciable concern for the species. Factoring in climate change, relatively small differences in upstream conditions between the BDCP Late Long Term scenarios and Existing Biological Conditions 2_LLT resulted in greater adult escapement under High Outflow Scenario_LLT or lower adult escapement under Evaluated Starting Operations_LLT and Low Outflow Scenario_LLT. These results reflect what appears to be appreciable model sensitivity to relatively small changes in estimated upstream conditions because, as noted above, the BDCP does not change Shasta Reservoir and upper Sacramento River operating criteria, so that changes in upstream areas derived from modeling, be they positive or negative, may not be fully reflective of the nature of actual changes that could occur." (pg. 5.5.3-45, lines 38-46)<br><br>The above statement about climate change impacts on Chinook abundance is clear and noteworthy, but the text below it is confusing and should be clarified (did the model receive inaccurate information for upstream conditions?). | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 101 | Chinook salmon<br><br>For egg incubation of spring Chinook, Chapter 5 describes conflicting results (pg. 5.5.4- 14). The text states, "Several models show no change in upstream condition as a result of BDCP". In the same paragraph, it states that SacEFT predicts a 12% reduction in egg incubation "condition" based on water temperature effects on egg survival. In contrast, the Reclamation Egg Mortality model predicts no effect due to the BDCP except in below normal water years (12% reduction in survival). SALMOD predicts negligible impacts of the BDCP on eggs, fry and smolt. The text concludes that the adverse impacts are related to high sensitivity of some models to small changes in upstream conditions. The text is not clear when describing how the models might predict these changes during egg incubation, if the BDCP has no effect on upstream conditions as reported in portions of Chapter 5. In spite of these conflicting results, Figure 5.5.4-1 shows that there would be zero effect on eggs in the Sacramento River with moderate to high certainty in this conclusion. This evaluation needs clarification.<br><br>Habitat and flow modeling efforts in the Delta were not linked. As noted above, habitat suitability modeling indicates somewhat large habitat increases for foraging salmonids in response to restoration activities. However, these estimates of habitat did not account for reduced flows that would occur when juvenile salmonids are present in the Delta area, especially in wet years. In other words, will reduced BDCP flows affect access by juvenile | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | salmonids to the habitat identified in Table 5.5.3-4, or do tidal fluctuations overwhelm river flows in all of these habitats? | |
| 1673 | 102 | Lack of consideration of propagation of errors or sensitivity analysis in linked models<br><br>A direct comparison of the output from competing models is rarely presented. Results from different models are rarely formally compared on either an absolute or a relative scale. When different models projections exist, the BDCP rarely attempts to explain why the discrepancies are occurring or describe the direction of the expected errors.<br><br>Uncertainty plus more uncertainty produces even more uncertainty. Uncertainty never averages or cancels uncertainty any more than noise plus additional noise produces less noise. The propagation of errors will not be a simple sum of uncertainties in most cases. One can use variance in stages formula<br><br>[see equation in letter]<br><br>to propagate errors over multiple processes or sequentially linked models and where 1 and 2 denote sources of error in estimating the parameter - by --. Levels of uncertainty have different credence depending on the importance of biological stressors or attributes. An assessment might have high uncertainty for all low-importance attributes and still have overall high certainty if all the important attributes carry with them high certainty. Conversely, the overall assessment would have low certainty if one or more high-importance attributes carry high uncertainty. Overall uncertainty will never be less than the highest level of uncertainty for the more important biological attribute being considered.<br><br>There are several different cases in the Effects Analysis where multiple models are linked together. Each model has inherent errors either due to assumptions made in the modeling or numerical method errors. One of the best examples of how to link models in the Delta system is the U.S. Geological Survey's CASCaDE project (http://cascade.wr.usgs.gov/index.shtm). Publications from that project would be resources to guide the evaluation of propagation errors in the BDCP Effects Analysis. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 103 | The assumptions made in hydrodynamic models TRIM/ RMA versus DSM2 or CALSIM2 result in a range of outcomes; their analysis is limited to only one set of ROA configurations<br><br>During the hydrodynamics presentation on 1/28, the calibration of the DSM2 (1-D) model compared to the TRIM/RMA (multi-d) models showed that the models agreed better when the Delta Cross Channel was closed than when the Delta Cross Channel was open. When the Delta Cross Channel is open, transport is influenced more by the circulation in the Mokelumne channels on the east side of the Delta.<br><br>The fact that the two models do not match well when the Delta Cross Channel is open indicates that the representation of Restoration Opportunity Areas is different between the 1-D and 2-D models. Hydrodynamic models are sensitive to how the open water regions are represented and how they are connected to the adjacent channels.<br><br>Because the panel was not provided the bathymetric configuration of the Restoration Opportunity Areas or the order in which the Restoration Opportunity Areas were established, it is not feasible to evaluate the sensitivity of the models to the placement of | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | the Restoration Opportunity Areas. | |
| 1673 | 104 | How well does the Effects Analysis link to the adaptive management plan and associated monitoring programs?<br><br>While the adaptive management plan is considerably more developed in the BDCP Phase 3, it remains characterized as a silver bullet but without clear articulation about exactly how key assumptions will be vetted or uncertainties resolved to the point that the BDCP goals and objectives are more assured. The concept of adaptive management is appropriately described and allocated a prominent role in the implementation structure. However, as is increasingly documented, the commonly acknowledged process of adaptive management continues to be misunderstood and misapplied (Allen et al. 2011; Fontaine 2011; Westgate et al. 2013), often resulting in a loss of rigor and commitment in application. The consequence hasn't improved much since Walter's (1986) description of the adaptive management process as beginning:<br><br>"…with the central tenet that management involves a continual learning process that cannot conveniently be separated into functions like research and ongoing regulatory activities, and probably never converges to a state of blissful equilibrium involving full knowledge and optimum productivity."<br><br>In the case of the uncertainties surrounding the assumptions and predictions of the BDCP, the Panel emphasizes that BDCP needs to recognize the risks of not institutionalizing an exceedingly rigorous adaptive management process in order to avoid ecological surprises that will be difficult or impossible to reverse once they have established (Lindenmayer et al. 2010; Westgate et al. 2013). BDCP must make a commitment to the fundamental process, and specifically the required monitoring, not just the concept of adaptive management. As Murphy and Weiland (2014) counsel:<br><br>"…adaptive management that targets listed species represents a complex process that can be resource intensive, including in its demand for guidance from research, monitoring, and modeling, therefore requiring substantial technical and institutional capacity. That considered, adaptive management has a great potential to improve the effectiveness and efficacy of resource management actions provided it is properly implemented."<br><br>In the final assessment of the Effects Analysis, the Panel found the cautionary conclusion of Olden et al. (2014) about large-scale flow experiments to be particularly germane:<br><br>"…managers and policy makers must embrace both the scientific uncertainty and surprise learning opportunities that inevitably arise from these experiments, and not purposely ignore uncertainty to avoid complicating their message to stakeholders, only to later invoke this issue when flow experiments fail to deliver expected ecological or social outcomes."<br><br>Recommendations<br><br>The Effects Analysis effectively communicates the important principles and implementation stages of adaptive management, but the specific process whereby adaptive management would be utilized to ensure BDCP meets its goals and objectives by rigorous adaptive management need to be described in much more detail. There needs to be a more obvious commitment to active adaptive management. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| 1673 | 105 | There is explicit linkage between key uncertainties underlying the assumptions of the Effects Analysis and the monitoring and research that need to address them through adaptive management. However, many of the critically uncertain ecosystem processes, population responses, etc. that are identified as adaptive management targets are delegated to research, rather than monitoring. Any metric upon which decisions about the expected or predicted performance of a management measure will be made should be a foundational monitoring metric, not a focus of research, which is often vulnerable to competing priorities. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 106 | To facilitate an active adaptive management plan that has some chance of ensuring the beneficial result of BDCP conservation measures, each and every key uncertainty should be "fleshed out" into implementable adaptive management "experiments" where the following are specifically described: (1) a conceptual model, or components of an existing model, that characterizes the uncertainty and what it influences; (2) assessment of the relationship between the uncertainty and the BDCP goals and objectives; (3) sensitivity of the proposed implementation to the uncertainty; (4) success criteria, monitoring metrics, baseline levels, thresholds and trigger points that will identify whether or when the performance of the conservation measure is deviating significantly from the anticipated target or prediction; (5) alternative hypotheses and how they affect the original conceptual model; and, adaptation of the (6) implementation action or (7) adaptation of the goals and objectives.<br><br>Linkages between scientific development of the Effects Analysis and adaptive management should continue, if not expand, with implementation of the BDCP. At the minimum, consider the necessity to guarantee independent science review at the interface between the Adaptive Management Team and the Implementation Office, to ensure close to real time tracking of adaptive management experiments and decisions. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 107 | Perhaps the largest challenge to achieving the stated goals and objectives of the BDCP is how many of these critical uncertainties can be addressed by adaptive management given the baseline and the required monitoring? For example, some of the key uncertainties identified in the Effects Analysis (Appendix 3.D), often associated with conservation measures 4, 5, 7, and 11, include:<br><br>-The ability of the restored habitat to meet the objectives and expected outcomes, including the time it takes to meet the biological objectives. (Can this be addressed by both magnitude and siting of restoration action?)<br><br>-The risk that the restored habitat will be colonized by invasive species such as nonnative submerged vegetation, nonnative predatory fish, and/or clams. (Hardly uncertain, but controllable?)<br><br>-The change in magnitude of predation mortality on covered fish. (Doesn't this require an existing reliable estimated of predation mortality?)<br><br>-Food web responses to habitat restoration actions on both a local and a regional scale.<br><br>-The risk of adverse effects resulting from unsuitable changes in water quality and exposure to toxic contaminants. (How much can be modeled?)<br><br>-The proportion of the covered species population that actively inhabit restored habitats and the change in growth rate, survival, abundance, life-history strategies, and population | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | dynamics. (A very difficult baseline to quantify!)<br><br>The Effects Analysis provided explicit associations of such key uncertainties with each conservation measure and linked these to "potential research actions" (BDCP, Table 3.D-3).<br><br>The context of a "phased approach to serve as a large-scale experimental program" in adaptive management context implies conceptual models, baselines and thresholds?<br><br>Linkages between scientific development of the Effects Analysis and adaptive management should continue, if not expand, with implementation of the BDCP. In particular, it will be important to ensure that there is direct science input to the adaptive management process, and preferably an independent science body that has no conflict of interest in interpreting and adapting conservation measures. In the proposed implementation structure, the Science Manager chairs the Adaptive Management Team and coordinates with the Delta Science Program, and the Delta Independent Science Board may also be consulted about "…matters relating to these monitoring activities and research efforts." (Chap. 7-25, pp. 7-25). However, the Delta Independent Science Board is not engaged to the extent that they could deal with extensive monitoring and research results and adaptive management decisions in real time. We would doubt that the adaptive management process would be efficient, timely and evaluated without an independent scientific advisory body that reports to the Adaptive Management Team, Science Manager, Program Manager and the Delta Science Program. | |
| 1673 | 108 | Are the analyses related to the north Delta diversion facilities appropriate and does the Effects Analysis reasonably describe the results? In particular:<br><br>Q. Was existing empirical information such as Perry et al. 2010 and Newman 2003 incorporated appropriately into the modeling? Where model runs required extrapolation beyond existing data ranges, were assumptions and interpretations appropriate?<br><br>Summary<br><br>The empirical information in Perry (2010) and Newman (2003) must be guardedly and cautiously applied in the modeling in future cases when north Delta diversion is operational. These empirical relationships are based on the best available information regarding current physical and operational configuration of the Delta. We assessed the validity of four model assumptions. The panel concluded: 1) the assumption of a 3-day moving average to characterize flow on the Sacramento below Georgiana Slough is not valid in the new configuration, 2) exporting water at the north Delta diversion facilities will change circulation patterns at the important north Delta channel junctions (i.e. Steamboat, Sutter, Delta Cross Channel, Georgiana), 3) an additional transfer point out of the Sacramento at the north Delta diversion will alter the empirical relationship, and 4) there are issues with original assumptions in Newman (2003). The concerns raised above, at best, add additional uncertainty to the conclusion drawn by BDCP. At worst, these concerns may result in systematic biases in the model projections. The direction of the net effect of these biases is unknown.<br><br>Recommendations<br><br>-Consult with Russell Perry and Ken Newman on their perspectives regarding the applicability of their models to the Effects Assessment. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | -Perform more hydrographic modeling below the anticipated north Delta diversion to determine whether the nature of the outflow will violate assumptions or parameterizations of the Perry (2010) model and alter model output.<br><br>-Additive simulations should be performed varying the parameterization and possible structure of the relationships with Perry (2010) and Newman (2003) to determine robustness of the model results to changes in Sacramento River outflow under the BDCP.<br><br>Comments<br><br>The empirical relationships, derived in Perry (2010) and Newman (2003), are based on the best available information regarding current physical and operational configuration of the Delta. For these relationships to be useful, they also need to describe the Delta under BDCP. To assess the validity of these relationships, we must examine how the system will change with the addition of the north Delta diversion. There are four primary sets of questions to address: 1) Will the system continue to have a "quasi-steady state" condition or the will the timescale of flow variance change? Is a 3-day moving average to characterize flow on the Sacramento below Georgiana Slough a legitimate assumption?, 2) Will the circulation patterns change at the important channel junctions (i.e., Steamboat, Sutter, Delta Cross Channel, Georgiana) as a result of north Delta diversion operations?, 3) Will the north Delta diversion be another transfer point out of the Sacramento river migration corridor?, and 4) Are the assumptions used in the original analysis valid? | |
| 1673 | 109 | Will the system continue to have a "quasi-steady state" condition or will the timescale of flow variance change as the result of north Delta diversion operations?<br><br>In the current configuration of the system, the north Delta is in a quasi-steady state. In general, flows on the Sacramento at Freeport change slowly over time (i.e., on the order of days). The only operation that can dramatically alter circulation patterns is the opening or closing of the Delta Cross Channel gates. The position of this gate is not frequently changed. And, when changed, the system reaches a different quasi-steady state condition after about a day. A visual example of this step change is found in Perry (2010, Fig. 3). Therefore, the assumption of a three-day moving average to characterize flow on the Sacramento below Georgiana Slough seems reasonable for the current configuration (flow and operations) of the North Delta.<br><br>When the north Delta diversion facilities become operational, the North Delta will no longer be in a quasi-steady state condition. The flows will behave more like what is currently observed in the South Delta as the pumping will not be continuous throughout the day. And, pump volume will also change at least daily. The timescale of flow variance will change more rapidly over time (i.e., on the order of hours). Therefore, the three-day moving average flow assumption is not valid in the new configuration with the north Delta diversion. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 110 | Will the circulation patterns change at the important channel junctions (i.e., Steamboat, Sutter, Delta Cross Channel, and Georgiana) as a result of north Delta diversion operations?<br><br>We know that opening and closing the Delta Cross Channel changes the circulation patterns in the north Delta. Exporting water at the north Delta diversion facilities will also change circulation patterns at the important channel junctions (i.e., Steamboat, Sutter, Delta Cross Channel, Georgiana). The DSM2-Hydro simulations that were used for the analysis of this issue in section 5C.5.3.5 are capable of outputting data even on a 15 minute time step. This model resolution should be able to quantify these differences. If the circulation patterns | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | change, the proportion of fish distributed to each downstream channel will be altered as well. Therefore, the empirical relationship created for the current configuration of the Delta is not valid for the future configuration. | |
| 1673 | 111 | Will the north Delta diversion be another transfer point out of the Sacramento migration corridor?<br><br>Throughout the analysis in 5C.5.3.5, there is an assumption of zero entrainment of as a result of 100% effective diversion screens. However, the north Delta diversion will be pumping water. Therefore, empirical relationship between the flow at Sacramento below Georgiana and the number of fish present will be different from the current empirical relationship using the current (no north Delta diversion) configuration.<br><br>In addition, the validity of the primary assumption that there will be no entrainment of fish at the north Delta diversion should be evaluated. In reality, there will be some fish lost at the transfer point, therefore, the empirical relationship would be altered including this additional transfer point. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 112 | Are the assumptions used in the original analysis valid?<br><br>Newman (2003), Table 2 presents a summary of the covariates used in his modeling. There are two columns, mean and sample standard deviation. In this table, he reports a mean value for Delta Cross Channel gates of 0.61 with a sample standard deviation of 0.49. The Delta Cross Channel gate signal is a binary signal. It should be either open (1) or closed (0). Under no circumstances should that variable be reported as something other than 0 or 1. This analysis should have been broken into two time periods: gate open and gate closed conditions. This table raises a significant concern that the author did not have a basic understanding of how the Delta Cross Channel gate changes flow patterns (and migration patterns) in the Delta.<br><br>The concerns raised above, at best, add additional uncertainty to the conclusion drawn by the Plan. At worst, these concerns may result in systematic biases in the model projections. The direction of the net effect of these biases is unknown.<br><br>Q. Does the analysis of the frequency of reverse flows at Georgiana Slough accurately characterize changes in hydrodynamics due to changes in river stage, sea level rise, and Delta habitat restoration?<br><br>Modified question based on 1/29/2014 meeting discussion: Will the operation of the north Delta diversion change the circulation patterns around the Sacramento junctions with the Delta Cross Channel and Georgiana Slough such that fish (particularly migrating fish) have a higher likelihood of being diverted into the interior of the Delta via Georgiana Slough or the Delta Cross Channel due to tidal flood/ebb flows in this region? | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 113 | Based on long-term field observations and hydrodynamic modeling, the transition point from uni-directional flow and bi-directional flow at the tidal timescale occurs somewhere between Sacramento River above the Delta Cross Channel (RSAC128) and Sacramento River below Georgiana (RSAC123) for the current configuration and operations of the Delta. The operation of the north Delta diversion facility will reduce the amount of freshwater flow in the region of the Delta Cross Channel and Georgiana junctions. Hydrodynamic modeling will likely show that transition point between uni-directional and bi-directional flow will move upstream as a result of north Delta diversion operations. This transition location is also a | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | function of whether the Delta Cross Channel is open or closed. If bi-directional flow occurs more frequently near the Sacramento junctions with the Delta Cross Channel and Georgiana Slough, fish will have a higher likelihood of being diverted into the interior of the Delta via Georgiana Slough or the Delta Cross Channel.<br><br>Recommendations<br><br>The DSM2 simulations should be re-run for the ELT and LLT simulations with bathymetry that does not include the Restoration Opportunity Areas but driven with ELT or LLT river flow and tidal stage boundary conditions and operations. These simulations would clearly show how north Delta diversion operations change circulation patterns near Georgiana Slough and the Delta Cross Channel.<br><br>Comments<br><br>During the Effects Analysis Panel presentation on 1/29/2014, one of the Panel members (N. Monsen) asked for clarification of Question 7b. Based on that discussion, we concluded that the main questions that the Fish Agencies would like to see the panel address were:<br><br>"Will the operation of the north Delta diversion change the circulation patterns around the Sacramento junctions with the Delta Cross Channel and Georgiana Slough such that fish (particularly migrating fish) have a higher likelihood of being diverted into the interior of the Delta via Georgiana Slough or the Delta Cross channel due to tidal flood/ebb flows in this region?<br><br>Will this change in flow regime as a result of north Delta diversion operations result in fish encountering this junction multiple times rather than just once, thus increasing the probability of the fish being diverted into the interior Delta?"<br><br>It should be noted that these rephrased questions are very different than what the analysis in Sections 5C.4.3.2.6 and Section 5C.5.3.8.1 of the Effects Analysis addressed. The following suggest an approach to answer the modified question and comment on the analysis in Sections 5C.4.3.2.6 and Section 5C.5.3.8.1. | |
| 1673 | 114 | Part A: Suggested approach to address the modified 7b question<br><br>For this discussion, please refer to the Draft Environmental Impact Report/Environmental Impact Statement Appendix 5A that has examples of observed tidal stage and flow time series data from three key locations along the Sacramento River (Appendix C of this document).<br><br>The Sacramento River throughout the Delta has a tidal signal for both stage and flow. The Sacramento observation station at Freeport (RSAC155), above the proposed north Delta diversion intakes, has a tidal flow signal (Appendix 5A-D1, p. 128). At Freeport, both the tidal and tidally-averaged flow is always uni-directional downstream. Therefore, a neutrally-buoyant particle going with the flow at this location will always be traveling downstream, although the velocity at which it moves is dependent on the phase of the tides.<br><br>In the current bathymetric configuration and operations of the Delta Cross Channel (no north Delta diversion facilities), the observation station on the Sacramento above the Delta Cross Channel (RSAC128, Appendix 5A-D1, p. 129) also has downstream uni- directional flow | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | both for the tidal and the tidally-averaged timescale. However, the flow signal on the Sacramento below Georgiana Slough (RSAC123, Appendix 5A-D1, p. 130) has reversing tidal flows. Therefore, even though the tidally-averaged flow at RSAC123 is downstream. A particle moving with the velocity field in the region of RSAC123 will flow both upstream and downstream. Therefore, the tidal excursion or range that a neutrally-buoyant particle will move upstream and downstream, at RSAC123 is important to determine how many times the particle will encounter junctions (such as Georgiana and Delta Cross Channel).<br><br>The Sacramento River above the Delta Cross Channel (RSAC128) and the Sacramento River below Georgiana (RSAC123) are only 5 river km apart and yet the flow signals at these stations are very different. These flow signals are distinctly different because there are two junctions, the Delta Cross Channel and Georgiana Slough, between these measurement stations where a portion of the water is diverted towards the Central Delta. The flow signal at RSAC123 also changes depending on whether the Delta Cross Channel is open or closed.<br><br>Therefore, we know, based on long-term field observations and hydrodynamic modeling, that the transition point between uni-directional flow and bi-directional flow at the tidal timescale occurs somewhere between RSAC123 and RSAC128 for the current configuration and operations of the Delta.<br><br>To determine how the north Delta diversion operations will change circulation patterns around the Delta Cross Channel and Georgiana Slough, the DSM2 model can be used to determine the location along the Sacramento where the flow transitions from unidirectional and bi-directional tidal flows. This transition location will also be a function of whether the Delta Cross Channel is open or closed. It is also useful to determine the extent of tidal excursion to determine whether particles would encounter either the Delta Cross Channel junction or the Georgiana Slough junction multiple times.<br><br>The operation of the north Delta diversion facility will reduce the amount of freshwater flow in the region of the Delta Cross Channel and Georgiana junctions. Modeling will likely show that transition point between unidirectional and bi-directional flow will be moved upstream. This transition point may be even as far upstream as RSAC128 (Sacramento above DCC). | |
| 1673 | 115 | Comments related to the analysis in Sections 5C.4.3.2.6 and 5C.5.3.8.1<br><br>The approach taken for the analysis in Sections 5C.4.3.2.6 and 5C.5.3.8.1 focused only on the exchange between the Sacramento River with Georgiana Slough. The approach of analyzing flow direction every 15 minutes was a reasonable approach given the original 7b question. However, the analysis did not attempt to also look at the exchange through the Delta Cross Channel, which should be done for the modified 7b question.<br><br>The bigger issue with this particular analysis is the assumed Delta bathymetry used for the ELT and the LLT simulations. For both the ELT and LLT simulations, Restoration Opportunity Areas are included in the bathymetry. The tidal field is significantly changed by the inclusion of these Restoration Opportunity Areas. Note that these Restoration Opportunity Areas are only one possible configuration. As of this BDCP draft, the final locations of the Restoration Opportunity Areas, the order of construction the Restoration Opportunity Areas, and the bathymetric connections between the Restoration Opportunity Areas and the adjacent channels have not been established.<br><br>In the BDCP conclusion for this analysis states: | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | "Ongoing research is investigating link is between the distribution of energy dissipation and the distribution of tidal prism within the context of Plan Area restoration and other factors (DeGeorge pers. comm.). … it is unknown whether the presently limiting conveyance capacity of a number of Delta channels for tidal flows may become enlarged by scouring in response to Plan Area changes in geometry resulting from habitat restoration. These factors may have consequences for the hydrodynamics at the Sacramento River-Georgiana Slough divergence and other locations." (5C.53-331, lines 22-29)<br><br>This conclusion indicates that the present hydrodynamic modeling does not separate the effects of the north Delta diversion from the preliminary Restoration Opportunity Areas configuration in the ELT and LLT simulations.<br><br>One of the best reasons to use hydrodynamic modeling as an analysis tool is that models have the capability of isolating individual effects. The DSM2 simulations should be re-run for the ELT and LLT simulations with bathymetry that does not include the Restoration Opportunity Areas but does have the ELT or LLT river flow and tidal stage boundary conditions and operations. These simulations would clearly show how north Delta diversion operations change circulation patterns near Georgiana Slough and the Delta Cross Channel. | |
| 1673 | 116 | How should the effects of changes in Feather River flows on fish spawning and rearing be characterized? In particular, how should the trade-off between higher spring flows and lower summer flows be interpreted? Does the analysis adequately capture the expected benefits of CM 2, Yolo Bypass Fishery Enhancement?<br><br>Chapter 5 correctly recognized that flow/habitat relationships are necessary for evaluating changes in Feather River flow and temperature on salmonids. However, relationships between flow and habitat were not presented in Chapter 5, therefore it was not possible for the Panel to evaluate changes in spawning and rearing habitat. Most salmonids reportedly inhabit the low flow channel which will reportedly experience little change. BDCP effects relate primarily to the fraction of salmonid populations inhabiting the high flow channel plus fish exposure to the high flow reach during upstream and downstream migrations.<br><br>Chapter 5 provides a reasonable discussion of the approximate benefits of increasing flow into Yolo Bypass and allowing more juvenile salmon, especially foragers, to utilize this rearing habitat. Potential adverse effects on migrating adults should be monitored.<br><br>Recommendations<br><br>-Develop flow/habitat relationships for salmonids in the Feather River high flow channel, approximate the proportion of the population that uses this habitat, and correct inconsistencies in the text and summary figure.<br><br>-The Yolo Bypass evaluation should recognize that natural origin Chinook salmon have a higher fraction of foraging type juveniles compared with migrant Chinook produced in hatcheries. Natural origin juveniles would likely benefit more than hatchery fish. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 117 | Feather River<br><br>Salmon and Steelhead. Chapter 5 provided a summary of beneficial and adverse effects of Feather River flows on juvenile and spawning spring Chinook salmon. The analysis was based on expected changes in monthly flows in the low and high flow channels and associated changes in water temperature. The text recognizes that salmon habitat area and | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | quality are important (see introductory paragraph), but the evaluation did not attempt to convert predicted flow and temperature scenarios to habitat units for steelhead and Chinook salmon. Lack of habitat data for each species reduces the certainty of the anticipated effects, except when flows and temperature are expected to experience little change, as in the low flow channel. Key to this analysis is the reportedly high use by salmonids of the low flow channel relative to the high flow channel, given that the low flow channel is expected to experience relatively little change.<br><br>The text states that juvenile spring Chinook salmon may be present in the Feather River from November through June. Chapter 5 also concludes that juvenile migration would not be affected by BDCP flows, which are higher in spring and lower in summer in the high flow channel during BDCP operations. Why is juvenile migration not affected by higher spring flows and lower summer flows? To what extent is rearing habitat in the high flow channel affected by higher flows and to what extent are juveniles using this habitat? There is no mention of the actual temperature experienced by the fish in the Feather River.<br><br>It is not clear how the low positive effect with moderate certainty (Figure 5.5.4-1) was derived, given that there was no presentation on flow/habitat relationships, which were discussed as being key to the analysis. Chapter 5 states that real-time operations could be used to minimize adverse effects in the Feather River, but there is no mention of whether this will be done and what the criteria might be to protect salmon. The Chapter 5 description of Feather River effects on salmonids did not incorporate information related to exceedance of minimum flows that was discussed in Appendix 5C.5.2.<br><br>For steelhead, the analysis and text involving Feather River flows are somewhat more conclusive. A key statement is that the vast majority of steelhead reportedly spawn and rear in the low flow channel which would receive little effect from the BDCP (what percentage of steelhead rear in the high flow channel?). Adult and juvenile steelhead may experience somewhat higher flows during migration, but there is no judgment of whether this is beneficial or not. The text also states that summer flows in the high flow channel would be reduced by 50%, a period that includes year-round rearing of steelhead. The Panel notes that steelhead prefer higher velocities than other salmonids, but changes in the amount of habitat in relation to velocity was not presented. The text concludes with moderate certainty that there would be a low negative effect in the Feather River (the text should clearly identify that it is the rearing stage in the high flow channel that is affected). However, Figure 5.5.6-1 shows zero effect on rearing steelhead and low positive effect on migration. The results in this figure are not consistent with the text. | |
| 1673 | 118 | Yolo Bypass<br><br>Chapter 5 provides a reasonable discussion of the approximate benefits of increasing flow into Yolo Bypass and allowing more juvenile salmon, especially foragers, to utilize this rearing habitat. Reported data indicate only ~12% of the juvenile population would utilize the habitat. For spring Chinook salmon, the analysis assumed 80% of the juveniles were migrant rather than foraging Chinook. These values apparently included hatchery spring Chinook salmon which are mostly migrants and less likely to utilize rearing habitat and benefit from Yolo Bypass compared with wild Chinook salmon that are more likely to be foragers that benefit from the Yolo Bypass. Yolo Bypass is more likely to benefit wild Chinook (to the extent that they are "foragers") than hatchery Chinook salmon, and it would be worth discussing this in Chapter 5.<br><br>Potential adverse effects of Yolo Bypass on juveniles, such as stranding, were described. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | Potentially adverse temperature effects or predation affects (if predators are attracted to the Bypass) were not described, but BDCP authors stated at the January meeting that temperature and predator attraction are not likely to pose a problem within Yolo Bypass. Adult salmonids could be adversely affected in Yolo Bypass, as discussed in Chapter 5; these fish should be monitored to ensure safe migration. | |
| 1673 | 119 | Does the analysis adequately describe the predation and other screen-related effects of the proposed north Delta diversion structures? Is the application of the observed mortality rate at the fish screen of the Glenn-Colusa Irrigation District (GCID) an appropriate assumption for expected mortality at the proposed BDCP north Delta intakes? Are there other studies on salmonid survival at positive barrier fish screens that would be appropriate to apply?<br><br>Summary<br><br>Chapter 5 concluded that there is a low negative impact related to contact and impingement of salmonids with the north Delta diversion screens, but the technical appendix states that this effect could not be evaluated. Regarding predation, the Panel believes that there is uncertainty about the extent to which juvenile salmon and predators will aggregate near the intakes, and this is an issue that must be monitored. Positive barrier fish screens are widely used throughout the Pacific Northwest to protect juvenile salmonids from entrainment into water diversions, and this information should be readily available to the BDCP team.<br><br>Recommendations<br><br>-Correct inconsistency in conclusions in Chapter 5 and the Appendix regarding impingement.<br><br>-Monitor predator aggregation and predation rates at north Delta intakes.<br><br>-Conduct literature search on positive barrier fish screens, which are widely used | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 120 | Screen contact and impingement<br><br>The Effects Analysis stated in regard to fish contact and impingements at the north Delta intakes:<br><br>"It is concluded with moderate certainty that there will be a low negative change to the north Delta intakes attribute to foraging and migrating juvenile salmonids as a result of contact and impingement at the north Delta diversions".<br><br>A reasonable summary of information leading to this conclusion was presented, although more information on relative abundances of foraging Chinook (smaller & more susceptible fish) versus migrant Chinook could have been presented. It was stated that monitoring would occur during operation as a means to ensure low adverse effects. This monitoring is important because debris build-up might alter contact and impingement rates. However, Appendix 5.B: Entrainment stated:<br><br>"Because of the lack of an established relationship between passage time, screen contact rate and injury or mortality, it is not possible to conclude with certainty what the effects of the north Delta intakes may be on juvenile Chinook salmon or indeed on juvenile steelhead…".<br><br>Therefore, information presented in Chapter 5 on injuries related to the north delta intakes | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | was inconsistent with information presented in the supporting Appendix. This inconsistency needs to be corrected. | |
| 1673 | 121 | Predation at north delta intakes. The Effects Analysis presents some findings that indicate mortality of salmonids associated with predation is uncertain at the north delta intakes and that monitoring and adaptive management would address this issue. The use of monitoring and adaptive management to address the predation issue is important, and implementation of these activities is key to minimizing predation risk. The Panel believes that there is uncertainty about the extent to which juvenile salmon and predators will aggregate near the intakes.<br><br>One of the predation analyses relied upon information collected in relation to salmon losses at the Glenn Colusa diversion and screen. Application of the Glenn Colusa analysis to the north delta intake suggested a cumulative loss of 12% of the juvenile winter-run Chinook salmon at the north Delta intake, a value that is high for a relatively short reach of river. Relatively few details about the Glenn Colusa predation study were presented in Chapter 5 or in the supporting appendix (5F: Biological stressors), therefore the Review Panel cannot directly address the question above on this issue. Nevertheless, the Glenn Colusa study seems to indicate that predators may aggregate near fish screens and consume many salmonids. The study at Glenn Colusa highlights the need to monitor fish predation at the north Delta intakes.<br><br>Positive barrier fish screens are widely used throughout the Pacific Northwest to protect juvenile salmonids from entrainment into water diversions, and fish screening criteria are widely applied. The BDCP team could access relevant documents on the web.<br><br>However, regarding predation at the north intake, salmon and predator behavior in response to flow and habitat conditions along the screen intakes will likely be the key determinants of salmon mortality at the intakes. This information must be gathered during project implementation. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 122 | Does the Effects Analysis provide a complete and reasonable interpretation of the results of physical models as they relate to upstream spawning and rearing habitat conditions, particularly upstream water temperatures and flows resulting from proposed BDCP operations?<br><br>Summary<br><br>A valid approach was used to calculate daily flow and daily temperatures in the upstream locations. However, the presentation of the temperature results and the synthesis of the results should be improved to aid understanding. The Fish Agencies should also refine the types of analysis they need to best show the temperature impact on fish as the result of BDCP actions. Currently, the temperature analysis includes: 1) a comparison of mean monthly temperatures categorized by water year type, exceedances of water temperature thresholds for the different fish species calculated for each month and categorized by water year type, and 3) the number of years where the exceedance occurred categorized by the level of concern (Table 5C.4-4, pgs. 5C4- 19, example Table 5C.5.2-42, pgs. 5C5.2-79). | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 123 | Recommendations<br><br>-Question 10 is one of the topics in the Effects Analysis where the data is presented in individual species and life stage sections. It is very hard to synthesize the results in this | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | format.<br><br>-To help the reader understand what locations, which species, what life stages are most likely to be impacted by temperature as a result of upstream reservoir operations in response to north Delta diversion requirements, a synthesis section in the main Effect Analysis Chapter 5 should be included. This synthesis should address the summary of the problem presented in Section 5C.4 (5C.4-16 lines 26-32).<br><br>-Most charts in this section are hard to visually synthesize the temperature data. Color coding the charts would help guide the reader. Table 5C.5.2-197 (pg. 5C.5.2-364) is a good example of how to improve chart readability.<br><br>-Table 5C.5.2-32 (p. 5.C.5.2-79) show compares the level of exceedance for the different scenarios. This table is not effective at communicating that the level of exceedance is shifting between different categories. For example, less "orange" classifications may mean that there are more "red" classifications. It would be helpful to re-visit how this information is presented.<br><br>-Another potential key statistic that could be extracted from the model data is the number of consecutive days in which water temperature is greater than the threshold level. | |
| 1673 | 124 | Approach to calculating upstream flows and water temperatures:<br><br>The CALSIM II watershed model was used to specify the monthly flows in each of the upstream rivers. These monthly results were then "downscaled" to daily values based on the historical records at three historical locations in the watershed. These flows are used as inputs into the Sacramento River Water Quality Model (SRWQM) or the Reclamation Temperature model, depending on the location. This downscaling approach seems to be reasonable approach to estimate flows. The temperature models used are specific to this region and have been used in other applications.<br><br>The temperature analysis included: 1) a comparison of mean monthly temperatures categorized by water year type; 2) exceedances of water temperature thresholds for the different fish species calculated for each month and categorized by water year type; and, 3) the number of years where the exceedance occurred categorized by the level of concern (Table 5C.4-4, pgs. 5C4-19, example Table 5C.5.2-42, pgs. 5C5.2-79). | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 125 | Analysis and synthesis of the Temperature modeling:<br><br>Question 10 is one of the topics in the Effects Analysis where the way the data is presented makes it very hard to synthesize the results. The topic of temperature was evaluated in the Upstream Habitat Results Section 5C.5.2 (548 pages long) for each species and life stage. In many cases the description of the results were very repetitive and did not explain how the results differed from other species.<br><br>To help the reader understand what locations, which species, what life stages are most likely to be impacted by temperature as a result of upstream reservoir operations in response to north Delta diversion requirements, a synthesis section in the main Effect Analysis Chapter 5 should be included. The current summary of upstream temperature (Table 5.3-5, p. 5.3-21) is too general to be useful. It is not a sufficient synthesis of the information contained in Section 5C.5.2. This synthesis should address the summary of the | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | problem presented in Section 5C.4 (5C.4-16 lines 26-32). | |
| 1673 | 126 | Does the Effects Analysis use a reasonable method for "normalizing" results from the salvage-density method to the population level for salmonid species?<br><br>Summary<br><br>The normalization approach seems to simply adjust entrainment values based on relative population size over the years of observation so that entrainment values relative to water export may be more comparable from year to year. The normalization should be used for qualitative purposes but not for modeling purposes, because it will mask some of the variation and uncertainty. This standardization has utility for the purpose of calculating entrainment per volume of exported water, but it provides only a partial view of the pumping effect on fish populations. The percent of the populations entrained is more important. This value has more relevance to Effects Analysis on the population. It also appears the variance calculations for salvage abundance and entrainment index are being calculated incorrectly.<br><br>Recommendations<br><br>Calculation of salvage density and entrainment need to be revisited and the variance calculations corrected. Current variance calculations for salvage density are underestimating actual variance and uncertainty. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 127 | The salvage-density method was developed to provide an index to entrainment that reflects the volume of export, taking into account fish species abundance. The method assumes a linear relationship between entrainment and export flows. There is some evidence this assumption of linearity may not be correct over the total range of conditions (Kimmerer 2008).<br><br>An estimate of total salvage abundance ($Si$ ) for year $i$ is estimated by the product [see letter for equation]<br><br>The estimate of salvage loss is then "normalized" for an average population size of the fish according to the formula [see letter for equation]<br><br>Ideally, the fish abundance values should be based on the same population as the fish being salvaged. For example, winter-run Chinook where normalization is based on juvenile production estimates. In the case of fall and late fall-run and spring-run Chinook salmon, the normalization is based on adult run size and in the case of longfin smelt, a trawl index. For each of these latter cases, there is the additional assumption that juvenile abundance is proportional to either adult abundance or the trawl index, i.e., [see letter for equation] or [see letter for equation]<br><br>The normalized values, $Si$ , can be used in indices of annual salvage numbers but should not be used in subsequent simulations or the calculations of interval estimates. The normalization process has dampened the variability among annual values such that any subsequent variance calculations will underestimate the actual magnitude of the uncertainty (i.e., confidence interval [CI] width).<br><br>The entrainment index ($Ei$ ) is calculated [see letter for equation]<br><br>per Section 5.B.5.4.3. It is unclear whether the actual salvage abundance $Si$ estimate or the | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | normalized value $Si$ is used in these calculations.<br><br>The variance calculations for the entrainment index (Section 5.B.5.4.3, lines 8-17) appear to be wrong. Based on the description, the average index value is calculated by taking the entrainment density for all relevant water years ($Di$ , $i$ = 1, ⋯ , $n$) multiplying these values by alternative water volumes from CALSIM $Vj$ , $j$ = 1, ⋯ , $m$ , then averaging over all $nm$. The variance is based on the empirical variance using the $nm$ values, i.e., [see letter for equation] per the plan, and where the $Sij$ are all possible values over $n$ and $m$, then [see letter for equation]<br><br>However, based on the stratified nature of the calculations, the correct variance has the form [see letter for equation]<br><br>The report variance is too small.<br><br>The variance of the total salvage estimate also appears to be wrong (pages 5.B-65 and 66). The calculation of total salvage ($S$) was based on the description to be: [see letter for equation] where the estimator of density was based on a linear regression of log salvage density vs. day of inundations. The report then states that the confidence intervals were then computed using the 95% confidence levels of the estimates of the regression." This calculation, as described, is wrong. The calculations should be based on the variance estimate for the back-transformed estimate of density from the regression, i.e., [see letter for equation]<br><br>See Appendix D for appropriate variance calculations for the salvage model.<br><br>Are the assumptions of the analysis of aquatic habitat restoration food web effects appropriate for covered fish species? Are the conclusions and net effects appropriate?<br><br>Summary<br><br>The BDCP develops a robust conceptual model of aquatic food webs and the diverse linkages that may impact the net production of food for Covered Fish. Yet the BDCP contains a number of assumptions, some of which are inappropriate, others of which contain considerable uncertainty. Uncertainties are mentioned, but no effort was made to include whether conservation efforts reach only a portion of the goals of biological objectives. Thus the analysis of effects further assumes only the most beneficial potential results in any calculations, but doesn't incorporate other possibilities. Other processes of food webs in aquatic habitats are described but remain unanalyzed, some of which may enhance, while others of which would inhibit their biological objectives.<br><br>While the overall conceptual model is adequate, integration and synthesis is lacking. Consequently the conclusions and net effects are not appropriate given the gaps in analyses and the uncertainties.<br><br>Recommendations<br><br>-Model the potential flow of energy through the pelagic food web - baseline information<br><br>-Assume a variety of primary production flows to covered species due to competitors or environmental issues - to what extent might their optimistic scenarios vary from equally potential realities | |

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| | | -Assume shifts in composition of plankton from favorable to unfavorable species (with respect to covered species) - even with potentially higher productivity by plankton, what happens if energy flows into other pathways other than nearly immediately into the covered species<br><br>-Incorporate a detrital energy flow - this might shift energy flow back toward covered species<br><br>-The direction of restoration in these systems that would support phytoplankton is not simple and linear, adaptive management would need to be an aggressive component of the BDCP with authority to take immediate actions, regardless of what those might be | |
| 1673 | 128 | The conceptual model of the food web appears to contain all the significant compartments required for an adequate assessment of the impact of the BDCP. The BDCP contains a number of conservation efforts that have the potential to provide considerable enhancement of the populations of covered fish. These include increasing habitat, providing a diversity of habitat conditions that may enhance different life history stages, as well as allowing for potential increases in food web services for covered species. However, other than estimates made for phytoplankton production, no other assessments are made. First we review some of the assumptions inherent in the BDCP consideration of food webs.<br><br>An overarching assumption is that Conservation Measures have rapid and positive impacts. With respect to food webs, wetland and aquatic systems restoration are assumed to be effectively restored and functional immediately or in a short time frame and meet the biological objectives of the BDCP. This result is based on a number of additional assumptions, all of which contain considerable uncertainty. Similarly, while potentially negative impacts on the success of restoration are considered in passing, e.g., invasive bivalves, none of their potential effects are incorporated into their analyses or conclusions. The simplest effects perspective of the BDCP is that it edits out all potential outcomes except for the most favorable one.<br><br>Restoration of natural ecosystems, however, is difficult and fraught with great uncertainties and some systems that are assumed to have a positive influence on covered species are particularly difficult. The contingency of ecological communities means they will not automatically assemble in some predictable manner (Parker 1997). Chapter 5 contains even less information this time concerning details about timing and sequencing required to evaluate potential impacts. Understanding the sequences is also critical because they have major influences (Drake 1990, 1991; Hobbs and Cramer 2008). For example, the BDCP implies a consistent increase in restoration acreage through time, but without strong management intervention prior to opening of new wetland or shallow aquatic habitat, submerged aquatic invasive species such as bivalves, Egeria, or other newly detected species may expand rapidly into the new tidal habitat. The result would be a much larger management problem without the food web benefits proposed by the BDCP.<br><br>The assumption of rapid positive food web benefits from restoration of aquatic habitat is a potential benefit, but the degree of benefit, its timing, and even whether benefits will accrue is uncertain. Restoration even may be on a pathway to achieving desired biological objectives, but the time frame may be considerable and beyond the 50-year period of the BDCP. Similarly, changing the order of different conservation measures may push ecological systems onto different trajectories. Usually these cannot be predicted, and requires an integrated monitoring and adaptive management with considerable authority and manpower. Restoration rarely achieves immediate conservation or biodiversity goals (Hobbs | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. Please refer to Master Response 14. |

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| | | and Cramer 2008, Hobbs et al. 2011). While tidal water as a process can be achieved by opening dikes, restoration of biological function is actually quite difficult with respect to ecosystem processes beyond tidal flux and especially with respect to ecological equivalency to comparable natural wetlands (Kentula 1996; Simenstad and Thom 1996; Zedler and Callaway 1999; Lockwood and Pimm 1999). More recent studies substantiate these evaluations (Burgin 2008; BenDoer et al. 2009; Moilanen et al. 2009).<br><br>The BDCP further ignores critical data that should have been incorporated into trajectories concerning the restoration of wetland and associated aquatic habitat. This is a crucial piece because the restoration that is planned is critical key to increasing suitable habitat and food web productivity. The issue is sediment supply for these restorations. The BDCP assumes a constant sediment concentration for the time period of the plan (Appendix 5.E, pp. 43-44: turbidity held constant in models and interpretations), yet they indicate that sediment concentration has been declining over the past 50 years (p. 109) and that the BDCP conservation measures will further reduce the sediment supply by an additional 8-9%. While in their discussion of sediment supply, they also conclude that declining sediment concentration and the impact of CM1 will mean much lower sediment supply, these issues have no impact on the BDCP analysis and inference. Yet the loss of sediment supply creates great uncertainties in the rate and potential for restoration of these habitats, while only the most optimal circumstances are modeled or estimated.<br><br>Similarly, the BDCP uses a simple depth-productivity model to quantify how habitat restoration may impact primary production (Figure 5.E.4-85, Relationship between Phytoplankton Growth Rate and Depth, in Appendix 5.E, Habitat Restoration). This assumes the relationship between phytoplankton growth rate and depth developed by Lopez et al. (2006) is accurate. The analysis focused solely on the relationship between phytoplankton and depth, while recognizing that other factors may influence phytoplankton production in particular locations (p. 121).<br><br>Ironically, the literature they rely on, Lopez et al. (2006) and Lucas and Johnson (2012), indicate that biomass and production of phytoplankton in the Delta do not fit this simple model expectations. A major limitation of the depth-productivity model is the impact bivalve grazing on available net production. Net phytoplankton production (in excess of potential grazing) peaked at different depths and at much lower rates depending on overall habitat depth and water residence time. Assumptions of phytoplankton production and their conversion to zooplankton and invertebrates as food sources for covered species in aquatic systems consequently lack realism.<br><br>A third assumption involves the production of food for covered fish. Food produced in the restoration areas is assumed to directly benefit covered fish and indirectly by export. The restoration of these areas are predicted to create better habitat and food for juvenile Chinook salmon, splittail, sturgeon, delta smelt, and longfin smelt. Two issues arise from this assumption, one is their analysis of phytoplankton production and the second is that the analysis never includes potential competitors.<br><br>In contrast to their assumption, they cite literature that models the impact of introduced clams and their rate of filtering of phytoplankton and other aquatic organisms. These models suggest 1) that the depth-productivity model they used is completely inaccurate in the context of invasive clams and 2) remind us that while the potential impact of clams are mentioned as an uncertainty, only the most optimal scenario without clams is used for conclusions about the short and long-term benefits of the BDCP. | |

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| | | Beyond the analysis of assumptions, the other compartments of the food web are not incorporated into their analyses. For example, the potential for detritus as a major source of food web production was reviewed at some point and mentioned during the discussion of food webs. However, no incorporation or estimation of potential detritus production was made, nor was the detrital web discussed any further. Ironically, this could be a significant and positive impact on covered species.<br><br>Similarly, the role of SAV and emergent vegetation were not assessed although they were mentioned. The issue of competitors was not assessed. No incorporation was made of anthropogenic nitrogen influences on phytoplankton community composition (for example increasing the proportion of Microcystis). While the BDCP generally has a review of most of these compartments that they illustrate in the conceptual model, no quantitative models, nor estimates derived from the literature review were developed to allow a variety of scenarios that might indicate the potential robustness of the impacts of the conservation measures. Thus, some quantitative detail on one or a few compartments, complete with large tables showing all the numbers produced, lacks significant meaning when other compartments are merely discussed. The overall impression is that these compartments live in conceptual isolation, lacking the integration of multiple and linked processes/interactions together into a synthesis. Consequently the BDCP analyses are ambiguous and conclusions and estimates of net effects overestimate the net positive impacts of conservation measures.<br><br>Is the analysis of food web benefits to longfin smelt from habitat restoration appropriate? How well do the analyses link intended food web improvements to improvement in the longfin smelt spring Delta outflow/recruitment relationship? | |
| 1673 | 129 | While the Effects Analysis develops an appropriate logic train suggesting that restoration actions (e.g., CM4) would result in the production and export of increased longfin smelt "food", this objective is constrained by considerable uncertainty (acknowledged as only "Partial" assessment) because the data is lacking to quantitatively estimate the relationship between longfin smelt production and what might be exported from tidal wetland restoration and converted to food web linkages to the smelt. Although there are good, synthetic conceptual models developed for the Bay- Delta longfin smelt population encapsulated in the Effects Analysis (e.g., Baxter et al. 2010; Rosenfield 2010), this uncertainty is further constrained by the lack of a life- history model that would elucidate the role of prey composition and abundance in population dynamics. Delta smelt are principally planktivorous, feeding on copepods, cladocerans and mysids in the Bay-Delta (Moyle 2002; Feyrer et al. 2003; Hobbs et al. 2006). A potentially significant change in the viability of food web support of longfin smelt by the shift from the native Eurytemora affinis to non-indigenous species such as Pseudodiaptomus forbesi and Sinocalanus doerri is implicated in declining availability of natural prey for longfin smelt. However, these changes were also confounded by flow diversions and restriction of the mixing zone and potential increased entrainment into water diversions and the increased predation of the overbite clam Potomocorbula amurensis on mysids and other zooplankton prey after its introduction in 1986 (Alpine and Cloern 1992; Kimmerer 2002).<br><br>Recommendations<br><br>Strengthen the documented data and other evidence supporting the presumption that export of detrital matter would specifically contribute to food web linkages supporting longfin smelt. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| 1673 | 130 | While there is viable evidence that poor survival and growth are a major cause of longfin smelt decline (Bennett and Moyle 1996; Sommer et al. 2007), the mechanism and magnitude of increased production of desired longfin smelt prey contributed by restoring tidal natural communities and other proposed BDCP restoration actions is still highly uncertain (see response, above, to Question 12). As discussed elsewhere, the contribution of restoring shallow water tidal wetlands to net phytoplankton production and increased plankton abundance available to longfin smelt is basically hypothetical because of the uncertainties of primary consumption within the restoring ecosystems, especially by non-indigenous clams, and whether these systems would be sources or sinks for any increased production. The Effects Analysis does acknowledge that tidal wetland restoration is also likely to export detrital organic matter, as well as macroinvertebrates, but the potential contribution of these food web sources to longfin smelt production is equally uncertain without more explicit and quantitative linkages to the longfin smelt prey potentially involved, such as mysids.<br><br>From that standpoint of linking food web benefits to the longfin smelt spring Delta outflow/recruitment relationship, the Effect Analysis does provide a reasonable rationale for smelt post-larvae and juveniles to benefit from exported production from the Suisun Marsh ROA, albeit with the same uncertainty associated with the utility of that exported production. Current understanding of juvenile longfin smelt occupancy of the Suisun Bay and West Delta subregions during March through June, before moving further into San Francisco Bay proper, suggests that linking the outflow/recruitment relationship to the management of spring (March-May) Delta outflow (Chap. 2, Section 2.4.1.4.4 Decision Trees) could be a management strategy. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 131 | How well does the analysis address population-level effects of the BDCP on white sturgeon?<br><br>Summary<br><br>The analysis does an excellent job of summarizing what is currently known about the life history and ecology of white sturgeon (southern distinct population segment) using the most recent analyses and peer-reviewed publications. In addition, the conclusions regarding the level of certainty about the effects of the different conservation measures on white sturgeon, based the expert panel convened in August 2013, are thoroughly discussed in the text and well summarized in Figure 5.5.8-2.<br><br>Estimating the effects of the BDCP on white sturgeon population levels is very difficult because of: 1) the lack of a thorough understanding of the effects of flow regimes on downstream migration and year class recruitment; 2) considerable uncertainty about white sturgeon sensitivity to water quality and whether current water quality conditions constitute negative impacts; (3) a poor understanding of the role of intertidal and subtidal habitat on food availability for migrating juveniles; and 4) little information about factors influencing growth and survival of adults in San Francisco Bay and the ocean.<br><br>Given these limitations, the Effects Analysis does an adequate job of using existing information to predict the effect of the various conservation measures on white sturgeon.<br><br>Recommendations<br><br>-Implement measures to improve estimates (reduce uncertainty) of adult survival and population size of white sturgeon in the Delta. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | -Undertake research studies to identify the reason(s) for the observed association between high flows and high recruitment.<br><br>-Initiate studies to understand the links (or lack thereof) between water quality and intertidal and subtidal habitat on growth and survival of 1) migrating juveniles and 2) adults. | |
| 1673 | 132 | The life history of white sturgeon, high adult survival and fecundity in combination with episodic recruitment in high water years, suggests that the multiple approach to conservation measures should promote increased adult survival and ensuring high recruitment when conditions are favorable. We agree with the conclusions of the Effects Analysis that reduction of illegal harvest (CM 17) and reduction of entrainment at the Fremont weir (CM 2) are both highly likely to have a positive effect on adult survival. Similarly, we agree that the restoration of tidal wetlands under CM4 are very likely to provide significantly increased rearing habitat and epibenthic and benthic food resources. Perhaps more than the pelagic covered species, white sturgeon could also derive significant benefits from enhanced and exported detrital organic matter from tidal wetland restoration because much, if not most, of their natural (and unnatural given the non-indigenous clams contributions to their diets) prey on mudflats and in adjacent channels are detritivores.<br><br>Quantitatively estimating the effects of these conservation measures on adult survival will require more rigorous, focused sampling efforts. The large confidence intervals associated with recent estimates of adult survival will make it nearly impossible to document effects of the conservation measures. The effects of water diversion and changes in flow regimes on white sturgeon recruitment are much more difficult to predict and will require a more thorough understanding of the mechanisms behind the correlation between recruitment and flow volume. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 133 | Adequacy of Technical Appendices<br><br>Appendix 5.B--Entrainment<br><br>Summary<br><br>Section 5.B.4.1 (p. 5.B-11 lines 18-23) has the most important statement of the entire appendix. This conclusion that should be the first conclusion in the executive summary:<br><br>"Under the ESO (Evaluated Starting Operations), in the wetter water years (wet and above-normal water years…), most of the combined total exports would come from the new north Delta facility and exports from the south Delta facility would be lower than existing biological conditions … The use of the north Delta pumps would be lower in the dryer years with most pumping going from the south Delta pumps in dry and critical water year… Less use of the north Delta pumps in drier water years reflects requirements to maintain adequate bypass flows at the north Delta diversions." (5.B-11, lines 18-23)<br><br>This conclusion is the basis of most of the entrainment analysis in Appendix 5.B for the South Delta facilities. There may be different approaches to come up with the regression between export rate and salvage, but the simplistic conclusion is that when the pump operations are lower, so is the entrainment of fish. However, in the dry and critical years, entrainment at the South Delta facilities will be higher because the north Delta facilities' operations will be limited.<br><br>The next question to ask, therefore, is how often we will be under dry or critical year | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | conditions. Will California have more frequent dry water years, resulting in fewer times when the north Delta diversion facilities can be operated?<br><br>Recommendations<br><br>-The conclusion stated above in the summary Section 5.B.4.1 (p. 5.B-11 lines 18-23) should be the first conclusion in the Appendix 5.B executive summary and should be included in Chapter 5.<br><br>-The Climate Change (Appendix 5.A) portion of the Effects Analysis needs to address the question for frequency of dry/critical water years and relate it back Appendix 5B.<br><br>-The documentation of the DSM2 and particle tracking model (PTM) model in this appendix should be greatly expanded to provide clarity in their approach. | |
| 1673 | 134 | Section 5.B.4.1 (p. 5.B-11 lines 18-23) has the most important statement of the entire appendix. This conclusion that should be the first conclusion in the executive summary:<br><br>"Under the ESO (Evaluated Starting Operations), in the wetter water years (wet and above-normal water years…), most of the combined total exports would come from the new north Delta facility and exports from the south Delta facility would be lower than existing biological conditions … The use of the north Delta pumps would be lower in the dryer years with most pumping going from the south Delta pumps in dry and critical water year… Less use of the north Delta pumps in drier water years reflects requirements to maintain adequate bypass flows at the north Delta diversions." (p. 5.B- 11, lines 18-23)<br><br>This conclusion is the basis of most of the entrainment analysis in Appendix 5.B for the South Delta facilities. There may be different approaches to come up with the regression between export rate and salvage, but the simplistic conclusion is that when the pump operations are lower, so is the entrainment of fish. However, in the dry and critical years, entrainment at the South Delta facilities will be higher because the north Delta facilities operation will be limited.<br><br>The next question to ask, therefore, is how often we will be under dry or critical year conditions. Are we going to have more frequent drier water years, resulting in fewer times when the north Delta diversion facilities can be operated? The Climate Change (Appendix 5.A) portion of the Effects Analysis needs to address this question and relate it back to this Appendix.<br><br>In this appendix, the first conclusion stated is: "The BDCP would substantially change the amount and pattern of water exports from the south Delta SWP/CVP facilities, which generally would be expected to lower the number of fish of all species entrained relative to existing biological conditions." (Appendix 5.B, p. 5.B-iii, lines 38-40)<br><br>We agree that the south Delta export patterns will change substantially, especially in wet and above normal years. However, it is also important to look at how the flow patterns will also change in the north Delta. This is an equally important piece of evaluation that should be included in the entrainment analysis. The use of the DSM2 PTM is a first attempt at this type of analysis. However, the documentation of the DSM2 PTM model in this appendix should be greatly expanded to provide clarity in their approach. Some of this documentation may already be in Appendix 5.C, however, the present documentation is not | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | sufficient to allow Appendix 5.B to act as a stand-alone document. | |
| 1673 | 135 | Appendix 5.C--Flow, Passage, Salinity, and Turbidity Summary<br><br>Appendix 5.C has been a catch-all appendix ever since Phase 1 of this Effects Analysis review. Unlike the Entrainment or Contaminants appendices, this appendix does not have an individual issue that it is trying to address. This appendix is 2,636 pages long and spans a laundry list of topics including flows in river, salmon migration through the Delta, Delta Cross Channel and Georgiana Slough circulation, non-physical barriers, temperature modeling, water clarity, turbidity, invasive species, nutrients, dissolved oxygen, and algae. This appendix should have been divided into multiple appendices in previous iterations of the BDCP document. At this point, the division of the appendix will likely never happen. As a result, this is a very difficult appendix to review. In general, the Panel read through portions of this appendix to answer specific questions for the main charge questions for Chapter 5.<br><br>Recommendations<br><br>-Most Appendix 5.C recommendations are included in the Chapter 5 questions.<br><br>-Guiding operational rules in place for the current configuration of the Delta, such as E/I ratios, need to be reviewed to see if they still make sense for the combined system.<br><br>-The calculation of transport time scales should be done with relation to a particular question being addressed rather than calculated as a bulk parameter.<br><br>-Improve the synthesis of results in Section 5C.5.3.1: Passage, Movement, and Migration Results, Flow Summary.<br><br>-Water clarity and suspended sediment should have been in an appendix all its own rather than being buried in Part 6 of Appendix 5.C. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 136 | Baseline operations (Section 5C.2.2)<br><br>The Effects Analysis used two different baseline conditions, one that was consistent with the USGFWS BiOp RPA actions (EBC2) and one in which the USFWS RPA (Fall X2 action) was not included (EBC1). The panel will not comment the details of the baseline operations that were used to represent current conditions because this level of detail is beyond the area of expertise of the panel. We defer this issue to public comments by interested stakeholders, state and federal agency personnel that have more understanding of these details. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 137 | Proposed operations, Maximum Allowable Export Rules (Section5C.2.2.2.1)<br><br>Before the north Delta diversion facility is operational, the operating criteria for both the North and South facilities need to be established. Guiding operational rules in place for the current configuration of the Delta, such as E/I ratios, need to be reviewed to see if they still make sense for the combined system. For instance:<br><br>"For the BDCP cases, the [Export/Import] E/I ratio was assumed to apply only to south Delta exports; the north Delta intake diversions were assumed to exempt form E/I rule because the north Delta diversions are controlled by the bypass flow rules. The south Delta pumping was limited by the E/I calculated with the inflow minus the north Delta diversions; this would allow slightly higher total exports during periods when Sacramento River flows are | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | high and north Delta diversion are high." (p. 5C.2-3, lines 41-42; p. 5C.2-4 lines 1-3) | |
| 1673 | 138 | Residence Time (Section 5C.4.4.7)<br><br>The residence times calculated using 38 particle release sites using the DSM2 PTM model is of limited use. The calculation of transport time scales should be done with relation to a particular question being addressed. For example, how long will water reside in a specific Restoration Opportunity Area and how does that transport timescale compare to other important timescales, such as phytoplankton growth rates, contaminant reaction time, etc.<br><br>The Delta is a very diverse mosaic of regions. Each sub-section of the Delta has unique characteristics. Transport timescales in each sub-region is a function of operations (such as the operation of the Delta Cross Channel and the placement of temporary barriers, flooding in the Yolo Bypass), bathymetry, and connectivity to adjacent regions. Transport timescales calculated in sub-regions rather than full Delta "average" residence time will give much more detailed information about changes in circulation patterns as a result of alterations to the system as a result changes in operations and additions of restoration opportunity areas. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 139 | Passage, Movement, and Migration Results, Flow Summary (Section 5C.5.3.1, Pages 5C.5.3-1 through 5C.5.3-64)<br><br>Please improve the synthesis of results in this section. These pages contain only charts with no dialogue or graphs to aid the reader. This section likely contains very important information about how the circulation changes in the Delta will change as a result of the Conservation Measures at key locations throughout the Delta. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 140 | Attachment 5C.D (Water Clarity-Suspended Sediment Concentration and Turbidity) (5C.D-1 through 5C.D-64)<br><br>Water clarity and suspended sediment should have been in an appendix all its own rather than being buried in Part 6 of Appendix 5.C. This is a topic is as important as Entrainment and Contaminants. This section is a good resource to read for background on issues related to sediment transport in the Delta. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 141 | Appendix 5.D--Contaminants<br><br>Summary<br><br>Currently, the contaminants section of Chapter 5 comprises 1 ½ pages of a 745 page document with most of the information related to contaminant effects contained in a single table. There are many caveats to consider with contaminants and this topic should get more attention within Chapter 5. Appendix 5D has a very well written introduction that lays out the key issues related to both mercury and selenium in the Delta. This introduction should be included in Chapter 5 where it will be read and considered. This list of potential contaminants seems reasonable and the conceptual model for contaminants (Fig 5D.3-1) is well developed. The growing list of contaminants of emerging concern is a clear sign that additional contaminants may need consideration in the future.<br><br>The Executive Summary of Appendix 5.D (p. 5.D-i, lines 24 -29) states that quantitative analyses were applied where available but were not sufficient to fully examine the potential for contaminant effects. This statement is important for characterizing the level for which potential contaminant effects can be assessed, however this is not part of the bulleted | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. Please refer to Master Response 14. |

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| | | summary within the Executive Summary (p. 5.D.ii, lines 35-42).<br><br>The Contaminants Appendix is limited to direct contaminant effects on covered species even though it is recognized that both direct and indirect contaminant effects must be considered (p. 5.2.3, lines 5-7). The Effects Analysis authors indicate that indirect contaminant effects are handled within Appendix 5.F: Biological Stressors on Covered Fish. Given the degree to which indirect contaminant effects are presently covered in Appendix 5.F this is not satisfactory. A Phase II Panel recommendation was to incorporate grey literature where needed in the contaminants section, especially for indirect contaminant effects. These recommendations were not taken and stand from the original review.<br><br>The separation of direct and indirect contaminant effects lead to strange splits in organization, including for Microcystis which is included as a "contaminant" in the contaminant conceptual model but is not part of the discussion in Appendix 5.D: Contaminants. Rather, Microcystis is considered in Appendix 5.F.<br><br>Both Conservation Measure 15: Methylmercury Management (pp. 4-257) and AMM27 Selenium Management (p. 5.D-37, line 18) should be evaluated by contaminants experts to determine if these approaches will be acceptable for mitigation. The modeling of Methylmercury effects are highly uncertain due in large part to site-specific characteristics that cannot be modeled at present.<br><br>Recommendations<br><br>-Provide more information with Chapter 5: Effects Analysis rather than relying heavily on Appendix 5.D: Contaminants.<br><br>-Include both indirect and direct contaminant effects within Contaminants Appendix (Phase II recommendation).<br><br>-Methylmercury Management and Selenium Management should be evaluated by contaminants experts.<br><br>-Incorporate grey literature where needed (especially herbicide application for control of Invasive Aquatic Species).<br><br>-Provide clear statements within Chapter 5 and the Executive Summary of Appendix 5.D about the high level of uncertainty associated with contaminant effects as a result of site-specific details that cannot be modeled without explicit information about the location and connectivity of ROAs. | |
| 1673 | 142 | The Contaminants Appendix is limited to direct effects of contaminants on covered species despite the recognition (Chap. 5, pg. 5.2-3, lines 5-7) that that both direct and indirect contaminant effects must be considered. Appendix 5.D states that with the exception of herbicides used to control Aquatic Vegetation, the BDCP does not add any contaminants to the Plan Area. Nonetheless, as stated (Chapter 5, page 5.3-26, lines 29-30) BDCP activities will alter freshwater flow and alter water residence times at various locations in the Delta. These changes can result in major changes in how contaminants interact with the Delta ecosystem by changing the local concentration of a given contaminant or duration of exposure. For these reasons, restricting the analysis to direct effects on covered species is inadequate. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | The inherent challenges in navigating a document of this size could be overcome by placing all of the contaminant effects under the Appendix entitled "Contaminants". This was a recommendation made during the Phase 2 review. Indirect effects are handled elsewhere in the Effects Analysis (Appendix 5.F: Biological Stressors on Covered Fish) however at present discussion of potential indirect contaminant effects are not sufficient in scope, detail, or characterization of uncertainty. Ammonia (NH3) / ammonium (NH4) effects, as written in Appendix 5.D, appear to consider indirect effects of ammonia/ium which is inconsistent with the authors' intent for Appendix 5.D.<br><br>Appendix 5.D has a very well written introduction that lays out the key issues related to both mercury and selenium in the Delta. The analysis was very careful to separate out the effects of Conservation Measure 1 (north Delta diversion facilities) from the effects of Conservation Measure 2 (Establishment of ROAs). In general, the environmental effects related to constructing ROAs are a bigger concern for contaminants than the north Delta diversion. However, in the case of selenium, changing the pumping operation location in conjunction with the establishment of ROAs in the South Delta has a potential significant effect. Changing to the north Delta diversions shifts the primary source of water in the South Delta to San Joaquin derived water rather than Sacramento source water under certain conditions. | |
| 1673 | 143 | It is recognized that Methylmercury concentrations would continue to exceed criteria under the BDCP and restoration actions are likely to increase production, mobilization and bioavailability of Methylmercury (5.D-24, lines 41-44). There is considerable uncertainty related to Methylmercury production resulting from BDCP activities. This is due in large part to site-specific information needed to construct reasonable models and trophic interactions from various sources are not easily modeled (5.D-22, lines 11-17) DSM2 is a one-dimensional model that represents open water areas as well-mixed, continuously stirred tank reactors. In addition, the location of the ROAs and how these areas are connected to the adjacent channels is unknown.<br><br>Currently, dissolved Se in the San Joaquin is an order of magnitude higher than in the Sacramento River. (Monsen et al. 2007) Therefore, even if the proportion of San Joaquin discharge relative to the Sacramento River is low, the increase in Se concentration could still be significant. This conclusion should be reviewed. There is much uncertainty in the DSM2 results, especially for residence times in the newly established open water regions. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 144 | Section 5.D.43 (lines 8-10) on the impact of restoration on ammonium suggest that restoration will not have an impact on NH4 concentrations--This is overly simplistic as tidal wetlands are known to be important in nitrogen biogeochemistry, acting as a source via sediment re-mineralization (Cornwell et al. 2014) or clam excretion (Kleckner 2009) or as a sink via organic matter production or coupled nitrification--denitrifcation (Cornwell et al. 2014). | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 145 | Conservation Measure 13: Invasive Aquatic Vegetation Control is discussed in Section 5.F-6. There is little consideration of the potential effects on lower trophic levels (algal primary producer) due to herbicide applications. This issue is raised in a single bullet on page 5.F-130 Line 24-25. While the literature is not well developed for the SFE there is at least some indication that herbicide applications are detrimental to photosynthetic organisms (phytoplankton). This should be addressed as a possible effect with implications for adaptive management. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| 1673 | 146 | Appendix 5.F--Biological Stressors on Covered Fish<br><br>Summary<br><br>Appendix 5.F examines the effects of 10 conservation measures on four key biological stressors: invasive aquatic vegetation (IAV), predation, invasive mollusks, and Microcystis. Effects of these actions on fishes was largely based on professional opinion while utilizing available information. While intentions of these actions is good, the outcome for fishes is uncertain, indicating the need to monitor and adapt. Key issues include expansion of invasive clams that consume phytoplankton, more favorable conditions for Mycrocystis and harmful algal blooms, and continuous effort needed to control invasive aquatic vegetation and predator abundances.<br><br>Recommendations<br><br>-Page 5.F-107, last paragraph, first sentence, and Executive Summary: The 1% to 12.8% range in predation effects due to the north Delta diversion is a mixture of population-level and localized effects and should not be treated as measuring the same quantity. That range estimate is deceptive and technically incorrect.<br><br>-Monitor progress and maintain efforts to control invasive species than impact covered fishes. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. Please refer to Master Response 14. |
| 1673 | 147 | Invasive Aquatic Vegetation (IAV). The plan states controlling IAV is expected to reduce densities of largemouth bass but could enhance open water conditions favorable to striped bass. The control of IAV should increase turbidity which should be beneficial to foraging by juvenile fish and reduce predation. Brazilian waterweed (Egeria densa) and water hyacinth (Eichhornia crassipes) are the two most abundant IAV in the Delta. The CM13 proposes to treat approximately 1,700-3,400 acres of Egeria per year in and near restored habitat. Currently, Egeria is increasing at a rate of approximately 15% per year. Efforts will need to be sustained and focused to be effective.<br><br>Assessments of the benefits of IAV control were based on "scientific literature," consultations with local experts, and conceptual models of key processes, habitat, and covered fish species. There is also practical experience to draw from. At Franks Tract, Egeria control was 47% effective (5.F-40), while Delta-wide Egeria continues to expand at about 15%/year. Annual treatment of 1500 acres/year would be expected to maintain the status quo.<br><br>Figure 5.F.5-3 projects it would take approximately 10 years to eradicate Egeria under a high treatment scenario and a 20% annual expansion rate. Some of this benefit may be offset by the fact that habitat restoration under the Plan would also create susceptible Egeria habitat. Water hyacinth control, on the other hand, appears to be already successful. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 148 | Predation. Predation control is to be locally focused on predator hotspots. Ten spots have been specified, along with the new north Delta water diversion facilities and nonphysical barriers. It is unclear how effective these localized remodels will be because the predators being controlled (i.e., largemouth bass and striped bass) are moderately to highly mobile.<br><br>For the north Delta diversion facilities, two approaches were used to estimate predation-related effects: bioenergetics modeling and fixed estimate of 5% predation loss at each of three intakes screens. The Executive Summary states predation losses at north Delta intakes | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | should be from less than 1% to 12.8%. However, this range is contradicted by the simple fixed estimate model: Assuming three intakes each with a 5% independent rate of loss, then the overall rate is 1 - (1 - 0.05)3 = 0.1426 or 14.26%. The bioenergetics model was considered the Plan's best approach to assessing predation near the intakes. However, the fourth assumption of this model (p. 5.F-15) states predation was assumed to be proportional to the prey's relative abundance. This is in contrast with most energetics models that assume consumption has a lower threshold dependent on the predator's physiology and size. Predation is then proportional to predator abundance. The analysis also apparently ignores smaller size prey (assumption 6, p. 5.F-16). This analysis was also based on guesstimates of expected predator abundance at the future north Delta intake facilities. The model also assumes all prey are at equal risk, regardless of their location in the channel.<br><br>Using the bioenergetics models to express the effects of predation at the north Delta intakes as a percentage of total juvenile predation can be misleading (p. 5.F-75). Localized predation rates are more useful and can be compared to the 5% design specifications. Alternatively, the effect of predation at the intakes could be expressed in terms of proportional change in through-delta survival. Under the fixed predation loss method, it is unclear how proportions of 11.7%, 12.1%, and 12.8% for various fish stocks are estimated (p. 5.F-77) when a simple model based on independent intake events estimates (1 - (1 - 0.05)3 × 100% = 14.26%.<br><br>The predator removal program at the north Delta intakes and elsewhere is projected to remove 8,840 striped bass annually. The net effect is a project reduction in 13,320 juvenile salmonids being consumed. The Plan does not estimate the fraction of striped bass removal in the delta (i.e., another measure of relative reduction in predation). The Plan states it is uncertain how long such a removal effort could be sustained, and that predator removal treatments are likely short lived.<br><br>The effects of habitat restoration on predator control are uncertain. Effects on turbidity, flow, etc., may be much localized. In addition, it is unclear whether restoration actions will benefit prey, predators, or both. | |
| 1673 | 149 | Invasive Mollusks. The overbite clam (Potamocorbula amurensis) currently dominates the brackish transition zone of the delta estuary. Its presence has dramatically altered the zooplankton community. It can filter the entire water column once a day in delta channels. The decline in phytoplankton has been subsequently correlated with declines in copepods and mysid shrimp, a food source of the delta smelt and longfin smelt. The overbite clam has a salinity range of tolerance that could be affected by the Plan's water operations. There is expected to be "generally little difference (25%) in average suitable habitat for the clam between EBC2 scenarios and ESO scenarios . . . ." However, there is risk of Potamocorbula expansion:<br><br>"For ESO without Fall X2 (modeled as ALT1_ELT and ALT1_LLT), the area of suitable abiotic habitat for Potamocorbula would increase 7 to 9% in wet water- year types compared with the EBC1 baseline, but would be little different for all other water-year types. Suitable abiotic habitat for clams would increase in wet and above normal water-year types by about 18 to 28% in early long-term compared with EBC2 baselines (EBC2, EBC2_ELT) and increase 11 to 30% in late long-term." (Appendix 5.f, page 5.F-117, lines 7-11)<br><br>Restoration actions to produce more shallow water habitat may not have a net positive effect. While shallow water habitat produce phytoplankton, the presence of Corbicula may result in a phytoplankton sink (p. 5.F-121). One of the few management options is to | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | manipulate salinity which is a function, in part, of river flow. The water withdrawals from the north Delta Diversion should not help the situation. Decision whether to implement the Fall X2 will affect the area of notable colonization by Potamocorbula. | |
| 1673 | 150 | Mycrocystis. Microcystis blooms can have an adverse effect on phytoplankton, zooplankton, and fish. Factors associated with blooms include high water temperature, high water transparency, low flows, high nutrient concentration, and high nitrogen/phosphorus (N/P) ratios. Runoff from land use contributes to these favorable conditions. Microcystis affects fish populations through declines in food sources, mortality, and reduced fecundity. Water operations that reduce flow and increase water residence time may promote Microcystis. Shallow water habitat reduction may also promote Microcystis. Actions that increase water velocity and turbidity are helpful in controlling Microcystis blooms. ESO_ELT and LOS_ELT scenarios are projected to increase average water residence time (Table 5.F.8-2), which would have a detrimental effect in trying to control Myrcocystis. Submerged aquatic vegetation (SAV) control may produce water conditions unfavorable to Microcystis. Climate warming may be a significant driver in Microcystis trends in the future. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. Please refer to Master Response 14. |
| 1673 | 151 | Appendix 5.G--Fish Life Cycle Models<br><br>It is not clear to the Delta Science Program Independent Scientific Review Panel why life cycle models were not developed specifically for the evaluation of the BDCP. The Panel previously identified a number of expectations for the life cycle model appendix, which had yet to be released. The Panel also recognized that these expectations might not be achieved, and noted that the inability to achieve these expectations would indicate higher uncertainty in the ability of the BDCP to achieve the biological goals and objectives.<br><br>Recommendations<br><br>-Provide more detailed description of the 14 different scenarios modeled (Table 5.G-2) than shown on p. 5.G-17. For instance, specify what are the low- and high-flow operations specified in scenarios High Outflow Scenario and Low Outflow Scenario.<br><br>-Check survival estimates. The 94-98% or 96-98% survival values (inconsistent text, p. 5.6-42 and Table 5.G-3) between ocean entry and age 2 seem very high. Rechisky et al. (2009), for instance, found early ocean survival of yearling Chinook salmon smolts from the Columbia River to be as low as 0.28 within the first month. Rechisky et al. (2012) reported early ocean survival of yearling Chinook salmon smolts to range from 0.04-0.29.<br><br>-Clarify what information and how the information from Michel (2010) and Perry et al. (2013) were incorporated in the Interactive Object-Oriented Salmon Simulation models (page 5.G-44).<br><br>-Perform a sensitivity analysis at to generate confidence intervals at the north delta intakes using mortality values at existing structures (Perry 2010) (p. 5.G-46). The 95% survival value used in simulations of the north Delta intake is an engineering specification.<br><br>-Consider describing extinction rates. OBAN - Adult Escapement (pp. 5.G-51 to 5.G- 61). Examination of plots (Figure 5.G-15, p. 5.G-19) suggests extinction rates for winter-run Chinook salmon would be very high for all long-term (LLT) scenarios and not insignificant for short-term (ELT) scenarios.<br><br>-Compare model output as described below. Escapement values for OBAN (Tables 5.G-8 and | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | 5.G-12) and IOS (Table 5.G-24) models differ by roughly a factor of 5. No formal comparison of the model projections from the IOS and OBAN models was presented. A ranking of model output for median adult escapement of the two models shows reasonable agreement (see Table 1 below). The two models flip the number 1 and 2 ranks of scenarios Existing Biological Conditions 1 (EBC1) and Existing Biological Conditions 2 (EBC2). The largest discrepancy was in scenario HOS-LLT with alternative rankings of 5 and 8. Such a table should be included in the report, along with an analogous comparison of through-Delta survival. A comparison of scenarios ranks is in keeping with the sentiment that only the relative output of the models be considered.<br><br>-Define ES0 95 ELT. Sensitivity analysis (p. 5.G-79) refers to a model (i.e., ES0 95 ELT) not defined in Table 5.G-2 at the beginning of the Appendix.<br><br>-Evaluate and compare sensitivity of populations to a broader range in mortality at the north delta intakes and passage through the Delta. A 5% mortality at the north Delta intake is projected to cause a 58 to 61% reduction in adult escapement (i.e., EBC2- ELT or EBC2-LLT vs. ESO-95-ELT or ESO-95-LLT). This is a huge effect that would have to be mitigated by other BCDP conservation actions. Presently, 5% entrainment is based on engineering specifications and is lower than at other intake facilities (Perry 2010). These results are also in sharp contrast when through-Delta mortality was increased by 5% and escapement changed by only 0 to 4.6% in the OBAN model. Additional analyses must be done over a wider range of mortality values, 1% to 10%, to assess how bad the intake problem could be and how well must the intake function. In addition, the discrepancy between the effects of the 5% north Delta intake mortality and the 5% through-Delta mortality needs to be reconciled. It is unclear why these sensitivity results noted in the Conclusion (5.G.4) were not reconciled. They appear to be an important finding of the life cycle analysis.<br><br>Comments<br><br>A total of 17 candidate life cycle models were considered for use in the Effects Analysis (seven Chinook, eight smelt, one splittail, and one steelhead model). Appendix 5.G reviewed a number of life history models in the Central Valley, but concluded that only two of the Chinook models (i.e., Interactive object-oriented simulation [IOS] model and Oncorhynchus Bayesian analysis [OBAN]) were applicable to the BDCP. The OBAN model for winter Chinook involved factors such as water temperature in the Sacramento River (Bend Bridge), exports at the south Delta pumps, days of flow in Yolo Bypass, Delta Cross Channel operation, striped bass (predator) abundance, ocean harvest and ocean upwelling. None of the smelt models were selected, despite the fact that four models (state-space, multivariate autoregression, Bayesian change point, and smolt survival regression) met their five selection criteria. Given the relative importance of the delta smelt, it is unclear how none of the models met the criteria of best available science. It is also unclear, given the important of BDCP, why the plan did not invest in independent model developed tailored to its objectives or invest in modifying one or more of the existing models to better meet the objectives of the plan. The IOS and OBAN models were used to assess effects only on winter-run Chinook salmon.<br><br>Under the BDCP, the ISO and OBAN models were used to simulate the projected effects of:<br><br>a. Benefits of CM 2 Yolo Bypass Fisheries Enhancement<br><br>b. Benefits of SM 15 Nonphysical Barriers (assumed 67% diversion away from Georgiana | |

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| | | Slough)<br><br>c. Detrimental effects of juvenile entrainment at north Delta intakes (assumed 5% mortality)<br><br>No other BDCP conservation measures were considered. How the benefits of Yolo Bypass Fisheries Enhancement were modeled is unclear.<br><br>The OBAN model "cannot account for north Delta exports" and "does not include any Delta flow-based covariates other than export (EXPT) and Yolo Bypass inundation (YOLO) and, therefore, cannot account for any potential changes in survival below the north Delta diversions, e.g., because of changes in water velocity" (p. 5.G-32).<br><br>Consequently, the effect of lower flows due to water withdrawal or slower water velocities and subsequent increased smolt predation were not incorporated in the OBAN modeling. Appendix 5.G goes on to state that because of these modeling limitations, all performance measures should be compared on a relative basis.<br><br>However, ratios of model output (i.e., relative differences) will not eliminate biases due to structural defects in the model under alternative scenarios.<br><br>The IOS model also assumed "survival and travel times during River Migration are independent of flow" (p. 5.G-44). However, the IOS model does model the effects of flow and route selection and water exports on smolt survival in the Delta (p. 5.G-33). Such assumptions are very important because water withdrawals will affect flows which, in turn, are known to affect the travel time and survival of salmon smolts.<br><br>Calibration of the models was limited by available data which, in turn, can limit the range in valid model response. Nevertheless, model descriptions are generally adequate as a whole. Primary model outputs considered median through-Delta survival and annual escapement. In population assessments of endangered or listed species, it is common to include 50-year or 100-year extinction rates. Increasing median escapement has limited value if a salmon population continues to have an unexceptionally high probability of extinction in the future. The simulations should also be summarized in terms of extinction rates under the 14 different operational/environmental scenarios (Table 5.G-2).<br><br>The appendix does not include a formal comparison of model output for OBAN and IOS, either on an absolute scale or relative scale. It should be acknowledged that adult escapement differs between models by a weighting factor of 5. More importantly, the relative ranking of the different BDCP scenarios (Table 5.G.-2) between models should be included in Appendix 5.G. Certainty should be assessed, in part, based on the degree of consistency in model predictions. | |
| 1673 | 152 | ATT1: ATT1: Table 1. Relative ranking of alternative model scenarios for medial adult escapement based on the IOS and OBAN models | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 153 | Appendix 5.J--Effects on Natural Communities, Wildlife, and Plants<br><br>In general, the Panel felt that the information in Appendix 5.J was clearly presented in the tables and figures. Because so much of the information in the appendix depends on the accuracy of the GIS database, the authors should provide a reference or preferably a link to a description of the database and an analysis of its accuracy. As discussed in other sections of our review, providing a single value for the number of acres of habitat that will be | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | occupied by each species is scientifically questionable.<br><br>Recommendations<br><br>-The description of the methods used to arrive at the number of acres of restored habitat that will be occupied needs to be revised.<br><br>-Consider including a range of values (minimum and maximum) of potential occupied habitat rather than a single value. | |
| 1673 | 154 | Construction-Related Nitrogen Deposition on BDCP Natural Communities<br><br>The analysis of construction-related nitrogen deposition is thorough and sufficient. It is clear that the amount of nitrogen produced by construction-related activities of the BDCP will be negligible relative to the amount that is currently being contributed by the surrounding urban and agricultural areas. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 155 | Natural Community Restoration and Protection Contributing to Covered Species Conservation<br><br>The estimates of the current distribution of natural vegetation types in the Plan Area depend on the accuracy of the GIS database that used for the analysis. Provide a citation for the database and a brief discussion of the error associated with the different community types. In addition, the description of the approach that was used to estimate the amount of habitat for each species (pp. 5J.B-1 and 5J.B-2) is poorly worded and needs revising. The description should state that the details of the approaches used to develop the species-specific habitat models are provided in the species accounts in Appendix 2A. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 156 | Analysis of Potential Bird Collisions at Proposed BDCP Powerlines<br><br>The authors did an excellent job of integrating spatially explicit information about roost and foraging sites in the Plan Area to estimate the number of potential encounters with power lines and combining this with information in the scientific literature on mortality estimates from each encounter. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 157 | Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane<br><br>The authors considered all of the important indirect effects of the construction on sandhill cranes in the Plan Area. The analytical tools they used were appropriate for the analyses. Most of the estimates of indirect effects came from studies in other regions but that is unavoidable because no detailed studies have been conducted in the Plan Area. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 158 | Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat (Acreage of Rice) in the Yolo Bypass<br><br>This section is a simple accounting of the number of acres that are planted to rice within the Yolo bypass that may be removed when the bypass is inundated. Rice fields are used as foraging habitat by giant garter snakes and therefore could result in a loss of this habitat for the snake in the Plan Area. By intersecting the maximum amount of rice that was planted in area with the inundation level that results in the maximum amount of rice removed, the analysis provides an estimate of the maximum amount of potential foraging habitat that will be removed. We feel this approach is adequate to address this very specific question. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| 1673 | 159 | How clear and reasonable is the scale of analysis?<br><br>Natural Community Restoration and Protection Contributing to Covered Species Conservation<br><br>The scale of vegetation distribution information (1 acre, from Appendix 2A) is reasonable for most species. Although some wildlife species may use habitat patches that are < 1 acre, it is unlikely that those patches contribute significantly to the amount of suitable habitat in the Plan Area. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 160 | How well were the Panel's earlier comments addressed and applied in the technical appendices/analyses?<br><br>Natural Community Restoration and Protection Contributing to Covered Species Conservation<br><br>Earlier comments were addressed to some degree. The previous version of this appendix did not have any text at the beginning describing the methods that were used to arrive at the numbers presented in the tables. The description, however, needs to be edited and should specify that the assumptions behind the approaches used when developing habitat models can be found in Appendix 2A. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 161 | How well did the technical appendix evaluate the effects of potential BDCP conservation measures on the specified variable(s)?<br><br>Natural Community Restoration and Protection Contributing to Covered Species Conservation<br><br>The estimate of the amount of habitat that will be occupied by a species following restoration is questionable. The number of acres of suitable habitat that are temporarily or permanently removed and restored are clearly conveyed in the tables in Appendix 5.J. But, the approach used in Appendix 5.J assumes that the proportion of the appropriate habitat that is within the current range of the species in the Plan Area is an appropriate estimate of the proportion of suitable habitat that will be occupied when habitat restoration measures are completed.<br><br>However, if habitat restoration does not occur within the potential range of the species in the Plan Area, none of it will be occupied. The best way to address this is to set specific goals for habitat restoration within the potential range of the species in the Plan Area and to identify occupancy thresholds. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 162 | Were the conclusions drawn from the results accurate and did these conclusions appropriately consider uncertainty, including chained statistical uncertainties?<br><br>Natural Community Restoration and Protection Contributing to Covered Species Conservation<br><br>Uncertainty was not considered when estimating the number of acres of restored habitat that a species would occupy following restoration. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 163 | Were appropriate models used in the technical appendices? If model results conflicted, was this clearly stated and was the conflict appropriately addressed? | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |

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| | | Analysis of Potential Bird Collisions at Proposed BDCP Powerlines<br><br>The authors considered all 12 bird species that are covered by the BDCP when addressing collision risk. They concluded, and we concur, that the only species that may suffer significant mortality from BDCP-related power lines in the areas is the sandhill crane. The authors used the highest estimate of the probability of mortality due to power line collisions from the published literature when making their computations. In addition, their estimates of the number of potential encounters between cranes and power lines were based on spatially explicit data from the BDCP region. We feel their estimate of potential crane mortality from new power lines that will be constructed is appropriate based on the information available from the site and the literature. We also feel that the estimates of the reduction in crane mortality due to placing bird diverters on existing lines are appropriate. We emphasize, however, that crane mortality from power line collisions should be closely monitored in the Plan Area and additional bird diverters should be put in place if targets for overall reduction in crane collisions are not achieved. | |
| 1673 | 164 | How well are the models and analyses described, interpreted and summarized?<br><br>Analysis of Potential Bird Collisions at Proposed BDCP Powerlines. The results of their analyses are well described and are well summarized in Tables 2-7 of Appendix 5.J.C. Their estimates of the mitigation from marking power lines are also well described and summarized in section 5.0 of Appendix 5.J.C. | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 165 | ATT1: ATT2: Appendix C--Observed tidal stage and flow time series data from three key locations along the Sacramento River (from BDCP Appendix 5A-D1, pp. 128-129 | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 166 | ATT1: ATT3: Appendix D--Variance Calculations Associated with Salvage Model Estimator of average salvage: | Please see responses to Letters 1448 and 2546 that address comments submitted by the ISB. |
| 1673 | 167 | ATT2: Article: A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan<br><br>by the Panel to Review California's Draft Bay Delta Conservation Plan; National Research Council<br><br>Dated 2011 | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 168 | ATT3: State of San Francisco Bay 2011<br><br>Appendix F<br><br>Living Resources--Fish Indicators and Index Technical Appendix<br><br>Prepared by Christina Swanson<br><br>July 2011 | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 169 | ATT4: Article entitled "Integration of bed characteristics, geochemical tracers, current measurements, and numerical modeling for assessing the provenance of beach sand in the San Francisco Bay Coastal System"<br><br>Dated 2012 | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |

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| | | by United States Geological Survey, Pacific Coastal and Marine Science Center | |
| 1673 | 170 | ATT5: DFG April 2012 BDCP EA (Ch. 5)<br><br>Staff "Red Flag" Review Comprehensive List<br><br>Sturgeon | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 171 | ATT6: Powerpoint presentation--Yolo Bypass and Its Sources<br><br>Figure 3.1. Northern-looking oblique graphic illustration of the hydrologic contribution of the Yolo Basin Wildlife Area (YBWA) to the Yolo Bypass hydrologic unit. | The comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 172 | ATT7: Article entitled "Evaluating the biogeochemical cycle of selenium in San Francisco Bay through modeling"<br><br>by Shannon L. Meseck and Gregory A. Cutter<br><br>dated 2006 | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 173 | ATT8: Title: Agricultural Losses from Salinity in California's Sacramento-San Joaquin Delta<br><br>Journal Issue: San Francisco Estuary and Watershed Science, 12 (1)<br><br>Author: Medellin-Azuara, Josue, University of California, Davis<br><br>Howitt, Richard E., University of California, Davis<br><br>Hanak, Ellen, Public Policy Institute of California<br><br>Lund, Jay R., University of California, Davis<br><br>Fleenor, William E., University of California, Davis<br><br>Publication Date: 2014<br><br>Publication Info: San Francisco Estuary and Watershed Science<br><br>Permalink: http://escholarship.org/uc/item/4b7295m9 | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 174 | ATT9: Title: Ecosystem-scale Selenium Model for the San Francisco Bay-Delta Regional Ecosystem Restoration Implementation Plan<br><br>Journal Issue: San Francisco Estuary and Watershed Science 11(1)<br><br>Author: Presser, Theresa S., U.S. Geological Survey<br><br>Luoma, Samuel N., John Muir Institute for the Environment, University of California, Davis<br><br>Publication Date: 2013<br><br>Publication Info: San Francisco Estuary and Watershed Science | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |

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| | | Permalink: http://www.escholarship.org/uc/item/2td0b99t | |
| 1673 | 175 | ATT10: Title: Subsidence, sea level rise, and seismicity in the Sacramento-San Joaquin Delta<br><br>Journal Issue: San Francisco Estuary and Watershed Science 3(1)<br><br>Author: Mount, Jeffrey, University of California, Davis<br><br>Twiss, Robert, University of California, Berkeley<br><br>Publication Date: 2005<br><br>Publication Info: San Francisco Estuary and Watershed Science<br><br>Permalink: http://escholarship.org/uc/item/4k44725p | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 176 | ATT11: Projected Evolution of California's San Francisco Bay-Delta River System in a Century of Climate Change<br><br>Dated 2011<br><br>by James E. Cloern, U.S. Geological Survey | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 177 | ATT12: Subsidence, Sea Level Rise, and Seismicity in the Sacramento-San Joaquin Delta<br><br>Dated 2005<br><br>by Jeffrey Mount, University of California, Davis<br><br>Robert Twiss, University of California, Berkeley | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 178 | ATT13: California Regional Water Quality Control Board, Central Valley Region<br><br>Resolution No. R5-2010-0043<br><br>Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River basins for the control of methylmercury and total mercury in the Sacramento-San Joaquin Delta estuary. | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 179 | ATT14: Title: Levee Decisions and Sustainability for the Sacramento-San Joaquin Delta<br><br>Journal Issue: San Francisco Estuary and Watershed Science, 8(2)<br><br>Author: Suddeth, Robyn J., University of California, Davis<br><br>Mount, Jeff, University of California, Davis<br><br>Lund, Jay R., University of California, Davis<br><br>Publication Date: 2010<br><br>Publication Info: San Francisco Estuary and Watershed Science, John Muir Institute of the Environment, UC Davis | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |

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| | | Permalink: http://escholarship.org/uc/item/9wr5j84g | |
| 1673 | 180 | ATT15: Mercury and Methylmercury Processes in North San Francisco Bay Tidal Wetland Ecosystems<br><br>CalFed ERP02D-P62 Final Report<br><br>Submitted to California Bay-Delta Authority Ecosystem Restoration Program<br><br>San Francisco Estuary Institute | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |
| 1673 | 181 | ATT16: Article entitled "Methylmercury cycling, bioaccumulation, and export from agricultural and non-agricultural wetlands in the Yolo Bypass<br><br>Cooperator Report Prepared by: U.S. Geological Survey, California Department of Fish and Game, Moss Landing Marine Laboratory, Battelle Marine Sciences, Bachand and Associates, Yolo Basin Foundation<br><br>Responsible Organization: San Jose State University Research Foundation<br><br>FINAL REPORT<br><br>September 30, 2010 | This comment describes an attachment to the comment letter. The attachment does not raise any additional issues related to the environmental analysis in the 2015 RDEIR/SDEIS or the 2013 DEIR/EIS that are not already addressed in comment referencing the attachment or the Final EIR/EIS. |