

March __, 2014

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

From: Delta Independent Science Board

Subject: Review of the Draft EIR/EIS for the Bay Delta Conservation Plan

Overview

Together, the Draft BDCP Plan and Draft EIR/EIS provide an impressive assessment of efforts to reduce uncertainty in water reliability and reverse declines in ecosystem health in California. The documents offer thorough descriptions and a wealth of detail in presenting analyses of a portfolio of potential actions.

BDCP is to be based on “best available science,” or at least science that is good enough to move forward on a project this large, complex, expensive, and important. In our view, however, the Draft Plan and EIR/EIS fall short of meeting these standards. The following points summarize our major concerns. We then elaborate on these points, providing successively greater detail in two appendices. We also suggest improvements to address many of our concerns.

These are the main findings of our legislatively mandated review of the Draft BDCP EIR/EIS.

- Many of the impact assessments hinge on optimistic expectations about the feasibility, effectiveness, and timing of the proposed conservation actions.
- Uncertainties about actions and their consequences are considered inconsistently and incompletely, and modeling has not been used effectively to bracket a range of uncertainties or to evaluate sensitivity to assumptions, which themselves are not uniformly or clearly stated.
- The potential effects of climate change and sea-level rise on the implementation and outcomes of Conservation Measures are not adequately considered.
- Formalized procedures of risk assessment and decision support have not been used to assess the individual and combined risks associated with BDCP actions.
- The details of how adaptive management will be implemented are left to a future management team without explicit prior consideration of situations where adaptive management may be inappropriate or impossible to use; there is little evidence of contingency plans if things do not work as planned. As proposed, the skills, capacity, and funding needed to implement effective adaptive management and monitoring may be insufficient.

- Insufficient attention is given to linkages and interactions among species, landscapes, and the proposed actions themselves.
- The impact assessments generally neglect the effects of levee failures or effects on San Francisco Bay or on San Joaquin Valley agriculture.
- The alternative conveyance facilities and their operations and environmental impacts are treated exhaustively but separately, making it difficult to conduct a rigorous comparison among the alternatives.

Review Process and Approach

The Delta Reform Act of 2009 (§85320(c)) instructs the Delta Independent Science Board to review the Bay Delta Conservation Plan (BDCP) Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) and to submit its comments to the Delta Stewardship Council and the California Department of Fish and Game. To meet this responsibility, we conducted interviews, held briefings, and spent hundreds of hours reviewing the chapters and appendices of the EIR/EIS. Our review focuses on the science in the EIR/EIS: how well the statements and conclusions are supported by current scientific information; how science is applied to proposed actions; and how science is communicated. To understand the content of the EIR/EIS, we found it necessary to extend our review to include chapters and appendices in the BDCP Plan. We reviewed files posted on December 9, 2013, at <http://baydeltaconservationplan.com/PublicReview.aspx>.

The BDCP presents a rare opportunity to coordinate strategic decisions regarding infrastructure and human resources, together with environmental, regulatory, institutional, and financial aspects of Delta management—all in the context of improving water-supply reliability and ecosystem health in the Delta. Our review has been driven by the recognition of the importance and of this unique opportunity, but also by the awareness that the BDCP may not yet mesh as well as it could with the broad goals of the Delta Plan.

Our review has three parts:

- *Major concerns.* We summarize several main concerns and offer suggestions for improving the scientific framework of the BDCP and the content and presentation of the draft EIR/EIS itself.
- *Charge questions.* Appendix A offers detailed responses to specific questions from the Delta Stewardship Council.
- *Resource chapters.* Appendix B provides detailed reviews of individual chapters of the EIR/EIS.

Main Concerns

There are several broad areas in which we found the EIR/EIS (including referenced parts of the BDCP Plan) to be scientifically incomplete or insufficient. We believe that addressing these deficiencies will improve the prospects for improving water reliability and ecosystem health through the BDCP.

1. *Expectations for the effectiveness of conservation actions are too optimistic.*—Throughout the EIR/EIS, the BDCP actions, supplemented by Avoidance and Minimization Measures and Mitigation Measures, are assumed to produce the anticipated benefits. This is an implausible standard of perfection for such a complex problem and plan. It is also assumed that any time lags between when impacts arise and when the benefits of compensatory or mitigation actions emerge can be addressed through planned phasing of activities. Such expectations seem unrealistically optimistic.
2. *Scientific uncertainties are inconsistently and incompletely addressed.*—Expectations may be optimistic in part because the effects of uncertainties are not fully addressed. Uncertainties accompany every action and consequence discussed in the EIR/EIS, from the designations of habitats for species to projections of entrainment to model results used in the analyses. When combined, these uncertainties will be compounded and propagate. Although the BDCP Plan discusses some of these uncertainties, they are treated inconsistently in the EIR/EIS and are largely ignored in the Executive Summary. If the outcomes of an action are considered too uncertain or speculative, it is argued that the uncertainty is sufficient reason not to address the issue at all. Consequently, those charged with implementing the Plan may be inadequately prepared to deal with uncertainty. Unaddressed, uncertainties pose a major and significant risk to the project as a whole.

Some of the uncertainty in the documents results from a failure to state underlying assumptions explicitly. Although many assumptions are listed in the BDCP Plan, they are noticeably absent in the EIR/EIS from many statements about the effectiveness or presumed benefits of BDCP actions. Throughout the document, the lack of clearly and consistently stated assumptions weakens the scientific foundation of the EIS/EIR.

3. *The potential effects of climate change and sea-level rise are underestimated.*—Future climate change and sea-level rise are perhaps the greatest sources of uncertainty affecting BDCP. The BDCP Plan and EIR/EIS do a respectable job of describing how climate change and sea-level rise might influence communities, species, and some aspects of hydrology, and how the BDCP actions may enhance resiliency and adaptation to these effects. However, the speed and magnitude of these changes may cause the consequences

of conservation actions to not emerge as planned. The potential direct effects of climate change and sea-level rise on the effectiveness of actions, including operations that are part of new water conveyance facilities, are not adequately considered. Similar comments could be made about the treatments of other disrupting factors, such as levee failures, earthquakes, or invasive species, any of which has the potential to profoundly alter the desired outcomes of BDCP actions.

4. *Risks are not modeled or fully evaluated.*—If not considered, uncertainties increase risks. There are risks with almost every action proposed as part of BDCP. These risks can interact and cascade, with potentially major consequences. Formal tools of risk assessment and decision theory, which assign probabilities, uncertainties, and magnitudes to various risks, could be used to evaluate which aspects of BDCP are most vulnerable to high-consequence risks and help to prepare for contingencies. We found no indications that formalized risk assessment has been used to any great extent in the development of BDCP.
5. *The adaptive management process is not fully developed.*—Adaptive management is the key to dealing with uncertainties and successfully implementing BDCP. The proposed organizational infrastructure to support adaptive management is well described in the Plan. Yet, although adaptive management is mentioned frequently in the EIR/EIS, details of how it will be designed and done are left to a future Adaptive Management Team to define. As a result, it is unclear how adaptive management will be integrated into the implementation of BDCP, whether the scientific skills needed to plan and oversee adaptive management will exist in the Implementation Office and on the Adaptive Management Team, and whether the capacity to conduct the monitoring and analysis needed for adaptive management will be available. Because conditions in the Delta and responses to BDCP actions may change quickly, the adaptive-management process must be nimble and flexible, yet the organizational structure may delay rather than expedite needed adjustments. Although the BDCP Plan has a detailed listing of performance measures linked to its Biological Goals and Objectives, the measures needed to evaluate actions and make adjustments are not addressed substantively in the EIR/EIS. Because BDCP actions are unlikely to play out as planned, it may be useful to view them as planned experiments or hypotheses to be tested. Consequently, it would be prudent to have contingency plans generally outlined *before* discovering that actions are not working as expected. Yet contingency plans are rarely mentioned in the documents we reviewed. We have substantial misgivings about how well the adaptive management process proposed will actually function as a key component of BDCP.
6. *Confounding effects of linkages and interactions are insufficiently considered.*—The EIR/EIS acknowledges that the Delta is a complex, interacting system. In such systems,

actions in one place or for one species will affect dynamics, both there and elsewhere, of the same or other species. Consequently, failure to meet the expectations of conservation actions will have cascading effects. By ignoring the competitive or predatory effects of one species on another or the effects of habitat restoration in one place on upstream or downstream restoration projects, the effectiveness of actions may be compromised. Although some non-covered species are combined for analysis and some predation effects are considered, much of the EIR/EIS is focused on individual species, particular places, or specific actions that are considered in isolation from other species, places, or actions. By failing to treat the Delta as a fully functioning and integrated ecosystem, potential interactions among actions that may enhance or undermine their effectiveness may be overlooked.

7. *Several important effects are neglected.*—Although the EIR/EIS and Plan deal comprehensively with a multitude of potential impacts, we note several effects for which the treatment does not measure up to their importance.

First, the geographic scope of the EIR/EIS does not extend to include San Pablo Bay and San Francisco Bay. It is obvious, however, that the consequences of BDCP actions undertaken within the Plan Area will extend downstream to affect these bays. Likewise, changes in the bays (e.g., tidal wetland restorations) will affect tidal fluxes and salinity intrusion into the Delta.

Second, although levees receive considerable attention in both documents (as befits their importance to what goes on in the Delta), the coverage is disconnected and incomplete. In particular, neither the consequences of levee failures on the effectiveness of Conservation Measures nor the financial implications of demands for levee maintenance receives adequate attention.

Third, the increased water reliability produced by BDCP (if successful) will particularly benefit the agricultural sector, and these economic benefits receive quantitative attention in the Plan and EIR/EIS. However, there is no parallel discussion of possible environmental impacts that might arise as increased reliability affects which crops are planted, how fertilizers and pesticides are used, or how these changes might affect agricultural runoff and water quality.

All three examples reflect decisions about how to set boundaries for the BDCP impacts and analyses. San Pablo and San Francisco bays are not considered because they fall outside of the geographical boundaries, For both levee failures and the agricultural impacts of increased water reliability, the argument is made that the potential impacts are too speculative to be included in the analyses, so uncertainty (at some undefined level)

has determined a boundary on what is or is not considered. We do not believe that the processes used to determine these boundaries have been made explicit, nor are the boundaries scientifically justified.

8. *Descriptions of the alternative conveyance structures and operations do not facilitate informative comparisons.*—The central purpose of the EIR/EIS is to clearly describe the alternative water conveyance options. This includes their effects on natural communities, covered species, and selected non-covered species, as well as ensuring their compliance with the regulatory requirements of NEPA and CEQA through the implementation of additional actions. In the EIR/EIS, each alternative is examined in great detail, in a consistent manner. However, because no overall framework draws together the specifics of the alternatives in a clear way, it is difficult to compare alternatives. Consequently, it is challenging to develop a rigorous assessment of the relative strengths and weaknesses of the alternatives. Moreover, each alternative is influenced by the areas of concern mentioned above, but in different ways; this further confounds comparisons.

Improvements in the scientific framework of BDCP

Successful implementation of BDCP will benefit from several science-related improvements:

1. *Adaptive institutional, regulatory, scientific, human resource, and financial capacity must be developed.*—An ability to adapt implementation to changing conditions is the most important need for BDCP. It is implausible to expect that the Delta's future will occur exactly as assumed in any of the EIR/EIS analyses. Without the institutional, regulatory, legal, scientific, human resource, and financial capacities to adapt, BDCP will be unable to achieve its stated objectives. Broadly collaborative yet decisive governance is essential. There is little in the Plan or the EIR/EIS to inspire confidence that the many individual agencies, each with narrow responsibilities and its own agenda, will have sufficiently sustained incentives and resources to approach the kind of integration needed for adaptive management to be effective in implementing BDCP.
2. *An integrated Science Plan and Program are critical.*— The science for BDCP must be clearly linked to the many related scientific problems of managing the Delta, and this scientific capability must be widely perceived as being independent and transparent. Science that is fragmented and partitioned among entities and interests is open to advocacy, which is unlikely to improve conditions in the Delta and will ultimately work against the long-term interests of the state and stakeholders. Most of the major science activity must be broadly collaborative. If Delta management is to be guided by science, then science will need to be more integrated and effectively communicated. The Delta Science Plan provides a framework for such integration

3. *A range of pilot restoration actions should be started early.*— Pilot restoration actions should be initiated as soon as possible, within a scientific framework that will allow BDCP and others to test, refine, and improve the effectiveness of restoration. This approach will reduce uncertainty and costs over the duration of this project and will advance the early application of adaptive management.
4. *Risk-based decision analysis can provide useful insights.*— A simple risk-based decision analysis is likely to provide insights into identifying and developing promising options covering a wide range of contentious issues. Although the BDCP Plan and the EIR/EIS lack a proper accompanying risk-based decision analysis, the so-called “decision tree” for operations for fall X2 is just one example of the kind of structuring that could be useful for many of the operational aspects of BDCP and broader Delta management.
5. *Take advantage of the current drought.*—The current drought provides an opportunity to demonstrate the ability of federal, state, and local agencies to collaborate in adaptively managing a complex and changing problem in the face of multiple objectives. In essence, this could be a test of the adaptive management process proposed in the BDCP Plan and a chance to apply these techniques early in the development of BDCP.

Improvements in the BDCP EIR/EIS document

An EIR/EIS is a major document intended to inform policy-makers and the public about the beneficial and detrimental consequences of alternative project actions, including a reasonable no-action alternative. The BDCP EIR/EIS provides a thought-provoking and exhausting wealth of information about the Delta and the likely impacts of the proposed alternatives. However, like much of the technical work behind California water policy and management, this wealth of information and data is not organized in a way that can usefully inform difficult public and policy discussions. Some necessary improvements for the final document are provided below; additional details appear in the chapter reviews in Appendix B.

1. *Include meaningful summaries for each chapter.*— Each chapter should begin with a sharply focused summary of the main points, conclusions, and important unresolved issues. We specifically note that the “Highlights” document does not do this and cannot be thought of as a substitute for a scientific summary.
2. *Provide a clear and concise comparison of water-conveyance alternatives.*— The EIR/EIS is a document intended to guide the selection of alternatives based on performance and consequences, The Executive Summary should focus on guiding the reader through a concise presentation of the alternatives, the process of selecting a preferred alternative, and the relative impacts of alternatives on major Plan objectives and

operations and on the physical, biological, sociological, and economic resources of the Delta.

3. *Clarify performance indicators.*— Inclusion of clearly defined performance indicators for BDCP actions in both the chapter texts and the Executive Summary would help to focus a discussion and comparison of alternatives and would greatly improve the usefulness of the document.
4. *Discuss uncertainties in each chapter.*— Presentation and discussion of the results of major analyses should include some indication of the uncertainty of those results. For quantitative and model-based analyses, this could include likely upper and lower bounds as well as an average or central tendency. For other analyses, a qualitative assessment of relative uncertainty or confidence in the results would be useful. A discussion of the implications of these uncertainties and possible actions to reduce uncertainty would be helpful.
5. *Bolster and consolidate the support framework for adaptive management.*— As currently described (only in the Plan; there is no description in the EIR/EIS), the adaptive management process seems unlikely to be workable in terms of financial and scientific support, institutional authority, or regulatory flexibility. It is critical that the management and regulation and the science supporting adaptive management for BDCP be integrated within a larger framework for adaptive management for the Delta. The EIR/EIS would benefit from a concise discussion of how the approaches to adaptive management described in the BDCP Plan, the Delta Plan, and the Delta Science Plan could be blended into an effective and comprehensible framework.
6. *Identify and list important assumptions in each chapter*— Although many assumptions may best be covered in appendices, the most important assumptions and their implications should be discussed in the main chapter texts, especially where the results of analyses are presented.
7. *Include risk-based decision analysis.*— An overall risk-based decision analysis of alternatives that includes some major contingencies would provide a more rigorous basis for structuring the document and developing a preferred alternative(s) for BDCP. A risk-based decision framework could be used to explore how potential adjustments in, for example, the sizing and placement of habitat restorations or the capacity of Delta conveyance might reflect opportunities or problems likely to arise in the future. Such analyses should explicitly incorporate uncertainty into the comparisons of alternatives, while assessing other decisions about BDCP actions.
8. *Refine the treatment and description of BDCP alternatives.*— Continued development of BDCP alternatives and plans for their implementation will improve their performance

and adaptability. Suggested improvements should be included and highlighted in the final EIR/EIS.

9. *Consider appropriate time frames for permitting BDCP actions.*— There are many uncertainties in BDCP actions, their consequences, and the use of adaptive management to adjust practices when necessary. Consequently, it would be appropriate for permits to include explicit intermediate milestones and opportunities for interim evaluation and correction within the 50-year time period of BDCP.
10. *Spell out the details of programmatic Conservation Measures.*—Currently, CM1 (water conveyance alternatives) is treated at a project level in the EIR/EIS, whereas the other Conservation Measures are dealt with at a less detailed program level. Additional detail should be provided, specifying ranges of possibilities or approximate actions wherever possible. This would enhance evaluations of the effectiveness and consequences of the Conservation Measures.