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## Comments on the BDCP Public Draft EIR/EIS

**1. The content of the Plan and the EIR/EIS is inconsistent with the stated objectives, purpose and need.** While these are comments on the EIR/EIS, not on the Plan itself, the "project" that is described in both the Plan and the EIR/EIS, has not been demonstrated in the EIR/EIS to achieve the stated objectives, purpose and need.

In Section 2.3, Projective Objectives, (under CEQA) it is stated:

DWR's fundamental purpose in proposing the BDCP 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-Delta, and water quality within a stable regulatory framework, consistent with statutory and contractual obligations.

This statement of purpose is followed by three project objectives:

- Respond to the applications for incidental take permits take related to:

1. The operation of existing SWP Delta facilities and construction and operation of facilities for the movement of water entering the Delta from the Sacramento Valley watershed to the existing State Water Project (SWP) and Central Valley Project (CVP) pumping plants located in the southern Delta;

2. The implementation of any conservation actions that have the potential to result in take of species that are or may become listed under the ESA, pursuant to the ESA at §10(a)(1)(B) 10 and its implementing regulations and policies; ( 3. is no longer applicable.)

- To improve the ecosystem of the Delta by:

1. Providing for the conservation and management of covered species through actions within the BDCP Planning Area that will contribute to the recovery of the species; and
2. Protecting, restoring, and enhancing certain aquatic, riparian, and associated terrestrial natural communities and ecosystems.
3. Reducing the adverse effects to certain listed species of diverting water by relocating the intakes of the SWP and CVP;

- Restore and protect the ability of the SWP and CVP to deliver up to full contract amounts, when hydrologic conditions result in the availability of sufficient water,

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> consistent with the requirements of State and federal law and the terms and conditions of water delivery contracts and other existing applicable agreements.

And by five "additional project objectives" which include:

To make physical improvements to the conveyance system that will minimize the potential for public health and safety impacts resulting from a major earthquake that causes breaching of Delta levees and the inundation of brackish water into the areas in which the SWP and CVP pumping plants operate in the southern Delta.

The three project objectives that are cited above are not met on the basis of the voluminous material presented in the Plan and the EIR. In particular, it seems unlikely that the first objective, which has to do with the granting of incidental take permits, will be met in view of the failure to date to produce an effects analysis that convincingly shows that all listed species will be lifted far above jeopardy with the potential for them to be delisted. The most recent peer review panel assembled by the Delta Science Program at the request of the BDCP[1] concluded that the current effects analysis is incomplete and inconsistent and an independent review conducted for The Nature Conservancy and American Rivers reached similar conclusions[2].

The additional project objective that is cited above is in fact a red herring, as will be discussed in more detail subsequently, but the notion that an undefined major earthquake could cause widespread breaches of Delta levees appears to rely largely on the Delta Risk Management Strategy, whose conclusions were also discredited by another peer review panel assembled by the Delta Science Program. To the extent that there is any risk to the Delta Levee System posed by earthquakes, this can be addressed more effectively and more cheaply by implementing the recommendations of the Economic Sustainability Plan of the Delta Protection Commission[3]. As noted below, this is just one of the actions that are likely to occur in the Delta within the next 50 years independent of the BDCP that should have been described and discussed in the No Action Alternative.

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[1] http://deltacouncil.ca.gov/science-event/10163

[2] http://mavensnotebook.com/2013/09/19/this-just-in-american-rivers-and-the-nature-conservancy-release-independent-review-of-the-bay-delta-conservation-plan/

[3] http://forecast.pacific.edu/desp.html

The Project Purpose (under NEPA) detailed in Sections 2.4 is generally similar to the Projective Objectives described under CEQA, although earthquakes are not mentioned. The companion Project Need detailed in Section 2.5 is more propaganda than a true statement of need and must be rewritten in order to be consistent with both the facts and the project that is actually described in the Plan and the EIR/EIS.

In Section 2.5.1, Delta Ecosystem Health and Productivity, actual data on the decline of native species could and should be cited rather than offering slanted speculation on the causes of these declines:

Most of the original tidal wetlands and many miles of sloughs in the Delta were removed by channelization and levee construction between the 1850s and 1930s. These physical changes, coupled with higher water exports and declines in water quality from urban and agricultural discharges and changes in constituent dilution capacity from managed inflows and diversions, have stressed the natural system and led to a decline in ecological productivity.

This language makes it sound as if higher water exports and urban and agricultural waste water are merely contributors to the current decline of the Delta ecosystem, rather than prime causes. While undoubtedly hydraulic mining, channelization of the rivers for flood control purposes and reclamation of the Delta irreversibly changed the River-Delta-Bay ecosystem, salmon runs measured in the millions persisted even after the first dams were built on the rivers. It was only when water exports started to be ratcheted up that salmon populations declined dramatically. Getting real about the causes of the problem might shine more light on possible solutions[4].

Section 2.5.2, Water Supply Reliability, concludes with the following statement:

The current and projected future inability of the SWP and CVP to deliver water to meet the demands of certain south of Delta CVP and SWP water contractors is a very real concern. More specifically, there is an overall declining ability to meet defined water supply delivery volumes and water quality criteria to support water users' needs for human consumption, manufacturing uses, recreation, and crop irrigation.

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[4] See http://www.fixcawater.com/problem.html generally, and http://nebula.wsimg.com/f672fc67a1a44a62e65fcf57c1b65829?AccessKeyId=AD7307F3D4020EDFF747&disposition=0&alloworigin=1 specifically.

This heart-rending language should be replaced with an evaluation of how much water surplus to Northern California and environmental needs is actually available for export under various scenarios. It is acknowledged that there will never be complete agreement on how much water is needed for environmental purposes but it is relatively easy to make calculations of how much surplus water is available for export making a range of assumptions regarding Delta outflows and pumping locations and operating rules. Such basic calculations do not appear to have been done but they are necessary to see whether it is now feasible to approach full contract amounts for exports even with favorable hydrological conditions when the diversions from the Northern Rivers that were to supply as much as 5 maf per year when those contract amounts were agreed to are no longer available as a result of State and Federal policy changes.

Section 2.5.3, Delta Hydrology and Water Quality, is remarkable for defining a need that the Plan does not address which includes both salinity intrusion and :

Additionally, other water constituents of concern in the Delta have been identified through ongoing regulatory, monitoring, and environmental planning processes such as CALFED, planning functions of the State Water Board, and the Clean Water Act Section 303(d) list of state water bodies that do not meet applicable water quality standards. In June 2007 (with updates in February and May 2009), the U.S. Environmental Protection Agency gave final approval of a list of 18 chemical constituents identified in the Section 303(d) list for impaired Delta waters (State Water Resources Control Board 2007). Included in this list are dichlorodiphenyltrichloroethane (DDT) and other pesticides, mercury, polychlorinated biphenyls (PCBs), and selenium.

Although there is a clear need for addressing in-Delta water quality issues, none of the alternatives considered except Alternative 9 are geared to address these issues and the CEQA preferred alternative, Alternative 4 in conjunction with Operational Scenario H, actually improves export water quality at the expense of Delta water quality! BDCP staff and consultants have admitted that it is not possible to address the projected decline in Delta water quality while sticking with this preferred alternative! That the preferred alternative does not address a stated need, but in fact aggravates the situation, is not only indefensible but laughable.

In summary, the principal objectives, purpose and need that are detailed for purposes of compliance with CEQA and NEPA are not met by the preferred alternative, or any other alternative that is described in the Plan or the EIR. There is no convincing evidence of any overall improvement in the Delta ecosystem - there may be marginal improvement in expectations for Delta smelt but expectations for salmon are made more problematic

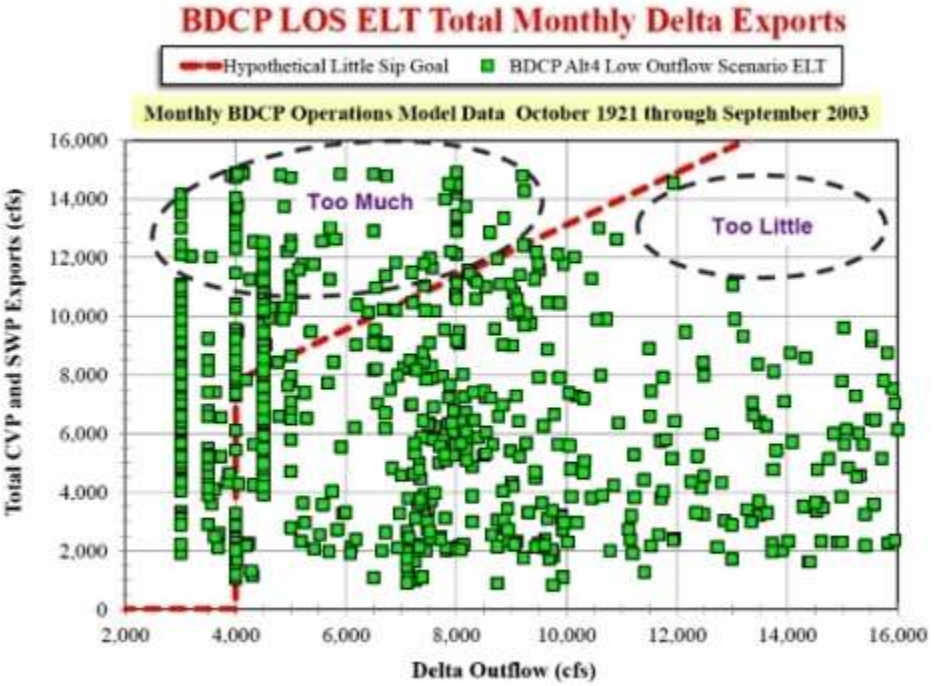


**Figure 1 – Monthly Delta Exports for Low Outflow Scenario**

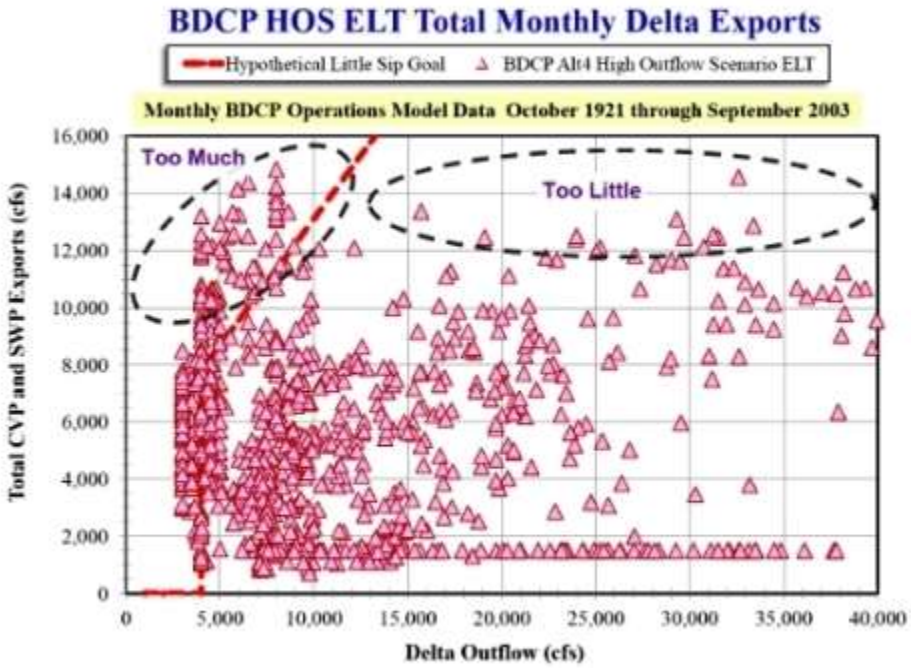


**Figure 2 – Monthly Delta Exports for High Outflow Scenario**

– and there is no expectation that the SWP and the CVP will deliver up to full contract amounts under any hydrological condition – the interpretation of the results buried in the EIR/EIS by the BDCP staff is that exports will be maintained at present levels, plus or minus 10 percent, except that exports may have to be reduced if species recovery goals are not met, a circumstance that appears to have a high probability of occurrence. In fact, even the projection of maintaining exports at something like present levels is a fiction. Figures 1 and 2, kindly provided by Richard Denton, show that in order to achieve this overall level of exports, it is necessary to resort to more pumping in drier months than is the case at present. It is not easy to trace the effects of this through the present effects analysis, but this might be one of the reasons that the effects analysis does not show sufficiently positive results to justify the granting of incidental take permits. If the operational rules were to be changed so that the effects analysis suggests more positive results for salmonids, the volume of exports would immediately be reduced. These figures also show that it is ludicrous for BDCP proponents to talk about taking a "little sip, big gulp approach", that is to take more water at periods of high flows and little of no water at periods of low flows. The BDCP does not in fact include the necessary physical components to do that. It should also be noted that it is unclear whether the aqueducts can presently carry the combined maximum exports of 14,400 cfs shown in Figures 1 and 2 because of subsidence caused by excessive pumping of groundwater, so that it is doubly questionable whether the planned level of exports can actually be achieved.

There are two reasons why the present Plan and EIR/EIS cannot be consistent with the stated objectives, purpose and need. One is that a "project" defined by its sponsors as being contained wholly within the Sacramento San Joaquin Delta (the Delta), cannot possibly solve the present conveyance and storage problems that limit water supply quantity and reliability to areas south of the Delta, nor can a "project" or "plan" that consists solely of actions within the Delta restore the ecosystem of what is inescapably a linked Rivers-Delta- Bay ecosystem of which the Bay-Delta estuary is an important component. Another is that a project that is basically a grab for the better quality water in the North Delta, that further reduces the flows through the Delta, cannot possibly reverse the conversion of the Delta from an estuary to a weedy lake nor make any significant progress on restoring the ability of the SWP and the CVP to deliver full contract amounts, even when there are favorable hydrological conditions.

**What then is required to address the stated objectives, purpose and need?**
Consideration of the water supply reliability question has to start with recognition that not only does two-thirds of the precipitation in California fall in the northern half of the

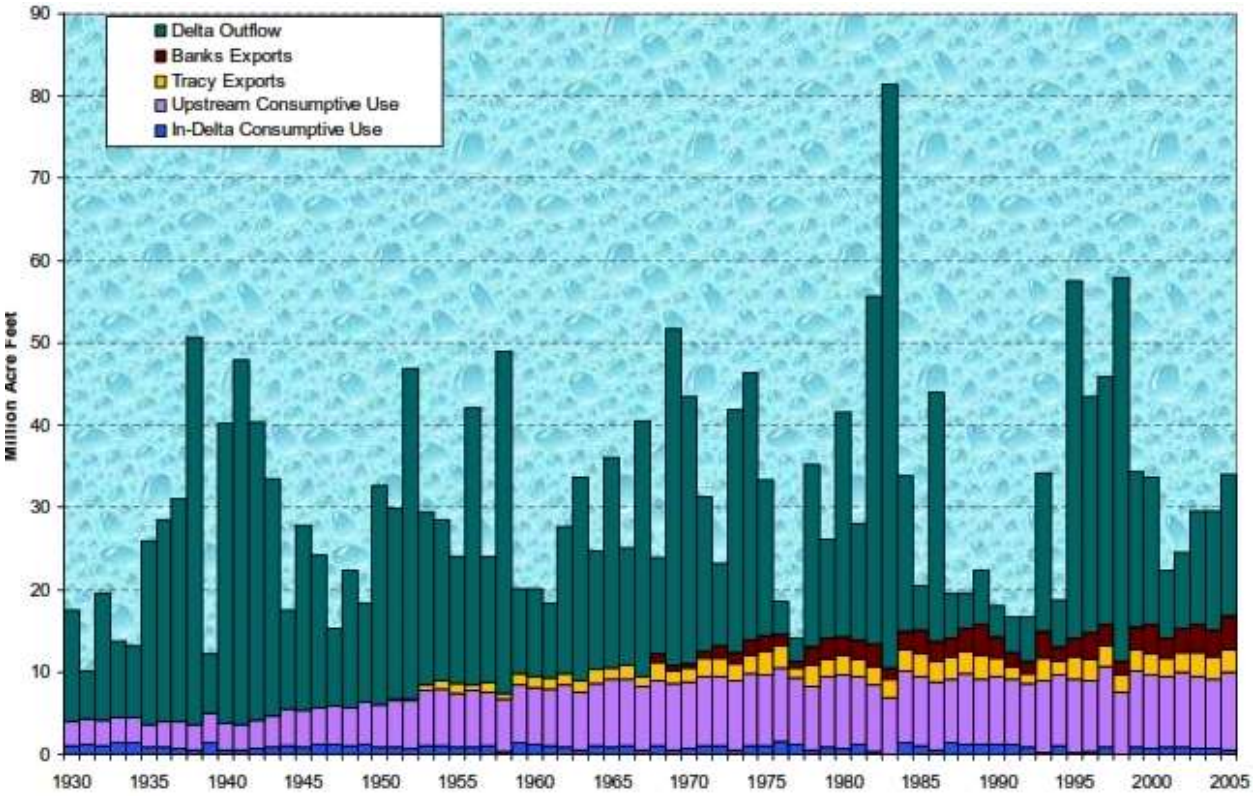


**Figure 3 – Delta Inflow and Outflow**

State while two-thirds of the population live in the southern half of the State, but also with recognition that in California precipitation is not evenly distributed over time but tends to come in bunches of wetter than normal years and then bunches of drier than normal years (droughts), as may be seen in Figure 3. This is just as important as the geographical distribution of precipitation. It may be noted in Figure 3 that earlier last century a decent amount of water passed out of the Delta to the Bay and the Ocean even in dry years (the green bars). But now in periods of drought very little water passes through the Bay to the Ocean. While there are other stressors on the Bay Delta ecosystem, it is inescapable that the lack of Delta outflow in dry years coupled with the cross flow within the Delta that leads to millions of fish being captured and subsequently dying in the fish salvage facilities associated with the South Delta pumps, has had a major adverse impact on both the Bay Delta ecosystem and the viability of salmon runs that have existed for 7,000 years or so through mediaeval warm periods and the Little Ice Age but are now threatened with extinction.

These basic facts lead to two fundamental principles:

1. That natural flows through the Delta should be restored to the maximum practical extent, both in terms of quantity and the pattern of flow;

2. That much less, or zero, water should be extracted at periods of low flows, and that greater amounts of the water available during periods of higher flow that is surplus to the needs of Northern California users and the Delta ecosystem can be extracted for export.

Preliminary calculations of the annual and average yields, of the kind that have not been made as part of the development of the Plan or the EIR/EIS, suggest that with the necessary plumbing in place to allow export of much greater amounts of water in periods of high flow, with the surplus over current needs South of the Delta being stored, primarily as groundwater, that average deliveries could not only be maintained at present levels but that they could be readily maintained through a three year drought and possibly through a six-year drought. That would constitute real water supply reliability, not false hope of water supply reliability.

A project complying with these two principles might require some re-operation of the existing reservoirs and definitely would require that additional South of Delta storage facilities be constructed by the recipients of the exported water, but the principal facilities would all be in the Delta as is the case with the BDCP.

The current "project" complies with neither of these principles and therefore cannot possibly meet the stated objectives, purpose and need. No amount of phony effects analyses or archaic water balance and water quality analyses can show that it does!

If the "project" were to redefined as a project whose principal purpose is to provide better water quality for SWP and CVP Contractors at the expense of in-Delta water quality, then the current findings of the EIR/EIS would be consistent with the objectives, purpose and need, but the current findings are not consistent with the currently stated objectives, purpose and need and, moreover, the public draft EIR/EIS is just as incomplete and inconsistent as the existing effects analysis.

In summary, the current public draft of the EIR/EIS does not describe a preferred alternative, or indeed, any alternative, that meets the stated objectives, purpose and need. Either a preferred alternative that will actually meet the stated objectives, purpose and need must be described and analyzed or the stated objectives, purpose and

need must be changed and in either case a new draft EIR/EIS must be released for public review and comment.

**2. The EIR/EIS does not include consideration of alternatives which better address the stated objectives, purpose and need and does not even seriously evaluate a No Action Alternative.**

With the exception of Alternative 9, the current EIR/EIS evaluates only variations on the common theme of adding an isolated conveyance from the North Delta to the existing export facilities in the South Delta. The reason for this is clear – the proposed project is driven by the desire of the Metropolitan Water District of Southern California for better quality water to blend with their salty Colorado River supplies coupled with the ire of the Westlands Water District at exports from the South Bay facilities sometimes being limited by arbitrary limits on the take of Delta smelt. But, as aggravating as those arbitrary limits might be to the westside farmers, their prospects are much more limited by the fact that they are farming in the rain shadow of the Coast ranges and, absent the past inflated and illegal diversions from the Trinity River and the lack of development of other diversions from the Northern Rivers, there is insufficient water available in the CVP for them to survive in dry years without pumping the groundwater ever lower. If the stated objectives, purpose and need of the BDCP are to be achieved, a much more serious study of alternatives is required, not just to demonstrate that the preferred alternative is superior to other alternatives but to find one or more alternatives that actually provide water supply reliability, restore the Delta ecosystem, and improve water quality for both exporters and in-Delta users. Basically that requires developing one or more solutions that comply with the two principles delineated in the previous section.

As noted above, no long-term plan to address California's water management issues can succeed unless the wide variation in precipitation from year to year is addressed. This creates a problem in discussion of possible alternatives to the BDCP because the BDCP does not really address this point and formal legal challenges to the BDCP EIR are limited to projects that include the same stated purposes as the BDCP. Thus, since the BDCP does not include any actions outside the Delta such as additional storage or measures to make existing water supplies go further such as conservation, recycling, stormwater capture and desalination, all of which are needed to better survive droughts, alternatives that rely on these measures do not necessarily constitute valid legal

alternatives to the BDCP under CEQA. For instance, a "limited action alternative" that simply improves levees to further reduce seismic risk and reduces exports but compensates for that with increased funding for conservation, recycling, stormwater capture and desalination may not meet the legal test for being a valid alternative because the purpose of the BDCP is to provide reliable exports at around existing levels and to obtain incidental take permits to cover those exports. However, the claim that the BDCP consists of measures entirely within the Delta is fallacious since at least some re-operation of SWP and CVP reservoirs is likely to be necessary to meet bypass flow and Delta outflow requirements and restoration of the aqueducts in the San joaquin Valley is likely necessary in order to convey as much as 14,400 cfs south from the Delta, as is proposed at present.

Moreover, the 2009 Delta Reform Act sets the following as a basic goal of the State for the Delta: Achieve the two coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place; and it subsequently charges the Delta Stewardship Council to accept the BDCP in to the Delta Plan if, and only if, the BDCP has studied a reasonable range of conveyance alternatives, amongst other things. These are broader requirements than the self-declared purposes of the BDCP and if the BDCP does not meet them, it cannot be included in the Delta Plan and it will otherwise be non-compliant with State law.

Of the various alternatives that have been proposed to date in public, but not studied seriously as alternatives in the BDCP, there are two that do appear to satisfy the stated purposes of the BDCP and in varying degrees address the broader, longer-term problem. These alternatives can be thought of a minimum approach and a maximum approach to exporting surplus water from the Delta. *Both assume that as economics dictate, growing use will be made of conservation, recycling, stormwater capture and desalination but they do not spell out the details of this. Both allow the construction of additional upstream and south-of-Delta surface storage, but do not specifically call for it*. The "maximum" alternative, however, specifically calls for much increased groundwater storage obtained by using big gulps in wet year to recharge the groundwater basins in the San Joaquin Valley that are presently overdrafted. The minimum approach would likely require significant retirement of irrigated lands in the San Joaquin Valley, but the maximum approach might not.

**The minimum approach** would essentially be a valid "no action alternative" in terms of the BDCP. The present public draft of the BDCP EIR/EIS gives short shrift to the No Action Alternative. Indeed at the open house held in Walnut Grove on the public draft, BDCP consultants freely admitted that in the current draft the No Action Alternative is not evaluated in the same detail as other alternatives and, laughably, gave "space limitations" as an excuse for that!

In Section 9.3.3.1 it is stated:

> The No Action Alternative assumptions also include projects and programs that are permitted or are assumed to be constructed by 2060.

However then, in Section 9.3.3.1.1 the current draft says:

> Ongoing and reasonably foreseeable future projects in parts of the Delta are expected to upgrade the levees to a "flood-safe" condition under the 100-year return flood elevation. However, these projects would provide very little levee foundation strengthening and improvements directed at improving the stability of the levees to better withstand ground shaking, liquefaction, and slope instability.

This language is purely political and does not reflect the reality that the Economic Sustainability Plan of the Delta Protection Commission recommends future improvement of most lowland Delta levees and other Delta levees that may be susceptible to damage resulting from liquefaction even though they meet the PL 84-99 standard to a new standard popularly called the "fat levee" standard. This has been widely discussed both in official meetings and in the press. It has been confirmed by recent improvements made on Jones Tract, as a result of outstanding cooperation between EBMUD, the local reclamation district, the DWR and CA Wildlife, that such "fat" levees can be constructed at the reasonable cost of $2-3 million per mile. Improvement of 600 miles of Delta levees to this standard would thus cost less than $2 billion, a small fraction of the estimated cost of the BDCP. The DWR, the Delta Stewardship Council and the DPC are currently collaborating on outlining legislation that would create a Delta Flood Risk Management District that will take over funding of such improvements once current bond funding has been exhausted. It can easily be projected that the Economic Sustainability Plan recommendation will be fully implemented by 2060.

The "fat" levees recommended in the Economic Sustainability Plan are specifically designed to allow the planting of vegetation on their water side in order to provide shaded riparian habitat for various listed species. Further, if supplemented by additional conservation measures including measures that are already being planned such as those at Prospect Island and Dutch Slough, that are properly located, instead of being wrongly located as is the case with the BDCP[5], what is still a no action alternative in terms of conveyance would be marginally capable of meeting the stated purposes of the BDCP in terms of CEQA and NEPA. Such a "no action alternative" would likely allow the SWP and CVP to deliver up to full contract amounts, when hydrologic conditions result in the availability of sufficient water (that is in wet years), although, as with the BDCP, full contract amounts would not be delivered in normal to dry years and no additional storage or groundwater recharge would be created in order to help the SWP and CVP Contractors survive periods of drought. This might force retirement of some irrigated acreage in the San Joaquin Valley or, at a minimum, necessitate restrictions on the planting of permanent crops. Under this minimum approach the pattern of flow through the Delta would still be unnatural and significant numbers of fish would still be caught in the "salvage facilities" in the South Delta and not survive subsequent transport and release, but such a conveyance alternative with appropriate operating rules, would still have a better chance of qualifying for HCP and NCCP status than the existing BDCP.

**The Maximum Approach** would comply with the two principles enunciated above. The Western Delta Intakes Concept (WDIC) which is mislabeled as the "Pyke Proposal" and poorly described in Appendix 3A, Section 3A.11.4, serves as an example of an alternative conveyance and ecosystem restoration solution that complies with these principles. The WDIC is not necessarily the only solution that complies with these principles and a serious effort should be made both to seek other solutions that do and to develop them to the point that a valid comparison of alternatives can be made. This is required not only to satisfy the requirements of CEQA but more importantly to develop the optimum solution to the problems or needs that the BDCP is supposed to be addressing. No-one disputes that these problems or needs are real. But what is needed is a solution that actually addresses them, rather than 40,000 pages of mumbo jumbo which do not.

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[5] See http://mavensnotebook.com/2013/09/19/this-just-in-american-rivers-and-the-nature-conservancy-release-independent-review-of-the-bay-delta-conservation-plan/

A detailed response to the inaccurate description and evaluation of the WDIC that is included in the public draft EIR/EIS is attached at Appendix A to these comments and more detailed description and references can be found at http://fixCAwater.com.

Briefly, the WDIC would relocate the principal point of diversion for exports from the South Delta to the West Delta. Water surplus to upstream and in-Delta needs and the Delta outflow required to sustain fisheries would be extracted through permeable embankments on Sherman Island that would constitute the world's largest fish screens. Because Sherman Island is located in an area of large tidal flows, the water extracted would only be a small fraction of the total flow at that point. The principle objective of this relocation would be to restore more natural flows through the Delta both in pattern and quantity in order to reverse the gradual conversion of the Delta from an estuary into a weedy lake choked by invasive plants, but it also has the merit of making the extraction of water for exports self-regulating, because any attempt to over-extract water would result in saline water being sucked into the pumps. Water extracted at Sherman Island would be transported to the Clifton Court Forebay in large tunnels, similar to those proposed in the BDCP, but half the length. The existing South Delta pumps would be retained both to lift water into the canals going south, but also to extract water directly from the Old River through new state-of-the-art fish screens on the very limited occasions when there are high flows in the San Joaquin and Old Rivers. When the South Delta pumps are extracting water from the Old River, water from Sherman Island that cannot not be moved south right away would be stored temporarily in a further enlarged Los Vaqueros Reservoir[6] and/or a new Brushy Creek Reservoir. The objective or this rearrangement of conveyance facilities is to allow the extraction of as much as 30,000 cfs during the limited periods of high flows in the Sacramento and San Joaquin Rivers. Without such a rearrangement it will never be possible to extract enough water during periods of high flows to make up for the need to reduce or eliminate extraction during periods of low flows. In the absence of other longer-term solutions, water quality in the South Delta would be maintained by re-circulation as necessary from the export canals to the San Joaquin River.

Again, the WDIC actually addresses the stated objectives, purpose and need of the BDCP whereas the BDCP does not. It was first outlined in an Op-Ed in the Contra Costa Times on Christmas Day, 2010. I subsequently met with Under Secretary Meral on May 11,

[6] Potential use of Los Vaqueros Dam is only conceptual and would require negotiation with the Contra Costa Water District. Los Vaqueros is presently restricted to local use only.

2011, and then with Secretary Laird and Under Secretary Meral on February 29, 2012. There was ample time after these meetings for the BDCP to conduct a proper evaluation of the WDIC, but that was not done. Apart from one phone call to chase down a reference, neither I nor the team that has worked on developing the WDIC have been approached by BDCP staff or consultants to discuss any aspect of the WDIC. As can be seen from my detailed responses in Appendix A, the evaluation that is included in the public draft EIR/EIS is ill-informed and incorrect.

As has been correctly noted by the Delta Independent Science Board[7] "the project (meaning the BDCP) is encumbered by uncertainties that are considered inconsistently and incompletely; modeling has not been used effectively to bracket a range of uncertainties or to explore how uncertainties may propagate." It will be true to some extent that there will be uncertainties involved in any solution to the water export reliability and ecosystem restoration problems facing the Delta, but the solution is not just better analysis but also to come up with robust solutions that show substantial improvements over the current conditions, rather than improvements which are at best marginal, as is the case with the BDCP.

In summary, the current public draft of the EIR/EIS does not contain an adequate comparison of alternatives and is misleading and inaccurate in its description of the Western Delta Intakes Concept. A proper analysis of alternatives that will actually meet that stated objectives, purpose and need, including but not limited to the Western Delta Intakes Concept, must be performed and then a new draft EIR/EIS must be released for public review and comment.

## 3. All the material in the EIR/EIS regarding the threat posed to reliable water supply by earthquakes is a red herring and must be revised or deleted.

The language of the Executive Summary and of Chapter 2 on Objectives and Purpose and Need, cite the "the potential for public health and safety impacts resulting from a major earthquake that causes breaching of Delta levees" as one of the reasons for

[7] http://deltacouncil.ca.gov/sites/default/files/documents/files/Attachment-1-Final-BDCP-comments.pdf

needing the BDCP. However, the EIR/EIS includes no formal evaluation of the impacts of earthquakes on water supply and water quality and therefore does not show that the preferred alternative is any better than the no action alternative.

In particular, Sections 2.5.2 on Water Supply Reliability and 2.5.3 on Delta Hydrology and Water Quality say nothing about earthquakes. Unless the implied threat to water supply and water quality can be justified by something more substantial than reliance on discredited and outdated studies such as the Delta Risk Management Strategy, and the impacts quantified in Sections 2.5.2 and 2.5.3, all the scattered references to the imagined threat to the Delta levee system posed by earthquakes should be deleted. These scattered references are detailed in Appendix B. To the extent that any discussion of this subject is retained, reference should be made to the Economic Sustainability Plan of the Delta Protection Commission which includes an updated appraisal of the vulnerability of the Delta levee system to earthquakes and an explanation of the flaws in the DRMS study.

In summary, the current public draft of the EIR/EIS does not show any compelling evidence that earthquakes are a significant threat to water supply reliability or water quality nor does it reference the latest authoritative study on the vulnerability of the Delta levee system to earthquakes, namely the Economic Sustainability Plan of the Delta Protection Commission. These flaws must be corrected and then a new draft EIR/EIS must be released for public review and comment.

## 4. Chapter 9 on Geology and Seismicity and Chapter 10 on Soils are not rational contributions to this EIR/EIS and the one real construction risk with consequences for the environment, namely loss of ground as a result of tunneling activities leading to levee failures, is ignored.

Chapter 9, Geology and Seismicity, is misnamed. The geology and seismicity of the Delta region is what it is and will not be impacted by any of the considered alternatives or by doing nothing. The chapter is actually about the impacts on people and property of various natural hazards, including earthquakes, and how they might be affected by the considered alternatives relative to doing nothing. It would make more sense for Section 9.1, Affected Environment / Environmental Setting, along with Appendix 3E, to be combined and inserted as a an additional chapter early in the document as

background to the subsequent evaluation of impacts in various categories of environmental impacts. Likewise, an intelligent and up-to-date discussion of the vulnerability of the Delta levee system should be inserted much earlier in the EIR/EIS as background to the subsequent evaluation of the impacts of the project.

The remainder of Chapter 9 follows some cookbook formula and includes mention of hazards such as debris flows, tsunamis and seiches which have no relevance to the Delta. This material should be rewritten to focus on impacts to people and property resulting from natural hazards that are applicable in the Delta. The treatment of liquefaction in this chapter is not only outdated and incorrect but misplaced. Again, this is background material that should be covered earlier in the EIR/EIS.

The subject of liquefaction of sands in earthquakes is relevant but the treatment of it in the EIR/EIS is overly conservative, as detailed in Appendix B. Nonetheless, the conclusion that the hazard to the BDCP conveyance facilities posed by any potential for liquefaction of sandy soils in earthquakes can be addressed in design or otherwise mitigated, is likely valid, just as it is for other elements of the built environment in the Delta including the levee system. The treatment of this subject needs to be rewritten to put the hazard in perspective. The hazard being low, it is possible to address it in design or otherwise mitigate it.

However, the one real construction risk with consequences for the environment associated with construction of the proposed conveyance facilities (as opposed to cost and schedule), namely loss of ground[8] as a result of tunneling activities leading to levee failures, is ignored. Only a minor loss of ground when tunneling passes under river and slough crossings could lead to breaching of levees, flooding of the adjacent islands and tracts, and even flooding of the tunnels themselves.

Similarly, the soils in the Delta are what they are and will not be substantially impacted by any of the considered alternatives or by doing nothing. It is true that over time the surficial soils in the proposed "habitat areas" might become more organic rich, but that is secondary relative to the negative impact on agricultural-based economy of the Delta and the possible, but dubious, ecosystem benefits.

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[8] http://www.fhwa.dot.gov/bridge/tunnel/pubs/nhi09010/07a.cfm

In summary, the treatment of natural hazards in the current public draft of the EIR/EIS is poorly organized, is misleading as to the hazard due to liquefaction in earthquakes, and this draft omits critical discussion of the possible effects of loss of ground due to tunneling operations. That possibility should be addressed elsewhere along with other impacts on the people, property and environment of the Delta. These flaws must be corrected and then a new draft EIR/EIS must be released for public review and comment.

Appendices A and B form part of these comments and the errors, omissions and misstatements that are noted in them must also be addressed in a revised draft EIR/EIS that is then submitted for public review and comment.

Robert Pyke Ph.D., G.E.

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# Appendix A

# Response to the Rejection of the Western Delta Intakes Concept as a Comparable Project to the Bay Delta Conservation Plan in the BDCP Public Draft EIR/EIS

## by Robert Pyke Ph.D., G.E.

Pyke responses are in blue. Line and section numbers in black are from Draft EIR/EIS.

35 ## 3A.11.4 Pyke Proposal

This section is misnamed. The Western Delta Intakes Concept (WDIC) had its origin in a white paper prepared by Tom Zuckerman and others for Delta Vision[9] and the key feature that it is self-regulating was the product of a conversation with Jonas Minton. The concept has been developed by a multi-disciplinary technical team and has benefited from discussions with staff of the Metropolitan Water District of Southern California.

36 The Western Delta Intake Concept proposed by Robert Pyke (the Pyke Proposal) includes the
37 following actions (Pyke 2012, Pyke 2013):
38 - Restoration of floodplains along the Sacramento and San Joaquin Rivers and their tributaries,
39 including the Lower San Joaquin Bypass.

This bullet is taken from a white paper that outlines the WDIC but is not essential to that subset of the WDIC that is directly comparable to the project defined by the sponsors of the BDCP as being "in the Delta". The preparers of this public draft EIR/EIS have not talked to the team that has developed the WDIC and do not appear to have made any effort to use the WDIC as the basis for evaluating an alternative that is directly comparable to the BDCP.

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9 http://nebula.wsimg.com/595e6fbcbe2738977a5973a0e478cbb1?AccessKeyId=AD7307F3D4020EDFF747&disposition=0&alloworigin=1

- Dual conveyance consisting of:
  1) Use of Sherman Island as an intake forebay, facilitated by removal of the peat soils and modification of the levees to allow for water to infiltrate up to 15,000 cfs into the island forebay from the surrounding rivers and sloughs (water inflow into Sherman Island would occur when water elevation in Sherman Island is lower than water elevation in the surrounding rivers and sloughs).
  2) A pumping plant and one or more tunnels to convey water from Sherman Island to a new reservoir near Clifton Court Forebay (Brushy Creek Reservoir).
  3) Continued use of existing south Delta intakes with new fish screens (water would not be conveyed from Sherman Island when salinity is high in the western Delta).

This is incorrect. Reconfigured South Delta intakes with completely new fish screens parallel to the flow in the Old River would be used only when there are high flows in the Old River. This would be occasional use only during periods of high flows. On the occasions that water is extracted from the Old River, extraction would continue at Sherman Island to take advantage of these high flows, but the water extracted at Sherman Island would be stored temporarily in an expanded Los Vaqueros reservoir and/or the new Brushy Creek reservoir. At most, only up to 15,000 cfs can be moved south-of-the Delta by the existing South Delta pumps. The Sherman Island intakes and the reconfigured South Delta intakes, would have a combined capacity of up to 30,000 cfs, so temporary storage within the Delta region will be necessary to make this "Big Gulp" strategy work. The term dual conveyance should not be used to describe this dual point-of-diversion concept as it normally refers to a combination of through-Delta and isolated conveyance facilities. The reason for allowing continued extraction of water in the South Delta is entirely to maximize the capture of water during infrequent periods of high flows in both the San Joaquin and the Sacramento Rivers. It is not related to periods of high salinity in the Western Delta, which occurs when outflows are low rather than high. Minimum Delta outflow requirements will be increased as part of the WDIC which will benefit fish and reduce salinity intrusion into the Western Delta.

- Levees around Sherman Island along the Sacramento River, San Joaquin River, and Threemile Slough would be replaced with permeable levees to allow water from the rivers to enter Sherman Island but not flow from the island.

Not along Three Mile Slough - only along the Sacramento and San Joaquin Rivers where river flows and tides provide good sweeping velocities. Water will in fact flow both in and out through the permeable embankments. When the water surface inside the embankments is not lowered by pumping, the water surface inside the Sherman Island

Forebay will simply rise and fall with the tides, which will help minimize clogging of the permeable embankments. During an extended drought if there is not enough water in the reservoirs to keep X2 west of Sherman Island, some salty water might penetrate the permeable embankments but the salty water will: (1) tend to be flushed out naturally when X2 is moved back to the west; and (2) be pumped out and wasted or run through a possible future brackish water desalination facility[10]) without using more than a small percentage of the annual energy costs of the WDIC (the forebay will only have a capacity of several hundred thousand acre-feet as opposed to the average 6 million acre-feet that might be extracted annually). There might be some mixing of fresh water with salty water in this process but since the extraction would be from the bottom of the forebay, the salty water should be taken out preferentially.

- Conversion of the Delta Cross Channel gates into a boat lock to prevent fish passage from the Sacramento River into the central Delta.
- New Brushy Creek Reservoir near Clifton Court Forebay (with a capacity of at least 1 million acre-feet), which could be used to store water diverted from Sherman Island when the total Delta exports exceed the 15,000 cfs capacity of the SWP and CVP pumping plants. A conveyance could be constructed between Brushy Creek Reservoir and Los Vaqueros Reservoir for additional storage capacity. If Los Vaqueros Reservoir is expanded (to a capacity of at least 1 million acre-feet), the two reservoirs could be designed with a pumped storage hydro-electric facility.
- Operation of SWP and CVP in accordance with the 2008 USFWS Biological Opinion and the 2009 NMFS Biological Opinion, as well as all existing operating criteria established by regulatory agencies.

Nowhere has it been said that the WDIC would operate in accordance with existing biological opinions. The WDIC would restore a much more natural flow regime to the Delta and new Biological Opinions would likely be required. It is, however, the general intent that all upstream operations would remain similar to the existing upstream operation except that increased minimum Delta outflow requirements would be required to provide the necessary fish and ecosystem benefits. It is ironic that the BDCP, which is intended to benefit fish, proposes no increase in minimum Delta flows for the Evaluated Starting Operations (Alternative 4, Scenario H3) relative to the existing or no-action cases.

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[10] See for instance http://www.regionaldesal.com/

22 • Construction of storage facilities south of the Delta, including additional groundwater storage
23 and western San Joaquin Valley surface water storage facilities.[20]

While one of the principles on which the WDIC is based is that at times of high flows, water that is surplus over environmental needs and immediate demand should be extracted and then used primarily to recharge the groundwater basins south of the Delta that have been overdrawn in dry years, no specific storage facilities are proposed for construction as part of either the WDIC or a subset of the WDIC that constitutes a project that is directly comparable to the BDCP. Rather, the specific means of using this surplus water to provide longer-term reliability of water supplies is left up to the participants in the CVP and the SWP. The WDIC at least allows this possibility. The BDCP does not, and therefore the BDCP cannot possibly achieve water supply reliability as called for in the Delta Reform Act of 2009. It is also disingenuous for the BDCP EIR/EIS to claim that the BDCP is a project whose impacts can be or are entirely confined to the Delta when, for instance, the announcement that Dr. Jerry Meral, who has directed the BDCP for the last three years, is joining the Natural Heritage Institute says: "The infrastructure improvements (*of the BDCP*) may also provide substantial benefits beyond the delta itself. NHI has worked for decades to illuminate opportunities for conjunctive use of surface and groundwater resources, many of which would rely on a more flexible system of moving water across the delta. When it becomes easier to move water to new off-stream storage facilities and empty groundwater basins in the San Joaquin Valley and Southern California, it will be possible to undertake stream enhancement north of the Delta, benefitting both the environment and water users of all regions." Not that the BDCP would actually make it any easier to move water to new off-stream storage facilities and empty groundwater basins, but the WDIC would. As noted in the main text under Comment No. 2 the claim that the BDCP consists of measures entirely within the Delta is also fallacious because at least some re-operation of SWP and CVP reservoirs is likely to be necessary to meet bypass flow and Delta outflow requirements and restoration of the aqueducts in the San Joaquin Valley is likely necessary in order to convey as much as 14,400 cfs south from the Delta, as is proposed at present. And, as pointed out in these comments and by others such as the Delta Independent Science Board[11], the BDCP will inescapably have downstream effects on the ecology of the Bay and the ecosystem of the Delta cannot be separately from that of the Bay-Delta estuary. The draft EIR/EIS must in fact be revised to reflect these realities and then must be resubmitted for public review and comment.

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[11] http://deltacouncil.ca.gov/sites/default/files/documents/files/Attachment-1-Final-BDCP-comments.pdf

- A new lined canal to convey water from the SWP California Aqueduct and the CVP Delta-Mendota Canal into the San Joaquin River upstream of Vernalis.
- Ecosystem restoration of tidal and sub-tidal habitat at the western end of Sherman Island, Lower San Joaquin River Bypass, and Franks Tract.
- Installation of fish screens along Old River at the entrance to Clifton Court Forebay.

Some of these components are already reflected in EIR/EIS alternatives that are being carried forward or in potential alternatives that have been screened out. For example, the Pyke Proposal includes portions of the western Delta conveyance analyzed under the EIR/EIS Alternatives 1C, 2C, and 6C. The proposal also includes fish screen facilities along Old River that were eliminated from further evaluation in the Initial Screening Conveyance Alternative C4.

The nature and use of the fish screens that are proposed in the WDIC for use along the Old River are in no way comparable to the fish screens associated with Initial Screening Alternative C4, which involved through-Delta conveyance from the Sacramento River, and to suggest that they are shows incompetence or ill-intent on the part of whoever has prepared this draft EIR/EIS. Similarly it is nonsensical to suggest that the WDIC includes any portion of Alternatives 1C, 2C and 6C, as shown in Figure 3-6 of this draft EIR/EIS, which shows a combination canal/tunnel/canal conveyance from the North Delta along an alignment that passes to the east of Sherman Island.

[20] These elements of the Pyke Proposal are beyond the purpose and scope of the BDCP, as was the case with similar elements in the Portfolio-Based Proposal, Congressman Garamendi's Water Plan, and the WACO Proposal, as described earlier. The BDCP is a permit-driven process in which DWR is seeking a long-term incidental take authorizations for the loss of endangered and threatened species in connection with the operation of the State Water Project. Proposals that seek to develop state-wide water management principles and practices will be helpful in other contexts, however. These include DWR's process for developing the Statewide Water Plan, the Delta Stewardship Council's process for creating its Delta Plan, and various water agencies' processes for preparing Integrated Regional Water Management programs.

This footnote is incorrect. There is a subset of the WDIC as described in Robert Pyke's white paper that is directly comparable to the BDCP, except that instead of being permit driven it is results driven. The core of the WDIC involves restoration of more natural flows through the Delta in conjunction with the construction of facilities that allow the possibility of more reliable water exports from the Delta to points south of the Delta. It will vastly exceed the BDCP in terms of meeting the goals of restoring the Bay-Delta ecosystem and avoiding jeopardy for listed species. It will improve both in-Delta and export water quality, rather than improving export water quality at the expense of in-Delta water quality. It meets the project objectives and purpose and need statements in Chapter 2 of this draft EIR/EIS better than the BDCP does. It does not seek to develop statewide water management principles and practices except for emphasizing that in an

era of limited resources and growing population, it is necessary to reconfigure the water conveyance facilities in the Delta in such a way that more water can be extracted in wet periods with high flows so that less water has to be extracted in dry periods with low flows. The suggestion that the WDIC could inform the Delta Stewardship Council's process for creating its Delta Plan is laughable for a number of reasons.

The Pyke Proposal also raises a number of challenges and problems. For example, the proposal also could result in limited use of the western Delta intake due to the presence of high salinity waters near Sherman Island, and salinity of the water stored in the island could increase if Delta waters migrated through groundwater or the levees into the island storage facility. More specifically, Delta water quality may limit the use of the Sherman Island reservoir. Sherman Island is located at approximately 92 kilometers from the Golden Gate. The Western Delta Intake Concept Alternative (Pyke 2012) indicates that diversions would not occur unless X2 is located "well west of Sherman Island." Generally, X2 is located near Chipps Island (74 kilometers from the Golden Gate) to provide freshwater to the western Delta intakes. Under existing conditions (as described in Appendix 5A, *BDCP EIR/EIS Modeling Technical Appendix*), X2 would be located at or to the west of Chipps Island in January through June of wet water years; in January through May in below normal water years; and generally not at all in critically dry years. Also, as water would be diverted at Sherman Island, the X2 location would move eastward unless additional water is released from upstream reservoirs. Therefore, diversions of up to 15,000 cfs would be limited near Sherman Island in a similar manner as north Delta diversions of up to 15,000 cfs are limited under Alternatives 1, 2, and 6 in the EIR/EIS, (as described in Appendix 5A, *BDCP EIR/EIS Modeling Technical Appendix*).
Water quality could be difficult to maintain in the Sherman Island forebay in the summer. During the summer and fall months, western Delta salinity near Sherman Island could range from 500 to over 2,000 micromhos/centimeter. The saline water could migrate through the groundwater into the Sherman Island forebay. This would be more likely if the volume of stored water is low. The potential for migration from the Delta into Sherman Island also would be more likely under this potential alternative as compared to the existing conditions because of the removal of up to 45 feet of peat soils.

One of the stated principles of the WDIC is that the intake facilities should be located in the Western Delta so that natural flows pass though as much of the Delta as possible before any surplus water is extracted and so that the system would be self-regulating with respect to water rights priorities and assurances because water could only be exported from the western Delta when salinities were low, i.e., when surplus flows were available. Preliminary calculations have indicated that even with this restriction, longer-term average exports might even be increased from present levels if more than 15,000 cfs of water is extracted during periods of high flow. While the average export water quality might not be quite as good as would be provided by North Delta intakes, it would be significantly better than the current exports from the South Delta. Should X2 move as far east as Sherman Island in an extended drought, the Forebay can easily be flushed out once the drought breaks, as discussed previously.

In addition to the water quality concerns described above, water quantities under the Pyke Proposal could also be limited.

This statement is both unsupported and incorrect. The preparers of the Public Draft

EIR/EIS do not appear to have understood the proposed plan for operating the WDIC. Water will be extracted using the reconfigured South Delta intakes only at times of high flows in the San Joaquin and Old Rivers. Preliminary calculations by the WDIC team have indicated that average water exports could be maintained or even increased, even with higher overall Delta outflow requirements and with minimal use of the reconfigured South Delta intakes. It does not appear that the BDCP has done any calculations to confirm or deny this finding or has in fact done any serious study of alternate points of diversion other than those on the Sacramento River in the North Delta. Even if the project under consideration is, by definition of its sponsors, confined to actions within the Delta to restore the Delta ecosystem with a view to removing listed species from jeopardy and to restore and protect water supplies of the SWP and the CVP south-of-the-Delta within a stable regulatory framework, when the existing South Delta point-of-diversion is widely acknowledged to be imperfect a serious study of alternate points-of-diversion is called for with at least some quantitative evaluation of the possible export water quantities. Location of the principal point-of-diversion in the Western Delta must been considered among these alternatives both because such a location genuinely helps restore a more natural pattern of flows through the Delta, recreating an environment that will favor native fish species, and because a concept such as the WDIC is largely self-regulating and is inherently more stable than the complex and perhaps changing operating rules and governance scheme of the BDCP. If the project defined by the sponsors is limited to intakes in the North Delta because the primary goal of the BDCP is to provide better export water quality to satisfy the quest of the Metropolitan Water District of Southern California to hold on to its retail water agency customers, then the EIR/EIS should say that, but it does not.

> Diversions of up to 15,000 cfs at the south Delta intakes probably would not occur due to current limitations under State Water Board water quality and water rights decisions, the 2008 USFWS Biological Opinion, and the 2009 NMFS Biological Opinion. Under the existing conditions, diversions at the south Delta intakes rarely approach 11,000 cfs. Due to the limitations of diversions near Sherman Island and diversions at the south Delta intakes, it would be difficult to achieve the water supply reliability goals of the BDCP.

This is nonsense and deliberately misstates the intent of the WDIC to only extract water from the South Delta during the occasional periods of high flow in the Old River though new fish screens that would extract water perpendicular to the flow in the Old River. The current Biological Opinions and other restrictions would no longer be applicable. One of the principal limitations on exports from the South Delta facilities is the permit issued by the U.S. Corps of Engineers. The reconfiguration proposed in the WDIC would render this permit moot but there appears to be no good reason why new permits could not be obtained as necessary, since the WDIC appears to be more environmentally friendly than any other suggested project that both fulfills the basic objectives of the

BDCP and complies with the Delta Reform Act of 2009 and has no impact on navigation. The WDIC will offer real fish benefits such as increased minimum flows and a return to the natural flow pattern through the Delta. An irony of the BDCP proposed project is that it actually makes OMR flows worse in many months, even though moving diversions to the north Delta was supposed to stop those reverse flows in the south Delta. The proponents of the BDCP argue the worsening of OMR occurs only in months when key fish species are not present but that cannot be predicted in advance with any certainty and the entire fish population needs better ecosystem conditions year-round.

31 The Pyke Proposal calls for permeable levees[21] to allow water to enter Sherman Island while
32 avoiding or reducing fish entrainment. Although, in concept, the reduction in entrainment is an
33 excellent feature, the construction of the proposed levees would likely be impractical. Levee designs
34 that include rock and sand to reduce fish entrainment in the facilities are of limited use and success
35 in a project this size. A permeable embankment capable of passing 15,000 cfs at a velocity of 0.002
36 ft/sec (100 times less than existing approach velocity criteria) would have to be about 95 miles long
37 (assuming 15 feet of wetted area). Sherman Island only has about 19.5 miles of existing levees.

The assertion that "construction of the proposed levees would likely be impractical" is unsupported and is incorrect. The proposed permeable embankments have been conceived by geotechnical engineers that have extensive design and construction experience. The proposed cross-section is shown in Figure A1.

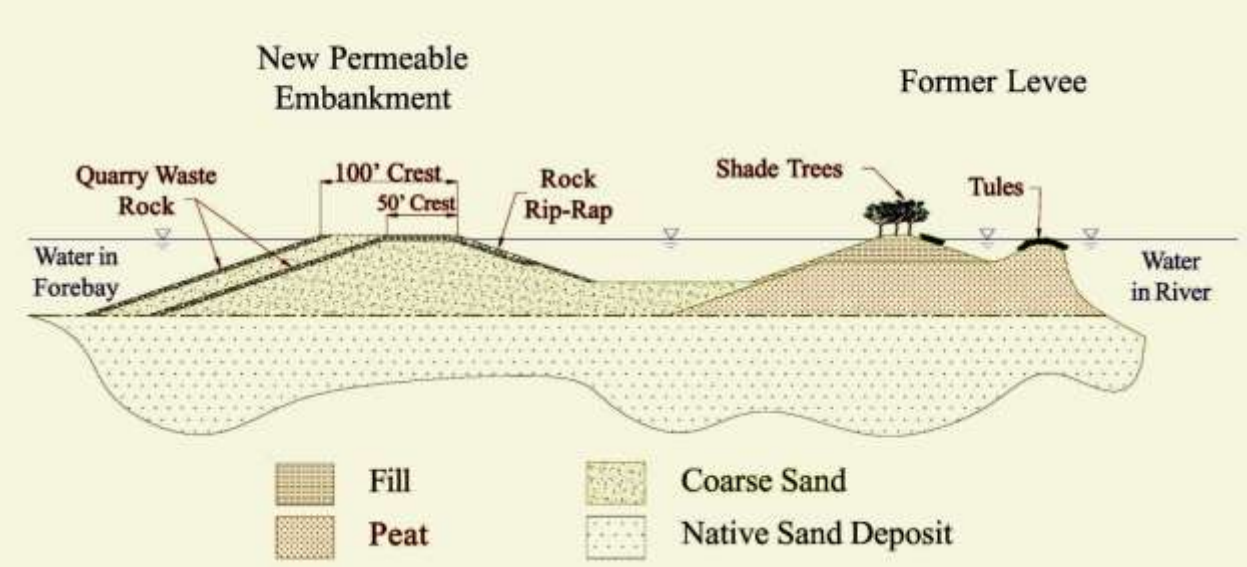


**Figure A1 – Cross Section through Permeable Embankment**

The new permeable embankment would be constructed using hydraulic dredging techniques subsequent to the removal of the peat but before the existing levees are breached. Excavation of the peat adjacent to the existing levee would take place only at times of low water and would be done in short segments with the sand fill that abuts the existing levee being placed immediately in order to control underseepage. Careful site investigations using advanced geophysical techniques would be used to identify possible locations requiring special treatment. The hydraulic dredging techniques that would be used both to remove the peat and place it in the areas designated for new habitat and for borrowing and placing sand and gravel for the permeable embankments are in use world-wide on major port, airport and land reclamation projects and represent the cheapest possible way of moving earth material. The cost per cubic yard of moving and placing earth materials using these techniques can be an order of magnitude cheaper than using trucks or barges.

The new permeable embankments and, where necessary, their foundations would be compacted so that they would be "bullet proof" from any conceivable earthquake loadings. While loose sands and gravels are susceptible to liquefaction, dense sands and gravels are not, and are optimally suited for construction of embankments in seismic areas because they are also "self-healing" in the event that differential displacements tend to initiate cracking. Construction of these new embankments inside the existing levees eliminates any concern about the susceptibility of the existing levees and their foundations to liquefaction or their failure in floods and earthquakes[12] and thus helps enhance the integrity of the eight western islands that serve as the bulwark against intrusion of salt water into the Delta/

It is very much appreciated, however, that the preparers of the EIR/EIS noted that "in concept, the reduction in entrainment is an excellent feature". This is in contrast to the negative reactions of some commentators who have correctly pointed out that Sherman Island lies at a critical location for the passage of both Delta smelt and salmonids, but fail to appreciate that because Sherman Island is also located in an area of large tidal flows, the water extracted would only be a small fraction of the total flow at that point, and also that both the pore sizes and the approach velocities of the water that is extracted would be way below those accepted for conventional fish screens.

The undocumented calculation of approach velocity is also incorrect. Preliminary calculations using the computer program SEEP/W have indicated that inflows of up to

[12] See for instance http://newscenter.berkeley.edu/2010/04/20/delta/

15,000 cfs with maximum approach velocities in the order of 0.002 ft/sec could in fact be obtained using the proposed geometry. The vertical height of the wetted surface would in fact be approximately 50 feet, not 15 feet as illustrated in the following cross section:

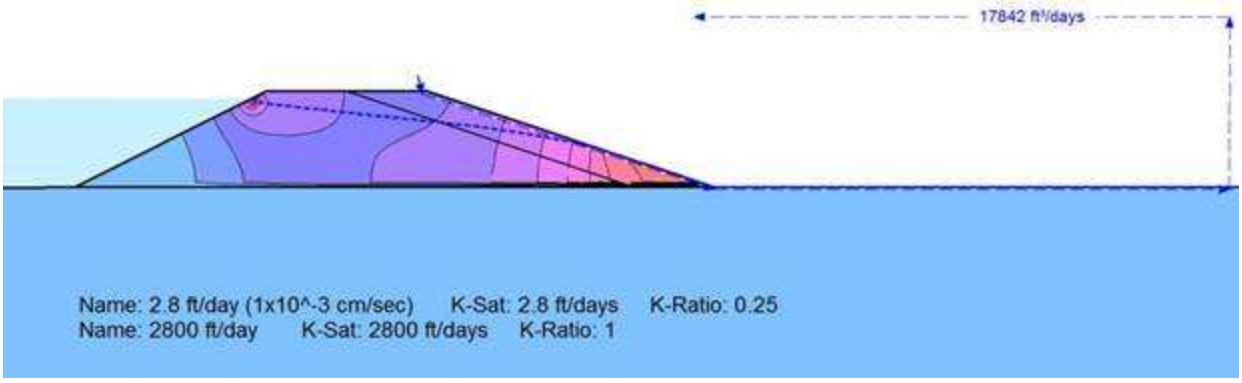


**Figure A2 – SLOPE/W Analysis**

It should also be noted that because of the embankment geometry, the approach velocities are generally much less than the maximum value:

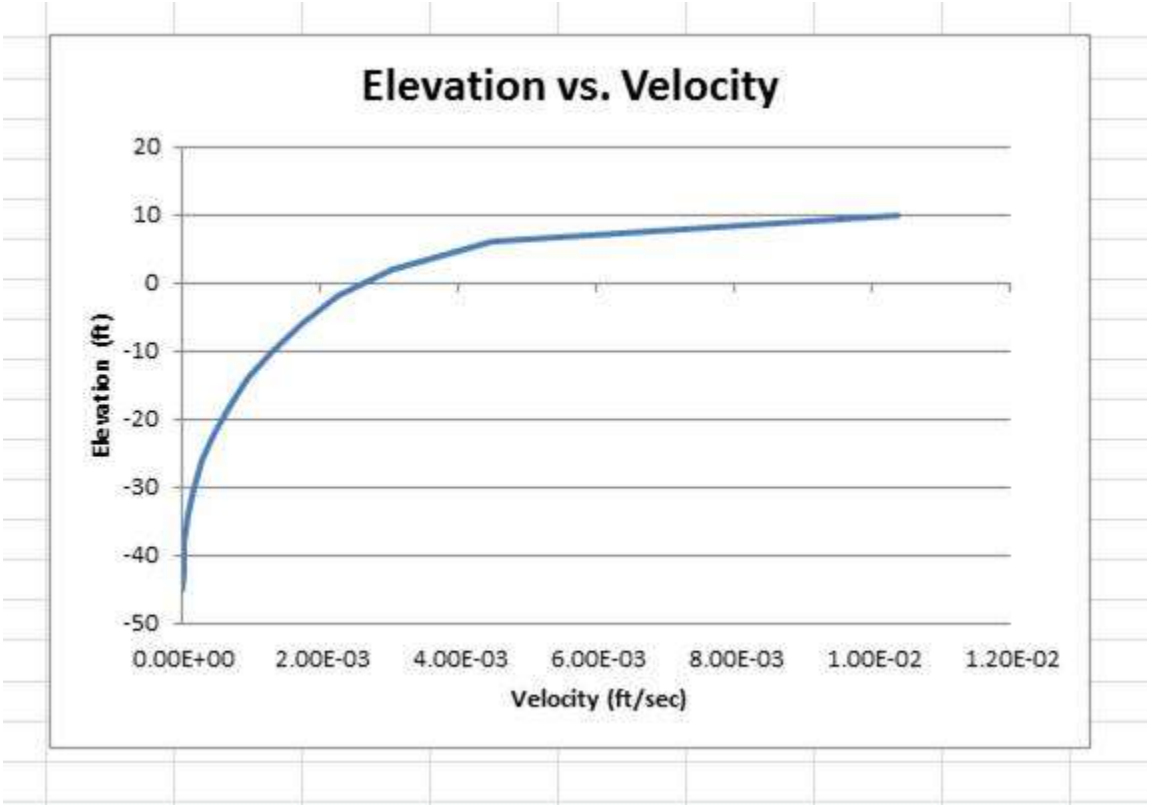


**Figure A3 – Variation of Approach Velocity with Elevation**

The methodology is unclear for controlling diversions through a permeable levee during periods when diversions would not occur in summer and fall to maintain freshwater conditions in the western Delta. If Delta surface water elevations were lower than the surface water elevation within the island, water may "leak" out of the reservoir back into the Delta. If Delta surface water elevations were higher than the surface water elevation within the island, higher salinity water may move through the permeable barrier and increase the salinity of the stored water. Although not included in the Pyke Proposal, this plan may require a dual levee system with an outside permeable barrier to allow water to flow through with limited fish entrainment, as well as an inside solid levee with inlet gates to prevent water from flowing back into the Delta or Delta water mixing with the stored water during periods of higher salinity.

It should be obvious that if the water level inside the Sherman Island Forebay is not drawn down by pumping, the water level inside and outside the permeable embankments will tend to equalize and the water surface inside will rise and fall with the tide. See previous comments regarding salinity control. Whoever prepared the draft EIR/EIS is seeing complications that do not exist.

Inundation of Sherman Island would create its own problems. Constructing a reservoir in the western Delta on peaty soils combined with more saline water will the increase the potential formation of trihalomethanes. Alternatively, should the peat soils be removed during construction, very substantial amounts of excavation, with attendant environmental impacts, would be necessary. Although the actual size of the Sherman Island Forebay has not been described, it would need to be at least several hundred acres to provide an operational buffer and take advantage of off-peak pumping. At some locations on Sherman Island, the peat can be up to 40 feet deep. Assuming the forebay size to be 750 acres and the average depth of peat to be 20 feet, removal of over 653 million cubic yards could be required.

The size of the proposed Sherman Island Forebay is shown in Figure A4 and the figures included in the white paper that describes the WDIC (see http://fixCAwater.com). Note that the potential use of Los Vaqueros Dam is only conceptual and would require negotiation with the Contra Costa Water District. Los Vaqueros is presently restricted to local use only.

The white paper makes it clear that the peat would be removed using hydraulic dredging techniques and used to create tidal and sub-tidal habitat on the western portion of Sherman Island and the submerged portion of Sherman Island that lies further west. While the volumes involved are substantial, the cost of moving this material would be relatively small and it constitutes a win-win, for both water supply and the environment.

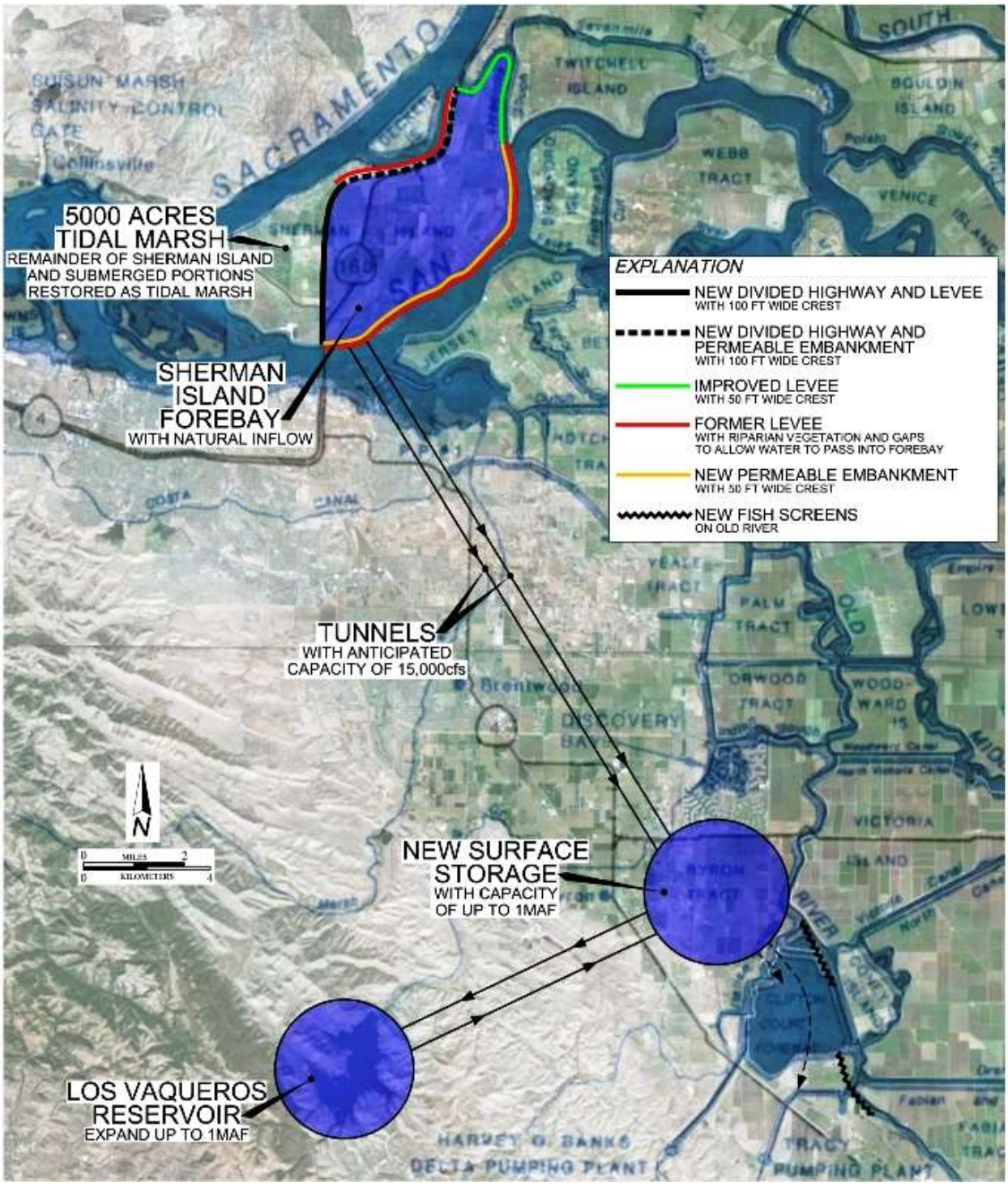


**Figure A4 – The Western Delta Intakes Concept**

Tidal and sub-tidal habitat at and off the western end of Sherman Island are properly located, close to the mixing zone where the saline and fresh water of the estuary meet each other, which is a happy feeding ground for aquatic species, as opposed to many of the proposed restoration areas in the BDCP which are improperly located. See "Tidal Marshes and Native Fishes in the Delta: Will Restoration Make a Difference?" a seminar sponsored by The Delta Science Program, The U.C. Davis Center for Aquatic Biology and Aquaculture (CABA) and the California Nevada Chapter of the American Fisheries Society held at UC Davis on June 10,2013, for more details[13]. Figure A5, taken from the presentation of Carl Wilcox of the California Department of Fish and Wildlife at that seminar shows a concept for restoration of the western end of Sherman Island which is similar to that proposed in the WDIC.


**Figure A5 – Concept for Tidal Marsh on Sherman Island**

[13] http://webcast.ucdavis.edu/llnd/73b1f03e

As noted above, the Pyke Proposal would convert the Delta Cross Channel into a boat lock, which would require removing the existing radial gate structure and replacing it with two sets of miter gates located at each end of the Cross-Channel. The lock would also include a pump system with fish screens needed to fill the locks. This structure could have a significant impact on boating traffic, especially during holiday weekends.

The design of boat locks is commonly accomplished worldwide and should not be beyond the capability of the State of California and its engineering consultants. The reason for having a boat lock is to allow for the passage of boats during active salmon runs when the Cross Channel gates are now sometimes closed. At other times of year the lock could be left open. The net result would be positive for both the salmon and recreational boaters.

In summary, the Pyke Proposal includes components that are similar to alternatives already being addressed within the various formal EIR/EIS alternatives described herein (including EIR/EIS Alternatives 1C, 2C, and 6C), as well as components of alternatives that have been eliminated from further evaluation, including fish screen facilities along Old River (considered in Initial Screening Conveyance Alternative C4). Those aspects of the Pyke Proposal that are not reflected in other proposals—such as the use of permeable levees at Sherman Island, and conversion of the Delta Cross Channel into a boat lock—are not workable. Therefore, the Pyke Proposal was not identified for evaluation in the EIR/EIS.

This summary paragraph is incorrect. There are no components of the WDIC that have been studied and rejected as parts of other alternatives. No legitimate reasons have been given for suggesting that either the concepts of permeable embankments at Sherman Island or a boat lock in the Cross Channel are unworkable. The overall description of the WDIC in this section is incomplete, incorrect and misleading. The preparers dismiss the WDIC without any real quantitative operations and water quality analyses being performed and without any Effects Analysis for fish. The WDIC would provide real substantive benefits for key fish species, unlike the BDCP proposed project that acknowledges harm to key fish species, including many listed under the federal and state Endangered Species Acts. The WDIC would improve all Delta fisheries by restoring more natural flows through the Delta, both in pattern and quantity, by adding food supply where it is most useful, and by extracting surplus water only in periods of high flow through permeable embankments which exceed current standards for fish screens by a factor of 100. This paragraph and the entire treatment of the WDIC must be corrected as part of a legitimate study of alternatives and then a new draft EIR/EIS must be submitted for public review and comment.

oOo

# Appendix B

# Comments on BDCP Public Draft EIR/EIS Regarding Ignoring the Economic Sustainability Plan, Misstating the Facts on Earthquakes and Levees, and the Irrational Content of Chapters 9 and 10

**by Robert Pyke Ph.D., G.E.**

Pyke comments are in blue. Quotes from the EIR/EIS are in black.

## Executive Summary and Chapter 2, Project Objectives and Purpose and Need

Surprisingly, the language of the Executive Summary and of Chapter 2 on Objectives and Purpose and Need, actually cite what might be called "the Earthquake Bogey" as one of the reasons for the BDCP. Although the Earthquake Bogey is widely used by the proponents as a scare tactic to drum up support for the BDCP, the authors of the EIR/EIS might have been better off to completely ignore it since they in fact include no formal evaluation of the impacts of earthquakes on water supply and water quality of levee failures due to earthquakes and therefore do not show that the preferred alternative is any better than the no action alternative.

In ES.2.1, Projective Objectives, (under CEQA) it is stated:

DWR's fundamental purpose in proposing the BDCP 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-Delta, and water quality within a stable regulatory framework, consistent with statutory and contractual obligations. The intent of the BDCP proponents is to formulate a plan that could ultimately be approved by USFWS and NMFS as an HCP under the provisions of ESA Section 10(a)(1)(B) and by CDFW as an NCCP under California Fish and Game Code Sections 2800 et seq.

In both the Executive Summary and in Chapter 2 it is then explained that:

The fundamental purpose is informed by past efforts taken within the Delta and the watersheds of the Sacramento and San Joaquin Rivers, including those undertaken through the CALFED Program and Delta Risk Management Strategy.

No references for these two studies are provided in the Executive Summary but they are provided in Chapter 2. The reference in Chapter 2 is to the DRMS Phase 1 study only. The improper reliance on DRMS is discussed in more detail subsequently.

This statement of purpose is followed by three project objectives and five "additional project objectives" of which one is:

● To make physical improvements to the conveyance system that will minimize the potential for public health and safety impacts resulting from a major earthquake that causes breaching of Delta levees and the inundation of brackish water into the areas in which the SWP and CVP pumping plants operate in the southern Delta.

However, in ES.2.2 Project Purpose and Need (under NEPA) earthquakes are not mentioned.

In ES.9.2 Land-based Resources and Impact Mechanisms there are generally appropriate short discussions of the possible impacts of earthquakes:

Additionally, alternatives with a westside canal alignment (1C, 2C, and 6C) would be more susceptible to earthquake damage and would be more difficult to construct than the eastside canals (1B, 2B, and 6B) due to geologic conditions. Alternatives with tunnels would also be less susceptible than alternatives with canals to liquefaction, seepage, settlement, and damage resulting from seismic events, wave run-up, and erosion during a flood event.

The potential impacts on people and property of the considered alternatives that are related to earthquakes are actually detailed in Chapter 9 Geology and Seismicity but are summarized in Table ES-9. These are discussed on more detail subsequently.

Strangely earthquakes are not mentioned in the listings in Table ES-9 of impacts on water supply, surface water or water quality. So, the considered alternatives, including the preferred alternative, do not in fact have any impact on the potential effects of earthquakes on water supply or water quality?

The DPC's 1995 "Land Use and Resource Management Plan for the Primary Zone of the Delta" is cited in the references in ES.10, but the Economic Sustainability Plan[14] is not. This egregious omission must not only be corrected but the content of the Economic Sustainability Plan must be incorporated in any discussion of the Delta levee system and its vulnerability to earthquakes.

Chapter 2, Project Objectives and Purpose and Need, in the Overview includes seismic risks as one of the "other factors" that exacerbate the conflict between species protection and water exports:

Other factors, such as the continuing subsidence of lands within the Delta, increasing seismic risks and levee failures, and sea level rise associated with climate change, serve to further exacerbate these conflicts.

However, the subsequent Sections 2.5.2 on Water Supply Reliability and 2.5.3 on Delta Hydrology and Water Quality say nothing about earthquakes. Unless it can be shown that potential failure of Delta levees in earthquakes realistically has significant effects on water supply reliability and water quality, the scary language about earthquakes must be deleted.

## Chapter 3, Description of Alternatives, and Appendix 3E, Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies

In Section 3.5.1 on the No Action Alternative, when talking about the inherent challenge in envisioning conditions influencing water supply throughout California, it is said:

As is explained throughout this EIR/EIS, such conditions would likely entail continuing uncertainty of SWP/CVP south Delta exports, continuing vulnerability in the south Delta to long-term reductions in water quality due to sea level rise, and continuing vulnerability resulting from a major seismic event harming Delta facilities so as to temporarily halt export operations. Further discussion of these risks and their potential consequences is incorporated in Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies*.

[14] http://forecast.pacific.edu/desp.html

The introduction to Appendix 3E then starts with an inaccurate characterization of the Delta levee system:

SWP/CVP water supplies conveyed through the Delta pass through a maze of channels and islands created by a system of levees. The construction of levees in the Delta began in the early to mid 19th Century and, in combination with channel dredging/modification, has facilitated uses such as flood control, agriculture, human habitation, navigation and recreation. There are currently over 1,100 miles of levees in the Delta, as well as approximately 230 miles of levees in the adjacent Suisun Marsh. Nearly 70 percent of these levees have been constructed, enlarged and maintained by local landowners or reclamation districts, and are largely or entirely non-engineered (i.e., not constructed in conformance with modern engineering and construction industry standards). These levees consist primarily of materials dredged/excavated from adjacent areas, including soils with high organic content (peat or mud/muck), alluvium and other deposits. Most of the Delta levees are also exposed to water 100 percent of the time, as opposed to river levees which are typically only exposed to water during flood conditions.

Rather than detailing every error in this statement, the reader is referred to Chapter 5 and Appendices C, D and E of the Economic Sustainability Plan for a more correct description of the Delta levee system. I simply note that the Delta levee system has been significantly improved over the last 30 years with major investments from both the State and the local reclamation districts. It is not unreasonable to say that most of the Delta levee system has in fact been reconstructed over the last 30 years in accordance with modern best engineering practices. In fact, improvement of the entire Delta levee system to meet the Delta-specific PL 84-99 standard is now within reach.

Section 3E.1.1 of Appendix 3E then goes on to say:

The purpose of this appendix is to describe the potential risks to SWP and CVP water supplies that could result from seismic activity and/or climate change absent changes to the Delta that would improve the reliability of water deliveries to the SWP and CVP. A broad consensus has emerged among scientists that the status quo of the Delta and water delivery system through the Delta is no longer viable (Lund et al. 2008; Delta Vision 2008). The Interim Federal Status Update for the California Bay-Delta: 2011 and Beyond reached this same conclusion. While all of these evaluations cited a myriad of stressors that contribute to the fragility of the Delta, seismic and climate change risks appear to be among the greatest risks for catastrophic interruptions in operation of water supply facilities in the Delta.

Note that this is all in the context of the no action alternative. If this background were valid it would presumably also be relevant to evaluation of the relative impacts on water supply and water quality of the considered alternatives, but no such evaluation is made in this public draft EIR/EIS. A "broad consensus has emerged among scientists" is an elegant phrase but in general such phrases are meaningless and in this particular case the phrase is not relevant because although the evaluation of the likely response of the Delta levee system to earthquakes requires input from competent geologists and seismologists with relevant experience, it is largely a geotechnical and earthquake engineering question. In fact, all three of the studies that are cited are out-of-date and incorrect. Again, reference should have been made to the Economic Sustainability Plan and the content of the Economic Sustainability Plan must be the basis for any present judgment on the vulnerability of the Delta Levee system, unless that content is refuted. That might be difficult because the Economic Sustainability Plan generally survived peer review with high marks, whereas the Delta Risk Management Study, not cited here but otherwise cited in the public draft EIR/EIS on the same issues, did not. These flaws must all be corrected and a new draft must then be submitted for further public review and comment.

Confusingly this section also says:

Refer to EIR/EIS Appendix 5B, *Responses to Reduced South of Delta Water Supplies*, for a discussion of the potential effects on the human and natural environment that would occur if SWP and CVP water deliveries are disrupted for an extended period of time.

Although the following section, 3E.1.2, then says:

Section 3E.2 also gives an overview of how the degradation of water quality at the intakes to those facilities could affect the viability of the SWP and CVP to supply water to those systems' users. (But note that 3E.1.2 contains incorrect references to the subsequent section numbers.)

**Section 3E.2.3** contains a major treatise on Seismic Risks that is 13 pages long and includes some nice figures that were omitted from the initial release of the public draft but were included in an errata. It should nonetheless be noted that the titles of Figures 3E-7 and 3E-8 are not consistent with their content and that the sources of the data in those figures are not provided. In particular, the source of the claimed greater than magnitude 6.1 earthquake near the Delta in 1889 should be provided.

The initial description of the geology of the Delta is reasonably good but then erroneous material from the introduction to the appendix is repeated:

As described in Section 3E.1, Introduction, a series of artificial levees has been constructed within the Delta and Suisun Marsh for purposes including flood control, habitation and agriculture. These levees are mostly non-engineered structures comprised of materials dredged/ excavated from adjacent areas (e.g., organic soils and alluvial deposits). Engineered levees (or "project levees") within the Delta were constructed as part of an authorized federal flood control project for the Sacramento and San Joaquin River systems. Such facilities typically consist of engineered fill, which meets associated standards such as proper composition, placement methodology, compaction and drainage, and may be capped (or armored) with material such as appropriately sized riprap.

In fact, although the project levees in the Delta were constructed to have generally adequate cross sections, the composition of both their foundations and the materials within the levees may be more suspect than that of the non-project levees and the non-project levees that have been improved over the last 30 years to the Delta-specific PL 84-99 standard may in fact be more robust than some of the project levees. No source or reference is cited for the erroneous language above. Again, reference should have been made to the Economic Sustainability Plan.

Section 3E.2.3.2 on seismic setting is very good and is properly referenced, although the distances from active faults that are given would be more meaningful if they were all to the primary zone of the Delta rather than to the Suisun Marsh. Section 3E.2.4.1 and 3E.2.4.2 on ground rupture and ground acceleration are also fine, although values for two key ground motion parameters are given only for stiff soil and "firm rock" conditions. Because the soft peat soils will significantly modify ground motions and, in particular, will attenuate the higher peak accelerations, the numbers that are provided are of limited value.

Section 3E.2.4.3 on liquefaction and related effects is generally fine although this statement is questionable:

The identified potential for liquefaction and related effects in the Delta area ranges from low to high, with alluvial soils typically exhibiting higher potential and peat/organic soils generally exhibiting lower potential.

In fact, the potential for liquefaction is likely low throughout the Delta. The reference to alluvial soils should be to recent alluvial soils since the potential for liquefaction of alluvial soils diminishes markedly with age, and peat/organic soils do not have a lower potential for liquefaction, they have no potential for liquefaction.

Section 3E.2.5 on the potential for seismic-related levee failure is almost entirely erroneous although it is correctly noted that the Delta levee system might be subjected to greater seismic loadings in the future than have been felt to date. However, Section 3E.2.5.1.3 on ground shaking / liquefaction and related effects largely relies on the DRMS Phase 2 report that was published in 2009 but at best reflects 2005 conditions in the Delta. A more complete discussion of the limitations of the DRMS Phase 1 study is included in the Economic Sustainability Plan and Appendix E of the Economic Sustainability Plan has a much more informed and current discussion of the relevant issues. Only a key segment of the discussion in the Economic Sustainability Plan is reproduced here:

Although led by very competent principal investigators, the DRMS effort was always hampered by being schedule-driven rather than quality driven. The DRMS Phase One report was extensively reviewed, including a review by an independent review panel (IRP) assembled by the Cal-Fed Science Program. The reviews were generally critical of the study. After revisions had been made, the IRP review concluded that "the revised DRMS Phase 1 report is now appropriate for use in DRMS Phase 2 and serves as a useful tool to inform policymakers and others concerning possible resource allocations and strategies for addressing risks in the Delta." But the IRP expressed concerns:

"*This conclusion, however, is subject to some important caveats. First, the IRP cautions users of this revised DRMS Phase 1 report that future estimates of consequences must be viewed as projections that can provide relative indicators of directions of effects, not predictions to be interpreted literally. Second, anyone using the results of the DRMS scenarios must be aware that ecosystem effects are not fully captured in the analysis....*"

Although the DRMS developed a good framework for assessing risks to the Delta levees, the effort had data gaps that were never filled, as acknowledged in the note on page 1-1 of the report. Gaps such of these in data and knowledge tend to drive the

estimates of fragilities down, and the risks up. However, despite the warning from the IRP, the numerical results from the DRMS Phase 1 report are widely quoted and used in other studies, painting a more pessimistic picture of the Delta levee system than is warranted. Just one example of the questionable results is presented by the last map in the DRMS Executive Summary depicting a high probability of flooding for Sargent-Barnhart Tract, which houses Stockton's most expensive neighborhood, known as Brookside. This tract has had modern levees that meet 200-year urban standards and is shown as having a mean annual probability of failure of greater than 7 percent, while the adjacent Wright-Elmwood Tract, which is undeveloped and has relatively poorer levees, is shown as having a mean annual probability of failure of only 1-3 percent. In addition, recent improvements have been made to many urban levees in addition to recent and on-going improvements to non-urban levees under the Delta levees subventions and special projects programs and these improvements are not reflected in the DRMS Phase 1 assessment.

It is incomprehensible that the EIR/EIS would rely on the DRMS study in view of the peer review panel comments and its obvious shortcomings and it is equally incomprehensible that no reference be made to the Economic Sustainability Plan.

Because the hazard to the Delta levee system is so overstated, the subsequent section 3E.2.6.2, potential impacts to water quality / supplies from seismic levee failure, is largely meaningless. But in particular the following statement is misleading:

For the purposes of this appendix, it is assumed that in some instances, restoration of the export of Delta water supplies after a major seismic (or flood) event could be longer than the approximate one year period variously attributed to the DRMS, Phase 1 Risk Report. Because of the potential extent of levee slumping and liquefaction, the possible competition for repair materials and labor, the time required to pump saline water from all (or most) flooded islands, and the time needed to flush saline water from the south and central Delta, restoration of water exports from Jones and Banks Pumping Plants could require up to three years.

Not only does this statement ignore the more recent findings of the Economic Sustainability Plan, it ignores ongoing work on emergency preparedness being carried out by the Department of Water Resources (DWR) in association with the water exporters, and it ignores the DWR's own findings regarding the time that it would take to flush out the Delta as reported by Dr John McGeorge to a meeting of the BDCP

Steering Committee on July 28, 2010, and subsequent studies conducted for the DWR by Dr McGeorge and Dr Martin McCann. These studies suggest that even in a 20 flooded islands scenario, a worse than worst case scenario with an exceedingly low probability of occurrence, the Delta would likely flush out within several months, and at worst within six months. The failure of this draft EIR /EIS to reference these studies is an egregious omission which must cast doubt on the validity of the entire document.

Appendix 3E concludes by saying:

The Delta currently faces significant risks from catastrophic levee failure and potential water export and in-Delta water supply interruptions. In addition, the Delta faces long-term progressive risks of levee failures and diminishing operational efficiency and supply reliability from sea level rise and changes in Delta inflow hydrology driven by climate change. Continuation of existing management and operation of the Delta will increasingly expose Delta water users and those that depend on water exported from the Delta to risks of water supply interruption and diminishing water supply reliability over time.

This is hyperbole that is unsupported by the facts. The recommendations of the Economic Sustainability Plan, if implemented, would result in a more robust Delta levee system in the face of all of extreme earthquakes and floods and rising sea levels.

**Appendix 5B.2.2** repeats much of the erroneous material that is in Section 3E.2.3 but introduces some new errors such as:

The majority of Delta Levees are non-project levees, built and improved by local interests, primarily to drain islands and tracts in the Delta so they could be put into agricultural use (California Department of Water Resources 2012b); they also serve other purposes, including preservation of water quality and conveyance for export water flows. These levees were built without State and/or federal assistance but have status under California Water Code. The non-project levees are under the jurisdiction of public agencies (reclamation districts) and eligible for State assistance due to their acknowledged special benefits to State interests.

Regardless of the exact origins of the Delta levees, they have been greatly improved, effectively reconstructed, in recent times as a result of the joint efforts of the local

reclamation districts, which serve as agents of the State in carrying out the State's responsibilities relative to Federal lands transferred to the State under the provisions of the Swamp and Overflowed Lands Acts. Further, since 1982, the State has contributed significant funding under both the subventions and special projects programs to make significant improvements to the Delta levee system with the overall goal of achieving the Delta-specific PL 84-99 standard that had been agreed to in 1982 by the State and federal governments. In spite of the negative propaganda on Delta levees that emanates from the more political elements within DWR, the DWR staff members that are responsible for these Delta levee programs are justifiably proud of the progress that has been made. It is preposterous to suggest that these are private levees built and improved solely by local interests.

Although the following discussion refers to a breach and flooding that is not attributed to earthquake loading, it is noted as an example of the limited impact that flooding of a single large island has on water exports:

Although the condition of the Delta levees is improving due to the investment of State funds, the failure of an individual levee could happen at any time because the Delta islands are below sea level. Such a sunny day failure occurred in 2004 on Middle River, which flooded Upper and Lower Jones Tract, inundating 12,000 acres of farmland with about 160,000 acre feet (AF) of water. Following the levee break, Delta export pumping was curtailed for several days to prevent the intrusion of saline water into the Delta. Water shipments down the California Aqueduct were continued through unscheduled releases from San Luis Reservoir. Also, Shasta and Oroville reservoir releases were increased to provide for salinity control in the Delta (URS Corporation and Benjamin & Associates 2008a).

Interruption of exports can be further limited by improved emergency preparedness and response and the EIR /EIS, even should multiple islands flood. This is properly acknowledged in section 5B.2.2.3 but the outdated scenarios described in section 3E.2.6.2.1 have not been updated.

## Chapter 5, Water Supply

Chapter 5 is supposed to discuss and evaluate the impacts on water supply, water supply reliability being one of the principal purposes of the BDCP, of doing nothing, the no

action alternative, or constructing the various considered alternatives. The language in this chapter also repeats errors made elsewhere. In Section 5.3.3.1, No-Action Alternative, for instance, it is stated that:

The construction of levees in the Delta began about 150 years ago. Delta levees are vulnerable to failure because they continuously hold back water and most were built with soils dredged from nearby channels and were not subject to engineering standards. Because the land on many Delta islands is currently 25 feet or more below sea level, deep flooding could occur at any time due to a levee failure event. Such an event could degrade the quality and disrupt the availability of Delta water (California Department of Water Resources 2012).

The referenced report is ———. 2012. *The State Water Project Final Delivery Reliability Report 2011*. June. Prepared by AECOM. This report is not authoritative on the history or current status of the Delta levee system. Again, reference should have been made to the Economic Sustainability Plan and this and all similar errors must be corrected in a revised draft of the EIR/EIS that is resubmitted for public review.

Subsequently this section states that:

According to the Delta Risk Management Strategy (DRMS), Phase 1: Risk Analysis (California Department of Water Resources 2007), the risk of levee failure in the Delta is significant. Since 1900, 158 levee failures have occurred (California Department of Water Resources 2008b). Some islands have been flooded and recovered multiple times. A few islands, such as Franks Tract, have never been recovered.

See above for the limitations of the DRMS Phase 1 study. The actual rate of failure is shown in Figure B1, prepared by DWR and taken from the DRMS Phase 2 report. DWR staff are justifiably proud of the improvement that has resulted in the Delta levee system as a result of programs that they have managed, however, the DWR data includes a number of levees failures in 1997 that were upstream of the Delta proper or were of levees that are not currently being maintained, and if these are deleted, the current rate of levee failures is even lower, as shown in the correction in red ink in Figure B1 that has been made by the writer.

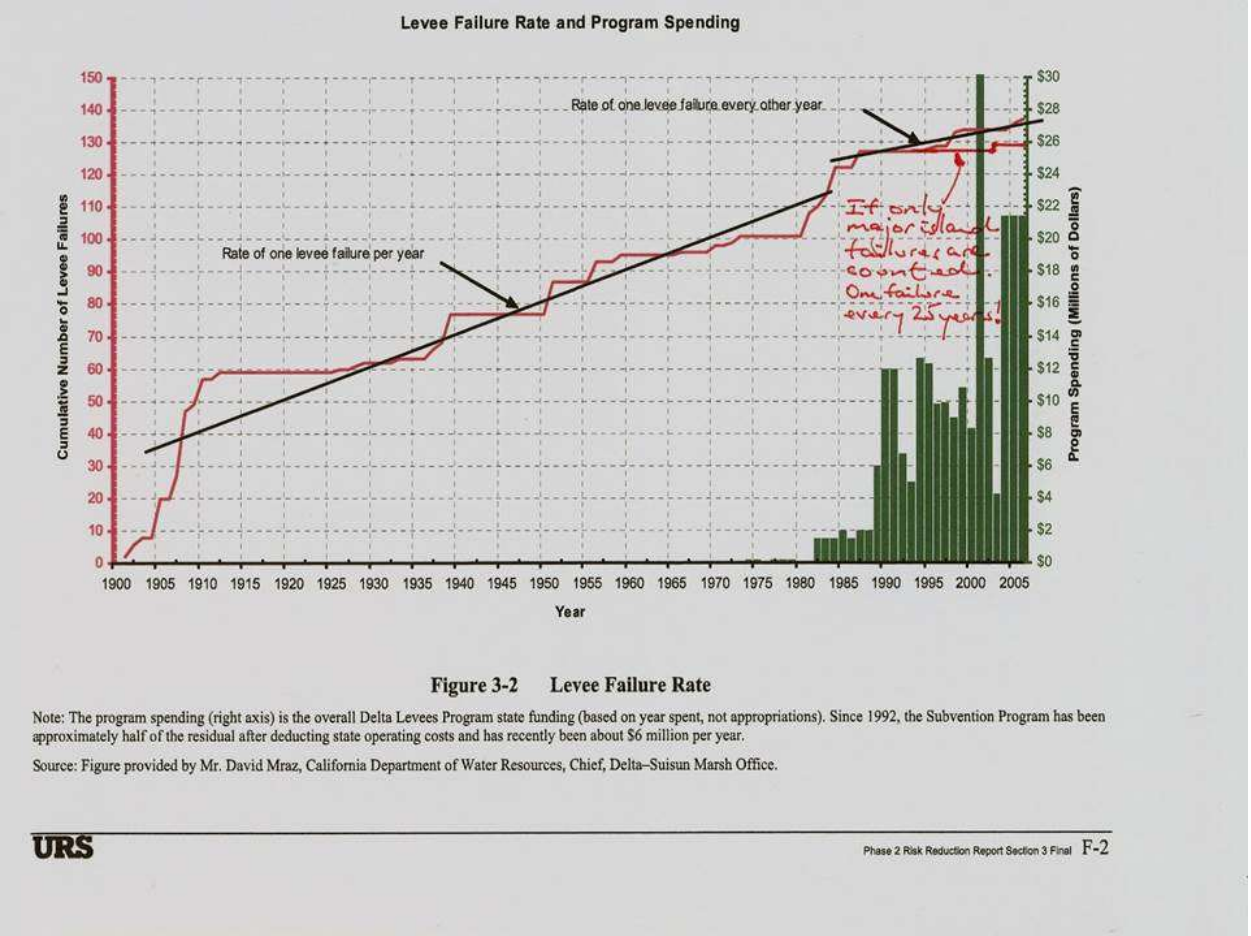


**Figure 3-2 Levee Failure Rate**

Note: The program spending (right axis) is the overall Delta Levees Program state funding (based on year spent, not appropriations). Since 1992, the Subvention Program has been approximately half of the residual after deducting state operating costs and has recently been about $6 million per year.

Source: Figure provided by Mr. David Mraz, California Department of Water Resources, Chief, Delta–Suisun Marsh Office.

URS Phase 2 Risk Reduction Report Section 3 Final F-2

**Figure B1 – Levee Failure Rate**

Then under the sub-heading Seismically Induced Levee Failures it is stated that:

The Delta is in an area of moderate seismic risk. A moderate to strong earthquake could cause simultaneous levee failures on several Delta islands, with resultant island flooding. The potential for levee failure to result from a seismic event was the subject of analyses conducted by the CALFED program and Phase I of the DRMS. In 2002, the Working Group on California Earthquake Probabilities estimated that an earthquake of magnitude 6.7 or greater has a 62 percent probability of occurring in the San Francisco Bay Area before 2032, and could cause 20 or more islands to flood at the same time (URS Corporation and Benjamin & Associates 2009). As discussed in the DRMS analysis, a major earthquake could flood many islands simultaneously, which would result in the influx of saline water into the Delta and could require the immediate cessation of water exports. The subsequent repair of levee breaches after the earthquake could require several months, after which the Delta would have to be restored to a fresh condition. Freshening the Delta could involve releases

from upstream reservoirs to flush saline water from the Delta. Emergency provisions of existing laws may be used in order to provide the ability to pump water for SWP and CVP to avoid or minimize adverse health and safety effects resulting from the reduced water supply conditions related to a seismic event.

The analyses conducted by the CALFED program and DRMS Phase 1 and the 2002 estimates of the Working Group on California Earthquake Probabilities are all out of date. It is true that the updated Working Group probabilities are not significantly different, but they apply to the Bay Area and not to the Delta. And, flushing out of the Delta is not directly linked to the repair of levee breaches.

Under the sub-heading Flood-Related failures, this section correctly states that:

Storm-related flooding tends to fill the Delta and Suisun Marsh with fresh water, thereby making disruption of the export supply less likely.

And that:

… for most single-island events, the effect on Delta water exports would generally be limited to a relatively short interruption, until it is confirmed that the resumption of exports would not draw saline water into the Delta.

But it then refers to the DRMS Phase 1 study again and to the erroneous discussion in Appendix 3E.

However, in spite of all this scaremongering about earthquakes and levee failures, the words seismic and earthquake are not mentioned in the discussion of the impacts of the various considered alternatives. In particular, under Alternative 4, the preferred alternative and Impact WS-2: Change in SWP and CVP Deliveries it is claimed that:

The addition of the north Delta intakes and changes to Delta regulatory requirements under all four Alternative 4 scenarios provide operational flexibility compared to deliveries under Existing Conditions and the No Action Alternative.

But there is no claim that water supply reliability is increased as a result of the reduction in the risk of levee failures due to earthquakes or any other cause. Perhaps this is appropriate since a substantial portion of the planned exports would still be from the South Delta, especially in drier years (see Appendix 5B Section 5B.4.2.1). However, all the out-of-date and inflammatory language relative to these impacts for the no action alternative should be removed in any case, and if there is a valid argument for increased water supply reliability as a result of the reduction in through Delta conveyance, this argument should be documented using current references including the Economic Sustainability and spelled out for the Action Alternatives. Neither CEQA nor NEPA requires the inclusion in an EIR/EIS of superfluous or erroneous information that only makes it harder to read the document, so that if there is a valid reason for retaining any of this material, it should also be edited to not only include up-to-date references but also for internal consistency. In either case, omitting this material or justifying its inclusion, the draft EIR/EIS must then be recirculated for additional public review and comment.

## Chapter 6, Surface Water

This chapter also contains some historic data on the Delta levee system, repeats some of the material on possible levee failure mechanisms from other chapters and adds some new material. Some of this material is fine, but the discussion is disjointed and makes frequent reference to Chapter 9. To the extent that it is relevant to the EIR/EIS, it would be desirable to consolidate all the material on levees and to update it with appropriate references in a single location. The principal discussion on seismic hazards is included in Section 6.1.4, Delta Levee Failure Risks:

Seismic activity may result in levee failure due to liquefaction of the levee or its foundation materials, resulting in excessive deformation or undesirable transverse cracks. No observed Delta levee failures have been directly linked to earthquake loading. However, it should be noted that levees in the Delta area have not yet been subjected to strong earthquake loading, as described in Chapter 9, *Geology and Seismicity*. Primarily because of the potential for liquefaction of levee embankments and foundations, it is assumed that an earthquake in the area would pose a significant threat to the Delta water supply, agriculture, and other land uses that rely on intact levees. Areas of reported levee problems in the Delta are shown in Figure 6-6. As described in Chapter 9, *Geology and Seismicity*, it is generally believed that the primary seismic hazards in the Delta consist of faults and events primarily in the Western Delta and Suisun Marsh, and thus it is unlikely that the entire

Delta region will be subjected to large motions from any single earthquake. Because of the large areal extent of the Delta and the varying distances from seismic sources, the Delta will experience different levels of ground shaking and potential associated geologic hazards. In addition, the Delta is underlain by blind thrust faults that are considered active or potentially active, but they are not expected to rupture to the ground surface.

This discussion overstates the significance of liquefaction as a failure mechanism and the data shown in Figure 6-6 is no longer very relevant. Again, reference should have been made to the Economic Sustainability Plan, which puts the hazard due to liquefaction in proper perspective.

And again, in discussing impacts seismic questions are only mentioned in connection with the no action alternative by reference to Appendix 3E – there is no mention of the words seismic or earthquake in discussion of any of the considered alternatives. Unless the considered alternatives can be shown to reduce the impact of earthquakes on surface water issues, the discussion of seismically-induced levee failures should be removed from this chapter and then a new draft must be circulated for public comment.

## Chapter 8, Water Quality

In the 791 pages of this chapter there is no mention of the words seismic or earthquake. Given that elsewhere in this draft EIR/EIS a big deal is made of potential levee failures due to earthquakes on both water supply and water quality, this is surprising. There is no claim that water quality is improved as a result of any reduction in the risk of levee failures due to earthquakes for any of the considered alternatives. Thus, either all the out-of-date and inflammatory language relative to these impacts elsewhere in the document should be removed, or if there is a valid argument for improved water quality as a result of the reduction in the risk of levee failures due to earthquakes or any other cause, this argument should be documented using current references including the Economic Sustainability Plan. A revised draft must then be circulated for public comment.

## Chapter 9, Geology and Seismicity

This chapter is misnamed. The geology and seismicity of the Delta region is what it is and will not be impacted by any of the considered alternatives or by doing nothing. The chapter is actually about the impacts on people and property of various natural hazards, including earthquakes, and how they might be affected by the considered alternatives relative to doing nothing. It would make more sense for Section 9.1, Affected Environment / Environmental Setting, along with Appendix 3E, to be combined and inserted as a an additional chapter early in the document as background to the subsequent evaluation of impacts in multiple categories.

With one glaring exception, the background provided in Section 9.1 is satisfactory to good. The glaring exception is that the treatment of liquefaction is simplistic and fails to take into account recent findings from geotechnical engineering including material that is covered in the Economic Sustainability Plan[15]. The sub-section on Site Soil Amplifications is also overly simplistic and the reference to CALFED is way out-of-date. More credible work on site amplification was in fact conducted as part of the DRMS study but this is not mentioned. More detailed comments are as follows:

In Section 9.1.1.4.3, Liquefaction, under the sub-heading Historical Occurrences of Liquefaction, three example of observed settlement in the 1906 earthquake are given but there is no evidence that these settlements were caused by liquefaction and in fact it is more likely that they were caused by distortion and settlement of the embankments that were involved:

Ground manifestation associated with liquefaction during the 1906 San Francisco earthquake was reported in three locations within and in the vicinity of the Plan Area. Youd

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[15] See also the comments of the Delta Independent Science Board "Chapter 9 appears to say nothing about these findings. As its leading example of liquefaction-hazard mapping the chapter instead uses findings from the year 2000 (page 9-22, Fig. 9-6). These findings were not built into DRMS because "all aspects of that analysis, the seismic hazard model and, the fragility analysis are out of date" and because several principals in the 2000 work advised against using it (URS Corporation and Jack R. Benjamin & Associates Inc., 2008, App. B, page 6-1). The depiction of hazard in Figure 9-6 contrasts with that by the DRMS study. For instance, Figure 9-6 of Chapter 9 shows all Sherman Island levees as having high potential for damage from liquefaction, while DRMS Figure 6-37c assigns a majority of Sherman Island's levees to the lowest of three categories of vulnerability to earthquakes (URS Corporation and Jack R. Benjamin & Associates Inc., 2008)."

and Hoose (1978) reported settlements up to 11 feet, south of Fairfield along the Southern Pacific Railway through the Suisun Marsh; ground settlement of several inches was reported at the Southern Pacific Bridge Crossing over the San Joaquin River in Stockton; and settlement of 3 feet was reported at a bridge crossing over Middle River approximately 10 miles west of Stockton (Youd and Hoose 1978). No ground manifestations were reported in the Delta and Suisun Marsh during the more recent 1989 Loma Prieta earthquake (Knudsen et al. 2000).

And, under the sub-heading Conditions Susceptible to Liquefaction it is stated:

Along the Delta and Suisun Marsh levees, loose silty and sandy soil are present in the levee embankments and in the underlying foundation soil. When saturated, such soil is susceptible to liquefaction during earthquake events. Since the levees are constructed (not naturally occurring), the loose, silty and sandy soil comprising the levees are likely to be more continuous than those present in the foundation of the levee (CALFED Bay-Delta Program 2000). Areas with larger lateral continuity of liquefied soil are expected to experience more ground failure. The available data also indicate that the levees protecting Sherman Island have extensive layers of liquefiable sandy soil, more so than other levees in the Delta and Suisun Marsh (CALFED Bay-Delta Program 2000). See Chapter 6, *Surface Water*, for more information.

This exaggerates the likely impact of liquefaction. See the Economic Sustainability Plan for a more realistic picture. It should also be noted that to the extent the reported data on Sherman Island is correct, most of Sherman Island is actually owned by the State and the levees on Sherman Island are project levees and are therefore the direct responsibility of the State per the Paterno Decision.

Under the sub-heading Liquefaction Hazard Mapping reference is made to a CALFED study by Torres et al. Not only are such mapping exercises of limited value but the study by Torres et al. would normally be assumed to have been superseded by both the DRMS study and the later study by Real and Knudsen which is referenced under Impact GEO-8. But, see the discussion below of Impact GEO-8 for the limitations of the Real and Knudsen study and the inferences that can be drawn from the five soil borings that are shown in Figure 9-4.

In Section 9.1.1.4.4, Areas Susceptible to Slope Instability, under the sub-heading Historical Occurrences of Landslides and Levee Failure the same misleading data about levee failures is repeated. See the Economic Sustainability Plan for

updated information:

Since 1900, at least 166 levee failures or breaches have been reported that resulted in flooding the Delta and Suisun Marsh islands and tracts. Figure 6-13 of Chapter 6, *Surface Water*, shows the historical and approximate locations of island flooding in the Delta. None of these levee breaches is believed to have been directly caused by earthquake ground shaking. The probable causes of the levee breaches have been water overtopping levees during high tides, erosion, piping and seepage though the levee embankment and foundation soils, and burrowing animals. (Delta Stewardship Council 2011)

See Figure B1 and the Economic Sustainability Plan for the truth about levee failure rates.

Curiously under Section 9.3.1 Methods for Analysis, Section 9.3.1.2.3, Liquefaction, talks about detailed assessment of liquefaction using geotechnical data but no results are actually reported, either in the early sections of this chapter or under Impact GEO-8:

Liquefaction hazard was assessed using the available soil data from the CERs. The assessment was performed primarily through correlations with basic soil characteristics (soil type, water content, depositional environment, and age). For areas where adequate soil engineering data were not available, additional analyses were performed, including assessments based on SPT sampler penetration blow-counts (SPT blow-counts), Cone Penetration Test (CPT) measurements, and shear-wave velocity of the soil. The liquefaction analysis (for areas where adequate soil engineering data were available) was performed for earthquake ground motions with return periods of 475 years and 975 years, corresponding to 10% and 5% probabilities of being exceeded in 50 years, respectively. The controlling earthquake magnitudes were determined from the results of the seismic study (California Department of Water Resources 2007a) and/or the U.S. Geological Survey National Seismic Hazard Mapping Program.

Under **Impact GEO-8**: Loss of property etc. resulting from seismic-related ground failure (including liquefaction) during operation of water conveyance features; for Alternate 4, the preferred alternative, this draft EIR/EIS relies heavily on a CGS research report by Real and Knudsen that was funded by the USGS Earthquake Hazards Reduction Program. This is a really esoteric unpublished research report that should not be used for anything in the real world! The discussion under GEO-8 is disconnected from the discussion about liquefaction in the early sections of this chapter, although it still refers to Figure 9-6 which references the earlier CALFED report referenced in the

introduction. In any case, both the CALFED report and the CGS research report lack credibility and conclude that the sands underlying the peat, which are at least 7,000 years old, are susceptible to liquefaction. They reach this conclusion because they have poor data from old borings and have not made the necessary correction to the standard simplified methods of analysis for the effects of aging. The CGS report is in fact ludicrous in that it attempted all kinds of fancy statistics using spotty data and overly simplified methods of analysis including use of an index of liquefaction potential that, to my knowledge, has never been used in practice. Guidance on the real world evaluation of the potential for liquefaction should have been sought and reference made to more credible publications such as Pyke (2001)[16] and all discussion of liquefaction should be revised in accordance with Semple (2013)[17] and Pyke (2014)[18]. In fact, the most interesting thing relative to liquefaction in this draft EIR/EIS is Figure 9-4, which shows the logs for five of DWR's new borings. There does not appear to be a consistent loose sand layer under the peat that is susceptible to liquefaction. There is some loose sand on top of the peat because the borings were drilled overwater but that is of no consequence. When additional and adequate site specific data is available, site-specific evaluations of liquefaction must be conducted and reported in full and then a revised draft EIR/EIS must be re-submitted for public comment.

However, even relying on excessively conservative evaluations the draft EIR/EIS concludes:

Figure 9-6 shows that the Alternative 4 alignment has no substantial levee damage potential from liquefaction in its extreme northern part and low to medium-high levee damage potential throughout the remainder.

And, regarding other potential effects of liquefaction it says:

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16 http://nebula.wsimg.com/8159d4ca541d959b25827ba0758ab20a?AccessKeyId=4504398EC594B8B6E51C&disposition=0&alloworigin=1

17 http://nebula.wsimg.com/23f7a64a9c52b32bbbdd3b015e7e3395?AccessKeyId=4504398EC594B8B6E51C&disposition=0&alloworigin=1

18 http://nebula.wsimg.com/38315fde3c0b9a71c5083c7e68c8071e?AccessKeyId=4504398EC594B8B6E51C&disposition=0&alloworigin=1

Because the tunnel invert would be at depths of 100–160 feet bgs, the potential effect on these facilities due to liquefaction is judged to be low. However, the surface and near-surface facilities that would be constructed at the access road, intake, pumping plant, and forebay areas would likely be founded on liquefiable soils.

That is excessively conservative, however, the draft then goes on to say under NEPA Effects:

During final design, site-specific potential for liquefaction would be investigated by a geotechnical engineer. In areas determined to have a potential for liquefaction, a registered civil engineer or California-certified engineering geologist would develop design measures and construction methods to meet design criteria established by building codes and construction standards to ensure that the design earthquake does not cause damage to or failure of the facility.

And:

Conformance to these and other applicable design specifications and standards would ensure that the hazard of liquefaction and associated ground movements would not create an increased likelihood of loss of property, personal injury or death of individuals from structural failure resulting from seismic-related ground failure along the Alternative 1A conveyance alignment during operation of the water conveyance features. Therefore, the effect would not be adverse.

Thus, a non-existent problem is first created and then dismissed, even though under Alternate 4 significant conveyance is still through-Delta and the BDCP does nothing to improve the levees which would presumably be impacted by liquefaction of the kind that they describe. Further, this draft EIR/EIS is in fact internally inconsistent because if there was any significant risk of levee failures due to liquefaction along the tunnel alignment, surely a registered civil engineer or California-certified engineering geologist would be able to develop design measures and construction methods to meet design criteria established by building codes and construction standards to ensure that the design earthquake does not cause damage to these levees, just as these esteemed professionals would be able to do that for access roads, intakes, pumping plants, and forebay areas.

But, most importantly, there is a glaring omission in that under **Impact GEO-3**, Loss of property, personal injury, or death from ground settlement during construction of

water conveyance features, while there is discussion of the possible "creation of large voids and /or sinkholes above the tunnel" there is no mention of the distinct possibility that loss of ground resulting from tunneling activities, which, if it occurs in the vicinity of levees, might cause slumping and even failure of levees with consequent flooding of one or more islands. While there are extra measures that might be taken to limit or prevent loss of ground at critical locations, these are more limited at channel crossings because it is not practical to use dewatering as an aide. At a minimum, these measures should be described and any residual risk should be quantified. The existing language that is reproduced below is grossly inadequate.

***NEPA Effects:*** This potential effect could be substantial because settlement or collapse during dewatering could cause injury of workers at the construction sites as a result of collapse of excavations. The hazard of settlement and subsequent collapse of excavations would be evaluated by assessing site-specific geotechnical and hydrological conditions at intake locations and adjacent pumping plants, as well as where intake and forebay pipelines cross waterways and major irrigation canals. A California-registered civil engineer or California-certified engineering geologist would recommend measures in a geotechnical report to address these hazards, such as seepage cutoff walls and barriers, shoring, grouting of the bottom of the excavation, and strengthening of nearby structures, existing utilities, or buried structures.

***CEQA Conclusion*:** Ground settlement above the tunneling operation could result in loss of property or personal injury during construction. However, DWR would conform with Cal-OSHA, USACE, and other design requirements to protect worker safety. DWR would also ensure that the design specifications are properly executed during construction. DWR has made an environmental commitment to use the appropriate code and standard requirements to minimize potential risks.

That a possible major environmental impact of the preferred alternative is not even addressed in this draft of the EIR/EIS undermines the credibility of the entire document. This omission must be corrected and a revised draft EIR/EIS then resubmitted for public review and comment.

## Chapter 29, Climate Change

Section 29.6.1.3, Delta Levee Stability and Reliability Impacts, includes the following language:

Whether increased sea levels are counteracted by increased outflows for salinity purposes or not, water levels in the Delta will rise as sea levels rise, placing additional stress on fragile Delta levees.

In addition, it is suggested that the increased likelihood and magnitude of extreme precipitation events, as described above, could also increase the vulnerability of Delta levees. This impact is described in greater detail in Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies*:

These levees not only protect farmland but maintain hydrodynamic conditions in the Delta. Western Delta levees serve a critical function of restricting the flow of saline water into the interior Delta, central Delta levees serve to direct freshwater inflows toward the south Delta pumping plants (reducing the amount of salinity that mixes with fresh water inflows). The additional stresses placed on these levees will increase the likelihood of levee failures, most notably from seepage and potentially result in catastrophic levee collapse. Depending on the location of the levee failure and hydrologic conditions at the time of the failure, a levee collapse could change the hydrodynamic balance in the Delta and lead to substantial salinity intrusion. Because the Delta serves as the conveyance system for SWP, CVP and local system exports and as the water source for in-Delta water users, a catastrophic levee collapse leading to salinity intrusion could interrupt water supplies to all of these water users for weeks or months while the levees are repaired and the salinity is flushed from the system. A catastrophic salinity intrusion could also have significant impacts on aquatic species as their habitat would also be affected.

This is hyperbole that is unsupported by the facts. The recommendations of the Economic Sustainability Plan, if implemented, would result in a more robust Delta levee system in the face of all of extreme earthquakes and floods and rising sea levels. This draft EIR/EIS not only ignores those recommendations but also ignores current DWR work on the time that it takes the Delta to flush out even after an assumed worse than worst case flooding scenario and on improved emergency preparedness and response.

In conclusion, all the flaws, errors and omissions in the existing public draft that are pointed out in this appendix must be corrected and then a new draft EIR/EIS must be submitted for public review and comment.

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May 31, 2014

**Addendum to Comments on the BDCP Public Draft EIR/EIS**
**Dated May 26, 2014**

In my comments dated May 26, 2014, it is stated on page six that "there is no expectation that the SWP and the CVP will deliver up to full contract amounts under any hydrological condition – the interpretation of the results buried in the EIR/EIS by the BDCP staff is that exports will be maintained at present levels, plus or minus 10 percent, except that exports may have to be reduced if species recovery goals are not met, a circumstance that appears to have a high probability of occurrence. In fact, even the projection of maintaining exports at something like present levels is a fiction. Figures 1 and 2, kindly provided by Richard Denton, show that in order to achieve this overall level of exports, it is necessary to resort to more pumping in drier months than is the case at present. It is not easy to trace the effects of this through the present effects analysis, but this might be one of the reasons that the effects analysis does not show sufficiently positive results to justify the granting of incidental take permits. If the operational rules were to be changed so that the effects analysis suggests more positive results for salmonids, the volume of exports would immediately be reduced. These figures also show that it is ludicrous for BDCP proponents to talk about taking a "little sip, big gulp approach", that is to take more water at periods of high flows and little of no water at periods of low flows. The BDCP does not in fact include the necessary physical components to do that. It should also be noted that it is unclear whether the aqueducts can presently carry the combined maximum exports of 14,400 cfs shown in Figures 1 and 2 because of subsidence caused by excessive pumping of groundwater, so that it is doubly questionable whether the planned level of exports can actually be achieved."

That language remains part of my comments but I failed to add two additional points regarding the estimates of water that would be delivered to the SWP and CVP Contractors on implementation of CM1 of the BDCP.

One is that the maximum export figure of 14,400 cfs appears to assume through-Delta exports under certain conditions that exceed the limitations of the current Corps of Engineers permit for taking water into the Clifton Court Forebay, which would require modification of the Corps of Engineers permit. I did not mention that in my initial comments because I know that at least Dr Meral was aware of this need, but on

reflection I believe that both the arguments that the BDCP would make to the Corps in expectation of a change in the Corps permit must be fully spelled out in the EIR/EIS and that unless the Corps has already granted a new permit, the calculations of expected exports under various scenarios must be revised to reflect the limitations of the existing permit.

The second additional point is that the current BDCP preferred alternative for conveyance does not allow the extraction of much greater amounts of water in wet years to make up for, overall, taking less water in dry years. The BDCP modeling does take more water in wetter years simply because there is more water available and because the CALSIM II model meets artificially high water demands without realizing that in the second and subsequent years of a succession of wet winters, there will be no storage available south-of-the-Delta to store that water. This can be seen quite dramatically in the reduced exports in 1983 and 1998 that are shown in Figure 3 of my initial comments. These were two particularly wet years, but exports were noticeably down. Demand in those years will also be lower because the farmers' fields and urban landscapes are already soaked. Dr Greg Gartrell, formerly of the Contra Costa Water District has been quoted[19] as saying: "Unless they (the water contractors backing the BDCP) have storage, they are in big trouble. If you don't do something about having a place to put the water in wet years, you're fooling yourself with these studies." Gartrell refers to these high export figures in wet years as "computer water." "It looks good on paper, but when it comes to real life, you can't get it."

Taken together, these four points strongly suggest that the estimates of water that would be delivered to the SWP and CVP Contractors in this draft EIR/EIS are not only uncertain, but are almost certainly exaggerated. While this should be of great concern to the Contractors who are proposing to pay for the new conveyance facilities, its significance in terms of the draft EIR/EIS is that it is false and misleading on these points and confirms that the plan does not in fact satisfy the objectives, needs and purpose with respect to water supply that are stated in the EIR/EIS.

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[19] The California Spigot, March 14, 2013 http://californiaspigot.blogspot.com/

These four points must be addressed in a revised draft EIR/EIS that is then submitted for public review and comment.

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