BDCP1599.

From: William Jennings <deltakeep@me.com>
Sent: Monday, July 28, 2014 2:50 AM
To: BDCP Comments
Cc: Mike Jackson
Subject: CSPA BDCP and EIR/EIS Comments: Comment Letter No. 2
Attachments: CSPA BDCP Ltr. No. 2, Water Quality.pdf

Dear Mr. Wulff,

Please find attached, the California Sportfishing Protection Alliance's (CSPA) comment Letter No. 2 on the BDCP and associated EIR/EIS.

Comment letter No. 2 relates to water quality, etc. Incorporated within our comment letter, are comments from Dr. G. Fred Lee and both comments should be responded to jointly.

We would appreciate a receipt of timely submission. Thank you.

Bill Jennings, Chairman
Executive Director
California Sportfishing Protection Alliance
3536 Rainier Avenue
Stockton, CA 95204
p: 209-464-5067
c: 209-938-9053
f: 209-464-1028
e: deltakeep@me.com
www.calsport.org

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BDCP 1374

California Sportfishing Protection Alliance

"An Advocate for Fisheries, Habitat and Water Quality"
3536 Rainier Avenue, Stockton, CA 95204
T: 209-464-5067, F: 209-464-1028, E: deltakeep@me.com, W: www.calsport.org

28 July 2014

Mr. Ryan Wulff
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814
BDCP.Comments@noaa.gov

VIA: Electronic Submission
Hardcopy if Requested

RE: Comment Letter No. 2: Bay Delta Conservation Plan and Associated EIR/EIS Related to Water Quality

Dear Mr. Wulff,

The California Sportfishing Protection Alliance (CSPA) has reviewed the proposed Bay Delta Conservation Plan and associated Environmental Impact Report/Environmental Impact Statement (hereinafter, BDCP or EIR/EIS) and submits the following comments related to water quality. Our comments include the attached review from Dr. G. Fred Lee and Dr. Anne Jones-Lee and we request that both documents be considered and responded to as a single submittal.

CSPA worked closely with the Environmental Water Caucus (EWC) in developing their comments and incorporates by reference into these comments both submittals by the EWC on all issues related to BDCP. We also incorporate by reference the submittal by Michael Jackson on behalf of CSPA, California Water Impact Network and AquAlliance, as well as the individual comments submitted by AquAlliance. We further incorporate by reference the submittals by the County of San Joaquin, South Delta Water Agency, Central Delta Water Agency, Restore the Delta, Earth Law Center and Friends of the River.

CSPA asked Dr. Lee and Dr. Jones-Lee to review Chapter 8 and Chapter 25 of the EIR/EIS and evaluate whether the approach in analyzing potential impacts to water quality and public health was technically valid and reliable. Their assessment of Chapter 8 is that,

> *"The approach used does not adequately or reliably consider the range of water quality impacts caused by the wide variety of potential pollutants present in the various Delta channels, that can be expected to result from the removal of large amounts of high-quality Sacramento River water from the Delta by this project."* and *"As it stands now Chapter 8 of this EIR/EIS does not reliably inform the public or decision-makers about the magnitude of the errors in estimates and conclusions inherent in the BDCP analysis of the impact of the diversions on Delta water quality/beneficial uses."*

Drs. Lee and Jones-Lee's assessment of the technical validity of Chapter 25 is that the,

> *"...approach is not technically valid for identifying all the constituents that need to be considered in evaluating potential water quality and public health impacts of the proposed BDCP."*

Table 31-1, page 31-9, Summary of Significant and Unavoidable Adverse Impacts, identifies six impacts to surface water quality. Three (concentrations of bromide, chloride and electrical conductivity) result from facilities operations and maintenance (CM1) and three (concentrations of mercury, organic carbon and pesticides) result from implementation of CM2-CM22. Perhaps, nothing more graphically illustrates the fundamental inadequacy of the EIR/EIS than the fact that it only identifies three water quality adverse impacts resulting from the diversion of another 2.5 million acre feet of water from an estuary already grievously suffering from lack of flow.

Our specific concerns are enumerated below followed by our comments.

1. A Word of Caution

We offer a word of caution. The Delta is an incredibly complex estuarine ecosystem and only in our hubris do we believe we understand the intricacies of its hydrological, chemical and biological tapestry. Virtually every previous environmental document prepared for hydro-modification projects in this estuary have promised benign or beneficial results. All exacerbated existing conditions. Almost every significant physical change of the environment by humankind has been accompanied by unintended consequences. Adaptive management must be an integral component of any Delta Plan. But, adaptive management is difficult to implement. As the National Research Council put it:[1]

> *"Numerous attempts have been made to develop and implement adaptive management strategies in environmental management, but many of them have not been successful, for a variety of reasons, including lack of resources; unwillingness of decision makers to admit to and embrace uncertainty; institutional, legal, and political preferences for known and predictable outcomes; the inherent uncertainty and variability of natural systems; the high cost of implementation; and the lack of clear mechanisms for incorporating scientific findings into decision making."*

Adaptive management has a long and checkered history in this estuary. Taken together, the suite of water quality control plans and water rights decisions by the State Water Resources Control Board (SWRCB or State Water Board) from D-990 (1961) through D-1641 (2000) to the adoption of the present Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (2006) constitutes adaptive management. The array of biological opinions issued over the years by the U.S. Fish and Wildlife Service and National Marine Fisheries Service comprises adaptive management. CalFed was an elaborate structured water planning and adaptive management program, as is the Long-Term Operational Criteria and Plan (OCAP) for coordination of the State Water Project and Central Valley Project, with its Water Operations Management Team (WOMT) and various technical working groups.

All of the reasons identified by the National Research Council, as to why adaptive management frequently fails, presently exist in this estuary. Managers and decision makers have routinely rejected the "adaptive" recommendations made by scientists, biologists and technical review teams. Resource and regulatory agencies have failed to adopt and implement recommended criteria and failed to enforce existing criteria. Financial resources have been lacking. Adaptive management has not only failed to reverse the downward spiral of native species in the estuary, it has chaperoned them to the brink of extinction. For adaptive management to play a meaningful role, scientists must have the authority to "adapt."

We can find nothing in the thousands of pages of BDCP's plan or EIR/EIS that provides any evidence that adaptive management is likely to succeed. Adaptive management remains subject to political pressure and the approval of the state and federal contractors. If the reviewer of these

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1 National Research Council, *A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan*, 2011, p. 6.

comments has a different opinion, please provide some support for the view that "adaptive management" will be different this time.

Over mere decades, construction and operation of the Central Valley and State Water Projects have deprived the Delta estuary of half its flow; turned the natural hydrograph on its head, reduced temporal and spatial variability; eliminated crucial habitat, complexity and diversity and deprived the estuary of dilution necessary to assimilate increased pollutant mass loading. It is not surprising that an ecosystem that developed and prospered under a state of nature has been brought to the brink of destruction. No estuarine ecosystem in the world has survived this level of abuse. If the reviewer can identify an estuary somewhere in the world that is suffering from lack of freshwater flow and that has been restored by depriving it of additional millions of acre-feet of flow, please provide the information to us.

Water quality and quantity are flip sides of the same coin; changes in flow change assimilative capacity, residence time and the fate and transport of contaminants. Hydrologic changes modify constituent concentration and bioavailability, which in turn can adversely impact the aquatic ecosystem and other beneficial uses.

Water from the Sacramento River is significantly less polluted than water flowing into the estuary from other tributaries, especially the San Joaquin River. Sacramento River water drawn across the Delta to the export pumps is a major reason water quality in the South Delta is better than it would otherwise be. Diversion of approximately 2.5 million acre feet (MAF) of this relatively good quality water around the Delta will increase the concentration of existing constituents in the surface water remaining in the Delta. It will also increase the residence time of water in the Delta, thereby enhancing the opportunity for bioaccumulation and oxygen depletion to occur. This is exacerbated in tidal environments where pollutants tend to move back and forth with the tides. The EIR/EIS and Delta Plan fail to contain a technically defensible analysis and discussion of the likelihood and extent of degradation and adverse impacts to Delta water quality caused by alternative conveyance or increased exports.

Previous efforts to evaluate potential water quality impacts from proposed projects to modify the hydrology of the Delta have either ignored water quality, with the exception of salt, or relied upon models that track "particles" to evaluate water quality. However, the majority of pollutants identified as impairing the estuary are non-conservative dissolved forms of pesticides, mercury, nutrients or oxygen demand constituents. Conservative constituents like salt are unacceptable surrogates for the universe of chemical constituents and pathogens degrading and impairing Delta waters.

CalSim II and various particle-tracking models, like DSM2, are unable to model potential impacts to water quality from non-conservative constituents. Different constituents respond differently to changes in flow and residence time. Consequently, any credible environmental review should evaluate the impacts of potential hydrologic modifications on a pollutant-by-pollutant basis. Unfortunately, BDCP fails to avail itself of the many water quality models that are routinely employed in NPDES permitting and expressly designed to address the fate and transport of chemical constituents in the environment.

The pollutants identified as causing impairments on the 303(d) list are only the tip of the iceberg. There are water quality impairments in the Delta attributable to total organic carbon, nutrients and other contaminants for which there are no federal or state water quality criteria. In addition to a lack of promulgated water quality criteria for many common water pollutants, there are situations in which the current water quality criteria/standards are well recognized as not being protective of aquatic life resources. For example, the water quality criterion for selenium in the SJR and Delta is not protective of some aquatic life.[2]

Furthermore, existing water criteria fails to address many issues that must be considered in considering impacts on aquatic life. For example:

- Existing criteria fails to consider additive and synergistic properties of regulated chemicals that occur in concentration below criteria. For example, Delta water frequently contains a cocktail of as many as 15 pesticides, many of which interact additively or synergistically.
- Adverse impacts to sensitive species, such as zooplankton, were not included in the development of many criteria.
- There is limited information on chronic exposure to sublethal impacts of chemicals and mixtures of chemicals. Numerous studies in the scientific literature demonstrate adverse effects of chemical exposure well below water quality criterion.
- Water quality criterion fail to address the chronic effects of multiple stressors acting on an already weakened aquatic ecosystem.
- Chemical degradants (or products of chemical breakdown in the environment) are little understood but frequently are highly toxic.
- Water quality criteria have been developed for only a small subset of the chemicals found in these waters. Of the approximately 100,000 chemicals registered for use in the United States, only about 200 are regulated with respect to water quality. The Priority Pollutant List is an artifact of a legal settlement several decades ago, has never been peer-reviewed and is an inadequate surrogate for the maelstrom of chemicals found in waterways today. These include pharmaceuticals and personal care products, industrial chemicals and other potentially hazardous constituents that have been identified as carcinogens, reproductive toxins, endocrine disruptors and immune suppressors, etc.
- Criteria are frequently insufficiently protective for pollutants that bioconcentrate and/or bioaccumulate in tissue.
- Many drinking water criteria are economically based and not health risk based.

As noted above, relocation of export facilities to the Sacramento River will increase residence time in the Delta. This increased residence time may encourage the growth of toxic blue-green algae, which has become a serious problem in recent years. Bioaccumulating constituents like selenium and methyl-mercury or pollutants like DDT and dioxin will have more opportunity to work their way up the food chain. Increases in the concentration of mercury in fish tissue would

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[2] US EPA, as part of endangered species consultations for the California Toxics Rule, agreed to have the US Geological Survey model the fate and transport of selenium in the Bay-Delta Estuary and the information would serve as the basis for revised water quality criteria. USGS completed the study in December 2010 and it indicated that the Bay-Delta standards should be lowered from 5 ug/l to 1 ug/l or less, depending on the residence time of selenium. The study can be found at: www.epa.gov/region9/water/ctr

further threaten the health of the Delta's large subsistence fishing community. Longer residence times will increase the timeframe for oxygen demanding constituents to reduce oxygen levels in channels already identified as impaired because of low dissolved oxygen.

An alternative conveyance facility and reduction in Sacramento inflow will impact dissolved oxygen levels in the Mokelumne River and Stockton Deep-Water Ship Channel. Presently, flow from the Sacramento is diverted through the cross-channel into the Mokelumne and San Joaquin River as it is drawn to the south Delta pumping facilities. The presence of better quality Sacramento River water in the central Delta and the reverse flows in the San Joaquin at Stockton served to somewhat ameliorate oxygen depletion in the reach below Stockton.

Presently, some part of the pollutant load in the San Joaquin River is drawn to the pumps via Old River, Middle River, Turner Cut and Columbia Cut and exported or "siphoned" south. Any reduction of this "siphon" mechanism would also affect nutrients and numerous other pollutants in the eastern and southeastern Delta. It would likely increase the spatial distribution of water quality impacts into the Central Delta. For example, it could increase nutrient loading to the ship channel exacerbating dissolved oxygen problems. Selenium concentrations might increase in the Delta to levels comparable to those found in wildlife in Suisun Bay. EC impairment might expand into the eastern Delta.

Alternative conveyance and reduction of dilution and outflow will significantly increase the concentration of salt in channels further impacting the yield of Delta agriculture. It will also reduce salinity variability and encourage the spread of certain undesirable invasive species. BDCP has been referred to as a habitat expansion plan for the overbite clam *Potamocorbula amurensis.*

To summarize, the Delta and its tributary streams are formally identified as impaired by a broad suite of pollutants. Water quality criteria have been developed for only a very small subset of the chemicals found in these waters. These criteria fail to adequately consider additive/synergistic, bioaccumulative and chronic/sublethal effects or multiple stressors acting on an already weakened aquatic ecosystem. Increased diversion or routing of good quality dilution flows around the estuary will result in increased concentration and residence time of pollutants. Increased residence time exacerbates the effects of toxic and bioaccumulative pollutants. Reduced diversion and increased Delta flow enhances flushing of pollutants and decreases pollutant concentration.

The BDCP and its EIR/EIS fail to comprehensively analyze and address potential impacts to fish, wildlife and human health from reduced water quality caused by loss of dilution, increased residence time and modified channel hydrology. They also fail to include a comprehensive antidegradation analysis required by the federal Clean Water Act and California's Porter-Cologne Water Quality Control Act.

2. BDCP's Analysis of Water Quality is Technically Invalid and Inconsistent with Prevailing Standards.

"All Models are Wrong, Some are Useful." Statistician E. P. Box

The approach to identifying impacts to water quality is fundamentally and technically flawed. Properly calibrated and verified, comparative models are useful in distinguishing relative differences between alternatives. However, comparative models like CalSim II or DSM2 are not designed and are unable to make credible short-term predictions. There are a number of predictive water quality models that have been designed, peer-reviewed and approved for assessing water quality – but these readily available models were not used.

The BDCP misuses tiered comparative models in an attempt to evaluate potential exceedances of one-hour and four-day water quality criteria that are based upon a not-to-be-exceeded more than once-in-three years standard. More frequent occurrences could, in and of themselves, lead to 303(d) listings of impairment that would be significant impacts. This misuse of modeling appears to be an ill-disguised attempt to minimize and deflect attention from the obvious impacts of diverting 2.5 MAF of freshwater around a severely polluted Delta that is already suffering from a chronic lack of flow. As such, it seriously understates the number and magnitude of adverse impacts.

Models are complex simulations that, at their best, only represent an idealization of actual field conditions. Models can be a black box with a "trust us" outcome. They must be used with extreme caution to ensure that the underlying model assumptions hold for the site-specific situations being modeled. Subtle changes in coefficients, assumptions or input data can dramatically alter output. It is crucial that models be properly calibrated and verified. The design parameters, assumptions, input data, calibration and validation must be transparent in order to be able to meaningfully evaluate the ability to accurately project values.

A critical problem arises when decision makers attribute more precision to modeling results than is warranted and where a model's output is misused to make definitive comparisons and predictions. While models can be employed to inform analysis, they cannot provide near-certain conclusions that significant environmental effects will or will not occur or will or will not be mitigated, especially where common sense and existing knowledge indicate otherwise.

The EIR/EIS, Table 4-1. Overview of BDCP EIR/EIS Modeling Tools, shows that several models were used to simulate water quality projections for the various project alternatives:

- *Artificial Neural Network (ANN) for CALSIM II An ANN has been developed for CALSIM II that attempts to mimic the flow-salinity relationships in the Delta, as simulated in DSM2. The ANN attempts to statistically correlate the salinity results from a particular DSM2 model run to the various peripheral flows (Delta inflows, exports and diversions), gate operations and an indicator of tidal energy.*
- *CALSIM II simulates operations of the SWP, CVP and areas tributary to the Sacramento-San Joaquin Delta. The model, based on inputted priorities and constraints, determines monthly river flows and diversions, Delta flows and exports, reservoir storage, deliveries to project and non-project users, and controls on project operations. CALSIM II results are used to determine water quality, hydrodynamics, and particle tracking in the DSM2 model.*

BDCP1579

- *Delta Simulation Model II (DSM2) DSM2 is a one-dimensional mathematical model that simulates hydrodynamics, water quality, and particle tracking throughout the Delta based on flow data generated from CALSIM II outputs. It describes the existing conditions in the Delta as well as performs simulations for the assessment of incremental environmental effects caused by facilities and operations. The model can be used to calculate stages, flows, velocities, mass transport processes for conservative constituents, and transport of individual particles. HYDRO provides the flow input for QUAL and PTM. QUAL simulates one-dimensional fate and transport of conservative water quality constituents given a flow field simulated by HYDRO. PTM simulates pseudo three-dimensional transport of neutrally buoyant particles based on the flow field simulated by HYDRO.*
- *Particle Tracking Model (PTM) PTM simulates fate and transport of conservative and non-conservative water quality constituents throughout the Sacramento-San Joaquin Delta given a flow field simulated by HYDRO. The model uses velocity, flow, and stage output from DSM2-HYDRO. Outputs are used to estimate the effects of hydrodynamic changes on the fate and transport of larval fish, other covered species, and toxics through the Delta, as well as entrainment of larval fish at various locations. It allows assessment of particle fate, transport, and movement rate from numerous starting points to numerous end points. It provides information on movement of planktonic larval fish, such as delta and longfin smelt, in a tidal environment and is used extensively in Central Valley fishery assessments.*
- *DSM2-HYDRO is a one-dimensional hydraulic model used to predict flow rate, stage, and water velocity in the Delta and Suisun Marsh at a 15-minute timestep.*
- *DSM2-QUAL simulates multiple conservative and non-conservative constituents including dissolved oxygen, carbonaceous BOD, phytoplankton, organic nitrogen, ammonia nitrogen, nitrate nitrogen, organic phosphorus, dissolved phosphorus, TDS and temperature. The model is used to predict water temperature, dissolved oxygen, and salinity in the Delta and Suisun Marsh at a 15-minute timestep.*

All of the DSM2 models require data provided by CalSim II.

The Review of the Draft BDCP EIR/EIS and Draft BDCP conducted by the Delta Independent Science Board (15 May 2014) observed,

> *"As noted for other chapters in the DEIR/DEIS, a concise and informative summary of the chapter would be extremely useful to readers and reviewers. This chapter, covering water quality impacts of the different Alternatives, is not very informative because of its reliance on a few modeling approaches, most notably CALSIM and DSM2, without an explanation of the limitations of these models. There is a noted lack of emphasis on validating model outputs with observational data, as well as a lack of any presentation or discussion of the uncertainties associated with the models."* Page B-22.
>
> *As stated above, there is an over-reliance on model outputs, both to describe existing conditions as well as to project the effects of Alternatives on water*

quality constituents. There do not seem to be either a) attempts to compare model outputs for existing conditions to existing water quality data, or b) calls for monitoring of future conditions in order to inform adaptive management of Draft BDCP implementation. Because models will always be incorrect, such observational data are obviously required. Moreover, models were run for only certain constituents and not others; this needs to be clarified and the reasons for selective applications of models should be explained. Page B-23.

3. BDCP's Inappropriate Use of CalSim II.

CalSim II is like Aladdin's Lamp; it grants wishes to whoever rubs it. CalSim II can be manipulated to produce desired results. Even properly operated it is only as accurate as the data and assumptions that are plugged into the model. It has previously been used to project a false certainty that impacts will be minor. For example, it has been used to show that salmonid mortality will increase by a specific percentage and discussion of possible error or of ranges of possible outcomes has been entirely absent. The model cannot possibly produce such certainty. At best it can predict, given a certain set of data and assumptions, a range of possible outcomes, with some outcomes potentially more probable than other, and with all predictions limited by both known and unknown sources of error.

CalSim II is a highly complex simulation model of a complex system that requires significant expertise to run and understand. Consequently, only a few individuals concentrated in the Department of Water Resources, U.S. Bureau of Reclamation and several consulting firms understand the details and capabilities of the model. State Water Resources Control Board (SWRCB) staff cannot run the model. To the extent CalSim II is relied upon, the EIR/EIS must be transparent and clearly explain and justify all assumptions made in model runs. It must explicitly state when findings are based on post processing and when findings are based on direct model results. And results must include error bars to account for uncertainty and margin of safety.

As an optimization model, CalSim II is hardwired to assume perfect supply and perfect demand. The notion of perfect supply is predicated on the erroneous assumption that groundwater can always be obtained to augment upstream supply. However, the state and federal projects have no right to groundwater in the unadjudicated Sacramento River basin. Operating under this assumption risks causing impacts to ecosystems dependent upon groundwater basins in the areas of origin. The notion of perfect demand is also problematic, as it cannot account for the myriad of flow, habitat and water quality requirements mandated by state and federal statutes. Perfect demand assumes water deliveries constrained only by environmental constraints included in the code. In other words, CalSim II never truly measures environmental harm beyond simply projecting how to maximize deliveries without violating the incorporated environmental constraints.

As a monthly time-step model, CalSim II cannot determine weekly, daily or instantaneous effects; i.e., it cannot accurately simulate actual instantaneous or even weekly flows. It follows that CalSim II cannot identify real-time impacts to objectives or requirements. Indeed, DWR admits, "CalSim II modeling should only be used in 'comparative mode,' that is when comparing