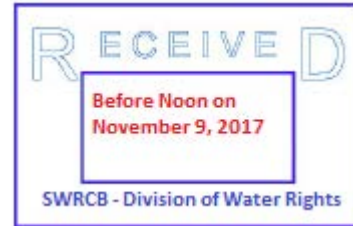


DEPARTMENT OF WATER RESOURCES

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SENT VIA E-MAIL: Bay-Delta@waterboards.ca.gov

November 9, 2017

Jason Baker
State Water Resources Control Board
P.O. Box 100
Sacramento, California 95812-2000

Subject: Phase II Bay-Delta Plan Input

Dear Mr. Baker:

The Department of Water Resources (DWR) appreciates the opportunity to submit information in response to the questions posed by State Water Resources Control Board (State Water Board) staff to consider in the development of the program of implementation for the Phase II Update of the Bay-Delta Plan. Although the questions are complex and the time allowed to provide information is short, DWR appreciates the efforts of State Water Board staff to use stakeholder input to inform further development of proposed changes to the Bay-Delta Plan. Below are DWR's responses to some of the questions posed by State Water Board staff. DWR will continue to review and consider the questions posed and work with State Water Board staff as additional suggestions arise.

1. What specific provisions should be included in the program of implementation to ensure the expeditious implementation of the inflow and cold water habitat objectives?

The program of implementation should require participation from all entities whose water diversions and other actions affect water quality protected by these objectives.

2. How should the State Water Board ensure that water released to meet objectives is protected through the system and not rediverted for other purposes?

DWR recognizes that protecting stored water that is released to meet downstream objectives is difficult and will require additional monitoring and reporting of diversions by downstream water users, possibly on a real time basis. As an initial step, DWR suggests using the information that all water right holders are now required to submit to comply with SB88 that requires all diversions over 10AF annually to be measured and reported. Using this information would allow the State Water Board to better understand how much water is in the system and where it is being diverted. Further, as to agricultural areas upstream of the Delta, DWR believes that in addition to understanding the consumptive use demands, how those demands are met by various

sources of water will be important in understanding how flows will be affected. Specifics on the type of data needed is listed below in the response to Question 3.

Further, protection of water released from storage to meet objectives should recognize that there is travel time from the reservoirs to the Delta. The travel time is estimated at five days for water released from Shasta, three days for water released from Oroville, and one day for water released from both Folsom and New Melones. Delta Outflow objectives that depend on reservoir inflows must recognize these travel times. Although there is no mention of this in the Phase II Scientific Basis Report, DWR requests that this critical lag in time be addressed in any proposal that links reservoir releases with Delta Outflow requirements.

3. What improvements should be made to measure compliance with the existing Delta outflow objectives (that are intended to be retained), and with the proposed new inflow-based Delta outflow objectives?

For the existing outflow objectives, DWR continues to support the recommendations put forward in the DWR report entitled "On Estimating Delta Outflow" released in March 2016. Specifically, the Net Delta Outflow Index (NDOI) approach is, at this time, the best science available. It is important to note that Delta Outflow cannot be measured reliably nor accurately, hence any reporting of Delta Outflow must utilize a mass balance (control volume) methodology. This reality is noted and strongly emphasized in the DWR report mentioned above.

DWR commends the work of the research group convened by the Delta Watermaster to do a comparative study of several methods for estimating consumptive use within the Delta. It is a major step in improving the understanding of agricultural water use within the Delta. Consumptive use focuses on the demand side for water. DWR believes there should be additional studies done on the supply side, i.e., how water is supplied to meet consumptive use demands. How the consumptive use demand is met affects the amount and timing of net channel depletions within the Delta and in turn the outflow from the Delta. For example, meeting the consumptive use demand by pumping groundwater or subsurface water may result in less net channel depletions at the time the water is pumped, but may affect channel depletions later as seepage moves in.

In the Delta, the elevation of the islands (uplands and lowlands) also significantly affects how water is supplied to meet consumptive use needs. For the islands that are several feet below sea level, farmers may be continuously pumping water off the islands to keep the water elevation in the soil below the root zone. Therefore, measuring the groundwater level alone does not indicate the amount supplied by sub surface water. To illustrate, for the Delta lowlands, DWR believes the following information is needed to fully understand the water balance:

- Diversions (from pumps or siphons) onto the island from channels;
- Returns (from pumps) from the island to the channels;
- Groundwater pumping (if any, for meeting consumptive demands);

- Soil moisture measurements for water content on the island;
- Seepage between the channels and island;
- Groundwater elevation; and
- Precipitation.

Valley floor and Delta depletions/accretions must be known in advance for the water projects to determine the necessary reservoir releases to be made. Therefore, these calculations must also be lagged, as described above in the response to Question 2.

6. How should the State Water Board account for flows provided for floodplain inundation to benefit native species?

DWR strongly supports the consideration of floodplain inundation as part of the WQCP update. DWR has long had a major role in managing Yolo Bypass as a flood facility. DWR also has a long history of working on the hydrology and ecology of Yolo Bypass, which has led to the recognition that seasonal floodplain represents one of the most important habitats in the Delta. DWR has a robust sampling program to study this region¹ and a long list of publications² examining how inundation of this area affects habitat area, the food web, and special status fishes.

DWR's work has been used as a basis for restoration actions in the National Marine Fisheries Service (NMFS) 2009 Biological Opinion³ and is a key component of the EcoRestore Program.⁴ In support of these programs, DWR and the U.S. Bureau of Reclamation (USBR) recently completed major environmental documents supporting habitat improvements in Yolo Bypass.⁵ Our current restoration activities include the following:

1. A proposed fish passage structure at Fremont Weir;
2. A notch at Fremont Weir to improve connectivity between the Yolo Bypass and the Sacramento River;
3. Modification of Wallace Weir to allow water operations and collection of salmonids and sturgeon that stray into Yolo Bypass;
4. Improved fish passage at agricultural road crossings along the Tule canal; and
5. Managed floodplain pilot studies in conjunction with CalTrout, University of California Davis, California Department of Fish and Wildlife (CDFW), and local landowners.

¹ See <http://www.water.ca.gov/aes/ybfmp/ybfmp.cfm>.

² See <http://www.water.ca.gov/aes/pubs>.

³ National Marine Fisheries Service, Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project Salmonid Biological Opinion (June 4, 2009, available at: http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/nmfs_biological_and_conference_opinion_on_the_long-term_operations_of_the_cvp_and_swp.pdf).

⁴ See <http://resources.ca.gov/ecorestore/>.

⁵ See <https://www.usbr.gov/mp/BayDeltaOffice/yolo-bypass.html> for a complete list of documents.

Based on these activities, DWR has several suggestions for the State Water Board to consider in formulating its approach to accounting for flows provided for floodplain inundation. Accounting for water used for floodplain habitat in the Yolo Bypass is challenging because historical records of westside tributary inflow are poor. However, DWR has added flow monitoring stations to improve its understanding of low flow hydrology, and Yolo County has developed a map of irrigation infrastructure throughout the floodplain.

Regarding evaluation of the benefits of floodplain inundation to salmonids, DWR has a suite of tools to evaluate the areal extent of inundation at different levels of outflow and to estimate biological benefits. Several of these tools may be helpful to the State Water Board in determining how to account for the biological benefits of flows targeting Yolo Bypass.

DWR and USBR recently provided the State Water Board with an Administrative Draft EIR/EIS for the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project. The document contains robust analyses that examine the relationship between flow and fisheries benefits. Generally, we found that flow diverted from the Sacramento River into the Yolo Bypass is a key driver for providing fisheries benefits. This finding was largely based on the relationship between flow and juvenile salmonid access to Yolo Bypass floodplain habitat.

DWR quantified fisheries benefits for juvenile salmon using four different approaches and summarized the results in reports that are publicly available.⁶ DWR also quantified adult fish passage benefits for six different alternatives.⁷

Generally, adult fish passage benefits are achieved with a channel and gate design that meets depth, width, and velocity criteria for adult salmonids and sturgeon. If additional flow is going to be diverted from the Sacramento River into the Yolo Bypass, it is important to divert that flow in a way that provides reliable adult fish passage. Reliable adult fish passage for salmon can be achieved in many ways, while reliable adult sturgeon passage will occur from open-channel flow with low turbulence.

Regarding application to Delta Hydrology, DWR believes that Yolo Bypass flows represent an important management action with wide-ranging consequences for the ecosystem. From a hydrological perspective, it is also important to develop Phase II

⁶ The Juvenile Entrainment Evaluation Tool report is available here: <http://deltacouncil.ca.gov/sites/default/files/2017/08/1%20Merz%20Salmon%20Benefits%20Model.pdf>. The Eulerian-Lagrangian-Agent-Method (ELAM) report is available here: <http://deltacouncil.ca.gov/docs/scenario-analysis-fremont-weir-notch-integration-engineering-designs-telemetry-and-flow-fields>. The Critical Streakline Analysis report is available here: <http://deltacouncil.ca.gov/docs/simulation-method-combining-hydrodynamic-data-and-acoustic-tag-tracks-predict-entrainment>. The Yolo Bypass Salmonid Benefits Model report is available for review here: <http://deltacouncil.ca.gov/docs/yolo-bypass-salmon-benefits-model-modeling-benefits-yolo-bypass-restoration-actions-chinook>.

⁷ Report is available for review here: <http://deltacouncil.ca.gov/docs/yolo-bypass-salmon-benefits-model-modeling-benefits-yolo-bypass-restoration-actions-chinook>.

criteria for the Delta that adequately account for flows that are routed through Yolo Bypass. Towards this goal, DWR recommends the following:

- The accounting of Yolo Bypass inputs should include all tributaries including Fremont Weir (Sacramento River), Knights Landing Ridge Cut, Cache Creek, Willow Slough, and Putah Creek⁸;
- All flows through Yolo Bypass should count as Delta Inflow; and
- Yolo Bypass outflow should be included as part of the Total Delta Outflow calculation.

7. How should the State Water Board structure adaptive management for the new objectives?

The California Water Fix (CWF) Adaptive Management Plan (Plan), which addresses current operations, operations proposed for CWF, and tidal restoration, can provide a model for developing adaptive management for the new objectives. In the Plan, the Federal and State water operations agencies (USBR and DWR) and the State and Federal fisheries agencies (U.S. Fish and Wildlife Service, NMFS, and CDFW) (collectively, the Five Agencies) agreed that adaptive management is the approach best suited to improve the management of the Delta and its resources. The Five Agencies committed to ongoing adaptive management under the current Biological Opinions of the combined operations of the Central Valley and State Water Projects, as well as the effects of planned future operations under CWF. The Plan includes a framework for a structured decision-making process with four overarching phases: (1) plan; (2) assess; (3) integrate; and (4) adapt. The Plan also engages stakeholders in the development of research activities and how that research is accounted for in decision-making. DWR recommends that the State Water Board refer to the CWF Plan to guide development of adaptive management for objectives that could benefit from this process. Note that DWR is not recommending that the Five Agencies have approval authority over adaptive management for water quality purposes.

DWR appreciates the opportunity to provide this information. If there are any questions, please contact Ms. Robin McGinnis at (916) 657-5400.

Sincerely,



Joel Ledesma
State Water Project Deputy Director

⁸ Note that the current accounting of Yolo Bypass flows in summaries such as DAYFLOW do not adequately account for tributary inputs, particularly during periods when there is no Fremont Weir overtopping.