EAST BAY MUNICIPAL UTILITY DISTRICT

December 16, 2016

Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
P.O. Box 100
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Via Email and Fed Ex

Subject: Comments on the October 2016 Working Draft Scientific Basis Report

Dear Ms. Townsend:

The East Bay Municipal Utility District (EBMUD or District) appreciates the opportunity to submit the following comments on the *Working Draft Scientific Basis Report for New and Revised Flow Requirements on the Sacramento River and Tributaries, Eastside Tributaries to the Delta, Delta Outflow, and Interior Delta Operations* (Draft Report). The Draft Report was released by the State Water Resources Control Board (State Water Board) on October 19, 2016 as part of its Phase 2 update of the Water Quality Control Plan (WQCP) for the Bay-Delta (Bay-Delta Plan) to support the protection of fish and wildlife beneficial uses in the Sacramento watershed and related areas.

EBMUD concurs with the need to address the continuing decline of water quality and fish species in the Delta. As a water agency that serves over 1.4 million people in the Bay Area, EBMUD's primary source of water is the Mokelumne River,[1] an Eastside tributary to the Delta. For nearly twenty years, EBMUD has led stewardship activities to protect and enhance the environmental resources of the Mokelumne River, working closely with the resource agencies, other agencies, and stakeholders along the Mokelumne River under the Joint Settlement Agreement (JSA). This partnership with the resource agencies has invested significant resources and yielded significant successes in the management of the Mokelumne River anadromous fishery and riverine ecosystem. EBMUD's JSA partnership has been cited as a model of collaboration that could be developed in other river systems.

We understand that the Draft Report was intended to identify the best available science to update the Bay Delta Plan. As presented in detail below, the initial Draft Report needs to include the most current and accurate science with respect to the coverage and conclusions for the Mokelumne River. We recommend that the Draft Report be revised to include data analysis, assumptions and other critical details to ensure a full understanding of the scientific basis for the WQCP update. It is essential that stakeholders have an opportunity to review and comment on the next revised Draft Scientific Report prior to final peer-review.

We also recommend that the Board clarify the Draft Report to specify which beneficial uses and fishery species the Bay Delta Plan is designed to protect. As explained below, some of the Draft Report's proposed measures could adverse the Mokelumne River anadromous fishery by prematurely flushing young fry to the Delta where they can't survive, and by depleting cold water in upstream reservoirs that would be necessary for the survival of returning Mokelumne River fall-run Chinook salmon later in the year. In other words, the Draft Report proposes a trade-off, benefitting some fishery species while harming others. Thus, the Draft Report should

[1] According to the Draft Science Report, the Mokelumne River above the confluence with the Cosumnes contributes 2.6% of unimpaired Delta Outflow on an average annual basis.

be revised to clarify which beneficial uses and specific fishery species it seeks to protect. In addition, when the State Water Board updates the Bay Delta Plan, it must consider the effects of flow objectives through a broad inquiry, balancing beneficial uses and considering public interest concerns such as human health and welfare, economics and power production, along with other environmental uses. EBMUD's detailed comments related to the Draft Report are outlined below and summarized in Attachment 1.

1. ***Lack of Best Available Science Information on the Mokelumne River*** – While the Draft Report includes information and figures on other fisheries such as Sacramento tributaries (see, e.g., Figures 3.4-4, 3.4-7, 3.4-9), it contains no comparable analysis of the Mokelumne River.[2] This gap is problematic, as such information is readily available and should have been included in the Report. For example, in its 2012 Scoping Comments in response to the Notice of Preparation of CEQA documentation for the State Water Board's update to the Bay Delta Plan, EBMUD provided an "extensive Mokelumne River habitat monitoring program and science database" that was compiled through years of monitoring, study and reporting on the river ecosystem. (EBMUD Scoping Comments letter, April 24, 2012, p. 2). This information was compiled in over 70 studies, reports and published literature, and in its letter EBMUD provided the State Water Board with a web link to that database. [3]

   We encourage the State Water Board to include the best available science concerning the Mokelumne River by incorporating the current data that we have enclosed in a computer disk containing EBMUD's annual reports, the FERC 6- and 10-year review reports, and published science on the Mokelumne River and its fisheries.

   Additionally, as noted in Mr. Setka's comments to the State Water Board at its December 7, 2016 Workshop on the Draft Report, EBMUD would like to work with State Water Board staff, through the Lower Mokelumne River Partnership, to improve the overall understanding of the system and provide the most recent science from the multi-organizational team. Please contact Jose Setka at (510) 287-2021 or jose.setka@ebmud.com to arrange an initial meeting on this matter.

2. ***The Draft Report Relies on Artificial, Simulated Results to the Exclusion of Actual Measured Data*** – The Draft Report relies extensively on artificial, simulated results of Unimpaired and Impaired or regulated flow comparisons.

   - For example, Figure 2.1-7 on page 2-10 is composed entirely of simulated numbers, rather than actual, real world data
   - This appears to also be true for the data presented in Section 2.2.7.1 beginning on page 2-34 as well as Figure 2.2-18 and Table 2.2-15 on page 2-35.

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[2] We do note the inclusion of one small table, Table 3.4-6, concerning the issue of Delta Cross-Channel closure and its effect on straying of Mokelumne River fall-run Chinook salmon. While this is an important issue that must be addressed, it is only a small part of the multi-faceted scientific knowledge base concerning the fishery ecosystem on the Mokelumne River.

[3] Note that EBMUD again submitted references and a web link to Mokelumne River scientific information in its subsequent October 25, 2012 letter to the State Water Board providing "information for consideration in Bay-Delta WQCP Review."

The Draft Report's estimated existing condition ratio of impaired to unimpaired condition (e.g. for Figure 2.1-7) needs to include the sources and methods of developing the data. For example, Appendix A appears to indicate that the source for the regulated flow condition comes from the 2015 Delivery Capability Report studies using CalSim-II; however, we are concerned that the Mokelumne module from CalSim-II may be producing unreliable results. A more complete description of the sources and methods applied to develop the "impaired" simulated condition should be included in the Report.[4]

The District recognizes that these modeling results will likely be superseded with the new SacWAM model results. EBMUD staff appreciates working with State Water Board staff and consultants to develop an accurate representation of the Mokelumne system within the SacWAM model.

3. ***The Mokelumne River JSA*** – In 1998 EBMUD entered a partnership agreement with the United States Fish & Wildlife Service (USFWS) and California Department of Fish & Wildlife (CDFW)[5] concerning the Mokelumne River ecosystem. This Joint Settlement Agreement (JSA) contains a comprehensive suite of flow and non-flow measures:

   - Flow Releases: The JSA specifies minimum flow releases by EBMUD from Camanche Dam to the lower Mokelumne River year-round, for all year types.[6] The JSA flows are significantly higher than the prior flow release requirements under a 1961 Agreement with CDFW, and are designed to protect fishery resources in the lower Mokelumne.

   - Ramping Rates: To protect fishery resources, the JSA stipulates ramping rates for decreases in flow releases from Camanche Dam.

   - Adaptive Management: The JSA allows the rescheduling or modification of flows to respond to changing river conditions, with prior written concurrence from CDFW and USFWS.

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[4] The comparison for "impaired" versus "unimpaired" flow needs to be performed at a consistent location. The Draft Report seems to use a regulated flow (Impaired) condition that applies to the tidally influenced confluence of the Mokelumne and San Joaquin Rivers, whereas the unimpaired condition relies on flows at a different location. If the analysis is performed at the confluence, and the model assumes the Delta Cross Channel gate is always open, it is unclear whether Sacramento River water that flows through the gate is included in the estimate shown in Figure 2.1-7.

The Cosumnes River, Amador Reservoir Watershed, and "Dry and Sutter creeks" flow into the Mokelumne River before the confluence with the San Joaquin. To avoid double counting, the Draft Report needs to clarify whether these flows are part of the unimpaired flow calculations in the Mokelumne watershed or the regulated or impaired flow condition.

[5] At the time of the 1998 Agreement, CDFW was known as the California Department of Fish and Game. We refer to the agency herein by its current name, California Department of Fish and Wildlife (CDFW).

[6] We note that while the Draft Report repeatedly stresses the need for year-round flows to protect anadromous and other fish and wildlife species (e.g., Draft Report, pp. 1-11, 5-5, 5-11), the JSA already requires year round flows in all year types.

- Gainsharing: The JSA requires the District to augment instream flows on the Mokelumne River by an amount equal to 20% of the actual yield of new water supplies developed by EBMUD, up to 20,000 acre-feet a year.

- Temperature Management: The JSA requires EBMUD to make its best efforts to maintain the volume of the cold water hypolimnion in Camanche Reservoir in order to manage water temperatures to benefit fisheries. Temperature management is discussed in more detail below.

- Non-Flow Measures: The JSA includes a broad array of non-flow measures, including planting trees and shrubs in the lower Mokelumne River riparian corridor, implementing a spawning gravel enhancement program, and creating new side channels adjacent to the main channel of the Mokelumne River to provide suitable and beneficial habitat to juvenile fish and aquatic invertebrates.

  For further detail on the JSA, see EBMUD's *Permit 10478 Time Extension Project Draft Environmental Impact Report* (September 2013)(Permit 10478 EIR), pages 3.2-21 to 27, and Appendix D thereof, which includes a copy of the complete JSA.

As described further below, the JSA has been a success.

a. ***Flow Responsibilities Do Exist on the Mokelumne River*** – Unlike a number of tributaries that do not have any requirements to protect fish and wildlife, or that have requirements but that are not integrated with the Bay-Delta Plan, EBMUD's responsibilities for contributing to Bay-Delta protection are implemented through D-1641. (See D-1641, pages 170-177.)[7] Thus, there are current fishery protection requirements for the Mokelumne River ecosystem that are integrated into the Bay-Delta Plan.

b. ***Adaptive Management Under the JSA*** – EBMUD has exercised the adaptive management provision of the JSA, coordinating with the resource agencies to modify flow releases to better manage the fishery ecosystem. In D-1641, the State Water Board added the adaptive management provision to EBMUD's water rights, modifying it to also require EBMUD to submit adaptive management requests to the Executive Director.[8] Since the JSA's inception in 1998, EBMUD has received permission from the State Water Board adaptively manage flows to meet fishery and habitat needs based on changing conditions, including reshaping spring flows to provide floodplain inundation flows, and implementing fall attraction pulses.

4. ***Assessment of State Water Board Decision 1641*** – Since 1998, under provisions of the JSA, EBMUD has provided both flow and non-flow measures to protect and enhance conditions

[7] These flow requirements were recently included again by the State Water Board in its August 2, 2016 Order WR 2016-0019-EXEC extending EBMUD's Permit 10478, and in the revised Permit 10478 issued by the Board on August 3, 2016.

[8] See Condition 5 on page 176 of the March 2000 Revised D-1641.

for the anadromous fish population and associated ecosystem of the lower Mokelumne River. As noted, these provisions were subsequently incorporated into EBMUD's Mokelumne River water rights under State Water Board Decision 1641. In 2008, USFWS, CDFW and EBMUD conducted a ten-year review of the JSA. The multi-agency review found improvements in fish returns and ecosystem health in the lower Mokelumne River. (See Permit 10478 EIR, Appendix D.2, for the full ten-year report.) This trend has continued, even through the most recent years of extreme drought. This assessment of the successes of the JSA and its contribution to the ecological health of the Delta should be included in the Draft Report.

5. ***Potential Impacts from Climate Change*** – Potential impacts from climate change including sea-level rise remain the leading issue of our times. Changes in rainfall patterns and reduction in snow accumulation, air temperatures and other parameters that are key to the ecological and biological health of the Delta should be considered in the Draft Report

6. ***Recognition of Water Rights Priorities*** – Water agencies throughout California have relied upon the water rights priority system to invest significant resources and develop supplies for their ratepayers. Since the 1920's, EBMUD has relied upon the water rights system and expended significant resources to build the Mokelumne River facilities. These facilities serve multiple benefits including water supply, hydropower, flood control, recreation, instream flows and water temperature management that benefits the Mokelumne River fishery resources. The Draft Report should describe how water right priorities will be recognized and implemented without adverse impact to current water rights and agreements, including the ability for water rights holders that operate reservoirs and water supplies to recover after drought periods.

7. ***Balance Delta and Mokelumne Fishery Needs***

    a. ***Consider Existing Tributary Conditions:*** The Draft Report needs to recognize the existing state of the fisheries populations within the Mokelumne River. EBMUD, as part of the Lower Mokelumne River Partnership (LMRP), has conducted migration monitoring of salmonid populations for over two decades and has provided data to open source databases as part of the Interagency Ecological Program (IEP) and more recently the Comprehensive Assessment and Monitoring Program (CAMP) platform for USFWS. Chinook salmon populations on the Mokelumne River are above historic long-term averages (see Figure 1), even during the last few years of extreme drought. Additionally, the Mokelumne River's Chinook salmon population is one of the few in the Central Valley that has neared its CVPIA doubling goal. (*Central Valley Project Improvement Act Annual Report, Fiscal Year* 2013, at www.usbr.gov/mp/cvpia/docs_reports/docs/Annual_Report/2013_cvpia_annual_report.pdf). The Mokelumne River's CVPIA doubling goal target is 9,300 salmon. In 2015, after years of extreme drought, 8,976 salmon returned to the Mokelumne River (96.5% of the doubling goals). Much of this success can be attributed to adaptively managing "blocks of water" that were used during key life history periods for salmonids. This is in contrast to the Draft Report's proposed rigid adherence to a percentage of unimpaired flow that would not account for numerous factors, including reduced fall flows.

b. ***Non-Flow Measures:*** EBMUD's implementation of over 20 years of spawning habitat restoration in the Mokelumne River has improved anadromous fishery egg-to-fry survival and increased production over time. For example, the District has created seasonally inundated habitat to meet juvenile life history stages of Chinook and steelhead to provide rearing habitat under the current flow regime. Unfortunately, the science indicates that juvenile salmonid survival in the Delta is significantly impaired due to predation and entrainment within the north and south forks of the Mokelumne River within the Delta.

   One way to improve survival outcomes is to have salmon out-migrate as smolts instead of smaller fry. However, imposing a strict percentage of unimpaired flow standard on the Mokelumne River, as proposed by the Draft Report, would result in a significant percentage of the natural production being pushed into the central Delta too soon. Moving salmon fry prematurely increases mortality and reduces natural production survival to escapement. While maintaining the fry portion of the population is an important aspect of maintaining life history diversity in the population, increasing the number of fry migrants to the Delta, without associated changes in structural and operational aspects of Delta management, could be harmful to Mokelumne River salmonids.

c. ***Reconfiguration of Central Delta Mokelumne River Forks:*** While implementation of the JSA has successfully protected Mokelumne salmonids, conditions in the central Delta continue to be a major impediment to enhancing survival. The physical modifications (Delta Cross Channel, extensive rocked levees) and operations associated with conveying SWP and CVP water to the south Delta pumping facilities have significantly altered the physical and flow configurations at the central Delta Mokelumne forks. These alterations have resulted in the near elimination of rearing habitat, increased predator habitat, and entrainment of juvenile salmonids in the central Delta. Prior to proposing any new flow regimes for the Mokelumne River, a thorough analysis must be conducted by the State Water Board to identify if any benefits would be obtained from any such new flow regime, given the current adverse physical and operating conditions within the central Delta.

d. ***Reservoir Coldwater Pool Management:*** Conditions within the upper Sacramento River in summer/fall of 2014 and 2015 highlighted the importance of monitoring and managing cold water pools within reservoirs. In the case of the Mokelumne River, EBMUD, CDFW, USFWS and NMFS established a number of management actions throughout the drought period of 2012-2016 which resulted in meeting all temperature criteria during key salmonid life stages. In fact, during 2014, the Mokelumne River Hatchery served as a refuge for eggs and fish from other Central Valley facilities due to the better and cooler water temperature conditions present in the Mokelumne River.

   The successful outcomes achieved in the Mokelumne during the drought point to some problems with relying on one exact set of temperature criteria, such as the EPA standards. On page 5-37, the Draft Report indicates that EBMUD reported that it often exceeded EPA life stage criteria. However, the Draft Report stops short; it does

not recognize that the actual release temperatures meet or are lower than those required under the JSA. Moreover, it fails to discuss the fact that the EPA criteria are designed around Pacific Northwest needs and not those of the Central Valley, which is the most southernmost portion of the Chinook salmon range. In fact, there is a body of literature and evidence indicating that a more appropriate approach to setting temperature criteria involves both establishing ranges (optimal to critical to lethal) and accounting for variation across the range of the species. When reviewing the actual recovery of the Mokelumne River Chinook salmon population under the JSA, it is clear that conditions within the river have improved using the established criteria under the agreement and this has resulted in meeting 96.5% of the CVPIA doubling goal.

8. ***Voluntary Agreements and Adaptive Management Measures*** – As described above, EBMUD has already negotiated, signed and continues to implement a multi-agency, comprehensive voluntary agreement (the JSA) on the Mokelumne River. The JSA has been a success, and also provides additional water and benefit for the Delta, as noted in D-1641. EBMUD urges the State Water Board to recognize existing agreements like the JSA within any new framework. Moreover, there are at least four other significant management teams that collaborate in covering aspects from the upper Mokelumne River watershed to Delta issues – the Upper Mokelumne Salmonid Restoration Team, CVPIA Science Integration Team, Upper Mokelumne River Watershed Authority, and the Mokelumne Hatchery Coordination Team. It's critical that progress and agreements made through these voluntary groups be considered within new frameworks.

EBMUD appreciates the opportunity to comment on the Draft Report and looks forward to working with other stakeholders, agencies and the State Water Board to develop a comprehensive plan that will enhance and protect natural resources while balancing other beneficial uses of water. As previously mentioned, we will contact Board staff to arrange a meeting between them and the Lower Mokelumne Partnership in order to assist in the refinement of the Scientific Basis Report and future Phase 2 documents.

Please do not hesitate to contact me a (510) 287-1629 should you have any questions.

Very truly yours,

Richard Sykes
Director of Water and Natural Resources

Encl.

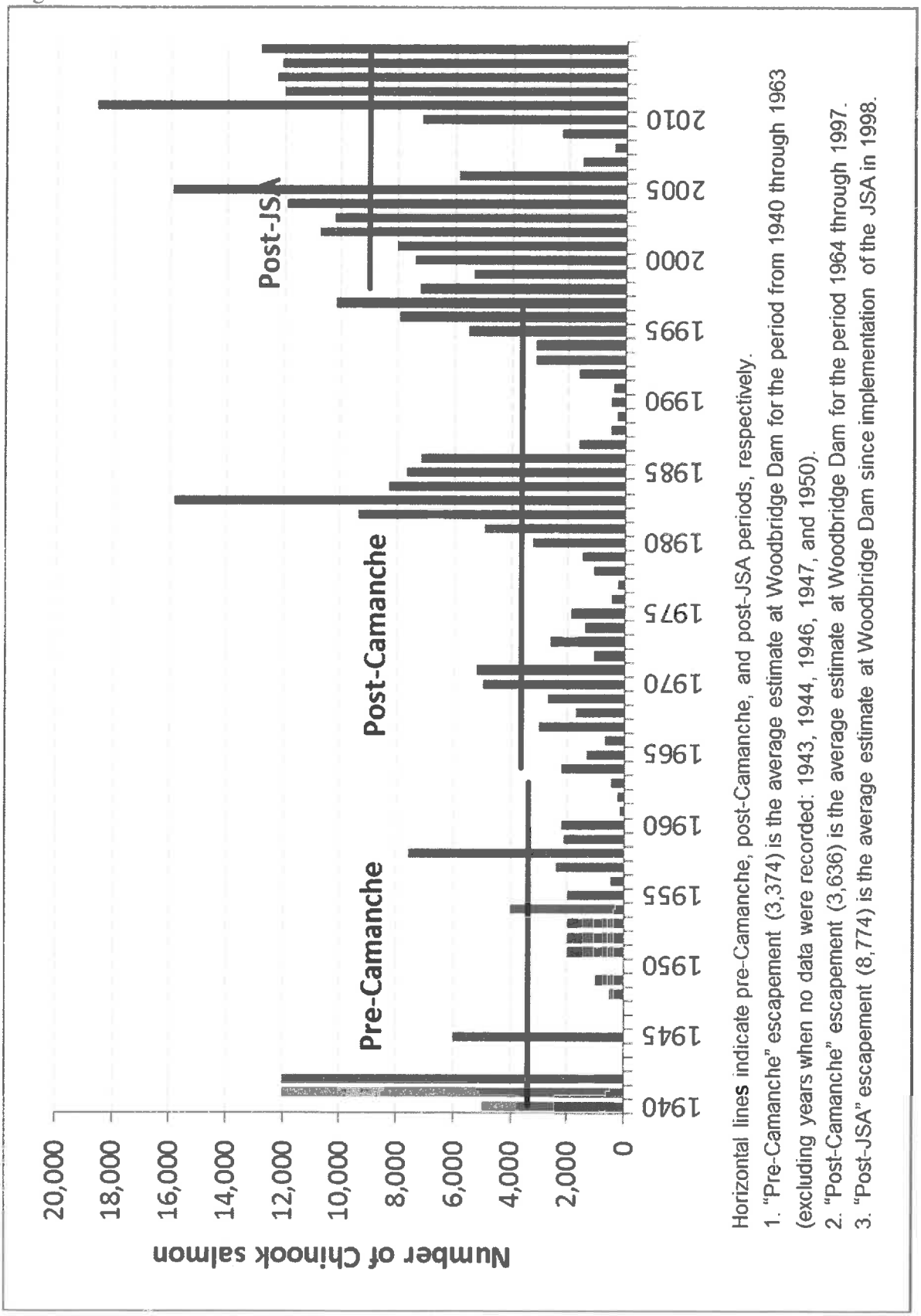

Figure 1. Long term Mokelumne River Chinook Salmon Escapement in relation to Construction of Camanche Dam and the Development of the Joint Settlement Agreement

ATTACHMENT 1

Number	Reference	Comment
1.	On page 1-3 3rd par, 1st sentence: "Upstream diversions and water exports in the Delta have reduced January to June outflows by an estimated 60 percent (average), and annual outflow by an estimated 48 percent."	Please provide supporting information including the period-of-record, data and modeling sources for the statement.
2.	Page 1-12, 4th paragraph, last sentence "Recent information also indicates..."	Please provide citations to the recent information cited.
3.	Page 1-13 2nd paragraph regarding recent "wet year" 2011.	The Draft Report focuses narrowly on flow, to the exclusion of other critical factors that contribute to fishery health. This can be seen in the page 1-13 reference to the "wet year" 2011. The year 2011 was an atypical year, with a relatively dry winter and a very wet spring with substantial snow still in the Sierras in June. In the case of the Mokelumne River, the four station average precipitation data shows that January 2011 was the tenth driest on record, whereas the entire water year 2011 was the eleventh wettest on average for the period of 1930 through 2015. This level of detail is not recognized in the Draft Report, which generalizes that more Delta outflow occurred in 2011 which led to a positive response for the aquatic estuarine community. This broad generalization is overly simplistic, obscuring the wide differences in the actual timing of precipitation and other key factors such as water temperatures and other inter-related metrics within water year 2011, all of which contributed to benefit the aquatic estuarine community. In other words, to properly assess 2011 and what factors contributed to aquatic health, it will be necessary to ascertain the **specific factors and parameters that resulted in** beneficial outcomes for the ecosystem.

		Analyzing these factors and the specific linkages between them would provide valuable scientific information which could then be used to accurately inform the Draft Report's effort to develop measures to protect specific, identified fisheries.es.
4.	Page 1-13, 5th paragraph, 1st sentence.	The eight river index criteria cited here is problematic in application to the Mokelumne River tributary for the following reasons: (a) The Mokelumne River is not included in either the Sacramento River 40-40-30 or the San Joaquin 60-20-20 indices; (b) Both the Sacramento and San Joaquin River indices have 5 year-type classes, whereas the Mokelumne River under the JSA has 4 year-type classes, clearly an inherent incompatibility; (c) Given its geographical location on the east side of the Delta, the Mokelumne River is not well correlated with either the Sacramento 40-30-30 index or the San Joaquin 60-20-20 indices, as both of those indices cover a much broader geographic scope, so that extending flow requirements consistent with these other indices to tributary systems such as the Mokelumne could lead to incongruent requirements as compared to actual hydrologic conditions. This problem is evident in Table A-10 Page A-55, where the Mokelumne River is fit into the 5 year classes, presumably based on the Sacramento 40-30-30 Index. To demonstrate how this could result in an invalid representation, consider water year 2003 on the Mokelumne River. It is classified under the Sacramento 40-30-30 index as "Above Normal," but is classified as "Below Normal" under the JSA classification index. Another example is water year 1961, which is designated as "Dry" under the Sacramento River index whereas it is classified under the JSA as "Critically Dry".
5.	Page 2-4 Figure 2.1-2	Some areas of the Delta are below mean-sea-level *i.e.* an elevation less than 0 ft msl, yet this is not apparent from the figure where the

		minimum elevation of the legend is represented as "0" (pink box at top left within the legend). Referencing the appropriate datum would also be useful information to include along with this elevation map.
6.	Comments on methodology of estimating unimpaired flow and comparing unimpaired flow to an impaired flow condition such as in the case of Figure 2.1-7 on page 2-10 the results section 2.2, and the modeling approach as documented in Appendix A.	There is an apparent flaw in the estimate of the denominator that serves as the basis for the ratios presented in Figure 2.1-7. This is deduced from Table A-10 on page A-55, where Mokelumne River inflow equal to 848 TAF includes inflow from other tributary systems that enter the Mokelumne downstream of Lodi in tidally influenced reaches of the lower Mokelumne River. See Table A-3 on page A-17 to A-18, where Amador (watershed 66) as well as Dry and Sutter Creeks (watershed 67) are lumped together with the other Mokelumne stations higher up in the Mokelumne Watershed. These two additional watersheds serve to inflate the denominator, thereby lowering the ratios as presented in Figure 2.1-7. The assessment for the Mokelumne, therefore, should be performed upstream of the confluence with the Amador and Dry and Sutter Creek watersheds, and the ratio of unimpaired flow to impaired flow must be derived at a consistent location on the tributary. Deriving unimpaired flow estimates at one location in the watershed and comparing this to an impaired flow at another location (downstream) will yield a distorted result. As noted above, the Sacramento River 40-30-30 index does not apply to the Mokelumne River; hence the year-type classes in column 2 as presented are misleading when assigned to the Mokelumne River. This impairment assessment should be based on actual recent gage data, since the JSA has been implemented and classified appropriately using the JSA year-type classifications that apply to the Mokelumne River.

		Another potential flaw in the methodology applied to compare unimpaired flow to impaired flow appears evident from the modeling approach as documented in Appendix A. Imported water or return flows resulting from groundwater pumping appear to inflate the estimate of regulated or impaired flow estimates in some tributary systems or locations where the ratio of impaired flow to unimpaired flow will, therefore, result in a misleadingly high number. Adjustments should be made to reduce these additional sources if this assessment is to be performed. In the case of the Mokelumne River, if the ratio of impaired flows to unimpaired flows is performed at the confluence of the Mokelumne and San Joaquin Rivers the assumption that the Delta Cross Channel is always open in the SVUFM (see Appendix A page A-26 under Section A.4.2.1 6th bullet) for the unimpaired value and closed for the impaired value will yield inaccurate results, such as those presented in Figure 2.1-7. Thus, this comparison is not representative of the impaired flow upstream on this tributary system. Finally, we advise against performing the assessment of impaired flow to unimpaired flow at a location on a tributary in areas of tidal influence, due to the complications created by tidal influences, which can skew the interpretation of gage data necessary to derive an unimpaired flow estimate.
7.	page 2.34 Section 2.2.7.1 1st paragraph 3rd sentence, Beginning with, "It is highly regulated..."	Only the North Fork Mokelumne is highly regulated by PG&E's hydropower system. The Middle Fork and South Fork have no PG&E hydropower facilities, the Middle Fork has only a small reservoir in its headwaters, and the South Fork is completely unregulated.
8.	Page 2.34 Section 2.2.7.1 last paragraph	Inclusion of watersheds 66 and 67 are skewing the Unimpaired Flow estimates and should not be included in this assessment (see above comment).

9.	Page 2.35 1st paragraph.	This text needs to be updated with the latest science, as the citation and the stated fisheries impairments are to conditions that existed circa 1996. There have been considerable changes on the Mokelumne River since 1996 through implementation of the subsequent JSA and related fishery programs that have addressed many of the issues cited here. Also, the following text needs to be replaced: • "Accord" replaced with "Agreement", • "Metropolitan" replaced with "Municipal".
10.	Page 2-44, last paragraph	In this case there is a description of a tributary system, Putah Creek, where there have been recent successes, specifically the returns in the recent critically dry year of 2015. Yet Figure 2.1-7 represents Putah creek as severely impaired. This calls into question the use of unimpaired flow as a surrogate to assess ecosystem health or status. One size does not fit all; an assessment should be made on an ecosystem by ecosystem basis where such information is available such as it is on the Mokelumne River. In such regulated systems, a more direct assessment could be helpful in providing appropriate context to the result obtained through the unimpaired to impaired ratio to inform what a reasonable ratio range should be. The unimpaired flow to impaired flow ratio as a metric of assessing ecosystem health appears to be an invalid indicator, at least when it is applied in isolation – as it is in the Draft Report – without consideration of other variables.
11.	Page 2-54, 2nd paragraph, 3rd sentence.	The agency "East Bay Municipal Utility District" should be replaced with "Freeport Regional Water Authority" to recognize that both EBMUD and SCWA (member agencies of FRWA) divert from the Freeport facility.

12.	Page 6-5	Last citation on the page seems to be incomplete or an orphan citation that is perhaps redundant with the first citation on the next page.
13.	Page A-1 last sentence of 3rd paragraph. "The methods used by the Division of Flood Management are similar to those utilized by the Bay-Delta Office, where the effects of diversions and storage are removed from the time series."	This could be phrased in a better way, where the unimpaired flow is estimated from gaged flow by adjusting the gaged flow to account for upstream diversions and storage regulation. The use of the word "removed" in the sentence here is mathematically misleading.
14.	Page 4-7 Table A-2	The meaning of blanks in all three of the methods columns, i.e. the last three columns, is not clear. Furthermore, it is unclear why all three methods may be necessary (see I_Pardee on Page A-10 of Table A-2 which differs from I_CMCHE on page 7 with no explanation of the basis). There needs to be a clear explanation of how the methods are used and what criteria is applied as the basis of selecting which method(s) is/are utilized.
15.	Page A-12 1st paragraph.	Note that the estimate cited is for all the watersheds and tributaries as presented in Table A-3, however, the second sentence is inaccurate as several of the tributaries are technically tributaries to the San Joaquin yet are lumped into the Sacramento basin.
16.	Page A-27 last paragraph. "There are no other alterations to the model inputs and there is no addition of "closure terms" as is used with CalSim II modeling to compensate for differences between model results and measurements (partly because there are no direct measurements of unimpaired flow on the valley floor)."	Two comments: (a) not including the closure terms may mean that conservation of mass is not preserved and, thus, the assumption of excluding closure terms should be more carefully considered and justified. Also, (b) the closure terms may be useful to inform an uncertainty analysis of the approach utilizing unimpaired flow.

17.	Table A-3; Mokelumne River Watershed:	The table needs to be clarified to indicate the specific location of estimated average annual flow. For example, for the Mokelumne watershed, it appears that the location for the unimpaired flow is above the confluence of the Consumnes River. The Amador Reservoir average annual flow should be included above Mokelumne Hill. Therefore, the total average annual flow at Mokelumne Hill is calculated to be 760 TAF (EBMUD records indicate that the long-term average annual unimpaired flow at Mokelumne Hill is 745 TAF for WY 1929-2011).
18.	Table A-6; Average Annual Gain (+-):	The estimated net gain/loss for the Mokelumne River above the Consumnes River is -91 TAF. EBMUD's estimate of annual average losses from Camanche Reservoir to Frandy is on the order of -45TAF.
19.	Pg 1-8	What environmental, economic and other analysis will be prepared? The report mentions that a hydrologic model (*i.e.* SacWAM) for Phase 2 is under development and review. It would be helpful to document the timeline for the model development and peer review processes. Given that there are other underlying factors involved, which are acknowledged yet may not be included in the model, it seems like this will most certainly not yield comprehensive quantitative results and should be revisited at a later time to assess whether the tool will be adequate for the intended use.
20.	Pg 1-11, 1st paragraph	This paragraph includes general statements that some tributaries may be adequate regarding existing flow conditions while others may not. This discussion would be stronger with more specificity and examples, as well as an elaboration on what is meant by flow requirements necessary to, "prevent future impacts to fish and wildlife." Perhaps using

		examples that cross reference later sections, and further descriptions of approaches to protect against future impacts fish and wildlife, would help to clarify the broad and vague statements asserted in this paragraph.
21.	Pg 1-12 2nd paragraph	There needs to be a well explained basis or citation to science that supports the stated range of 35-75% of unimpaired flows. In addition, an assessment of specific protective metrics to this range would provide a clearer, more comprehensive understanding of the basis for the alternatives. The tradeoffs of this specific metric to other performance measures, both good and bad, need to be more clear and explicit.
22.	Pg 1-13 5th paragraph, 1st sentence.	While the approach described here (*i.e.* current month flow requirement based on previous 8-river index), while feasible in a modeling context, may not be realistic and would be challenging in regard to actual real-time operations, given the uncertainty and inherent issues with estimating unimpaired flow. Furthermore, the 8-river index covers a broad geographic region that may be incompatible when applied to smaller discrete tributaries (as described in previous comments). There should be some consideration of potential hydrologic variation not adequately represented by this index, as discussed in comments above.
23.	Pg 1-16 last paragraph	This paragraph implies SacWAM development is complete and has been verified to meet the intended purpose outlined in the paragraph above, but in reality the development and testing of the SacWAM model is still underway. More information would be helpful to inform on the status of the model and the efforts to ensure the tool meets the needs identified in the previous paragraph.

24.	Pg 2-1 1st paragraph, last sentence	There needs to be additional discussion that clearly states the definitions and differences between "unimpaired flow", "natural flow" alluded to in the statement and "impaired flow" used elsewhere in the document.
25.	Pg 2-34 section 2.2.7.1	The regulated or impaired flow condition is not clear and needs to be clearly defined, especially since CalSimII does not simulate the Mokelumne River system. If a boundary condition from CalSimII input is being used as representative of current conditions, there needs to be a clear documentation of the sources and assumptions that factor into the regulated flow estimate.
26.	Pg 2-64 Table 2.4-2.	The sources and methods relied upon in deriving the estimates are not clear from the report. Furthermore, the simulated results relied upon in the Draft Report should be validated or compared with actual current conditions where gage data representative of current conditions are available.
27.	Pg 5-3 through 5-4	From this discussion, the inference is that the unimpaired flow requirement would result in different release requirements in any given month of any year *i.e.* no two years are the same. If this is intended, please compare with actual real-time operational considerations. Furthermore, the unimpaired flow requirement that also incorporates adaptive management, such as in the 3rd paragraph on page 5-4, needs to be much more clearly defined as a concept. The Draft Report recommends a series of measures, including a year-round inflow requirement based on a percent of unimpaired flow, along with higher flows in the summer and a requirement for cold-water management. When taken together, this combination of measures is clearly an infeasible objective and is simply unrealistic. Not all of these things can occur at the same time, as there simply is not enough water of sufficient quality and quantity available to do so. Instead, tradeoffs have to be

		made. For instance, cold-water is key water quality metric and neither the model approach utilized in the Draft Report nor the SacWAM model will explicitly model water quality, which means the tradeoffs will not be quantitatively defined. Additionally, the unimpaired flow criteria when applied to determine required releases means there would be essentially low flows in the summer. The recommendation to have required releases indexed on the previous month's unimpaired flow in isolation is inadequate. The Draft Report should be revised to rely on clear, well founded data and to clearly explain how these various factors contribute to meeting competing objectives.
28.	Pg 5-6 4th paragraph	While a reference to the Joint Settlement Agreement (JSA) is appreciated, the discussion is wholly inadequate and inaccurate. For example, maximum JSA releases from Camanche can exceed 325cfs, but the Draft Report incorrectly lists 325cfs as the maximum. Furthermore, discussion of water quality and adaptive management provisions of the JSA and the companion implementation document (i.e. the Lower Mokelumne River Project Water Quality and Resource Management Program) are completely absent here and should be included. Finally, it should be acknowledged that there are other release requirements, in addition to the JSA, such as releases for downstream senior water rights and flood control that are made to the lower Mokelumne River. The Draft Report undercounts total releases.
29.	Pg 5-10	Please explain why no numbers are provided for other tributaries of the Sacramento River at other times of the year. Quantitative information for tributaries and other parts of the Sacramento are provided elsewhere in the document and so it is unclear why no quantitative information provided here. Also, from the discussion, it is unclear whether the

		loss of connectivity of some tributaries is unnatural or a function of impaired conditions. This should be clarified or elaborated.
30.	Pg 5-12 footnote 3	Reiterating comments provided above, (1) note that the Mokelumne River is not included in the eight river index (ERI), (2) due to the fact that storm tracks can lead to differing conditions for some watersheds relative to others within this broad geographic range, the ERI may be inappropriate when applied to particular systems, sub-watersheds, or tributary systems, and (3) some discussion of implications for real-time operations must be acknowledged, since unimpaired flows or forecasts of the ERI are inherently uncertain where the magnitude of uncertainty changes during the course of a water year.
31.	Pg 5-14 4th paragraph, 2nd sentence	The statement that the initial modeling approach utilizing CalSimII and SVUFM does not take into account, "storm flows, uncontrolled flows, and other required flows" does not appear accurate, although the modeling methodology is lacking in sufficient detail to definitively conclude this is the case. Furthermore, asserting that these flow components will be evaluated using SacWAM is premature, given that SacWAM model development and testing are still underway. The use of a monthly time step may also limit the ability to quantitatively evaluate these flow components which may need to be acknowledged as part of the discussion.

Editorial Corrections

Page 2.35 1st paragraph.	"East Bay Metropolitan Utility District" is a typo; please replace "Metropolitan" with "Municipal"
Page 6-6, the first two citations on the page.	"East Bay MUD" should be replaced by "EBMUD" for consistency with the citation convention and abbreviations section of the document.
Page 6-11	Second citation on the page is incomplete, and the 4th and 5th citations are incorrect, as they should not say "Resource Management Associates." We believe the firm name is RMC Water and Environment Incorporated, abbreviated RMC.
Section 6.3.3	Is missing the full reference listing corresponding to the citation "(EBMUD, 2013)"