United States Department of the Interior

BUREAU OF RECLAMATION
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VIA ELECTRONIC MAIL ONLY

Mr. Joseph Byrne
Chair, California Water Commission
P.O. Box 942836
Sacramento, California 94236-0001

Subject: Bureau of Reclamation Comments on Draft Technical Reference Document (TRD)

Dear Mr. Byrne:

The Bureau of Reclamation appreciates the opportunity to provide comments and concerns regarding the recently drafted TRD issued by the California Water Commission (CWC). As you are aware, Reclamation and others have been studying the technical, environmental, economic, and financial feasibility of four storage projects identified in the 2000 CALFED Record of Decision (ROD) and the 2004 Public Law 108-361 since 2003. Our comments are focused on the potential effect of the required analysis on the federal feasibility studies and Reclamation's potential cost-share partners.

Background

When Congress authorized Reclamation to conduct feasibility studies of four storage projects identified in the CALFED ROD, Reclamation and the California Department of Water Resources (DWR) collaborated to jointly implement the entire storage program. Reclamation and DWR jointly funded storage studies intending to meet both Federal and State requirements. One major component, primarily led by DWR, was to develop the common analytical tools and assumptions needed to determine the costs and benefits of each project to assure broad acceptability of analytical results and directly comparable results. By doing so, the agencies assured that no one project would be justified in a way that unduly undermined another project or unduly overstated benefits. In 2010, the California Water Commission invited both Reclamation and DWR experts to present the feasibility and environmental study processes that the agencies were implementing.

When the State passed a suite of laws in 2009, commonly referred to as the "water package," funding for DWR's cost share ceased. However, Reclamation continued to advance four of the storage studies, consistent with the common assumptions and other agreements with DWR, and entered into cost share agreements with local project proponents to fund studies no longer funded by DWR.

Status

The following table summarizes the current status of each CALFED storage project study.

Storage Project	Study Cost-Share Partners	Current Status	Potential Water Supply Beneficiaries
Shasta Enlargement	Reclamation	Final Reports with Congress; draft legislation	Central Valley & State Water Project (CVP & SWP) contractors
Temperance Flat	Reclamation and San Joaquin Valley Water Infrastructure Authority	Final Reports in executive review	CVP & SWP contractors south of the Delta; Tribes
Sites	Reclamation and Sites Project Authority	Draft Reports in development	CVP & SWP contractors; other Sac Valley water users; Tribes
Los Vaqueros Enlargement, Phase 2	Reclamation, Contra Costa Water District, additional Bay Area water districts	Draft Reports in development	Select CVP & SWP contractors in the Bay Area; San Joaquin Valley refuges; CVP San Joaquin Valley contractors

Note: Reclamation is not authorized to study the feasibility of the In-Delta Project.

Summary Comments and Considerations

Reclamation tasked each project team with reviewing the draft TRD to identify the differences between the requirements and the work that Reclamation and partners have already conducted or are conducting. The attached document summarizes our teams' reviews and is intended to highlight the degree to which the draft TRD will require additional analysis and documentation by our project partners (applicants). For the most part, the comments focus just on differences. Occasionally a comment identifies a concern with the draft TRD.

Overall, our findings are that the draft TRD, particularly the prescriptive approach to including specified climate change and sea level rise assumptions in 2030 and 2070 baseline conditions, will require applicants to conduct extensive, time-consuming, and costly analysis in a very short period of time. We are concerned that the requirements may not be adequately developed and reviewed in order to effectively inform the CWC decisions. We are also concerned that projects that are further along in the Federal process are potentially at a disadvantage.

The analysis would require reformulation of each project in order to optimize potential benefits in a future with a singular set of climate change and sea-level rise assumptions. Those assumptions do not include any changes in how the existing statewide water system would be operated with the prescribed climate and sea-level rise assumptions. The intent of the analysis is to assure the CWC, California Department of Fish and Wildlife, California State Water Resources Control Board, and DWR that the benefits to be funded by the State investment would

be provided into the future. However, optimizing a project to a singular set of assumptions cannot provide such assurances because there are thousands of permutations of potential climate and sea-level changes in the future, and the existing infrastructure operations would assuredly change.

We have additional concerns related to applying economic values to potential benefits in the prescribed 2030 and 2070 conditions. Reclamation has utilized a conservative approach to developing estimates of economic benefits, assuming that current economic conditions would persist and providing sensitivity analysis where appropriate. Estimating economic conditions into the future is very difficult and further complicated by the potential worldwide effects of climate change on market conditions, population growth and location, and innumerable related conditions. The draft TRD provides some values that could be utilized, though the water supply value is below even today's value. Since benefit values are the primary driver of a cost allocation, developing or assigning values is extremely controversial, and introducing further uncertainty is likely to cause significant challenges to funding decisions and agreements with other cost-share partners.

It is clear that the decisions to be made by the CWC are critically important to the State, which are therefore critically important for the nation. Reclamation appreciates the complexity of water management in the State and the challenges of selecting and implementing huge infrastructure projects. And it is clear from the legislation that the State must partner with other organizations willing to fund project construction, operations, maintenance, and replacement costs.

It may be useful to reduce the prescriptive requirements and view the information submitted to the CWC as a proposal to partner with the applicant to implement a project. Those proposals that appear to match the goals and objectives of the State could then be further developed to determine the amount of funding the State should invest in each project. That further development could be completed in partnership with the potential cost-share partners. At that time, the climate change analysis may be more fully developed and vetted.

Please see attached more detailed comments for your consideration. If you have any questions, please contact me at mdenning@usbr.gov or 916-978-5060.

Sincerely,

Michelle H. Denning
Regional Planning Officer

Attachment

Comparison of Current CALFED Storage Project Feasibility and Environmental Studies to the Draft Technical Reference Document Published by the California Water Commission, August 2016
Consolidated Comments Prepared for the Bureau of Reclamation

Section 2 – Defining Without-Project Future Condition

- ***Section 2.3 Planning Horizon***
  Summary of Findings: Overall, the identified approach related to planning horizons is inconsistent with the approaches used for the CALFED Storage Projects. Additional new analysis approach or tool application would be required to be consistent with the Technical Reference Document (TRD) published by the California Water Commission (CWC).

  Specific Comments/Notes:
  - The section describes that analyses conducted for the WSIP must, at a minimum, include without- and with-project future conditions at 2030 and 2070, if the project planning horizon extends to 2070 or beyond.
    - CALFED Storage Projects were analyzed at a future condition of 2030, but were not analyzed at 2070.
    - Significant new analysis (e.g., CalSim, HEC-5Q, DSM2, SalMod, LTGen (CVP hydropower), SWPower) would be required at the 2070 future condition.

- ***Section 2.4 CEQA Considerations***
  Summary of Findings: Unclear if release of a Public Draft EIR is required for projects prior to application; projects are not eligible for funding unless Draft EIS is available. Refer to other sections on comments related to additional effort required for 2030/2070 future conditions analysis.

  Specific Comments/Notes:
  - Section compares CEQA impact analysis and WSIP benefits analysis. WSIP analysis need not include quantification of all changes and impacts identified in CEQA analysis; however, water-related benefits need to be analyzed in greater detail.
  - Project is not eligible for funding unless draft environmental documentation is available for public review, and requires completion of environmental documentation prior to allocation of funding. Unclear if draft environmental documentation is required to apply for funding, which would require additional effort for some storage projects.
  - For purposes of WSIP, projections of future conditions that include climate change and sea level rise are required (i.e., 2030 and 2070 conditions) in addition to No Project Alternative (CEQA) or analogous without-project condition.

- ***Section 2.5 Feasibility Study Considerations***
  Summary of Findings: CALFED Storage feasibility studies are currently in different stages of completion and some analyses differ from requirements in the TRD, which will require some new analysis and/or explanation of difference.

  Specific Comments/Notes:
  - A completed project feasibility study is required as part of WSIP project eligibility.

- If feasibility study is completed or updated concurrently with funding application, assumptions, procedures, and results must be consistent across the two documents. Applicant must explain differences if they exist and demonstrate that project remains feasible.

- ***Section 2.6 Water Resources System and Operations***
  Summary of Findings: The CALFED Storage Project discussions of without-project water operations are at a sufficient level of detail, and are based on all required operations related to Delta, BOs, SWP, and CVP; however, additional effort will be required to estimate effect of SGMA.

  Specific Comments/Notes:
  - Applicants shall assume full implementation of SGMA in planning horizon analysis, and provide and justify a best estimate of the future effect of SGMA implementation. None of the CALFED storage studies include SGMA as part of the without-project condition in the feasibility reports.
  - Section 2.6.1 (Page 2-7) and Section 2.12.2.1 (Page 2-15) require the use of 2030 and 2070 climate and sea-level conditions in modeled water operations. The CWC is providing CalSim II modeling runs that incorporate these conditions. This approach is inconsistent with CEQA and could result in without-project conditions that are unacceptable and cannot be sustained. It will be difficult for any project to show sustainable benefits under these conditions. This modeling (CalSim II and post processing models for ecosystem, water quality, and economic evaluation) is also very costly.

- ***Section 2.7 Socioeconomic Conditions***
  Summary of Findings: The CALFED Storage Projects use future socioeconomic conditions estimated only for 2030. It is unclear if 2070 condition projections are required and if it will be provided as it pertains to CalSim model (e.g. population, land use, M&I water demand). This would require significant level of effort to develop for 2070.

- ***Section 2.8 Ecosystem Conditions***
  Summary of Findings: The CALFED Storage Project future ecosystem conditions estimates are only for 2030. It is unclear if 2070 condition projections are required, but would assume to be if benefits need to be assessed in 2070.

  Section 2.9 Water Quality Conditions
  Summary of Findings: Similar to previous sections, CALFED Storage Projects use estimates of future conditions only for 2030.

- ***Section 2.12 Climate Change and Sea Level Rise***
  Summary of Findings: The released climate change models shows significant seasonal shift in runoff pattern. In addition, the CalSim ANNs appear to be not matching the DSM2 modeling results. Operations of the Storage projects are likely to require substantial adjustments to operate as intended and provide desired benefits under climate change modeling runs.

  Specific Comments/Notes:
  - Section 2.12.1 *"Climate Change is required in the quantification of public benefits of water storage projects to comply with Governor Brown's Executive Order…"* Although this statement is true, the manner of which climate change is to be considered is not prescribed.

Because of the evolving nature of prediction of future climate, consideration of climate change is best applied as sensitivity to test the robustness of projects to potential future conditions. While selection of one representation of the future as a baseline for estimating economic benefits and basing public investment decisions was made in order to simplify the process, the selection of one representation seems arbitrary.

- Climate Change results used in most recent studies (WaterFix/BDCP Draft EIS/EIR, DWR 2013; and Sacramento-San Joaquin Basin Study, Reclamation 2015) have showed that hydrology in California under future climate change is likely to be drier in dry years, and wetter in wet years (using central tendency projections). The current modeling released by the CWC show that future climate under the projected 2030 and 2070 conditions will be wetter in wet and dry years. It is not clear if CWC climate analysis used central tendency from the range of developed climate change scenarios.
- A peer review of the released climate change model runs (VIC, CalSim, and DSM2) would be beneficial. At a meeting with CWC staff on September 27, we were told that staff and consulting team are just now reviewing the runs themselves. It seems this modeling approach may need more time and input in order to prevent excessive expenditures by applicants.
- There is a pronounced seasonal shift, especially in the Sacramento Valley, where large outflow occurs during early spring (corresponding to flood flows). Although the system is wetter overall, CVP/SWP deliveries are reduced by upward of 1 million acre-feet in certain years. This corresponds to the fact that no adaption measures were included in the system operations under future climates. This has the potential to over inflate or exaggerate the effects of climate change on water supply, and therefore on the benefits of proposed projects under the WSIP.
- How this seasonal shift may affect biological resources is also unknown at this time. This is specially concerning because these climate change runs are to be used as baselines to assess benefits to ecosystem. For example, if Shasta reaches "dead pool" few years in a row, then current biological models would forecast extinction of certain anadromous fish species.
- Review of the salinity results from CalSim ANNs and DSM2 showed significant differences between the two. Have the ANNs for CalSim been calibrated for the used sea-level rise estimates? Need to provide explanation to the sources of these large discrepancies.

Section 3 – With-Project Future Conditions

- ***Section 3.4 Preliminary Operations Plan***

  Summary of Findings: Storage project operations measures could be packaged into a preliminary operations plan, but would not address all listed requirements in the TRD, and would require substantial new analyses and stakeholder/beneficiary/regulatory agency coordination. Some listed items such as adaptive management strategies have not been addressed in the federal storage project feasibility studies and could be addressed in later definite planning/design documents.

  Specific Comments/Notes:

  - The storage projects have not explicitly described how operations would be monitored to ensure public benefit outcomes, nor have they completed a risk/reliability assessment with resulting adaptive management strategies. Due to the complexity of these water supply systems, deviations from expected operations could trigger additional NEPA, CEQA, or other regulatory action; these potential impacts have not been evaluated in existing/current environmental documents.

- Coordination of the project with other facilities is typically a qualitative discussion, and is unclear if the TRD requires quantitative analyses.

- ***Section 3.5 Feasibility Study***
  Summary of Findings: All CALFED Storage Projects have completed or will soon complete Final Feasibility Reports that include the listed requirements in the TRD. However, Reclamation will not make a determination of financial feasibility until cost share partners enter into appropriate discussions, and it is unclear how this or any Reclamation determination would affect the CWC feasibility determination.

- ***Section 3.7 Observed and Simulated With-Project Conditions***
  Summary of Findings: The CALFED Storage projects use a simulated with-project condition in effects and benefits analyses, and assumptions and methods are used consistently in both the without-project and with-project conditions.

Section 4 - Calculating Physical Changes

- ***Section 4.2 General Project Analysis***
  Summary of Findings: Applicants are required to use the data and model products described and provided in Appendix A for the two without-project future conditions. If the recommended products do not adequately describe the without project future conditions relevant to the project, other tools than those described in Chapter 4 may also be used. However, applicants must justify the use of any models used, and explain why recommended models or tools considered 'best available science' by the CWC were not used. Text in this subsection and throughout Chapter 4 seems to indicate that significant effort may be required to justify any and all tools and assumptions used to quantify public benefits at the required future conditions.

  Specific Comments/Notes:
  - 4.2.1.6 Use of Trends and Interpolation: An applicant must explain and justify the assumptions and trend in hydrologic or other physical conditions used to interpolate and extrapolate over the planning horizon. A linear trend can be used if no other, more specific trend information can be justified. Trend justification must be applied consistently to both benefits and impacts.
  - 4.2.3 Model Integration: When using multiple or successive models/tools, applicants are not required to develop complex conversion routines that account for all possible interactions and feedback.

- ***Section 4.3 Surface Water Operations Analysis***
  Summary of Findings: Overall, the general theory, approach, and analysis processes described for surface water operations analysis are consistent with that applied on the CALFED Storage Projects. However, see also comments on other TRD sections (including Appendix A), which provide more specific requirements related to surface water operations, tools, and assumptions.

  - Applicants should strive to use analysis, data, and management assumptions that are reasonably consistent with SGMA's requirements. Applications should include description of (1) how the management and operation of the proposed storage project might be integrated

with the study area's GSP, and (2) coordination with GSA's overlying the basin in which the project will be constructed to ensure local buy-in.
  - For USJRBSI, LVE, NODOS, SLWRI, this would include multiple potential GSAs and GSPs (each). However, as none are likely to be completed/formed by the time applications are due, a great deal of assumptions would be required, and project teams may make conflicting assumptions. This would require significant effort.

- ***Section 4.7 Ecosystem Analysis***
  Summary of Findings: Nothing described in this section of the TRD is inconsistent with or would require rework of the analyses conducted for the LVE and Shasta Enlargement. The ecosystem analyses performed for USJRBSI used tools that are not included in Table 4-12.

  Specific Comments/Notes:
  - The TRD identifies a wide-array of potential approaches, including metrics predominately based upon flow only. Analyses based upon flow only, particularly when evaluating surface storage projects, would appear to be inadequate. For most Central Valley rivers/streams, a key source of fish mortality is related to temperature. Analyses should be robust and, at minimum, include analyses of both flow and temperature.
  - USJRBSI used the Ecosystem Diagnosis and Treatment (EDT) habitat model for ecosystem analyses, consistent with SJRRP. The EDT model is not listed in Table 4-12.The application of the EDT model to the USJRBSI was the subject of an independent peer review.
  - The TRD lists various analytical methods/tools for quantifying ecosystem benefits (Table 4-12), though none are required. These tools are largely focused on aquatic species (fish) and aquatic habitats (riverine and Delta conditions) and none address terrestrial or avian habitats.

- Section 4.7.4 and the associated Ecosystem Priorities Application Worksheets (August 2016) require substantial qualitative and quantitative analysis. Analysis to date for CALFED Storage Projects is similar, but not identical to the analysis requested. For example, the application worksheets require:
  - Detailed information on adaptive management (REV 4)
  - Species specific analysis of salmonids with spatial and temporal scales for each species
  - A discussion of how water provided can benefit multiple species
  - Analysis of the benefits against the objectives of species recovery plans
- CDFW Priority 16 requires an evaluation of benefits to species with commercial, recreational, scientific, or educational uses (e.g., waterfowl) that has not been evaluated previously.

- ***Section 4.8 Water Quality Analysis***
  Summary of Findings: Physical quantification approach related to water quality analysis includes water flow and temperature improvement elements evaluated in the CALFED Storage Projects, but also includes improvements to quality of water supply deliveries and groundwater quality conditions which were generally not quantified (i.e. qualitatively). Applicants are not limited to using the specific water quality constituents, benefits, and quantification methods and models discussed, but are required to quantify all physical changes of a project.

  Specific Comments/Notes:
  - Water quality improvements, for the purposes of this program and quantifying public benefits, are fishery protection, fish and wildlife conservation, preservation of waterways in their natural state, and recreation.

- State Water Board developed water quality priorities for the WSIP (Section 4.8.5), which can be measured by changes in temperature, dissolved oxygen, salinity, and concentrations of specific constituents (e.g., nitrogen, phosphorus, mercury) and by changes in groundwater, Delta tributary flows, demand on the Delta, and water for basic human needs.
- Dissolved oxygen, salinity, and concentrations of specific constituents were not evaluated quantitatively for USJRBSI. The contribution of relatively high-quality water from the San Joaquin River would dilute concentrations of water quality constituents in Mendota Pool, improving the quality of water supplies to entities receiving water from Mendota Pool, including CVP SOD and/or SWP M&I contractors under alternatives.
- Additional groundwater quality analysis would be required to quantify improvements to groundwater quality conditions within the CVP Friant Division and Westside San Joaquin Valley region. If groundwater banking projects are proposed for inclusion, analysis should include additional groundwater banks operated in conjunction with Temperance Flat Reservoir. Recharge of groundwater basins with high quality surface water supplies is likely to improve groundwater quality conditions within the CVP Friant Division. Additional surface water deliveries within the Westside Region would reduce the need to pump groundwater.

- Section 4.8.2 (Page 4-111) identifies the SWRCB water quality priorities. To receive points for relative environmental value, it will be necessary to model these specific parameters. Some of these must be attained in specific geographical areas. Water quality modeling needs to be performed for the right constituents in the right place.

- Section 4.8.5.1 (Page 4-116) addresses pollutants in 303(d) listed impaired water bodies. Although applicants can claim public benefits for improvements in areas that are not on the 303(d) list, they will not receive additional points for relative environmental value in the scoring.

- Section 4.8.6 (Page 4-123) indicates that water quality improvements may be at a project's location, adjacent to the project, and/or downstream. Water quality improvements may also be upstream if the project provides upstream improvements in the water system storage.

- ***Section 4.9 Flood Risk Reduction Analysis***
  Summary of Findings: The TRD states that projects in the Sacramento and San Joaquin basins should use the Central Valley Hydrology Study (CVHS) hydrology methods developed by DWR and USACE when quantifying system-wide flood benefits. However, these tools were not available when flood risk analyses were conducted for the CALFED Storage Projects. Further, no information or direction is provided on how to conduct flood risk analyses under future climate change conditions (2030 and 2070 hydrology that will be provided by the CWC is not applicable to flood risk analyses). Flood risk reduction represents a relatively small component of the benefits provided by the storage projects and, given the additional effort that would be needed to reevaluate flood benefits/impacts using the methods recommended in the TRD, additional work effort may not materially affect a project ranking.

- ***Section 4.11 Emergency Response Analysis***
  Summary of Findings: Physical quantification approach related to emergency response varies from the current method for the CALFED Storage Projects. New analysis may be required,

including new water supply modeling as it relates the planning horizon and project operations during and post-emergency.

Specific Comments/Notes:

- The WSIP regulations define emergency response's purpose (Section 4.11.1) as including, but not limited to, securing emergency water supplies and flows for dilution and salinity repulsion following a natural disaster or act of terrorism. The intent is to provide water supply that can be used to repel seawater from the Delta following a Delta levee failure event; however, projects could provide benefits following other natural disasters including floods, wildfires, landslides, or any other event capable of disrupting water supply.
- Applicant is responsible for determining and demonstrating which kinds of benefits apply. There must be a commitment that defines the amount or share of available stored water to be provided. This does not mean that water supply must be dedicated or reserved in storage for emergency supply.
- Section 4.11.2.1 states that probability and magnitude of all Delta events cannot be known, and that there are currently no probability functions for Delta levee failure that include sea-level rise, planned levee improvements, and probability of earthquake and flood events.
    - Requires applicants to assume only that the need for this amount of water to occur once within the hydrologic analysis. Applicants should assume average hydrologic conditions including average project water storage and average storage recovery conditions. For planning horizon analysis, applicant must assume that the Delta event and its use of project water occurs once, 30 years into the project operation period (they noted the CWC is still considering other appropriate size and frequency of events to use).
- Section 4.11.2.2 defines different requirements to claim a benefit for earthquake events that impact local or regional water supply operations with Delta water quality not likely to be involved.
    - Requires applicants to assume only that the need for this amount of water to occur once within the hydrologic analysis, during average hydrologic conditions. Applicants need to define the area that will benefit and justify why they will lose service or require costly alternatives. For planning horizon analysis, application must assume that the Delta event and its use of project water occurs once, 50 years into the project operation period.
    - USJRBSI alternatives could provide emergency supplies to SOD water users in the event of a disruption in Delta water supplies from a catastrophic levee failure due to seismic and/or flood events, sea level rise or, other factors. Supply disruptions to SOD water users in the No Action Alternative depends upon a variety of factors, including the availability of non-Delta water supplies and the timing and duration of the supply disruption. This analysis relied upon estimates of levee failures due to seismic events only. Information regarding the probabilities of Delta levee failures, potential levee failure scenarios, and associated projected SOD shortages was based on information developed for the Delta Risk Management Strategy (DWR, USACE, and DFG 2009). The estimated water supply deficit from SWP and CVP operations subsequent to the Delta island levee breach scenarios were simulated with the Water Analysis Module. Delta water supply disruptions were simulated by assuming that the disruption could begin within any month of a 76-year hydrologic period of record. Start times were chosen randomly to cover the range of hydrologic variation. Using this approach, the potential range of water supply disruption durations was developed and the level of water supply deficit for each hydrologic condition was calculated. The Temperance Flat RM

274 emergency water supply response was estimated as the difference at the time of the Delta pumping outage of water in storage in Millerton Lake and Temperance Flat RM 274 Reservoir, compared with Millerton Lake storage in the No Action Alternative and limited based on the size of the deficit and expected alternative plan response under different hydrologic conditions.
    - LVE is using a similar approach to that described above for USJRBSI to evaluate emergency supply benefits, though the potential beneficiaries differ. LVE could deliver emergency water supplies to the California Aqueduct, South Bay Aqueduct, or via the Mokelumne Aqueduct Intertie; consequently, the emergency supply benefits could apply to water users in both the Bay Area and SOD.
- To claim drought emergency benefit (Section 4.11.2.3), applicant must document the minimum per capita per day requirement for a public health emergency, define the committed quantities and condition under which stored water will be made available, and this must be accounted for in the project operations analysis. Drought emergencies can be assumed to occur during a critical year if it is the third or later year of any multi-year drought period that occurs in the hydrologic dataset.
    - CALFED Storage Projects were not formulated in CALSIM to achieve this specific benefit.
- To claim wildland fire emergency benefit (Section 4.11.2.5), applicant must define committed quantities of water and conditions under which stored water will be made available, and show how the project will contribute to reduced firefighting costs.
    - CALFED Storage Projects were not specifically formulated for this benefit.
- Emergency response analysis must consider any facility capacity limitation (e.g. conveyance).
- Water operations modeling must be used to estimate the amount of water in storage and available for emergency response, and must be used to assess impacts on storage in the years following an emergency event (Section 4.11.3.2). Operations modeling must account for emergency water released from storage, either within the operations model, or if that is not feasible, using post-processing of operations model results.
    - Question: does this mean that CALSIM with- and without-project should include the one instance of emergency (30 year and/or 50 year) versus using the current post-process statistical method? This has not been completed for the CALFED Storage Projects.

Section 5 – Monetizing the Value of Project Benefits

- ***Section 5.2.1 Planning Horizon***

  Summary of Findings: Benefits estimated for USJRBSI, LVE, and SLWRI are conservatively estimated for a 2030 condition consistent with Calsim II modeling. Each benefit would need to be estimated over each project's planning horizon in consideration of 2070 Calsim II modeling results and expected economic conditions.

  Specific Comments/Notes:
  - The TRD specifies that benefits need to be estimated over each projects planning horizon and provides guidance that 2030 and 2070 conditions should be modeled at a minimum. Benefits for USJRBSI, LVE, and SLWRI were estimated at 2030 condition as representative of values

over the planning horizon as decided at the initiation of the studies through CalFed Common Assumptions workgroups.

- ***Section 5.2.4 Discount Rate***

  Summary of Findings: USJRBSI and LVE analyses that use the discount rate are not consistent with the TRD and would need to be updated. The discount rate used in SLWRI analyses is consistent with TRD. Planning horizon analyses with the discount rate would need to be developed for USJRBSI, LVE, and SLWRI.

Specific Comments/Notes:

- The TRD specifies a discount rate of 3.5 percent. This is not consistent with USJRBSI (3.375) and LVE (3.125) benefit and cost analyses. Development of planning horizon analyses would require use of the discount rate for USJRBSI, LVE, and SLWRI.

- ***Section 5.2.5 Choice of Constant Dollar Year***

  Summary of Findings: The constant dollar year would need to be updated to 2015 for USJRBSI and SLWRI benefits and costs. LVE benefits and costs are in 2015 dollars and would not need to be changed.

- ***Section 5.2.6 Price Indices for Updating past Benefits and Costs to 2015 dollars***

  Summary of Findings: Price indices used for USJRBSI, LVE, and SLWRI analyses are different than indices recommended by TRD. Benefit analyses could be updated to use indices recommended by TRD, or applicant would need to justify why particular indices used.

  Specific Comments/Notes:

  - The TRD specifies use of the California CPI-U, housing construction cost, and producer cost price indices. USJRBSI, LVE, and SLWRI used the national level GDP implicit price deflator and CPI-U. The GDP Implicit Price Deflator has generally trended lower than the CPI-U which could justify its use, although projects that use the CPI-U may have slightly higher benefits than projects that use the GDP Implicit price deflator. Additional work would be required to update analyses with California specific CPI-U, or to justify use of GDP implicit price deflator.

- ***Section 5.2.7 Real Energy Prices for Future Cost Projections***

  Summary of Findings: The real energy price forecast to be used described in the TRD is different than used in analyses for USJRBSI, LVE, and SLWRI. Benefits and cost analyses that use real energy price forecasts would need to be changed or the justification for energy price forecasts used would need to be described.

  Specific Comments/Notes:

  - The TRD specifies use of 1.7 percent annual escalation developed by the CEC. DWR and PLEXOS model energy price forecasts are used for USJRBSI, LVE, and SLWRI analyses. The energy price forecasts used for hydropower, conveyance cost, and groundwater pumping cost analyses could be changed to use the real energy price forecast described in TRD or the energy price forecast used would need to be justified.

- ***Section 5.2.8.1 Real Economic Benefits May Trend Over Time***

  Summary of Findings: Benefits estimated for USJRBSI, LVE, and SLWRI are conservatively estimated at a 2030 condition. Projects that estimate increasing benefit streams beyond 2030 will have higher benefits than estimated for only the 2030 condition. Benefit estimates further into the future are more speculative and would need to account for potential real price increases based on population growth, land use, energy prices, climate, environmental conditions, and water use, among other factors, including implementation of SGMA. A significant effort would be required by applicants for CALFED storage projects to develop assumptions about pertinent factors based

on trends for benefit streams over the planning horizon based on 2030 and 2070 conditions and to have comparable projects that include increases in benefits beyond 2030.

Specific Comments/Notes:

- The TRD specifies using 2030 and 2070 conditions to estimate benefits over a 100 year planning horizon based on real price trends and other factors. CALFED storage project benefits are conservatively estimated at 2030 condition. Additional research and analyses would be required for each benefit category to estimate benefits for each year in the planning horizon. For example, many biological studies upon which ecosystem economic benefits rely do not provide estimates extending beyond 20 years. In addition, benefits accruing to ESA listed species may not be predictable if the listing status is anticipated to change in the future. Although extrapolation and interpolation to complete the planning horizon analysis is acceptable as described in TRD Section 5.2.8.2, consideration of each benefit category in each year of the planning horizon would be necessary to not over or under estimate benefits in the future.

- ***Section 5.3.3 Use of Unit Values***
  Summary of Findings: Unit values described in the TRD do not include conveyance costs and are generally lower than the water transfer and SWAP values for 2030 conditions estimated for USJRBSI, LVE, and SLWRI. Additional justification for the estimated values may be required by the applicant or new analyses could be explored using the suggested TRD values.

- ***Section 5.4.1.2 Water Supply Alternative Costs***
  Summary of Findings: Water transfer values used in USJRBSI, LVE, and SLWRI exceed unit values described in TRD and additional justification of project study values may be required by the applicant.

- ***Section 5.4.2 Ecosystem Improvements***
  Summary of Findings: There are limited models for the Central Valley system that estimate escapement and it would be difficult to estimate benefits on a per fish basis as one possible method suggested in the TRD. Environmental alternative cost and willingness to pay benefit estimates for USJRBSI, LVE, and SLWRI are consistent with methods described in the TRD. Refinements to existing least cost analyses could be made to environmental benefit estimates for specific USJRBSI operational alternatives, if those alternatives are desired to be presented by the applicants. Additional coordination with the Commission, staff, and reviewers could be required to communicate vulnerabilities to ESA listed species in dry and critical water year types and to justify application of contingent valuation survey used as sensitivity analyses for USJRBSI and SLWRI. New benefits transfer analyses that use the meta-analysis function suggested in the TRD could be developed with current physical modeling results although this method would be a much more simplistic approach in comparison to analyses already completed.

  Specific Comments/Notes:

  - The TRD recommends that for "fall-run Chinook Salmon, a value of $2,500 per escaping fish per year may be used." There are limited models for the Central Valley system that estimate escapement (i.e., Cramer IOS model for Winter-run only, NMFS life-cycle model that is incomplete) and none other than the Cramer model are identified in Section 4.7 – Ecosystem

Analysis. Accordingly, there seems to be a disconnect between Sections 4.7 and the recommendations in Section 5.4.2.

- USJRBSI environmental benefit estimates have been evaluated with alternative cost and benefits transfer of a contingent valuation study that estimated household willingness to pay values. Additional information could be developed to describe the screening process for least cost alternative analyses that were not carried forward including reoperation of Friant Dam and Millerton Lake. Additional analyses could be completed to identify specific least cost alternatives for the environmental benefits estimated for specific alternatives if those alternatives are desired to be presented.
- New benefits transfer analyses that use the meta-analysis function (Willingness to pay = 0.0843577*Percent increase in salmon population – 0.001182*Percent increase in salmon poupulation^2) suggested in the TRD could be developed with current physical modeling results (i.e., EDT and SALMOD) with interpretation of the results applied to salmon populations for USJRBSI and SLWRI. This method would not consider the vulnerability of ESA listed species in dry and critical years, a distinctly important aspect of ESA protection benefit, nor account for contemporaneous physical benefit to other listed species, and would be a much more simplistic economic analysis than the analyses already completed. By under-valuing the dry and critical year benefits, overall benefits are significantly reduced, likely over 50%.

- ***Section 5.4.3 Flood Damage Reduction***

  Summary of Findings: Flood damage reduction benefits estimated for USJRBSI are consistent with the avoided cost method described in the TRD. Avoided flood damage costs estimated with HEC-FDA are based on a study greater than five years old. Flood damage reduction benefits could be re-estimated with HEC-FDA or current benefits could be further justified to the Commission, staff, and reviewers.

  Specific Comments/Notes:

  - Flood damage reduction benefits for USJRBSI are based on HEC-FDA modeling developed by Reclamation and DWR in 2005 (U.S. Department of the Interior, Bureau of Reclamation and California Department of Water Resources. 2005. Upper San Joaquin River Basin Storage Investigation, Initial Alternatives Information Report. Flood Damage Reduction Technical Appendix. June). In section 5.2.6 of the TRD it describes that benefit estimates more than five years old should be recalculated. Although USJRBSI flood damage reduction benefits were calculated based on current alternatives' additional storage space (minimum 90 percent exceedence storage space during the flood season (November through February)), the underlying HEC-FDA modeling could be updated by the applicant to adhere to the TRD recommendations.

- ***Section 5.4.6 Emergency Response***

  Summary of Findings: The TRD requires a commitment to provide water when triggered by an emergency and this commitment may need to be explicitly included in materials submitted by the applicant. Emergency response benefits estimated for USJRBSI and LVE are consistent with the willingness to pay method and consistent with methods described in the TRD. Additional explanation and justification of the constant elasticity of demand (CED) function used in the USJRBSI and LVE analyses may be required by the applicant since the TRD does not describe it. USJRBSI and LVE use hazard frequencies estimated for the Delta Risk Management Strategy

and related shortage condition durations. Additional analyses with the specific avoided cost method and for potential firefighting benefits described in the TRD could be explored by the applicant.

Specific Comments/Notes:

- Emergency response benefits estimated for USJRBSI and LVE were estimated with a CED function with specific project beneficiary variables to estimate the willingness to pay to avoid M&I water supply shortages. The CED function was also used by the Public Draft BDCP prepared by Reclamation and DWR (Reclamation and DWR. 2013. Economic Benefits of the Bay Delta Conservation Plan and Take Alternatives. Public Draft Bay Delta Conservation Plan, Appendix 9.A. November) and is described in a recent study (Brozovic, N., D.L. Sunding, and D. Zilberman. 2007. Estimating Business and Residential Water Supply Interruption Losses from Catastrophic Events. Water Resources Research, 43(8). February 9).

Section 6 – Cost Estimates

- Section 6.2 (Page 6-2) categorizes a Reclamation feasibility study as having a Class 4 estimate. There is some ambiguity in the AACE definitions, but Reclamation feasibility estimates are designed to meet the Class 3 definition.

- ***Section 6.2.9 Non-Contract Costs***

Specific Comments/Notes:

- The TRD identifies "Non-contract costs include engineering and design, construction management, project closeout, contract administration, legal services, permitting, and other general expenses. The non-contract costs allowance is typically 20 to 25 percent of the field cost."
- This estimate is likely low for most storage projects. For Shasta, where limited land acquisition is required, non-contract costs were 30%.
- Due to potentially higher costs associated with non-contract costs for storage (i.e., planning, engineering, and design, construction management, permitting, and mitigation for surface storage/dams), the use of a flat percentage is inappropriate. Accordingly, recommend development of non-contract costs to an item/task level.

- ***Section 6.5 Economic Assumptions (Estimating Project Costs)***
  Summary of Findings: It is unclear if this section of the TRD is inconsistent with or would require rework of the analyses conducted for Shasta Enlargement or other storage projects.
  Specific Comments/Notes:
  - The TRD identifies "Planning horizon cost estimates shall be no more than 5 years old at the time of the submission of the application." It is unclear which portions of cost estimates must be no older than 5 years. It is assumed they are referring to unit prices and non-contract costs (if not using percentage estimate, see comments on Section 6.2.9). However, this section of the TRD also includes discussion of designs. For Shasta Enlargement, some of the designs and quantities were completed more than 5 years ago. Recommend that the TRD be specific that this reflects unit costs and non-contract costs, but excludes quantities.
  - The USJRBSI cost estimates would need to be updated to 2015 costs to comply with the TRD.

- Section 6.5.1 (Page 6-3) requires netting out conveyance costs when estimating benefits. The rules for applying this should be clarified to ensure that everyone uses a consistent approach to estimating benefits.

Section 10 – Evaluating Sources of Uncertainty

This chapter outlines: "quantitative or descriptive sensitivity analysis is required to evaluate the effect of climate change conditions, future projects water management actions, and other conditions identified by the applicant, such as ecosystem and regulatory conditions."

- ***10.1 Uncertainty Associated with Climate Change***
  Summary of Findings: Applicants are required "to provide a qualitative sensitivity analysis to identify how the expected physical changes caused or created by the proposed project could be changed by other water management actions and those included in the proposed project's CEQA cumulative effects analysis." This implies that projects are required to develop new operating scenarios and/or reformulate under the proposed future conditions (2030 and 2070, both of which include climate change), as benefits will undoubtedly be lower under the 2070 conditions (and potentially under the 2030 conditions). This effort, as interpreted, represents significant additional work and would be applicable to each of the storage investigations.

- ***10.3 Other Sources of Uncertainty***
  Summary of Findings: This section requires applicants to "disclose any other potential sources of uncertainty and describe alternative operational strategies or adaptations the proposed project could employ to provide alternative benefits or to maintain the level of benefits provided by the project if future conditions differ from the with-project future conditions." Similar to that described for 10.1 above, this implies that projects are required to develop new operating scenarios and/or reformulate under future conditions and potentially under any other "potential sources of uncertainty". If strictly interpreted, this could represent significant additional work and may be applicable to each of the storage investigations.