These comments address three general aspects of the model: the assumptions common to all alternatives, the assumptions for specific alternatives, and the presentation of the model results. There are five assumptions common to all alternatives that should be refined:

24

1. **Inflows** Even over the brief historical record, the yearly natural flow of the Colorado River has varied dramatically, ranging from an estimated low of 5.0 MAF in 1977 to an estimated high of 23.6 MAF seven years later. It is not clear that the Index Sequential Method (ISM) used in the model captures the full range of future variability, particularly for the brief 15 year duration of the surplus criteria. We suggest using a partially random model, one that inputs all of the possible permutations of the historical record, to increase the range of possible flows during the interim period.

25

2. **Upper Basin Consumption** The model uses 1996 projections of upper basin consumptive use. These projections reflect a maximum probable rate of increase. As noted by Reclamation at its Hydrological Modeling meeting (8/15/2000), upper basin diversions (and consumptive use) are subject to flow variability because many of them are run of the river diversions, rather than diversions from stable reservoirs, decreasing the likelihood that diversions will match projected demand. The model should incorporate most probable and minimum probable rates of increase for upper basin consumptive use, and Reclamation should assess the sensitivity of the results to differences in such projections. Such rates of increase affect the quantity of inflows to Lake Mead and therefore projections of Mead elevation, important for projecting flood releases flows, shoreline impacts, and probabilities of shortage conditions.

26

3. **Initial Mead Elevation** The model uses as a starting condition the elevation of Lake Mead on January 1, 2000. To improve the accuracy of the model, we recommend that this starting elevation be changed to reflect the projected Mead elevation on December 31, 2000, currently expected to be about thirteen feet lower than the previous year's elevation due to lower than average inflows. This significant drop in elevation will decrease the probability of water reaching the delta region.

27

4. **Deliveries at NIB** The DEIS notes that the U.S. delivers approximately 0.14 MAF/year to Mexico at a location one mile east of the river at the SIB. Yet the model assumes that this delivery occurs 23 miles north, within the river channel. The model should be refined to account for the different delivery points, the fact that the SIB delivery is not made within the river channel, and the fact that the SIB deliveries are return flows from Arizona and not mainstem water. This modeling assumption distorts projected flows through the limitrophe and further downstream, and also distorts projections of maximum probable diversion by Mexico through its Alamo Canal at Morelos Dam.

28

5. **Yuma Desalting Plant** The model assumes that the Yuma Desalting Plant will be operational in the year 2015, yet fails to account for the impacts such an action would have on the Cienega de Santa Clara. The Cienega currently relies on agricultural drainage flows that bypass the desalting plant; operation of the plant would not only markedly decrease the quantity of flows to the Cienega but would also markedly decrease the quality of the water sent to the wetlands, destroying habitat of special status species such as the Yuma Clapper Rail and Desert Pupfish. The DEIS should explain why it assumes operation of the Plant in 2015 and should not ignore the environmental impacts of such an action. Alternatively, and more appropriately, the DEIS should not assume operation of the plant until the appropriate environmental documentation has been completed.

24: See the response to Comment No. 31-8 for a discussion of the Index Sequential Method. Other methods are possible, and Reclamation is evaluating them for future use.

25: See response to Comment No. 14-10 for information regarding depletion schedules used in the FEIS.

26: The projected Lake Mead elevation on January 1, 2002 was used for the initial condition in FEIS modeling. See response to Comment No. 13-22 for further discussion.

27: The following excerpt will be added to Section 3.4.3.6 to address the Mexico water supply delivery requirements under Minute 242: Minute 242 provides, in part, that United States will deliver to Mexico approximately 1,360,000 acre-feet (1,677,545,000 cubic meters) annually upstream of Morelos Dam and approximately 140,000 acre-feet (172,689,000 cubic meters) annually on the land boundary at San Luis and in the limitrophe section of the Colorado River downstream from Morelos Dam. It should be noted that while a portion of Mexico's 1.5 maf annual apportionment is actually delivered below Morelos Dam, the entire delivery to Mexico was modeled at Morelos Dam. This basic assumption, while different than actual practice, served to simplify and facilitate the analysis of water deliveries to Mexico under the baseline conditions and surplus alternatives.

28: See response to Comment No. 11-14 for a discussion of the FEIS assumption that the Yuma Desalination Plant will begin operations after 2022.

29 6. **Climate Change** For the purpose of increasing the accuracy of longer-term projections, the model should incorporate the range of potential impacts of climate change on the Colorado River basin, which might reduce inflows by as much as 20 percent.[6]

The assumptions behind the various alternatives differ in some respects. These varying assumptions inform the projections of the alternatives' relative impacts. The DEIS bases much of its analysis on the relative difference in flows under the different alternatives, making the assumptions behind these alternatives especially important. Reclamation should clarify the following points:

30 1. **Baseline** NEPA requires consideration of a "no action" alternative, to serve as a baseline for comparison. To date, no formal surplus criteria exist to act as such a baseline. The Secretary, acting without formal guidelines or criteria, has declared a surplus condition for the river each year starting in 1996. Hydrologic conditions have varied considerably over the five years in which surplus has been declared, to the extent that in 1996 insufficient volume was deemed available to provide surplus for Mexico, while in 1998 more than 3.0 MAF were released above downstream demands. Reclamation determined that a "75R" strategy offered the best approximation of conditions on the river at the time of the Secretary's declaration in 1997. The DEIS fails to explain why Reclamation selected 1997 as the baseline year. Selecting 1996 as the baseline would have generated a much more liberal definition of surplus, while selecting the years 1998-2000 would have matched a flood-control definition of surplus (2.2.1.4). Reclamation should explain why it used a single year as the model for the baseline condition, rather than the three years that followed. Although not markedly different than the 75R baseline, a flood-control baseline would generate a greater frequency and magnitude of flows to the delta than the 75R baseline and a 16.7% greater chance of flood flows than the Six States alternative in 2015.

2. **California Consumptive Use** As shown in DEIS Attachment G, the 75R baseline and the flood control alternatives assume that California will only consume roughly 4.4 MAF/year. In comparison, the six states' plan assumes California will consume more than 5.2 MAF at full surplus, and 5.0 MAF decreasing to 4.7 MAF at the Level 2 surplus tier. Yet the main impetus for the creation of interim surplus criteria is to reduce California's use to 4.4 MAF/year. If California were only consuming 4.4 MAF/year, as assumed by the baseline, there would be no need for interim surplus criteria. It is inconceivable that California will reduce its use by more than 0.8 MAF in one year. The baseline/"no action" alternative therefore does not accurately reflect actual conditions.

31 3. **Six vs. 7 State Plan** The 7 State Plan is the consensus approach submitted by the Colorado River Basin states and therefore will very likely be the preferred alternative. Reclamation claims that the 7 State Plan (65 Fed Reg 48531) is substantially similar to the Six State Plan that is analyzed in the DEIS, and that it does not require its own analysis. The differences between the two plans therefore demand scrutiny, to assess whether the DEIS analysis of the Six State Plan is a reasonable proxy for what is likely to be the preferred alternative. The

[6] See L. Nash and P. Gleick, 1991, The sensitivity of streamflow in the Colorado basin to climatic changes, *Journal of Hydrology* 125: 221-241 and L. Nash and P. Gleick, 1993, The Colorado River Basin and Climatic Change: The Sensitivity of Streamflow and Water Supply to Variations in Temperature and Precipitation, Washington, DC: US EPA, EPA230-R-93-009, 121 pp.

29: There is not yet a consensus in the scientific community regarding whether long-term climate change will result in overall wetting or drying of the Colorodo River Basin. The use of the Index Sequential Method captures a wide range of flow conditions that enables the evaluation of future water supply conditions under different hydrologic scenarios. See the response to Comment No. 31-8 for a discussion of the Index Sequential Method.

30: Reclamation did not use only a single year as the basis for the baseline in the DEIS. See the response to Comment 57-11 for an explanation of the derivation of the baseline.

31: Reclamation's statement that the Seven States Proposal was substantially similar to the Six States Alternative was a conclusion about the need for a preliminary analysis to accompany the DEIS. The preferred alternative has been derived from the Seven States draft proposal, and has been analyzed in this FEIS at the same degree of detail as the other alternatives.

cont'd

following simplified table depicts specific differences between the two plans in their prescribed surplus deliveries to California:

Surplus Tier	Six States	7 States
Partial M&I for MWD	0.304 MAF[7], less new transfers	0.262 MAF
Full M&I for MWD	0.554 MAF[7], less new transfers	0.700 MAF

There are also programmatic differences between the two plans. The 7 State Plan is likely to increase consumptive use by California, further decreasing the elevation of Lake Mead and further decreasing the frequency and magnitude of excess flows reaching the delta and Upper Gulf.

The data generated by the model should be presented in a clear manner that conveys pertinent information to the reader. Model results should be refined as follows:

32

1. **Annual Scale** Much of the specific data in the DEIS is presented only for the years 2005, 2015, 2025, and 2050, providing only two data points for the interim period. At a minimum, the DEIS should present actual data for 1999 as a historical reference, and then project flows for the years 2000, 2005, 2010, and 2015, in addition to the longer-range projections, to provide the reader with a more precise understanding of the potential impacts of the various alternatives.

33

2. **Seasonal Scale** The DEIS projects monthly releases as proxies for seasonal flows to the delta. However, the months selected to represent seasonal flows (January, April, July, and October) do not reflect maximum discharge rates. The maximum quantity of flows to the delta in 1997, for example, occurred in the months of February, August, and September. Months should be selected based on their ability to represent maximum and minimum flows to the delta.

34

3. **Instantaneous Discharge** To provide a more accurate picture of transboundary impacts, the model should be adjusted to project instantaneous releases. Such discharge rates can be readily converted to river stage, allowing for an assessment of the potential to freshen backwaters in the U.S. and inundate the floodplain in Mexico below Morelos Dam. Both of these actions are critical for protecting and enhancing existing wetland and riparian habitat. Additionally, the DEIS states that uncertainty about water use in Mexico challenges efforts to predict potential effects of transboundary flows. The Pacific Institute agrees that it is reasonable to assume that Mexico will continue to maximize its consumptive use of Colorado River water. This use could be predicted by comparing the conveyance capacity of the Alamo Canal with instantaneous flow rates above Morelos Dam (effectively a run of the river diversion).

35

4. **Figures** The DEIS should clearly indicate the differences between the various alternatives under consideration. Many of these differences are slight and tend to be lost at the resolution displayed in the graphs in the DEIS. Figures 3.3-21a-d, for example, would benefit from limiting the x-axis to those values between 75% and 100%, which would enable the reader to draw a better distinction between the alternatives. Additionally, the DEIS incorrectly claims that the highest frequency of flows to the delta is expected to occur under the Six States

[7] Includes 0.108 MAF IID-MWD transfer (1999 level).

32: Figures and text were provided in the various sections of the DEIS and FEIS that describe current and historical conditions, many on an annual basis.

33: See response to Comment No. 13-27 for a discussion of seasonal analyses.

34: See response to Comment No. 13-28 for a discussion of model time steps.

35: Comment noted. All tables and figures have been updated to reflect data modeled for FEIS, and have been made more readable. The incorrect statement regarding frequency of flows to Mexico being greater for the baseline and flood control alternatives has been corrected.

Alternative (3.3-44). As shown in Figs. 3-3-21a-d, both the baseline and flood control alternatives would generate more frequent flows to the delta than the Six States Alternative.

7 STATE PLAN

36 The DEIS does not analyze the 7 State Plan, so its potential impacts can only be estimated from the projections for the Six State Plan. Beyond this failure to satisfy NEPA guidelines, there are several shortcomings associated with the 7 State Plan itself. Chief among these is that it does not require that California reduce its use from current levels of roughly 5.2 MAF/year to the state's legal entitlement of 4.4 MAF/year, a reduction of 0.8 MAF/year. Instead, the 7 State Plan states that California expects to implement projects generating 0.38 MAF of savings by 2011, 0.49 MAF of savings by 2016, and 0.54 MAF of savings by 2026, though it fails to provide a baseline for measuring such savings. Absent such a prescribed baseline, we assume that the savings will be measured against current levels of consumption. Yet this suggests that California will fall far short of the 4.4 MAF objective that is being promoted as the rationale for accepting greater depletions of Colorado River water and further harm to the environment.

The long-term Colorado River system management objectives require the Secretary to protect and enhance the environmental resources of the basin. Yet clause III.3.(f) of the 7 State Plan would preclude releases of water for any purposes other than those outlined in the Plan, including potential releases for the Lower Colorado River MSCP or releases to the Colorado River delta. This clause of the 7 State Plan is invalid and should be deleted. The *Arizona v. California* Decree (1964) established the Secretary of the Interior as River master and vested in him federal control of the Lower Colorado River. The states lack the legal authority to prohibit releases for other purposes.

36: The Seven States Proposal is identified as the Basin States Alternative/Preferred Alternative in the FEIS. The Basin States Alternative has been evaluated in this FEIS. Several particular sections of the Basin States Alternative, including III.3.(f) have not been incorporated in the Basin StatesAlternative/Preferred Alternative.

SECRETARIAL DISCRETION

37 Allocation of surplus water, over and above the basic lower basin apportionment, is a discretionary function of the Secretary that can and should be exercised consistent with other responsibilities incumbent upon him for allocating the benefits of the river, planning its use, and protecting its resources. Past decisions on development, basic allocations, and operations were made before most of those other responsibilities had been articulated under laws and policies of the United States. This has resulted in serious environmental harm. Given this situation, the Secretary can and should use his discretion in this more enlightened era to the maximum extent possible to ensure that his decisions result in no further harm and, wherever possible, in an improvement of environmental quality.

Environmental needs must be met before any quantity of discretionary water is dedicated to consumptive uses. Until then it is not truly "surplus." Environmental losses were perhaps unfortunate consequences of the basic allocations embedded in the Law of the River and related development; but they need not be perpetuated when the Secretary has discretion over whether and when to allocate additional water. The Secretary recognized as much when he insisted that the surpluses must be determined and allocated with no net loss of environmental benefits.

37: The Secretary, under the powers vested by Congress in Section 5 of the BCPA, as confirmed by Section II(B)(2)of the 1964 Decree, has certain discretionary authority to determine whether any year is a surplus, normal or shortage year. When more than 7.5 maf of Colorado River water is available for consumptive use during a calendar year in the three lower Division States, this is a surplus determination. Pursuant to the Decree II(B)(2), if sufficient mainstream water is available for release to satisfy annual consumptive use in excess of 7.5 maf, such excess consumptive use is surplus, and 50 percent shall be apportioned for use in California, 46 percent apportioned for use in Arizona, and 4 percent for use in Nevada. When making a surplus determination, the Secretary must apply the criteria in the Long-Range Operating Criteria (Section 602 of P.L. 90-537) in development of the Annual Operating Plan.

SOCIOECONOMIC IMPACTS

38 The DEIS fails to address the potential socioeconomic impacts of interim surplus criteria. The few remaining Cucapá living in the affected area, who traditionally subsisted on Colorado River fish and endemic grains, depend on Colorado River flows.[8] Decreasing the frequency and magnitude of these flows will negatively impact the Cucapá. Additionally, Colorado River flows are correlated with improved yields in the shrimp and fish harvests in the Upper Gulf of California,[9] a major source of employment in the area.[10] The reduced frequency and magnitude of such flows due to the sole and cumulative impacts of surplus criteria will have negative economic repercussions on fishermen and others in the affected area. These impacts should be assessed as part of the DEIS.

CONCLUSION

The Pacific Institute concludes that the DEIS is inadequate and should be formally revised and reissued for public comment as a Supplemental Draft Environmental Impact Statement. The deficiencies highlighted in these comments are of sufficient magnitude that they preclude a reasonable assessment of the potential environmental impacts associated with the adoption of interim surplus criteria.

[8] Daniel F. Luecke et al. 1999. *A Delta Once More*, pp. 7-8.
[9] Manuel S. Galindo-Bect et al. 2000. Penaeid shrimp landings in the upper Gulf of California in relation to Colorado River freshwater discharge. *Fisheries Bulletin* 98:222-225.
[10] Jason Morrison et al. 1996. *The Sustainable Use of Water in the Lower Colorado River Basin*. Oakland, CA: Pacific Institute for Studies in Development, Environment, and Security, p. 23.

38: The DEIS and FEIS include a section on "Environmental Justice" (3.15) for purposes of addressing potential economic and social impacts on minority and low-income populations. Executive Order 12898 establishes the achievement of environmental justice as a priority, but this direction is specific to minority and low-income populations in the United States. No socio-economic effects are anticipated due to implemnation of any of the interim surplus alternatives. In addition, the transboundary impacts section of the EIS, which addresses impacts to natural resources on Mexico, does not anticipate any adverse effects to sensitive biological resources along the river in Mexico. This includes potential impacts to commercial or subsistence harvesting of shrimp, fish or crops in Mexico.