GLEN CANYON DAM LTEMP EIS

Alternative Concept:
Water Conservation (Fill Mead First)

A proposal by Glen Canyon Institute

April 5, 2012

Glen Canyon Dam LTEMP EIS
Purpose

- *"To identify dam operations, management actions, and experimental options that will provide a framework for adaptively managing Glen Canyon Dam over the next 15 to 20 years consistent with the Grand Canyon Protection Act (GCPA) and other provisions of applicable Federal law…."*
- *"The proposed action is to develop a plan that will determine specific options for dam operations, non-flow actions, and appropriate experimental and management actions that will meet the [Grand Canyon Protection Act's] requirements and minimize impacts to resources, including those of importance to Indian Tribes." [Emphasis added]*

Glen Canyon Dam LTEMP EIS
Need

- *"The proposed action is needed to incorporate scientific information developed since the 1996 Record of Decision to better inform Department of the Interior decisions on dam operations and other management and experimental actions so that the Secretary continues to meet statutory responsibilities for protecting and improving Glen Canyon National Recreation Area and Grand Canyon National Park resources and values for future generations, conserving Endangered Species Act (ESA) listed and other native species, respecting Indian Tribal interests, meeting water delivery obligations, and generating hydroelectric power." [Emphasis added]*

Scientific Information Not Incorporated in the 1996 Record of Decision:

Inaccurate Initial Assumptions

- *"[Colorado River] Compact and later treaties apportioned 16.5 MAF per year of the [Colorado River's] flow at Lees Ferry…. The Compact's negotiators believed that the average flow at Lees Ferry was about 16.4 MAF, based on the 20 years of gage records available in 1922. However, the flow since 1922 has been generally lower than these early gaged flows, and the long-term mean gaged flow at Lees Ferry (1906-2004) is about 15.1 MAF. In other words, the Colorado River has been over-allocated."*

  —Colorado River Streamflow: A Paleo Perspective: The Compact and Lees Ferry, Western Water Assessment http://wwa.colorado.edu/treeflow/lees/compact.html

Scientific Information Not Incorporated in the 1996 Record of Decision:

Declining Water Supply

- *"The 10-year running average in supply is projected to range between 13.9 MAF and 16.8 MAF in 2035, with a median projection of 15.0 MAF in 2035. By 2060, these projections all demonstrate a reduction, with a median of 14.4 MAF."*

—Colorado River Basin Water Supply and Demand Study: Phase 4: Development and Evaluation of Opportunities for Balancing Water Supply and Demand, Request for Ideas, Bureau of Reclamation, November 2011, p. 7

Scientific Information Not Incorporated in the 1996 Record of Decision:

Massive Increases in Water Demand

- *"Over the historical period 1971-2008, basin-wide consumptive uses and losses (including delivery to Mexico) have grown from approximately 13 million acre-feet (maf) in 1971 to 16 maf in 1999, an increase of about 23 percent."*

  —Colorado River Basin Water Supply and Demand Study: Interim Report No. 1, Technical Report C – Water Demand Assessment p. C-22

Scientific Information Not Incorporated in the 1996 Record of Decision:

Climate Change

- *"The Colorado River Basin is ground zero for assessing the effects of climate change on our rivers and taking creative management actions to head off the related dangers posed to our water supplies, hydroelectric power generation and ecosystems."*

  —Secretary of the Interior Ken Salazar, quoted in News Release, Department of the Interior, October 20, 2010 http://www.doi.gov/news/pressreleases/Secretary-Salazar-Launches-New-Regional-Climate-Science-Center-and-Water-Census-at-Meeting-of-Colorado-River-Basin-Water-Leaders.cfm

- *"[I]n the Upper Colorado River Basin, the basin-average mean-annual temperature is projected to increase by approximately 6–7 °F during the 21st century."*

  —SECURE Water Act Section 9503(c) – Reclamation: Climate Change and Water, Report to Congress, Bureau of Reclamation, April 2011, p. vii

Scientific Information Not Incorporated in the 1996 Record of Decision:

Growing Supply-Demand Imbalances

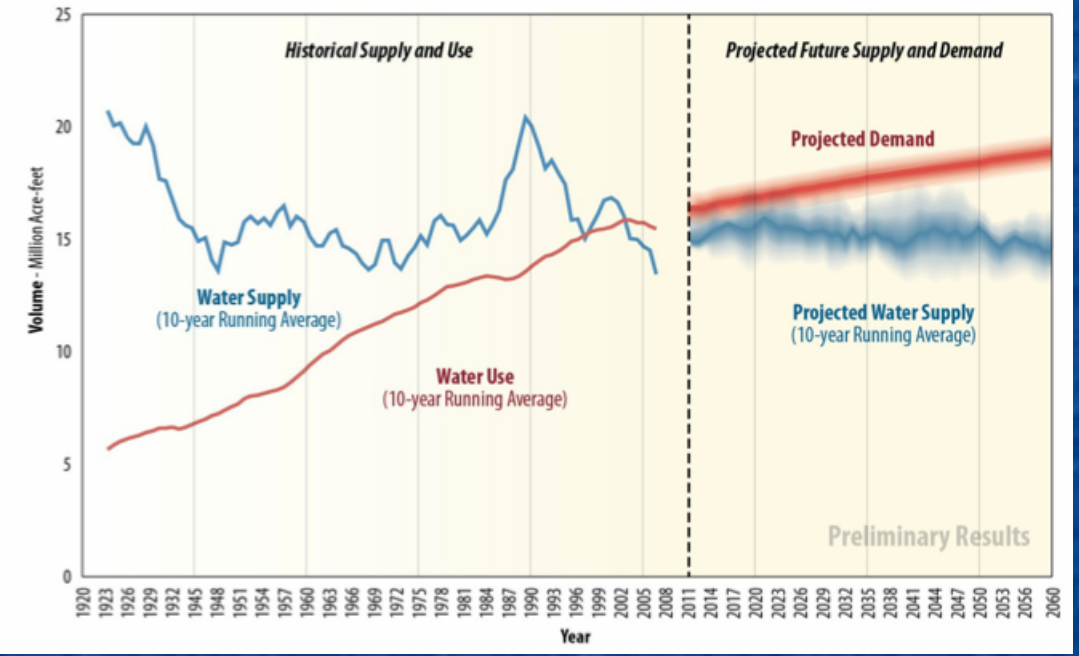
- *"Consumptive use demand is projected to exceed 17 MAF by 2035 and 18 MAF in 50 years, or by 2060."*
- *"Comparing the median water supply projections to the water demand projection, the long-term imbalance in future supply and demand is preliminarily projected to be about 2.0 MAF in 2035 and greater than 3.5 MAF in 2060."*

—Colorado River Basin Water Supply and Demand Study: Phase 4: Development and Evaluation of Opportunities for Balancing Water Supply and Demand, Request for Ideas, Bureau of Reclamation, November 2011, p. 7

Scientific Information Not Incorporated in the 1996 Record of Decision:

Growing Supply-Demand Imbalances

FIGURE 2
Historical Supply and Use and Projected Future Colorado River Basin Water Supply and Demand



—Colorado River Basin Water Supply and Demand Study: Phase 4: Development and Evaluation of Opportunities for Balancing Water Supply and Demand, Request for Ideas, Bureau of Reclamation, November 2011, p. 7

LTEMP EIS Alternative Concept: Water Conservation (Fill Mead First) – April 2012

Scientific Information Not Incorporated in the 1996 Record of Decision:

Unprecedented Stresses on System

- Since 1999, severe and persistent drought.
- In 2005, Lake Powell dropped to one-third of its capacity.
- In 2010, Lake Mead levels dropped to within 8 feet of triggering a Compact-driven curtailment of Upper Basin uses.
- In winter 2010-11, massive snowpack provided a temporary reprieve.
- In 2011, extensive equalization flows from Lake Powell raised Lake Mead, but reduced Powell and probably damaged Grand Canyon ecosystems.
- In April 2012, Colorado snowpack is at a record low of 50 percent of average.
- In April 2012, Lake Powell is at 64 percent of Full Pool and the projected April through July Unregulated Inflow Volume is 3.50 MAF (49% of average).

Potential Impacts of Reduced Water Flow

- Increasing need for equalization releases.
- Degraded water quality in Powell and Mead reservoirs.
- Reduced sediment deposition in Grand Canyon.
- Deteriorating endangered species habitats, recreational resources, and cultural resources in Grand Canyon.
- Reduced non-native fish and plant control and native plant restoration in Grand Canyon.
- Declining hydropower generation at Glen Canyon and Hoover dams.

Alternative Concept: Water Conservation (Fill Mead First)

Description

- Lake Mead would be designated as the primary water storage and distribution facility for the upper and lower Colorado River basins. Operation of Glen Canyon Dam would be changed to allow water to flow through the power plant and outlet works at Glen Canyon Dam, filling Lake Mead reservoir before impounding water in Lake Powell. Lake Powell would be generally kept close to the power pool elevation of 3,490 feet and the dam used primarily for seasonal flow variations, flood control, and sediment distribution purposes. The alternative could be enhanced by the addition of other strategies, such as mechanical sediment augmentation and addition of a temperature control device.

Alternative Concept: Water Conservation (Fill Mead First)

Benefits

- **Water Savings.** Higher Lake Mead would increase evaporation and bank seepage, but preliminary analysis indicates that this would be more than offset by reductions due to lower Lake Powell. Net water savings could be approximately 282,000 acre-feet per year. This is a significant savings — equivalent to 94 percent of the state of Nevada's entire annual appropriation from the Colorado River.
- **Water Quality.** Salinity, heavy metals, toxic pollution, and other water impurities would be reduced by keeping Lake Mead as full as possible. Lake Powell quality would be decreased, but this would affect a small number of water users, who could be provided with an alternate source.

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Benefits

- **Environment.** More natural flows would increase chances of replenishing Grand Canyon beaches, improving habitat for the endangered humpback chub, and controlling some non-native fish species. Non-native warm-water fish could possibly be allowed to expand their habitats, an issue that needs further scientific analysis. Lowered Lake Powell would allow the recovery of extensive now-flooded lands, including habitats for extirpated and threatened species. Reduced Lake Mead concentrations of salinity and contaminants would have positive impacts on fish, wildlife, and humans.
- **Recreation.** Recreational resources would benefit from greater flexibility to rebuild beaches in Grand Canyon. Recovery of vast, now-flooded Glen Canyon National Recreation Area backcountry would attract new user groups. Lake Powell-based recreation and the non-native trout sports fishery downstream of Glen Canyon Dam would be reduced. Lake Mead recreational quality would be increased as a result of higher reservoir levels.

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Benefits

- **Cultural Resources.** Lowered Lake Powell would allow the recovery of extensive now-flooded lands. This would reveal countless archaeological, cultural, and historic sites and artifacts for appropriate tribal, scientific, and educational access.

- **Hydroelectric Generation.** Glen Canyon Dam hydropower production has already been reduced by 30 percent due to low reservoir levels and Glen Canyon Adaptive Management Program mitigation measures. Production could be further reduced to a modest extent by the lower reservoir levels, but is already jeopardized by reduced Lake Powell inflow. Hoover Dam hydropower production — now reduced by 36 percent by low reservoir levels — would return to full capacity, potentially making up most of the reduction in Glen Canyon generation.

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Benefits

- **Socioeconomics.** Would have a positive impact by promoting the restoration of Grand Canyon, and would stabilize and strengthen the businesses of water-based recreation in Grand Canyon National Park. Would open up new opportunities for backcountry and river-based recreation at Glen Canyon National Recreation Area. Would reduce costs at Lake Mead National Recreation Area of modifying facilities to accommodate the declining reservoir and increase its attractiveness to recreationists.

- **Technical Feasibility.** Would not require major re-engineering of Glen Canyon Dam or new technology. Would allow for more flexibility to address adverse impacts on the downstream natural, recreational, and cultural resources in the park units, including resources of importance to American Indian tribes. If mechanical sediment augmentation or a temperature control device were added, it would involve further research and engineering.

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Benefits

- **Costs.** Would not require any significant additional costs. Could save significant amounts of Colorado River Storage Project (CRSP) hydropower revenues now devoted to the Glen Canyon Adaptive Management Program (GCDAMP), which is mainly necessary because of the need to assess and mitigate the damage caused by current operations of Glen Canyon Dam.
- **Implementation Risk and Uncertainty.** This alternative has the benefit of being reversible. If it did not produce the desired results, Glen Canyon Dam could be returned to current operations in a short period of time. It could be implemented as an experiment, with the decision as to whether to make it permanent left until the future, when more information is available. It would not involve a major change in reliability from the status quo. Moreover, its implementation would be flexible. Operations could be readily adjusted, if necessary, to address unforeseen problems.

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Legal and Public Policy Considerations

It appears that this alternative could be implemented within the current legal and regulatory framework. The Colorado River Compact requires the Upper Basin to deliver a ten-year rolling average of 75 million acre-feet (MAF) of water at Lee Ferry. The Compact does not include the "equalization" rule, which was introduced in the 1968 Colorado River Basin Project Act and implemented by the 1970 Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs, most recently amended in 2005. Currently, the Criteria and the Annual Operating Plans developed by the Secretary of the Interior, include the objective of maintaining a minimum release of water from Lake Powell of 8.23 MAF per year. However, the Compact itself only requires that delivery obligations be met on a ten-year rolling average, not on an annual basis. This alternative provides the flexibility to meet the Compact's requirements. As such, both the Upper and Lower basins would be meeting their obligations under the Compact.

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Legal and Public Policy Considerations

Modifying the equalization rule to allow Lake Mead to be kept full, even if Lake Powell is not, would also provide increased flexibility to implement the original goals of the Colorado River Basin Project Act. The Department of the Interior could embark on a reoperation study of Glen Canyon Dam within the present constraints of Colorado River water management. The language of the Act regarding the equalization rule is not absolute. The goal is to maintain equalization "as nearly as practicable."

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The Bureau of Reclamation already allows for modification of the equalization rule under some circumstances. For example, when Lake Powell is below a certain elevation, the Interim Guidelines call for the amount of water released to be driven by flow volume, not equalization of the two reservoirs. Since it is increasingly not "practicable" to maintain Lake Powell and Lake Mead at equal active storage volumes, the BOR could potentially further modify implementation of the equalization rule to allow most of the water to be consolidated in Lake Mead. Another approach could be for the Congress to amend the 1968 Colorado River Basin Project Act to modify or eliminate the equalization rule.

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Legal and Public Policy Considerations

In the current Colorado River management system, Lake Powell and Lake Mead are maintained as two separate reservoirs divided by Lee Ferry. Lee Ferry is the "counting point," where water delivery from Upper Basin to Lower Basin states is measured. The equalization rule is justified by the perceived need to keep the two reservoirs equally full to ensure even allocation of water to the two basins.

This alternative would not change the line between the Upper Basin and the Lower Basin, or the allocation of water to either basin. Instead, the Upper Basin would simply be allowed to store water in Lake Mead, which would otherwise be stored in Lake Powell. Upper Basin rights would be protected, because water shifted from Lake Powell to Lake Mead would be counted toward the Upper Basin solely for the purposes of delivery and not for consumptive use. In effect, Lake Mead and Lake Powell would be considered as one reservoir with two units.

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Legal and Public Policy Considerations

The most workable approach may be to change the Criteria for Long Range Operation and the Annual Operating Plan to count Upper Basin deliveries on the basis of a ten-year rolling average, as required by the Colorado River Compact. All the Upper Basin deliveries of water past Lee Ferry would be counted against the 10-year rolling average of 75 MAF. The amount sent in any year could vary, but delivery now would reduce the later delivery requirement — in effect, "paying off the mortgage early." This would require no Upper Basin reservoir storage rights in Lake Mead unless the Upper Basin exceeded its 10-year rolling overage at any point (a highly unlikely possibility). The additional volume necessary to meet the Mexican Water Treaty flows can be added to the 75 MAF rolling average.

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Time for Action Is Now

"Who will get some and who will not?... There is danger that litigation, associated with water right claims and environmental issues, will compound and put off any rational decisions on this matter until serious damage has been done to the diverse users of the Colorado River. Much of this litigation might be avoided if time dependent water solutions are crafted to reflect today's and tomorrow's water realities."

—Barnett, T. P., and D. W. Pierce. 2008. When will Lake Mead go dry?, Water Resour. Res., 44, W03201, doi:10.1029/2007WR006704.