



GLEN CANYON INSTITUTE
Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement
Scoping Comments
January 31, 2012

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<http://parkplanning.nps.gov/commentForm.cfm?documentID=43768>

On October 17, 2011, the U.S. Bureau of Reclamation (BOR) and National Park Service (NPS) announced that they were beginning the scoping process for the Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS). The following are the comments of Glen Canyon Institute (GCI) concerning the scope of the LTEMP EIS. GCI is a nonprofit organization founded in 1996 and based in Salt Lake City, Utah. GCI has 1,500 members and supporters from the seven Colorado Basin states and across the United States, who have a significant interest in the management, protection, and restoration of Glen Canyon, the Grand Canyon ecosystem, and the Colorado River system.

The materials issued for the November 2011 public scoping meetings state the purpose and need for the LTEMP EIS:

“[The purpose is t]o fully evaluate dam operations and identify 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 will help determine specific alternatives that could be implemented to meet the GCPA’s requirements and to minimize, consistent with law, adverse impacts on the downstream natural, recreational, and cultural resources in the park units, including resources of importance to American Indian Tribes.

“The need for the proposed action stems from the need to utilize scientific information developed over the past 15 years to better inform Departmental decisions on dam operations and other management and experimental actions so that the Secretary may continue to meet statutory responsibilities for protecting downstream resources for future generations, conserving Endangered Species Act-listed species, and protecting Native American interests, while meeting water delivery obligations and for the generation of hydroelectric power.”

(Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement, Public Scoping [poster],
<http://ltempeis.anl.gov/documents/docs/LTEMPScopingPosters.pdf> [accessed 11/18/11])

The LTEMP EIS process offers an opportunity for the BOR and NPS to take a new approach toward the management of Glen Canyon Dam and the Colorado River system. The BOR’s own Colorado River Basin Water Supply and Demand Study (Colorado Basin Study), now underway, has found that there could be large supply-demand imbalances — greater than 3.5 million acre-

feet — during the next 50 years, particularly when considering the potential impacts of climate change. Instead of continuing the status quo-oriented approach of the past, the LTEMP EIS can provide a new direction for the operation of Glen Canyon Dam that finally meets the purpose of the Grand Canyon Protection Act (GCPA) and is in synergy with the rest of the Colorado River system.

It is essential that the LTEMP EIS 1) takes a fresh, comprehensive look at the challenges and opportunities facing the region, 2) explores the full range of potential solutions, 3) fully considers public issues and concerns, and 4) chooses a preferred alternative that will restore the environmental, recreational, and cultural resources of the Colorado River Basin. The following comments are submitted with these objectives in mind.

SUMMARY OF RECOMMENDATIONS

There is strong evidence that Glen Canyon Dam operations do not meet the intent or letter of the Grand Canyon Protection Act, Endangered Species Act, and other relevant laws and regulations. The plan that is developed based on the LTEMP EIS will set the direction for management of the dam for the next 15 to 20 years. Therefore, it is imperative that the LTEMP EIS incorporate the best possible science and explore all possible issues, concerns, and alternatives. Toward this goal, the Bureau of Reclamation and National Park Service should:

1. Ensure that the LTEMP EIS fully complies with the requirements of the Grand Canyon Protection Act.
2. Encompass the entire Colorado River Basin in the scope of the LTEMP EIS.
3. Incorporate potential climate change impacts into all aspects of the LTEMP EIS.
4. Define “Desired Future Conditions” for measuring future operations of Glen Canyon Dam and other management actions.
5. Formally involve the Grand Canyon Monitoring and Research Center (GCMRC) in the LTEMP EIS process
6. Fully assess the impacts of “equalization” flows in the LTEMP EIS.
7. Ensure that the LTEMP EIS is not biased in favor of hydropower production.
8. Include a modified “Run-of-the-River” Alternative.
9. Include a steady flow alternative.
10. Include a mechanical sediment augmentation alternative.
11. Include a temperature control alternative.
12. Consider alternatives to the current structure, process, and operations of the Glen Canyon Dam Adaptive Management Program Work Group.

GENERAL ISSUES AND CONCERNS

The current operating plan for Glen Canyon Dam is clearly inadequate. As the government’s own science has concluded, this operating plan has led to fewer and smaller beaches, continued impacts on native fish communities, and continued impacts on the cultural and archeological resources in the Grand Canyon. Meanwhile, the plan does not take into account the far-reaching potential impacts of climate change on precipitation and water flow. A dramatically new approach is needed for the operation of Glen Canyon Dam. The LTEMP EIS offers the chance to lay the foundation for such a new approach. We urge the Bureau of Reclamation and National Park Service to incorporate the following recommendations as it develops the draft LTEMP EIS.

1. **Ensure that the LTEMP EIS fully complies with the requirements of the Grand Canyon Protection Act.**

The 1992 Grand Canyon Protection Act (GCPA) directed the Secretary of the Interior (Secretary) to take decisive action to save the Grand Canyon ecosystem:

“The Secretary shall operate Glen Canyon Dam in accordance with the additional criteria and operating plans specified in section 1804 and exercise other authorities under existing law in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including, but not limited to natural and cultural resources and visitor use.”

Today, almost two decades after the passage of the GCPA, Glen Canyon Dam is still operating under essentially the same conditions as before. Extensive government studies have concluded that the operation of the dam continues to have major negative impacts on beaches, native fish communities, and cultural and archaeological resources. Meanwhile, the delivery of water to meet the Colorado River Compact and the United States-Mexico Treaty and the sale of hydropower generated at Glen Canyon Dam have continued. (Hydropower production is reduced, but this is due primarily to the changing dynamic of the volume of water behind Glen Canyon Dam and the impacts of climate change, not constraints in flow due to environmental demands).

Congress passed the Grand Canyon Protection Act and in so doing provided direction to the federal agencies on how operations of Glen Canyon Dam should be prioritized. First, the treaties and legally binding compacts for water delivery were to be met. Second, the natural resources of the Grand Canyon were to be protected, and where impacts were unavoidable, they were to be mitigated. The overall goal was to improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established. Hydropower was to continue to be generated, but only after the first two priority goals were addressed and managed for. This was a reiteration of the Colorado River Storage Project (CRSP) Act of 1956, which provided for the construction of Glen Canyon Dam. In P.L. 84-485, Congress authorized the Secretary of the Interior to construct, operate, and maintain Glen Canyon Dam in regards to the “Law of the River,” the reclamation of arid and semiarid lands, for the control of floods, and for the generation of hydroelectric power, as an incident of the foregoing purposes.

As the waters began to rise behind Glen Canyon Dam, the water and power managers quickly found that, by manipulating dam releases, they could maximize revenue generation through peaking power generation and flow manipulation. The Bureau of Reclamation retained the seasonal and monthly flow release boundaries and let power demands dictate the day-to-day, hour-by-hour, minute-by-minute flow releases through the eight generators of Glen Canyon Dam. It was only when faced with an impending crisis with the huge Colorado River flows of 1983 and 1984 that the Bureau of Reclamation stepped in and took definitive control of the release patterns from the generators.

Power generated at Glen Canyon Dam comprises close to 75 percent of the total hydropower revenue generated by the CRSP. It is an extremely valuable revenue source for Western Area Power Administration and the Bureau of Reclamation, producing about 5 percent of the electric power in the Colorado River Basin. This is not insignificant, but it is also not irreplaceable, when compared to the damage hydropower generation causes to the nationally and globally significant resources of the Grand Canyon.

As soon as the gates closed in 1963, Glen Canyon Dam began causing massive environmental damage to Glen Canyon, as well as Marble Canyon and Grand Canyon downstream. By 1982, the Bureau of Reclamation was so concerned about these impacts that it established Glen Canyon Environmental Studies, an interagency effort to identify the sediment, biological, and recreation impacts of the operation of Glen Canyon Dam and to determine whether changes in dam operations were necessary. After several years of review by the Bureau of Reclamation and the National Academy of Sciences, it was determined that the impacts of Glen Canyon Dam were significant enough that formal National Environmental Policy Act (NEPA) compliance was necessary. In 1989, the Secretary of the Interior directed the Bureau of Reclamation to prepare an environmental impact statement (EIS) on the effects of Glen Canyon Dam on environmental and cultural resources of the Colorado River in Glen and Grand Canyons.

By 1992, with the Glen Canyon Dam EIS still not completed, the Congress passed the Grand Canyon Protection Act to give the Department of the Interior (DOI) further direction. The GCPA defined objectives, a timeline for completing the NEPA process, and the intent to develop an adaptive management program to guide future operations. The GCPA made it clear that the resources of the Grand and Glen Canyons were important, that science should be included in the decision process and that the environmental resources were not to be secondary to power operations.

In accordance with the direction of GCPA, the BOR completed the Glen Canyon Dam Operations Environmental Impact Statement in 1995 (1995 EIS) and issued a Record of Decision in 1996 (1996 ROD). However, the implementation of the mandate of the GCPA and the 1996 ROD have not been fully embraced by all stakeholder groups. As a result, Glen Canyon Dam operations are still not in compliance with the intent of the GCPA.

Recommendation: All aspects of the draft LTEMP EIS need to address the full range of values specified in the Grand Canyon Protection Act, including natural and cultural resources, tribal resources and responsibilities, and visitor use. This includes adequately describing the purpose and need, formulating alternatives, documenting the affected environment, and describing and analyzing environmental impacts of each alternative. As discussed below, the geographic scope of the LTEMP EIS needs to include the entire Colorado and Green rivers system, both upstream and downstream.

2. Encompass the entire Colorado River Basin in the scope of the LTEMP EIS.

The entire Colorado River Basin is connected by common challenges and opportunities. Water demand, drought, and climate change affect the entire Basin. Water diversions, loss through evaporation and seepage, species extinction, and pollution in one region affect other parts of the Basin. To date, the operation of Glen Canyon Dam has ignored this reality, as if the dam were an insular unit with minimal connection to the rest of the Colorado River Basin. This view is out of step, even with other BOR programs. For example, the BOR's Colorado River Basin Water Supply and Demand Study (Colorado River Study), now underway, takes a Basin-wide approach to the issues.

It is critical that the LTEMP EIS have a comparable geographic scope to the Colorado River Study. Glen Canyon Dam is a part of a Basin-wide management system for both water and power. The Bureau of Reclamation operates dams upstream and downstream of Glen Canyon Dam on an annual, monthly, and daily basis, to balance the movement of water from the Upper Colorado River Basin to the Lower Basin, and to Mexico. Similarly, Western Area Power Administration (WAPA) manages the generation and movement of power in the western grid. Power generated at Glen Canyon Dam can be used directly and indirectly to service contractors

from Salt Lake City to Phoenix and beyond. In his September 29, 1989 decision in *National Wildlife Federation, et al. vs. Western Area Power Administration, et al.*, Judge J. Thomas Greene affirmed the linkage between power contracts (i.e. dam operations) and environmental impacts.

This linkage of dam operations in a river system and environmental impacts on the system is a major priority in the Columbia and Snake rivers in the Pacific Northwest. In the Northwest, a primary concern has been the impacts of dams on salmon populations. A similar comprehensive approach is needed for the Colorado River system, to address the impacts that dams have had on the movement of water and sediment and on restrictions of the migration and habitats of native fish species. The Bureau of Reclamation and Western Area Power Administration do not operate or manage the water and power produced by Glen Canyon Dam in a vacuum. The more that is learned about the environmental impacts of Glen Canyon Dam, the more it is clear that those impacts affect the entire Colorado River system. The LTEMP EIS cannot be considered adequate if it does not assess these impacts in the context of the entire Colorado River system.

Recommendation: The geographic scope of the LTEMP EIS needs to encompass the entire Colorado River and Green River system, both upstream and downstream, which is a single ecosystem whose components are inextricably linked and must be managed in concert. In considering the operations of Glen Canyon Dam, the LTEMP EIS should provide a detailed analysis that extends upstream to include Cataract Canyon and Glen Canyon, and downstream to include Grand Canyon, Lake Mead, and Hoover Dam.

3. Incorporate potential climate change impacts into all aspects of the LTEMP EIS.

The 1995 Glen Canyon Dam EIS the 1996 Glen Canyon Dam ROD did not anticipate or incorporate the potential impacts of human-induced climate change. Sixteen years later, Glen Canyon Dam still continues to be operated with little or no consideration of climate change.

Despite the BOR's past unwillingness to address the issue, there is a clear scientific consensus that climate change will have a significant impact on the hydrology of the Colorado River Basin. Hydrological impacts are coming soon. After 12 years of drought, we now know that demand for Colorado River water is outstripping supply. We know that the levels of Lake Powell and Lake Mead reservoirs are dropping and continue to drop. We know that the future will require more active management of the Colorado River system than ever before.

The BOR and NPS have acknowledged that there is overwhelming scientific evidence that climate change is affecting the Colorado River Basin and its impacts are likely to increase in the future. In 2010, Interior Secretary Salazar announced that the University of Arizona had been chosen as home base for a regional Climate Science Center and that the Colorado River Basin had been chosen for the launch of the first U.S. water census since 1978. In making the announcement, Interior Secretary Salazar said:

"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 Salazar Launches New Regional Climate Science Center and Water Census at Meeting of Colorado River Basin Water Leaders, News Release, Department of the Interior, October 20, 2010)

In a February 24, 2011 story in the *Las Vegas Sun* (Salazar: Colorado River issue could push conservatives to face climate change”), the Secretary of the Interior was quoted as saying that the seven Colorado River Basin states understand that climate change is coming. “They get it. And so what they’re saying to us is ‘we support, understand, the changes climate change is going to bring to our communities and our states, and we want to get ahead of it.’” If the conservative Basin states get it, and the Secretary gets it, it would make sense that every single environmental document associated with the Colorado River should fully address climate change and its potential impacts on the resources and management of the system. This includes the LTEMP EIS.

The Colorado River is a critical water supply resource for more than 25 million people. A growing body of scientific research has identified significant future impacts on the hydrology of the Basin. It is critical that we use the opportunity provided by the LTEMP EIS to initiate a Basin-wide discussion on how to address these impacts through water management adaptation and mitigation. In this time of budget constraints, the most efficient use of limited resources is to collaborate, coordinate, and thoroughly evaluate the entire suite of potential future impacts.

Recommendation: All alternatives in the LTEMP EIS must fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites. This is critically important to ensure the delivery of adequate and appropriately timed water flows from Glen Canyon Dam to fulfill the BOR’s obligations under the Grand Canyon Protection Act and other laws.

4. Define “Desired Future Conditions” for measuring future operations of Glen Canyon Dam and other management actions.

Glen Canyon Dam is not currently operated based on clear targets or “Desired Future Conditions,” except for water flow and hydropower generation. This is not surprising, since every other resource is subservient to water flow (based on a number of laws and regulations) and hydropower generation (based on political and economic pressure). Without quantifiable standards for all values and resources, there will be no way to scientifically measure and evaluate the effectiveness of the various alternatives in the LTEMP EIS. Instead, we will continue to be in the situation where water and power economics rather than environmental balance define the decision environment. We understand that the Glen Canyon Dam Adaptive Management Program Work Group (AMWG) is developing a set of Desired Future Conditions. However, these cannot be expected to be adequate, considering the strong bias of the AMWG toward water and power interests (see further discussion below).

One of the first orders of business in 1996 for the newly established Grand Canyon Monitoring and Research Center was to develop a set of desired future conditions for the Colorado River corridor. During the course of the last 16 years, at least two different iterations of “Desired Future Conditions” have been articulated, debated, and summarily put on the shelf to gather dust. It is difficult to understand how agencies that live and die by the “numbers” of acre-feet of water moved, kilowatts of power produced, or volume of water stored, can have such a difficult time articulating quantifiable Desired Future Conditions.

As has been the case since we entered the dam development phase in the United States, the priority has always been to build first and mitigate afterwards. Very little front-end time has been spent articulating environmental or biological thresholds that will guide management activities. The science of quantifying environmental impacts has improved considerably since the gates of Glen Canyon Dam were closed in 1963. The supporting Department of the Interior agencies, the Native American tribes, and the states have all been identifying and quantifying the impacts for

many years. The time is now to consolidate that information and develop quantifiable and qualifiable Desired Future Conditions with specific thresholds that, if exceeded, require specific management actions. The science will never be perfect, but there are models out there to help direct the development of useful tools using the best available scientific data.

Recommendation: The LTEMP EIS must include clearly defined “Desired Future Conditions” for the full range of values and resources. This includes, not only water flow and hydroelectric generation, but also water quality, air quality, climate change impacts, sediment, vegetation, noxious weeds, terrestrial wildlife, aquatic wildlife, birds, endangered species, cultural resources, recreation, Indian Trust assets, environmental justice, and National Wild and Scenic Rivers. These conditions need to be clearly stated so that the Secretary and the public can determine if the various alternatives are consistent with the intent and mandate of the GCPA and other laws and regulations.

5. Fully involve the Grand Canyon Monitoring and Research Center (GCMRC) in the LTEMP EIS process

In announcing the launch of the LTEMP EIS process, Interior Secretary Ken Salazar stated,

“We need to make use of the latest science to develop and implement a structured, long-term management plan for the Glen Canyon Dam that adheres to the Law of the River, respects the interests of the tribal nations, and sustains the health of the Grand Canyon and the communities that depend on its water, consistent with the Grand Canyon Protection Act.” (Salazar Launches Development of a Long-Term Plan for Managing Glen Canyon Dam and Water Flows through the Grand Canyon, News Release, July 5, 2011)

The U.S. Geological Survey's Grand Canyon Monitoring and Research Center (GCMRC) is the science provider for the Glen Canyon Dam Adaptive Management Program (GCDAMP). As the GCMRC states on its web page,

“In this role, the research center provides the public and decision makers with relevant scientific information about the status and trends of natural, cultural, and recreational resources found in those portions of Grand Canyon National Park and Glen Canyon National Recreation Area affected by Glen Canyon Dam operations.”
(<http://www.gcmrc.gov/>)

The active involvement of the GCMRC is critical to ensure that the substantial information it has gained during the last two decades is fully utilized for the development of a scientifically credible and defensible LTEMP EIS.

Science has long been a lever in the decision-making process for the Glen Canyon Dam Adaptive Management Program. The premise of the GCDAMP was to learn by doing (monitoring, research, flow regimes) and using the science to make decisions. However, it has often seemed that the desire to minimize risk to the water and power programs has taken precedence over doing what the Grand Canyon Protection Act directed. The result has been an endless loop of scientific study that leads to more scientific study instead of action. The DOI can get past this endless loop by abiding by the Obama Administration's stated desire to use good scientific process and transparent peer review processes to make decisions. This includes using outside peer reviewers, who are outside the political and financial influence of the power users, to review and make risk-based recommendations.

Recommendation: Formally provide for the Grand Canyon Monitoring and Research Center to play an integral role in scoping, determining desired future conditions, and developing alternatives for the LTEMP EIS.

6. Fully assess the impacts of “equalization” flows in the LTEMP EIS.

Since Lake Powell filled for the first time in 1980, there has been a balancing act between the operations and management of the Powell and Mead reservoirs. Efforts have focused on developing guidance and direction for addressing “surpluses” and “shortages” of water in the Colorado River Basin. These refinements of operations are built on the existing body of information and management direction contained in the Law of the River. A major component of these operational refinements are “equalization” flows from Lake Powell to Lake Mead.

“Equalization” releases from Glen Canyon Dam are provided for in the Operating Criteria for Glen Canyon Dam. These are temporary, greatly expanded water releases to lower the level of Lake Powell and raise Lake Mead, keeping both reservoirs at comparable levels. However, there has never been a comprehensive analysis of the impacts of equalization on the Grand Canyon or other downstream resources. Beginning in April 2011 and continuing through December 2011, the BOR instituted the first-ever full-scale “equalization.” Because of unusually large amounts of snowpack in the upper Colorado River Basin, the BOR released as much as 60 percent more water than normal from Lake Powell to raise the level of Lake Mead, which has been declining for the last 12 years.

These massive equalization releases have raised a number of serious concerns. These releases were implemented without any significant environmental analysis and without consultation with other resource agencies and tribes. They were apparently not coordinated with the availability of meaningful amounts of sediment. As a result, initial data collected during and immediately after the equalization flows by sediment scientists are showing that the sediment resources in the Grand Canyon were significantly modified by the high flow releases. If this is confirmed, it will be overwhelming evidence that these equalization flows violated the intent of the Grand Canyon Protection Act.

Recommendation: The LTEMP EIS needs to include a full assessment of the impacts of equalization water releases on the Grand Canyon and the entire Colorado River system. This analysis must ensure that any equalization flows will be implemented in a way that is consistent with the mandates of the Grand Canyon Protection Act, Endangered Species Act, and other laws and regulations.

7. Ensure that the LTEMP EIS is not biased in favor of hydropower production.

Since Glen Canyon Dam first began producing hydropower, the BOR has given an inordinately high priority to maximizing power production, both capacity and energy. With the passage of the Grand Canyon Protection Act in 1992, the BOR was required to manage the dam for more balanced priorities — “to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including, but not limited to natural and cultural resources and visitor use.” Today, two decades later, it appears that hydropower production continues to be as high a priority as it was before the passage of the GCPA.

Senator John McCain, who introduced the GCPA, made it clear that one of the major goals of the act was to put the protection of Glen Canyon and Grand Canyon values and resources ahead of the generation of hydroelectric power:

“The erratic release of water from the dam to meet peak electric power demands [has] destroyed Colorado River beaches, and harmed other natural, cultural, and recreational resources. Somewhere along the line, we forgot our obligation to the canyon and to [t]he future generations for whom we hold it in trust. In response, I introduced the Grand Canyon Protection Act to reorder those priorities—to stop the damage and legally require the dam to be operated in a manner which will protect park resources” (Congressional Record, October 8, 1992).

The 1996 ROD reiterated this goal, clearly stating that the BOR was meant to implement

“an alternative dam operating plan that would permit recovery and long-term sustainability of downstream resources while limiting hydropower capability and flexibility only to the extent necessary to achieve recovery and long-term sustainability.”

Despite these stated intentions, Glen Canyon Dam operations have continued to favor hydropower production at the expense of other natural, cultural, and recreational resources. Operations during 2011 offered ample proof that this is the case. For the first 3 months of water year 2011, precipitation upstream from Lake Powell had been nearly 150 percent of average. Meanwhile, Lake Mead hovered near record low levels. The BOR acknowledged that it would almost certainly need to initiate increased releases from Glen Canyon Dam to “equalize” the levels of Lake Mead and Lake Powell to meet the 2007 Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead (Interim Guidelines). The decision to proceed with equalization was made in April 2011.

The BOR could have planned these equalization flows to be implemented in a way that minimized negative impacts on the Grand Canyon and other downstream resources. This would require adjusting the timing and volume of flows to coincide with available sediment from the Paria and Little Colorado rivers to help rebuild beaches in the Grand Canyon. However, instead of waiting for the decision on equalization to be made in April, the agency proceeded to dramatically increase releases from Glen Canyon Dam on Sunday, January 9, 2011, to an average daily volume of approximately 34,000 acre-feet (af) — an average daily release of 17,100 cubic feet per second (cfs) — versus the previous average of 15,700 cfs. These higher than normal releases came at a time when there was limited or no available sediment. Even if there were, the flow volume was far too small to provide the benefits of a high-flow experimental release. This increased flow was implemented by BOR without any public involvement and with no meaningful assessment of its potential impacts or the agency’s overall compliance with the GCPA and ESA. The increased releases continued through December 2011, potentially causing massive damage to the beaches, endangered species such as the humpback chub, and recreational and archaeological resources of the Grand Canyon.

The real reason for the timing of these increased releases was hydropower generation. In late February, only 5 of the 8 generator units at Glen Canyon Dam were going to be available for electrical generation, due to ongoing maintenance. At that time, BOR planned to reduce flows to avoid having to “waste” water by sending it through the outlet works where it is unavailable to produce electric energy. In order to meet its monthly release goals, BOR had to release more water than normal before the generators were taken offline. This action was taken after the BOR had released its Development and Implementation of a Protocol for High-flow Experimental Releases from Glen Canyon Dam Draft Environmental Assessment (Draft EA) for public comment. The Proposed Action in the Draft EA calls for repeating this same kind of erratic flow regime several times between 2011 and 2015 to ensure maximum power generation during future ongoing generator maintenance.

The LTEMP EIS process offers a chance to finally bring hydropower production and other important values and resources into balance. However, the LTEMP EIS is being developed by Argonne National Laboratory, one of the U.S. Department of Energy's largest research centers. This raises the concern that the historic bias toward hydropower in the operation of Glen Canyon Dam will be perpetuated in the LTEMP EIS. This would conflict with the stated purpose of the LTEMP EIS, to "meet the GCPA's requirements and to minimize, consistent with law, adverse impacts on the downstream natural, recreational, and cultural resources in the park units, including resources of importance to American Indian Tribes."

Recommendation: The Bureau of Reclamation and National Park Service need to provide strong oversight to ensure that the LTEMP EIS does not present any bias toward hydropower, in violation of the mandate of the Grand Canyon Protection Act.

FORMULATION OF ALTERNATIVES

If the assumption is that the removal of Glen Canyon Dam is not within the scope of the LTEMP EIS process, then the range of alternatives should allow for a full spectrum of river operations. Each alternative should be overlaid and analyzed with respect to the likelihood of being able to meet the mandates of the Colorado River Compact, the Grand Canyon Protection Act, Endangered Species Act, and other relevant laws and regulations. Each alternative needs to maintain the physical integrity of the dams and conveyance structures. The impact of each alternative on hydropower production should be assessed, but this should not drive any particular alternative. As a secondary and incidental operational alternative, hydropower should not take priority over other values and resources.

8. Include a modified "Run-of-the-River" Alternative.

The 1995 EIS considered but eliminated detailed study of a "Run-of-the-River" (ROR) Alternative, whose objective was to: "mimic, as nearly as possible, the natural predam conditions. This would be achieved through operational changes, sediment augmentation, and selective withdrawal" (Chapter II, Description of Alternatives, p. 45). This alternative was rejected because it was deemed to require significant modifications in Glen Canyon Dam configuration and operations. In particular, the BOR determined that a return to a seasonal stream flow pattern emulating historic spring floods would wash away sediments in Grand Canyon unless a large-scale, long-term sediment augmentation program were added. Another concern was the ability to meet the requirements of the "Law of the River," because the reservoir would need to be kept full so releases could match high spring inflows.

Much has changed since the 1995 EIS was completed. Large amounts of additional information have been collected, supply and demand relationships have been extensively explored, and the initial impacts associated with climate change are already becoming evident. Water flows have declined and are expected to further decline in the future. The lack of sediment is allowing Grand Canyon beaches and habitats to continue to degrade and wash away. The humpback chub and other species are imperiled by habitat degradation and predation by non-native species. Pressure to maintain maximum possible hydropower production drives a highly unnatural flow regime. The "equalization" rule that requires BOR to keep Lake Powell and Lake Mead at equivalent levels is colliding with the fact that both reservoirs are in danger of dropping below dead pool in the not-too-distant future. Massive amounts of water are lost each year through evaporation and, in the case of Lake Powell, seepage into porous sandstone banks.

Since the completion of Glen Canyon Dam, the goal of water managers has been to keep both Lake Powell and Lake Mead full. Now, in an era of rising water demand, reduced supply, drought, and climate change, it is not feasible to maintain two half-empty reservoirs in the desert. Scientists have predicted that both reservoirs will never be full again and Lake Mead has been hovering at a dangerously low level for years. Meanwhile, Grand Canyon beaches, wildlife habitats and populations, and recreational and archaeological sites continue to decline due to the impacts of the dam. Current operating plans for Glen Canyon Dam are inadequate to address these new realities and it is unclear that minor alterations will be sufficient to meet the mandate of the GCPA.

A major reoperation of Glen Canyon Dam may be the only way to provide for sustainable water delivery and long-term restoration of the Grand Canyon ecosystem. The “Run-of-the-River” alternative that was eliminated from detailed study in the 1995 EIS could be modified to include the re-engineering of Glen Canyon Dam. The old river bypass tunnels could be reconnected or new tunnels could be opened to bypass Glen Canyon Dam. Most water could be allowed to flow through Glen Canyon Dam, filling Lake Mead reservoir, with Lake Powell serving as a backup. This strategy could help to maintain a reliable water supply for the millions of people who depend on Lake Mead, provide more flexibility for efforts to protect the Grand Canyon ecosystem downstream, save a significant amount of water that is now currently lost through seepage from Lake Powell, and allow the restoration of most of Glen Canyon.

A more conservative variant of the ROR alternative that should also be considered is the “Fill Mead First” approach. This would allow most water to flow steadily through the generators at Glen Canyon Dam, filling Lake Mead reservoir before impounding water in Lake Powell. This alternative would accomplish much of what the full modified “Run-of-the-River” alternative would accomplish. However, it would require less re-engineering of Glen Canyon Dam and could be implemented in a relatively short timeframe.

The Fill Mead First alternative could be enhanced by the addition of other strategies. This includes sediment augmentation and temperature control, which are discussed here in the context of other alternatives. (We include a full synopsis of the Fill Mead First alternative as Appendix A to these comments.)

Recommendation: The LTEMP EIS should include a detailed analysis of a modified “Run-of-the-River” alternative that would re-engineer Glen Canyon Dam to restore natural water and sediment flows to the greatest extent possible. This includes consideration of a “Fill Mead First” variant, which would shift primary water storage from Lake Powell to Lake Mead, using Powell as a backup for seasonal and flood control purposes. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

9. Include a steady flow alternative.

The Reasonable and Prudent Alternative (RPA) in the U.S. Fish and Wildlife Service’s (USFWS) 1994 Final Biological Opinion on the Operation of Glen Canyon Dam (1994 Biological Opinion) calls for the “[a]ttainment of riverine conditions that support all life stages of endangered and native fish species....” To achieve this, the RPA requires, in part, the testing of Seasonally-Adjusted Steady Flows (SASF). The RPA states,

“[a] program of experimental flows will be carried out to include high steady flows in the spring and low steady flows in summer and fall during low water years (releases of approximately 8.23 maf) to verify an effective flow regime and to quantify, to the extent

possible, effects on endangered and native fish. Studies of high steady flows in the spring may include studies of habitat building and habitat maintenance flows. Research design and hypotheses to be tested will be based on a flow pattern that resembles the natural hydrograph...."

In the 1995 EIS, the BOR analyzed a Seasonally Adjusted Steady Flow (SASF) alternative that would partially mimic the natural, pre-dam seasonal flow pattern. This was rejected in favor of the Modified Low Fluctuating Flow (MLFF) approach that is now being used. The choice of the MLFF instead of SASF approach can perhaps be best explained by hydropower production and demand. SASF would require increased flows corresponding to natural flood cycles, primarily during early spring and late summer. These are times of low peak electric demand, so large amounts of water would be "wasted" by flowing through the generators without generating power. This approach seems primarily designed for minimum inconvenience to the power industry, not maximum benefit to the Grand Canyon ecosystem.

The 1994 Biological Opinion found that MLFF *"is likely to jeopardize the continued existence of the humpback chub and razorback sucker and is likely to destroy or adversely modify designated critical habitat."* In 2008, the USFWS issued a new biological opinion recanting this position, no doubt under pressure from upper-level officials in the pro-development Bush administration. Regardless, extensive research and monitoring during more than a decade of ROD operations clearly demonstrates that park resources and values have continued to decline under the MLFF.

Recommendation: The LTEMP EIS should include a Seasonally Adjusted Steady Flow alternative that follows the direction of the U.S. Fish and Wildlife Service's 1994 Biological Opinion. This would replace the current Modified Low Fluctuating Flow approach, which has failed to fulfill the mandate of the Grand Canyon Protection Act

10. Include a mechanical sediment augmentation alternative.

A 2008 article written by several scientists who have been extensively involved in Grand Canyon ecosystem studies notes that

"[Glen Canyon Dam] traps the entire incoming sediment load in Lake Powell and modulates the hydrologic regime by, for example, eliminating spring snowmelt floods, resulting in changes in the geomorphology of the river downstream. The primary geomorphic impact has been the erosion of sandbars along the banks of the river. Recognition of this impact has led to many scientific studies and a variety of experimental operations of Glen Canyon Dam with the goal of rebuilding the eroding sandbars. These efforts have thus far been generally unsuccessful and the question remains as to whether or not the dam can be operated such that sandbars can be rebuilt and maintained over extended periods with the existing sediment supply." ("Is there enough sand? (Evaluating the fate of Grand Canyon sandbars," GSA Today, August 2008.)

Scientists have considered several possible strategies for increasing the sediment supply to Grand Canyon. The 1995 EIS discussed the issue in relation to its Run-of-the-River alternative:

"the Run-of-the-River Alternative would require massive sediment augmentation (1 to 10 million tons annually) in order to replenish sediments transported out of the system.... Sediment would be dredged from a remote source and then continually transported and deposited in the Colorado River. The river would then carry the sediment downstream for deposit in eddies and main channel pools." (p. 45)

The 1995 EIS concluded that sediment augmentation “is beyond the scope of dam operations and would be better addressed in a separate NEPA document.” (p. 47). However, in 2007, BOR published the results of a study, “Colorado River Ecosystem Sediment Augmentation Appraisal Engineering Report.” The study was approved by the AMWG as part of the humpback chub comprehensive planning activities and programmed by the GCMRC. This study found that it might be technically feasible to transport sediment from Navajo Canyon through a slurry pipeline within Lake Powell and overland slurry pipelines along existing roads to delivery points.

There is no question that the Grand Canyon is facing a sediment shortage. As long as Glen Canyon Dam continues to be operated in the current manner and Lake Powell continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment supplies will continue to be redistributed downstream. Without an increased sediment supply, it may prove to be impossible to fulfill the stated need of the LTEMP EIS, to “continue to meet statutory responsibilities for protecting downstream resources for future generations, conserving Endangered Species Act-listed species, and protecting Native American interests.” A full NEPA analysis of the potential of the strategy of sediment augmentation is long overdue.

Recommendation: The LTEMP EIS should include an alternative that analyzes the impacts of augmenting the sediment supply to Grand Canyon by mechanically bypassing Glen Canyon Dam. This may be the only way to halt and reverse the erosion of beaches in the Grand Canyon without re-engineering the dam itself.

11. Include a temperature control alternative.

Before Glen Canyon Dam, the temperature of the Colorado River flowing through the Grand Canyon ranged from near freezing in the spring to 85 degrees in the summer. Since the construction of the dam, the water that is released is drawn from the depths of Lake Powell and released through the dam's penstock intakes, at a temperature ranging between 45 to 50 degrees. This cold water below the dam benefits non-native trout, but it is not warm enough to allow endangered native fish species, such as the humpback chub, to reproduce and thrive.

Researchers believe that increasing the water temperature from Glen Canyon Dam would benefit the humpback chub and other native fish in the Grand Canyon. In its 1994 Biological Opinion, the USFWS recommended that the BOR study the feasibility of modifying the operation of the dam by adding a temperature control device to the existing dam intake structures. This device would provide flexibility to draw water from different depths of the reservoir, including warmer water from near the surface of the reservoir, which is critical for the endangered humpback chub. However, there is concern that increasing river temperatures may encourage nonnative warm water fishes to move up the Grand Canyon or increase parasites and diseases that are currently inhibited by colder water.

Several years ago, the Glen Canyon Adaptive Management Work Group recommended to the Secretary of the Interior that BOR complete further analysis of the temperature control device option. The BOR plans to conduct high flows in seasons of the year when endangered fish species are at temperature sensitive life stages in the main stem Colorado River. Thus, it would seem prudent to provide operational options to minimize temperature impacts on these native fish.

Recommendation: The LTEMP EIS should include an alternative that evaluates the use of a temperature control device at Glen Canyon Dam that would allow dam operators to pull water from different thermal zones in the reservoir to minimize temperature shock downstream.

12. Consider alternatives to the current structure, process, and operations of the Glen Canyon Dam Adaptive Management Program Work Group.

The 1996 Glen Canyon ROD initiated the Glen Canyon Dam Adaptive Management Program to monitor the impacts of dam operations and modify those operations if they are not protecting downstream resources as required by the GCPA, the Endangered Species Act (ESA), and other laws. However, year after year, the findings of scientific studies have been ignored or interpreted to mean that more studies — rather than decisive action — are needed.

A major reason for this inaction is that the BOR has delegated most of the decision-making authority to the Glen Canyon Dam Adaptive Management Work Group. This “stakeholder” committee has failed to recommend meaningful changes in dam operations policy, because it is dominated by members who represent entrenched water and power interests that seek to maintain the status quo. As a result of this policy stalemate, the BOR has taken the easy route — focusing on scientific research and experimentation instead of taking decisive action to save the Grand Canyon, as required by the GCPA.

The GCAMP should go through a rigorous and transparent independent review. This should evaluate whether the process and operations of the program are meeting the needs of the resource agencies and the public. The LTEMP EIS could lay the groundwork for such a review.

Recommendation: The LTEMP EIS should explore reforming the structure, process, and operations of the Glen Canyon Dam Adaptive Management Work Group. This would include ensuring that membership is fairly balanced between advocates for water and power production on one hand, and advocates for protecting, mitigating adverse impacts to, and improving the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including, but not limited to natural and cultural resources and visitor use on the other.

CONCLUSION

The Department of the Interior has a unique opportunity to provide leadership on one of the most important issues ever to face the American Southwest — the future of the Colorado River. The agency needs to move beyond the historical easy path and offer a new vision that will sustain the Colorado River and benefit the 30 million people who depend on it. Bold action is needed now. Thank you for the opportunity to comment on this important process.

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