

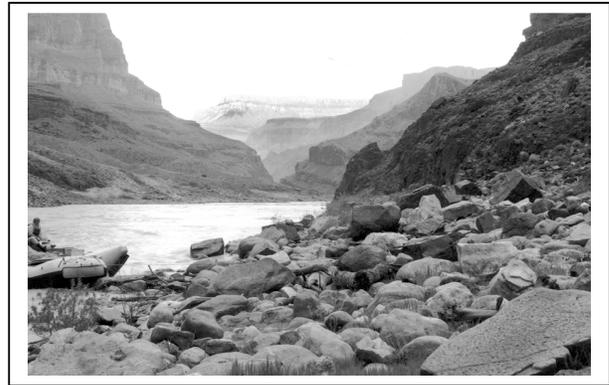


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Grand Canyon River Guides, Inc.
Scoping comments on the development of a
Long Term Experimental & Management Plan Draft EIS for
Glen Canyon Dam
Submitted January 17, 2012



July 1952. This view downstream from the below the mouth of Tapeats Creek (mile 133.8-R) shows a large sand bar with few rocks or boulders exposed. This sand bar was frequently used for layovers in the 1950s; the passengers of Mexican Hat Expeditions trips fished for trout in the creek (Kent Frost, no number, courtesy of the photographer).



March 1, 1995. Large rocks and boulders are now exposed because of severe beach erosion. New sand was deposited here during the 1996 controlled flood but was quickly removed (Steve Tharnstrom, Stake 2676, courtesy of the USGS Desert Laboratory Repeat Photography Collection).

Webb R.H., Melis, T.S., Valdez, R.A., 2002, Observations of Environmental Change in Grand Canyon, Arizona, U.S. Geological Survey, Water Resources Investigations Report 02-4080, prepared in cooperation with Grand Canyon Monitoring and Research Center, http://www.paztcn.wr.usgs.gov/webb_pdf/WRIR4080.pdf.

1 Introduction

Grand Canyon River Guides, Inc. (GCRG) was founded in 1988 to provide a collective voice to protect Grand Canyon and the Colorado River experience. Our non-profit 501(c)(3) educational and environmental organization is made up of over 1,600 river guides and fellow travelers who care deeply about Grand Canyon and the Colorado River. Most of our officers and board members are (or have been) professional river guides in Grand Canyon. The same is true of our 800+ guide members. Having spent much of our lives immersed in the Grand Canyon river experience, our collective perspectives are uniquely well informed.

The Grand Canyon experience has a remarkable effect on our lives and the lives of those we share the canyon with, and inspires us to preserve its legacy for future generations. Our mission is to:

*Protect the Grand Canyon
Provide the best possible river experience
Set the highest standards for the guiding profession
Celebrate the unique spirit of the river community*

Since its inception, GCRG has been heavily involved with dam management issues beginning with the initial Glen Canyon Dam EIS process in the early 1990s. Our members played an instrumental role in the passage of the Grand Canyon Protection Act of 1992 – “As Arizona Senator John McCain said in Flagstaff a short time before the signing, a lot of the credit goes to the guides who realized that things were not right and kept the issue alive.” (Boatman’s Quarterly Review, Volume 5 #4, Fall 1992). Our subsequent involvement as the recreational river running stakeholder within the Glen Canyon Dam Adaptive Management Program (GCDAMP) has provided GCRG representatives with an opportunity to unify and direct the concerns of the river community on scientific and policy issues affecting operations of Glen Canyon Dam.

We are therefore very appreciative of the opportunity to provide scoping comments for the development of an Environmental Impact Statement (EIS) for the Long Term Experimental and Management Plan (LTEMP). We realize what an incredibly complex and challenging process this will be, but we are encouraged that the Bureau of Reclamation and the National Park Service will work together as cooperating agencies in charge of this endeavor. And we expect that you will conduct thorough and respectful consultation with the eleven affiliated tribes of the Grand Canyon as well.

Our members understand that a river expedition through Grand Canyon is a highly sought after and deeply treasured outdoor experience. As river guides, we have direct contact with the 20,000 people who seek out this world class recreational river running experience each year. We understand that without proper protection, we could lose one of the most valued, irreplaceable areas, not only of the United States, but of the world. Taking a broader view, the National Park System is part of our national heritage, and it is our profound responsibility to protect and preserve it on behalf of all Americans, including future generations.

Consequently, as river stewards, Grand Canyon River Guides would like to share our vision for dam management and the experimentation efforts on the Colorado River which should serve as context for the development of the LTEMP and LTEMP alternatives. The elements of our vision are as follows:

- A long term, scientifically-grounded, and sustainable “ecosystem management” approach for the river corridor that carefully preserves park resources and values in accordance with the National Park Service Organic Act, the Endangered Species Act, the Grand Canyon Protection Act, the 2006 NPS Management Policies, the Redwoods Amendment, and other

federal legislation.

- Re-establishing the range of natural variability for all ecosystem patterns and processes in keeping with the conservation mandate from the 2006 NPS Management Policies which requires that *“The Service will reestablish natural functions and processes in parks unless otherwise directed by Congress.”* (NPS Management Policies, Section 4.1.5). This is also in keeping with one of the nine principles of the GCDAMP: *“Dam operations and management actions will be tried that attempt to return ecosystem patterns and processes to their range of natural variability. When this is not appropriate, experiments will be conducted to test other approaches.”* (Strategic Plan, Glen Canyon Dam Adaptive Management Program, August 17, 2001)
- Protection of the fragile and non-renewable cultural resources and Traditional Cultural Properties along the river corridor in accordance with the National Historic Preservation Act of 1966 and related laws.
- A renewed commitment to respect and incorporate values and traditional cultural knowledge from the eleven affiliated tribes of the Grand Canyon. Those spiritual and cultural connections, concerns, and objectives must be woven into the LTEMP and incorporated more effectively and holistically into the GCDAMP.
- A river corridor ecosystem that matches the natural conditions as closely as possible, including a biotic community dominated in most instances by native species.
- A river corridor landscape that matches natural “pre-dam” conditions as closely as possible, including extensive beaches and abundant driftwood.
- Numerous campable sandbars distributed throughout the canyon within a scour zone between the 8,000 – 35,000 cfs levels, built and maintained by Habitat Maintenance Flows and Beach Habitat Building Flows (BHBF) timed to maximize/optimize sediment distribution throughout the river corridor, and conducted under sediment-enriched conditions.
- River flows that continue to be within a range that ensures navigability and boating safety (8,000 cfs minimum).
- Preservation and enhancement of a full range of recreational opportunities along the river corridor including the opportunity to experience the wilderness character of the canyon. Wilderness experiences and benefits available in the canyon include solitude, connection to nature, personal contemplation, joy, excitement, the natural sounds and quiet of the desert and river, and extended time periods in a unique environment outside the trappings of civilization.
- Stewardship worthy of Grand Canyon so it can be passed from generation to generation, unimpaired.

(Excerpted and/or adapted from “A Narrative of Desired Future Resource Conditions for the Colorado River Ecosystem in Grand Canyon” by Andre Potochnik and Matt Kaplinski as published in BQR Volume 14 #1, Spring 2001, and other internal GCRG documents and discussions).

2 Comments on the Purpose and Need

The Notice of Intent to prepare an EIS and conduct scoping on the adoption of a Long Term Experimental and Management Plan indicates that the Purpose and Need for Action is as follows:

“The purpose of the proposed action is to 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 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 two 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 ESA listed species, and protecting Native American interests, while meeting water delivery obligations and for the generation of hydroelectric power.” (Federal Register, Volume 76, Number 129, July 6, 2011)

A) GCRG feels this Purpose Statement does not do justice to the situation at hand. Congress passed the Grand Canyon Protection Act (GCPA) of 1992 to give guidance to the initial Glen Canyon Dam EIS, to establish and implement long term monitoring programs and research activities, and to determine if the revised dam operations were achieving the resource protection objectives of the 1995 Final EIS and the 1996 Record of Decision. The GCPA states:

“The Secretary shall operate Glen Canyon Dam... 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.” (GCPA, Section 1802)

The GCPA directive to "...protect, mitigate adverse impacts to, and improve the values..." has been watered down to "...minimize—consistent with law—adverse impacts..." This should be changed. The Grand Canyon should be protected and improved to the full intent of the GCPA.

B) The reference to hydropower should be dropped from the need statement. Water storage and water delivery obligations are the primary purposes of Glen Canyon Dam, whereas hydropower is an ancillary benefit. The construction of Glen Canyon Dam was authorized by the Colorado River Storage Project Act of 1956 (Public Law 84-485). The underlying project purposes are outlined in Section 1 of the Act (43 United States Code [U.S.C.] ' 620) which authorized the Secretary of the Interior to “construct, operate, and maintain” Glen Canyon Dam:

. . . for the purposes, among others, of regulating the flow of the Colorado River, storing water for beneficial consumptive use, making it possible for the States of the Upper Basin to utilize, consistently with the provisions of the Colorado River Compact, the apportionments made to and among them in the Colorado River Compact and the Upper Colorado River Basin Compact, respectively, providing for the reclamation of arid and semiarid land, for the control of floods, and for the generation of hydroelectric power, as an incident of the foregoing purposes . . .
(emphasis, ours)

For many years Glen Canyon Dam was operated with hydropower revenue as the main operational consideration, to the great detriment of the river corridor ecosystem. The chief considerations for the LTEMP should be *protection and recovery* of that ecosystem.

Therefore, we recommend that the EIS team consider changing the Purpose and Need for Action Statement as follows:

- Change the language of the Purpose statement to accurately reflect the language and intent of the Grand Canyon Protection Act.
- Drop the reference to hydropower.

3 Comments on the Process

Define and ensure a substantial role for the Grand Canyon Monitoring and Research Center (GCMRC) within the LTEMP EIS process.

- GCMRC's involvement is critical to draw on the body of knowledge that has been gained as the science arm of the Glen Canyon Dam Adaptive Management Program.
- GCMRC's involvement is also necessary for the development and evaluation of scientifically credible, well-defined alternatives to best meet program and ecosystem goals.

It's clear that the LTEMP team at Argonne Labs are knowledgeable and experienced, and we are sure they will do as conscientious and high-quality a job as is required for a place as unique and important as the Grand Canyon. However, on the whole they themselves have little to no direct experience with and knowledge of the canyon and the river. No scientific background, no matter how extensive and thorough, can impart a complete understanding of such a complex place.

Because of this we suggest:

- Argonne Labs should work in close consultation with Grand Canyon Monitoring and Research Center (GCMRC). They know their research well, and they also understand the context supporting their research.
- Core members of the Argonne team should invest the time to go on a river trip through the Grand Canyon and get to know the place first hand.
- The Argonne team should communicate with and ask questions of stakeholders during the NEPA process.

The LTEMP should reflect the societal shift to a desire for river restoration and ongoing protection. Previous studies have examined operational restrictions to Glen Canyon Dam in terms of environmental constraints to hydropower. The dam operations and the subsequent result of the LTEMP EIS must not be viewed in terms of environmental constraints but instead, *environmental responsibilities*. We therefore urge that the new LTEMP to reflect a shift in focus and language that corresponds with a statement made by Bureau of Reclamation Commissioner, Mike Connor:

“It is certainly my goal over the next decade that Bureau of Reclamation becomes as well known for its expertise in river restoration as it is for building dams, maintaining dams, and building and taking care of other water supply infrastructure.” (<http://www.usbr.gov/river/video.html>)

The National Environmental Policy Act (NEPA), the Grand Canyon Protection Act (GCPA), and the Endangered Species Act (ESA) together represent a distinct societal shift from the dam-building “man over nature” mentality to an improved understanding of, and deep desire for the protection of, the natural, cultural and visitor use values of our public lands. The LTEMP should be one more step down the path of preserving, protecting and improving those values for future generations to enjoy.

Look to other dam managed rivers, examine their challenges and successes in restoring natural patterns and processes while a dam is still in place and utilize that expertise to inform and strengthen the LTEMP process. Existing knowledge and research should inform the decision on whether to build a Temperature Control Device (TCD) on Glen Canyon Dam. For example, it might be useful to compare native fish recruitment and survival in the upper basin due to the affects of the Flaming Gorge TCD with what could be expected in Grand Canyon. Or utilize the TCD at Flaming Gorge to carry out temperature variation experiments on native fish populations in the upper basin. These results could be used for extrapolation of TCD effects in Grand Canyon. The question that must be answered is... “whether the potential benefits to the endangered fish of operating a TCD and warming the water outweigh the potential adverse effects from potential increases in nonnative predators, parasites and diseases, or other unintended, systemic interactions

in the downstream environment.” (Biological Assessment on the Operation of Glen Canyon Dam, 2007)

Ensure that the eleven affiliated tribes who live in and around the Grand Canyon and the Colorado River have a substantive role in LTEMP development which continues throughout the LTEMP process, and the life of the plan. The LTEMP must find a way to successfully incorporate tribal values and knowledge into policy development and decision making – a distinct challenge for the Adaptive Management Program to date.

- Towards that end, science must not be the only lens through which we view the Colorado River ecosystem (CRE), its resources, and associated values. Respectful and thorough tribal consultation must occur at each stage and those cultural and spiritual connections must be woven into the LTEMP and incorporated more effectively into the Glen Canyon Dam Adaptive Management Program.

The LTEMP should consider *more than just the last 15 years of science*:

- Review the scientific evidence from Phase 1 of the Glen Canyon Environmental Studies (GCES) that served as the basis for the Record of Decision of the initial Glen Canyon Dam EIS. Utilizing that information *in light of what we know now*, could be beneficial.
- Examine pre-dam conditions to provide some much needed perspective for developing future management directions for the Colorado River. We specifically recommend reviewing: “*Observations of Environmental Change in Grand Canyon, Arizona*,” (Webb, Melis and Valdez, 2002, http://www.paztcn.wr.usgs.gov/webb_pdf/WRIR4080.pdf). The report incorporates historical diaries, interviews with pre-dam river runners, repeat photography, and historical data and observations.

The LTEMP should be considered in the light of outside processes, such as equalization flows, that cause severe adverse impacts to the downstream resources in Grand Canyon. In December of 2007, responding to the worst eight years of drought in a century of record keeping, the Secretary of the Interior adopted the Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations of Lake Powell and Lake Mead. The specific focus of these guidelines was to address water availability in the Lower Basin and the operations of Lakes Powell and Mead during drought and low reservoir conditions. As we shifted to the Equalization Tier in 2011, between January 1 and August 1, *the amount of sediment transported in all of Grand Canyon (from Lees Ferry to Diamond Creek), equalled 2.1 to 3.7 million metric tons*, with the specific breakdown by reach as follows:

Reach	Sediment Exported between Jan 1 – Aug 1, 2011
0 to 30 mile	1.4 to 1.6 million metric tons
30 mile to 60 mile	.2 to .5 million metric tons
61 mile to 87 mile	.5 to 1 million metric tons
87 mile to 225 mile	0 to 0.6 million metric tons

(GCMRC unpublished data presented at the August 24-25, 2011 AMWG meeting).

The magnitude of sediment erosion caused by the equalization flows is sobering, and efforts to rebuild that sediment (which is a foundational element for the health of many Colorado River resources) may have been set back years. Clearly higher flow volumes have a direct and profound effect on sand transport, which is also corroborated in the modeling simulations of sand transport for hypothetical annual release volumes as published in USGS Open File Report 2010-1133, Evaluation of Water Year 2011 Glen Canyon Dam Flow Release Scenarios on Downstream Sand Storage along the Colorado River in Arizona (Wright and Grams, 2010).

GCRG therefore considers it essential that the LTEMP process should take a *proactive* stance to

managing for the possibility of future equalization needs that will help achieve LTEMP and GCDAMP goals rather than the current reactive mode that clearly thwarts those goals and makes them all the more difficult to achieve.

Desired Future Conditions (DFCs) developed within the GCDAMP with DOI input and approval should be utilized in analyzing the impacts of LTEMP alternatives and applied as a benchmark for defining identified objectives that are scientifically measurable and attainable through dam operations during the life of the Plan. The goal should be to “ensure that park resources and values are passed on to future generations in as good as, or better than, the conditions that exist today.” (Section 1.4.7.1, NPS Management Policies, 2006). Related considerations include:

- The Core Monitoring Program under development by the Grand Canyon Monitoring & Research Center will help track progress towards those desired outcomes.
- The DFCs must not be static, but rather they must be continually refined as new knowledge is gained, unacceptable impacts are discerned, and subject to a determination of whether the specific DFCs are achievable.

Since the Record of Decision for the initial Glen Canyon Dam EIS created the Glen Canyon Dam Adaptive Management Program, the LTEMP EIS should be able to address and improve its structure and functionality in order to meet GCDAMP mission and goals. Simply put, we would like to see a much more balanced GCDAMP stakeholder group that has the ability and willingness to act adaptively on what is learned.

4 Comments on Alternatives

GCRG wishes to provide two kinds of comments about proposed alternatives here – elements that should be applied to all flow regime alternatives that are considered within this Draft EIS, and our suggestions for possible alternatives that should be considered for inclusion.

4.1 Elements common to all alternatives

First and foremost, it is paramount that all alternatives fully meet the intent of the 1992 Grand Canyon Protection Act. The act specifically states, “The Secretary shall operate Glen Canyon Dam...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,” (GCPA, Section 1802).

The selected alternative should improve the quality of recreational resources for users of the Colorado River, and ensure their protection for generations to come. This is in line with Goal 9 of the Glen Canyon Dam Adaptive Management Program and the specific Management Objectives tied to that Goal (MO 9.1: quality of recreational opportunities; MO 9.2: visitor safety; MO 9.3: beaches and campsites; MO 9.4: the wilderness experience; and MO 9.5: maintaining the visitor experience affected by GCDAMP activities). More importantly, this is the right thing to do, in keeping with the fundamental purpose of all parks to provide for the enjoyment and preservation of park resources and values, including visitor use.

All alternatives must include the continuation of a robust program of scientific research and experimentation. Our understanding of the system has greatly improved in the last fifteen years, but even so there is much left to learn. Some ideas that were once almost axiomatic are now less clearly true. The system is complex, and to manage it well, for the long term, we need to continue

to learn about it.

Beach Habitat Building Flows (BHBFs) should be a well-defined, key component of all alternatives. The BHBF is the only known mechanism to test whether sand can be sustained in the river ecosystem on a multi-year time scale and a “critical tool” according to GCMRC. (Melis, 2011, ed., USGS Circular 1366, Page 141)

- The High Flow Experimental Protocol Environmental Assessment should be finalized and incorporated into the design of all LTEMP alternatives.
- A science plan for the Rapid Response model should be developed. The plan should be included if it can be successfully integrated without confounding the results of regular HFE events.
- Recommendations from Grand Canyon Monitoring & Research Center for optimizing the results of future High Flow Experiments should be incorporated, specifically that the “...design of controlled floods for optimal sandbar deposition in the Colorado River in Grand Canyon National Park should not be based only on threshold levels of sand enrichment, but also on reach-averaged bed-sand median grain size.” (Topping, Grams, and others, 2010, Page 101)
- Variability should be introduced into the system by changing the level and timing of the High Flow Experiments (not just 42,000 to 45,000 cfs, or early spring every time). Flood events are a natural occurrence of free-flowing rivers and controlled floods were introduced in Grand Canyon in order to mimic those highly variable pre-dam flood events. Experimental BHBFs could be undertaken during the historic hydrograph peak, the monsoon season, and winter flood events (Chapter 5, Figure 6, USGS Circular 1366)
- Consider testing experimental high flows above 45,000 cfs when hydrologic conditions allow. According to GCMRC, “Testing of peak flows greater than 45,000 ft³/s is scientifically justified, but is constrained by current low reservoir levels such that the spillways at Glen Canyon Dam are inaccessible. Higher peak flows could be considered in the future if reservoir levels permit.” (Melis, 2011, ed., USGS Circular 1366, Page 139) Before Glen Canyon Dam was completed, the annual spring snowmelt floods ranged between about 35,000 and 120,000 cfs, and averaged around 55,000 cfs with peak flows of 120,000 cfs reoccurring about once every size years (Topping and others, 2003).

For all alternatives, flows *between* BHBFs should be designed to maximize sediment retention.

In the report synthesizing the results of the three High Flow Experiments conducted to date, GCMRC notes that, “For sandbars, the intervening dam operations are important because they determine the rate of post-HFE sandbar erosion, the rate of export of sand from the system flowing tributary-derived sand inputs, and thus the amount of sand available for building sandbars during a given HFE.” (Melis, 2011, ed., USGS Circular 1366, Page 143).

- Address the preservation of sand deposits by designing post-High Flow Experiment hydrographs that optimize ecosystem goals (i.e. sediment retention) to the greatest extent possible.
- Intervening dam operations must be carefully considered in the context of an ecosystem approach and the respective tradeoffs they may elicit.

All alternatives must be based on an adaptive ecosystem management approach. This is a dynamic and complex system. Our learning and adapting/building on what we know must continue indefinitely. According to the USGS, “The most effective strategy for future releases from Glen Canyon Dam is one that provides flexibility and adaptability – flexibility that would allow the best scientific information to be used in decisionmaking, and adaptability would allow ongoing learning to be readily incorporated in the process.” (“Effects of Three High-Flow Experiments on the Colorado River Ecosystem Downstream from Glen Canyon Dam, Arizona,” Circular 1366, Page 143)

For all alternatives, experiments need to be:

- well planned and scientifically credible,
- of sufficient length to elicit measurable responses,
- coupled with long term monitoring to ascertain the impacts to the various resources, and,
- followed by a timely synthesis of that information to GCDAMP program stakeholders.

All alternatives should include an increased experimental and managerial focus on cultural resources along the river corridor. Archaeological site conditions will continue to deteriorate at unknown rates due to impacts from erosion and visitor use. Impacts that the NPS views as being directly related to dam operations include: bank slumpage and gulying/arroyo cutting in locations where drainage systems are actively entrenching to achieve grade with the present-day “highest discharge” terrace levels formed under dam-controlled flows. (SCORE Report, Page 182). Additionally, any reduction in beach size and distribution exacerbates crowding and congestion along the river corridor, which in turn can lead to impacts to the high terraces where archaeological sites are often located.

All alternatives should include a thorough and rigorous socio-economics study. Flows from Glen Canyon Dam run through a very complex system. For managers to make wise decisions now and protect the river corridor for generations to come, they need a clear understanding not just of the mechanics and interrelationships of system components, but also the value of those components. For example, the estimated cost of analyzing, permitting, building and operating a sediment replacement system should be used to determine the value of the sediment removed by MLFF flows (or other LTEMP alternative flows), and as a comparison to values obtained from use of the power plant for peaking flows.

Additionally, a lack of a strong socio-economic study has been a major weakness of the Glen Canyon Dam Adaptive Management Program. In their comments for the 1996 ROD, the GSA specifically mentioned that socio-economic understanding of the system was weak, and little has been done to correct that weakness in fifteen years since.

When developing and choosing alternatives, the focus should be on benefiting, protecting and preserving *all* of the downstream resources (such as camping beaches, cultural sites, etc) and their associated values. The LTEMP should go beyond a focus on mass sediment balance and fish.

- River users care about all that makes Grand Canyon unique, including cultural resources, tribal perspectives and the rich cultural heritage of the Colorado River.
- Reaching a certain metric for mass sediment balance is not sufficient – The LTEMP needs to focus on whether the sediment adequately benefits, protects, and improves the individual resources along the Colorado River. A positive mass sediment balance is not very meaningful if that sediment is not where it is most needed.
- The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

Examine potential alternatives and develop science plans in a broader context, and use that information to improve the quality of scientific and management perspectives. In his introductory memo to the Technical Work Group, the new chief of GCMRC pointed out that an “expansion in research perspective would provide GCMRC and the GCDAMP the opportunity to place the issues of Colorado River science and management in Grand Canyon in a larger perspective and thereby increase the quality of science support provided to the GCDAMP.” (memo from Jack Schmidt to the TWG, dated 10/18/2011) He specifically pointed to studies in Cataract

Canyon, upstream from Lake Powell on the Colorado River mainstem. Additionally, the GCMRC Chief noted that the majority of research has been conducted on the mainstem between Glen Canyon Dam and Lake Mead, and that it had been “more than a decade since any ecosystem process level studies have been conducted on humpback chub populations in the Little Colorado River. Nevertheless, the key to understanding trends in native fish populations might lie in understanding the tributaries better.” There is much to be learned in other areas that would deepen our understanding of the resources that we are charged with protecting.

No alternative should lock the Glen Canyon Dam Adaptive Management Program into a single flow regime for the next 15 to 20 years. Flow regime experiments should be run long enough to be thoroughly tested and evaluated, and then adjustments should be made based on the new understanding of the system. The time frame for flow regime experiments should be determined by the needs of science.

All alternatives should be developed in a way that reflects not only “Law of the River” release requirements but also proactively manages for outside processes such as the equalization criteria. An experimental plan that reflects the de facto management requirements of Glen Canyon Dam will be more likely to succeed than one that is developed without considering the bigger picture.

4.2 Suggested Alternatives

Include a Seasonally Adjusted Steady Flows alternative. The original Glen Canyon Dam EIS included a SASF alternative, and it was included again in the matrix of alternatives for the short-lived 2007 Long-Term Experimental Plan EIS effort. At the close of the Glen Canyon Dam EIS, Grand Canyon River Guides did not support the preferred alternative (MLFF) as we were unconvinced that it would best conserve terrestrial riparian habitat in the canyon, especially in regards to crucial sediment needs. We did support a rigorous test of the SASF alternative to determine whether releases that closely mimic pre-dam flows would better restore the endangered species and severely eroded beaches. To date, the four-month duration Low Summer Steady Flow (LSSF) experiment in 2000 “is the longest planned hydrograph that departed from MLFF operations since the Record of Decision in 1996” (Ralston, 2011). Although the intent of the LSSF was to “mimic predam river discharge patterns by including a high, steady discharge in the spring and a low, steady discharge in the summer,” the duration was insufficient to determine its effects on the ecosystem. Further testing of this concept is necessary to assess system response and to test the RPA of the U.S. Fish and Wildlife Service.

Include a Year-round Steady Flow alternative. This is the "best case scenario" presented in the article "Is there Enough Sand? Evaluating the Fate of Grand Canyon Sandbars" (Wright and others, 2008). It is based on the conclusion that the “optimal intervening dam operation for rebuilding and maintaining sandbars is year-round steady flows, which would export the least amount of sand compared to other potential dam operations.” (USGS Circular 1366, page 143)

Include a "Stewardship Alternative" where the flow regime is designed to best serve the ecological, cultural and recreational resources of the Grand Canyon with no consideration given to the sales of hydropower. This alternative would be in best alignment with the Grand Canyon Protection Act, which makes no mention of hydropower beyond calling for a report on "economically and technically feasible methods of replacing any power generation that is lost through adoption of long-term operational criteria for Glen Canyon Dam," and the original purpose for the construction of Glen Canyon Dam, in which power generation was seen as an incidental benefit as referenced previously in our comments. At this time it is not clear that changes in dam operations alone will be sufficient to protect and improve the river corridor in the Grand Canyon.

However, for the next 15 to 20 years, we should take our very best shot at doing that.

5 Environmental Impacts that should be taken into consideration

As alternatives are considered, please note that while a positive sediment mass balance for the river corridor in Grand Canyon is necessary to rebuild sandbars, restore campable areas and improve the recreation experience, it is not necessarily a sufficient measure of success. We need enough sand, but we also need it in the right places.

Climate Change: The effects of climate change must be taken into account and prepared for in the LTEMP and during the life of the plan. The Colorado River watershed is likely to become warmer and drier in coming years, which will have a wide range of effects. It is noteworthy that the water managers who developed the agreement that serves as the cornerstone for the “Law of the River” most likely had water surpluses rather than water deficits in mind. In fact, “The period from 1905 to 1922, which was used to estimate water production allocated under the Colorado River Compact, had the highest long-term annual flow volume in the 20th century, averaging 16.1 million acre feet at Lees Ferry.” (SCORE Report, Circular 1282, Page 59). In stark contrast, “By using either actual annual flow data or annual flow records adjusted for consumptive uses in the upper basin, it was found that runoff from 2000 through 2004 was the lowest in the period of record (99-110 years).” (SCORE Report, Circular 1282, Page 66)

Tamarisk Leaf Beetle: The tamarisk beetle has recently entered the Grand Canyon, an occurrence that will elicit a watershed-scale change for the river corridor ecosystem in the Grand Canyon. The NPS is currently poised to proactively and comprehensively prepare for the future through their new Watershed Stewardship Program. We'll need to learn what the tamarisk leaf beetle will mean for dam releases and future adaptive management efforts. Every effort should be made to coordinate with Grand Canyon National Park towards this end.

6 Mitigation

Several concepts should be taken into consideration, studied for an understanding of their risks, rewards and costs, and potentially acted upon during the lifetime of the LTEMP. These should be considered for all alternatives.

- Sediment Augmentation.
- A Temperature Control Device.
- Beach/campsite work. Flow regimes with lower variation tend to remove less sediment from the system, but they also encourage plant growth in the riparian zone. Some beaches lose more campable area to vegetation encroachment than to sediment erosion. Whatever the cause, loss of camping space on beaches directly affects the recreational experience.
- Reintroduction of extirpated native species. Native species of plants and animals are part of the values for which Grand Canyon National Park was initially created. Reintroduction should be part of a mitigation strategy.

7 Conclusion

Grand Canyon River Guides and its members would like to thank you for the opportunity to provide scoping comment for the development of a Draft Environmental Impact Statement for the Long Term Experimental and Management Plan for Glen Canyon Dam. We also understand and appreciate the hard, thoughtful work you'll do in producing a new plan, in keeping with the

directive outlined in the Senate committee report regarding the 1978 Redwood Amendment, which stated clearly,

*“The Secretary has an **absolute duty**, which is not to be compromised, to fulfill the mandate of the 1916 Act to take whatever actions and seek whatever relief as will safeguard the units of the national park system.” (emphasis, ours) (NPS Management Policies, Section 1.4.2, Page 10)*

The Grand Canyon is utterly unique—one of the seven natural wonders of the world, a World Heritage Site, and one of the last, best, wild places that belong to us, the American people. Grand Canyon offers life-changing experiences to those who venture into its depths and down its mighty river, and it even means a great deal to many people who may never have the opportunity to visit it themselves. It is our profound honor and responsibility to carefully protect Grand Canyon and pass it on to future generations in the best, most pristine condition we possibly can.

Please contact us if you have questions.

Respectfully,

Grand Canyon River Guides, Inc.

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8 References

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