SUMMARY OF
PUBLIC SCOPING COMMENTS ON THE GLEN CANYON DAM LONG-TERM EXPERIMENTAL AND MANAGEMENT PLAN ENVIRONMENTAL IMPACT STATEMENT

Prepared by

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For

Bureau of Reclamation
Upper Colorado Region
Salt Lake City, Utah

and

National Park Service
Intermountain Region
Denver, Colorado

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NOTATION

AMWG	Adaptive Management Working Group
AMP	Adaptive Management Program
AGFD	Arizona Game and Fish Department
Argonne	Argonne National Laboratory
°C	degrees Celsius
cfs	cubic feet per second
CRSP	Colorado River Storage Project
DFC	desired future conditions
DOI	U.S. Department of the Interior
EIS	Environmental Impact Statement
ESA	Endangered Species Act
°F	degrees Fahrenheit
ft	foot/feet
FWCA	Fish and Wildlife Coordination Act
GCDAMP	Glen Canyon Dam Adaptive Management Program
GCMRC	Grand Canyon Monitoring and Research Center
GCPA	Grand Canyon Protection Act
GCRG	Grand Canyon River Guides
HFE	High-Flow Experiment
in.	inch(es)
LCR	Little Colorado River
LTEMP	Long-Term Experimental and Management Plan
LTEP	Long-Term Experimental Plan
MLFF	Modified Low Fluctuating Flow
mm	millimeter(s)
MSCP	Lower Colorado River Multi-Species Conservation Plan
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPS	National Park Service

NOTATION (cont.)

Reclamation	Bureau of Reclamation
ROD	Record of Decision
RPA	Reasonable and Prudent Alternative
TCD	Temperature Control Device
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
Western	Western Area Power Administration

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1 INTRODUCTION

On December 10, 2009, Secretary of the Interior Ken Salazar announced the need to develop a Long-Term Experimental and Management Plan (LTEMP) for Glen Canyon Dam. The Secretary emphasized the inclusion of stakeholders, particularly those in the Glen Canyon Dam Adaptive Management Program (GCDAMP), in the development of the LTEMP.

The decision of the U.S. Department of the Interior (DOI) to develop the LTEMP is a component of its efforts to continue to comply with the ongoing requirements and obligations established by the Grand Canyon Protection Act of 1992 (GCPA). The LTEMP will ensure continued compliance with federal law and will recognize the importance of protecting, mitigating adverse impacts, and improving the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established; at the same time, recognizing the water delivery obligations regarding allocation, appropriation, development, and exportation of the waters of the Colorado River basin under federal law. Other actions that are related to the ongoing work of the GCDAMP, such as efforts to protect cultural resources and to conserve endangered and threatened species, are anticipated to be part of the LTEMP.

DOI, through the Bureau of Reclamation (Reclamation) and the National Park Service (NPS) will prepare an Environmental Impact Statement (EIS) to evaluate the impacts of adoption of the LTEMP. The proposed action being considered in the LTEMP EIS is the development and implementation of a structured, long-term experimental and management plan, to determine the need for potential future modifications to Glen Canyon Dam operations, and to determine whether to establish an Endangered Species Act (ESA) Recovery Implementation Program for endangered fish species below Glen Canyon Dam.

In 1995, the first EIS on operations of Glen Canyon Dam was published (Reclamation 1995). The LTEMP EIS will be the first EIS completed on the operations of Glen Canyon Dam since the 1995 EIS, which was intended to allow the Secretary to "balance and meet statutory responsibilities for protecting downstream resources for future generations and producing hydropower, and to protect affected Native American interests." Given that it has been over 15 years since completion of the 1996 Record of Decision (ROD) on the operation of Glen Canyon Dam, DOI will study new information developed through the GCDAMP, including information on climate change, to more fully inform future decisions regarding the operation of Glen Canyon Dam and other management and experimental actions.

A previous planning process called the Long Term Experimental Plan (LTEP) for the operation of Glen Canyon Dam started in late 2006. In February 2008, the LTEP EIS was put on hold until the completion of environmental compliance on a five-year plan of experimental flows (2008–2012), including a high-flow test completed in March 2008, and yearly fall steady flows to be conducted in September and October of each year from 2008 to 2012. As stated in the Notice of Intent (NOI) in the *Federal Register* on July 6, 2011 (DOI 2011a), the LTEMP EIS supersedes the LTEP EIS. The LTEMP EIS will draw on the environmental documentation and updated information developed for the LTEP EIS. Accordingly, to the extent applicable, the scoping comments received for the LTEP EIS will be considered when the agencies determine the scope of the LTEMP EIS. The LTEP scoping report, which summarizes those comments, is publicly available at the following Web address: http://www.usbr.gov/uc/rm/gcdltep/scoping/FinalScopingReport.pdf.

Public scoping is a phase of the National Environmental Policy Act (NEPA) analysis process, and is intended to give the public the chance to comment on the LTEMP, recommend alternatives, and identify and prioritize the resources and issues to be considered in the EIS analyses. The public scoping phase of the EIS process gives interested parties the opportunity to comment and provide early ideas about:

- The resources or issues to be evaluated in the LTEMP EIS,
- The alternatives to be included in the LTEMP EIS, and
- Concerns or observations regarding Glen Canyon Dam operations and downstream resources.

This report presents a summary of the issues raised during the scoping process and discusses which issues will be addressed in the EIS. The report also includes summary statistics of participants in the process. Specific comments and their context are not provided; instead, the relevant issues raised in the comments as they apply to the preparation of the EIS are presented. All comments — regardless of how they were submitted — received equal consideration.

2 SCOPING PROCESS

2.1 Approach

The primary objective of scoping is to conduct an open and thorough process, to hear and understand the opinions of all interested parties, and to afford the public opportunities to provide input. Scoping for the LTEMP EIS provided the public with an opportunity to comment on the proposed action, recommend alternatives, and identify and prioritize the resources and issues to be considered in the LTEMP EIS analyses. The public was invited to submit comments via the project web-site and by standard mail. The scoping period started with the publication of the NOI in the *Federal Register* on July 6, 2011 (DOI 2011a), and ended January 31, 2012.

Six open-house-style public meetings and one Web-based meeting were held to inform the public about the LTEMP EIS. At the public meetings, the public could view exhibits about the project, discuss issues informally, and ask questions of technical experts and managers. A brief overview of the project was also presented at the start of each meeting by Reclamation and NPS. Computer stations were available for meeting participants to browse the project Web site and submit electronic comments. Hard-copy comment forms were also available for attendees to submit comments at the meeting or to take with them for later use. There were 221 people who attended these meetings, which were held in the following locations:

- Phoenix, Arizona — November 7, 2011
- Flagstaff, Arizona — November 8, 2011
- Page, Arizona — November 9, 2011
- Salt Lake City, Utah — November 15, 2011
- Las Vegas, Nevada — November 16, 2011
- Lakewood, Colorado — November 17, 2011

The Web-based meeting was held on November 15, 2011. For this meeting, the public was able to watch, via the Internet, a live overview presentation of the LTEMP EIS, and to ask questions of technical experts and managers. Twelve people participated in this meeting.

Prior to the public scoping meetings, Argonne National Laboratory (Argonne) established a Web site for the LTEMP EIS (http://ltempeis.anl.gov) that provides background information about the project, information on public involvement, and answers to frequently asked questions. The Web site also provides an opportunity to join a mailing list to receive project updates and announcements via e-mail, and a link to the project's online comment form that was made available on NPS's Planning, Environment, and Public Comment (PEPC) Web site.

The project Web site was used to disseminate information about the public scoping meetings, including locations, times, meeting format, pre-registration, and presentation materials. The public also was notified of the meetings by a *Federal Register* Notice published on October 17, 2011 (DOI 2011b), a press release and media advisory distributed to local media outlets, and an op-ed article for publication in local and regional newspapers.

2.2 Scoping Statistics

A total of 447 individuals, recreational groups, environmental groups, power customers or organizations, federal and state government agencies, and other organizations provided scoping comments on the LTEMP EIS. Ninety-six percent of the comments were submitted using the Web comment form. Comments were received from individuals or organizations from 41 states and 3 foreign countries. Sixty percent of the comments were from three states near the

project area (Arizona, Utah, and Colorado); followed by California and New Mexico (Table 1). All of the remaining states and countries contributed fewer than 3 percent of the comments (Table 1). Table 2 lists the names of organizations that provided official comments. Table 3 provides summary information on commenter affiliations.

TABLE 1. Comments Received from the Public According to State and Country of Residence

State/Country	Number	Percent
Arizona	153	34.2
Utah	64	14.3
Colorado	53	11.9
California	45	10.1
New Mexico	15	3.4
Washington	13	2.9
Oregon	9	2.0
Tennessee	7	1.6
Nevada	6	1.3
Idaho	6	1.3
Texas	6	1.3
All other states	70	15.7
Foreign countries	3	0.7

Although no formal campaigns letters were received, some commenters chose to submit entire letters or portions of letters from various other commenting organizations. The following multiple submittals were received:

- Submittals that endorsed the comments of the Grand Canyon River Guides (GCRG) by either posting the GCRG submittal in its entirety or by submitting a subset of the GCRG letter (number of commenters = 13).

- Submittals that endorsed a "Grand Canyon First!" alternative that would "achieve the requirements of the Grand Canyon Protection Act." This submittal recommended that the EIS develop a high-flow/steady-flow alternative; involve staff of the Grand Canyon Monitoring and Research Center (GCMRC) in the science development; and look at a long-term (e.g., 15-year) operations change (number of commenters = 18).

TABLE 2. Organizations that Provided Scoping Comments

Organization
American White Water
Arizona Department of Water Resources
Arizona Power Authority
Arizona Raft Adventures
Arizona Game and Fish Department
Arizona State Council of Trout Unlimited
Colorado River Basin State Representatives of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming
Colorado River Energy Distributors Association
Environmental Defense Fund
Farmington River Club
Federation of Fly Fishers
Glen Canyon Institute
Grand Canyon Private Boaters Association
Grand Canyon River Guides, Inc.
Grand Canyon River Outfitters Association
Grand Canyon River Runners Association
Grand Canyon Trust
Grand Canyon Whitewater
Grand Canyon Wildlands Council, Inc.
Irrigation and Electrical Districts Association of Arizona
Living Rivers
Marble Canyon Business Interests
Salt River Project Agricultural Improvement & Power District (SRP)
San Pedro Flycasters
Sierra Club[a]
Sun City Grand Fly Fishing Club
U.S. Fish and Wildlife Service
Utah Associated Municipal Power Systems
Western Area Power Administration
Western Resource Advocates
White Mountain Fly Fishing Club

a The scoping letter submitted by the Sierra Club inadvertently was not included in an earlier version of this report. The Sierra Club's letter was received prior to the close of the scoping period, and issues raised in the letter were fully considered in developing the scope of the LTEMP EIS.

TABLE 3. Commenter Affiliations

Organization	Number	Percent
Grand Canyon River Guides	42	9.4
Fly Caster Clubs (Various)	18	4.0
Whitewater Associations (Various)	15	3.4
Grand Canyon Private Boaters Association	14	3.1
Glen Canyon Institute	8	1.8
Other Fishing Clubs (Various)	8	1.8
Other Boating/Rafting Associations (Various)	4	0.9
Grand Canyon Trust	3	0.7

- Submittals that included the same 14 points that focused on improving recreational experiences on the Colorado River; protecting and improving downstream resources; maximizing sediment retention on beaches and backwater areas; and ensuring a role for the GCRMC (number of commenters =7).

- Submittals that included six points focusing on protecting natural and cultural resources. These commenters also called for the EIS to comply with the Grand Canyon Protection Act and include the GCMRC as an integral part of the EIS process. (number of commenters = 23).

- Submittals that called for the EIS to meet the requirements of the Grand Canyon Protection Act; address climate change; include a full assessment of the impacts of "equalization" water releases; analyze a "Run-of-the-River" alternative that includes consideration of the "fill Lake Mead first proposal"; include an alternative that augments the sediment supply to Grand Canyon by mechanically bypassing the dam;; and ensure no bias toward hydropower (number of commenters = 14).

- Submittals that included the points mentioned above and wanted the EIS to consider the Colorado River from Cataract Canyon to Hoover Dam as a single ecosystem; include clearly defined "desired future conditions"; ensure an integral role for GCMRC; include a Seasonally Adjusted Steady-Flow alternative; include an alternative that uses a temperature control device; and consider restructuring the Glen Canyon Adaptive Management Work Group (number of commenters = 23).

3 SUMMARY OF SCOPING COMMENTS

Comments received during public scoping covered a wide range of topics and issues and represented a variety of points of view. Comments addressed various aspects of the proposed action, including environmental and socioeconomic impacts, dam operations and flows, geographic scope, and potential alternatives.

A summary of issues raised in comments are presented in the following sections under the main topics of purpose and need; environmental issues; dam operations and hydropower; geographic and temporal scope; policy and regulatory concerns; LTEMP approach and considerations; alternatives; other issues; and stakeholder involvement. All of the major scoping comments are represented in Sections 3.1 through 3.9. The actual correspondence received from the public on the scope of the LTEMP EIS is presented in the appendix to this report.

3.1 Purpose and Need

Comments expressed concerns over the purpose and need for the LTEMP EIS as stated in the July 6, 2011, NOI (DOI 2011a). Many comments said the language of this statement did not sufficiently reflect the purpose and intent of the GCPA. They noted that the primary purpose of the Glen Canyon Dam should be water delivery to the lower basin, followed by the preservation and recovery of downstream (i.e., the Colorado River corridor through Grand Canyon National Park and Glen Canyon National Recreation Area) natural resources and values; hydropower is secondary and should only be generated after the priority goals were addressed and managed.

In contrast, other comments said that any EIS that addresses the Glen Canyon Dam must address hydropower as a primary purpose, as required by the 1956 Colorado River Storage Project (CRSP) Act, which authorized this federal project. They specifically cited the 1996 ROD, which stated that the existing operational alternative would "balance competing interests and to meet statutory responsibilities for protecting downstream resources and producing hydropower," and Section 1802(b) of the GCPA, which states, "It is imperative that the proposed action clearly be one that preserves the purposes for which Glen Canyon Dam was constructed, while meeting environmental and science objectives to the extent practicable."

3.2 Environmental Issues

Comments and concerns frequently raised by the public in their comments on the LTEMP EIS scope included restoration of the downstream Colorado River Ecosystem; reestablishment of ecosystem patterns and processes to their pre-dam range of natural variability; elimination or minimization of further beach erosion; facilitation of sediment re-deposition; in situ maintenance and preservation of the integrity of cultural and archeological resources; elimination of adverse impact on and assisting the recovery of native species; nonnative fish management; and assistance in repropagation of the native riparian plant communities.

Many comments emphasized the importance of preparing the LTEMP EIS pursuant to and in compliance with relevant acts, policies, and legislation, including the GCPA, the ESA, the Fish and Wildlife Coordination Act (FWCA), the NPS Organic Act of 1916, 2006 NPS Management Policies, the 1978 Redwood Amendment to the NPS General Authorities Act of 1970, and the numerous compacts, federal laws, court decisions, contracts, and regulatory guidelines that address the management and operation of the Colorado River, collectively known

as the Law of the River. In addition, the EIS process should be coordinated with (and not allowed to disturb or contradict) the existing programs currently operating in the Colorado River Basin.

The following text describes the main categories that encompass environmental concerns identified in submitted comments. The text summarizes comments from the public and represents a variety of views and interpretations. There has not been an attempt to correct any of the statements or assertions.

3.2.1 Water Resources

Water Flows. Commenters indicated that steady flows are likely optimal for all sediment-related resources and recovering the overall environment below Glen Canyon Dam because they conserve sediment, minimize damage, and provide warm water (especially near the shoreline). Steady flows would improve the productivity of the aquatic food base at higher trophic levels and create the habitat and opportunity necessary for the reestablishment of native fish populations. One comment noted the need to conduct a true steady-flow experiment to monitor the benefits to native fish over at least a six-month period in the summer, when day length and sunlight angle can stimulate productivity. In addition, it was noted that these flow regimes will not change or affect water allocations among the states.

Some commenters specifically suggested what they considered optimal flow levels. In relation to balancing environmental protection, recreational access, and overall safety, multiple commenters supported a base flow in the 8,000–11,000 cubic feet per second (cfs) range, with appropriately timed moderate fluctuations. Another comment requested consideration of a flow lower than 8,000 cfs for both safety and convenience of private boaters, as opposed to commercial operators. Another comment suggested a steady flow of about 9,000 cfs would be optimal for beach preservation and rebuilding. This commenter specifically noted the importance of differentiating between steady and average flows. For example, an average flow of 9,000 cfs, which results from flows of 5,000 cfs and 13,000 cfs for equal periods of time or a flow of 8,000 cfs for 23 hours and 32,000 cfs for one hour, could have different effects. A steady flow of about 9,000 cfs was seen as meeting a goal of no further damage to beaches and habitat.

A few comments discussed concerns regarding steady flows and the presence of green algae lining the riverbank, particularly at camps and heavy day-use areas. The commenters believe that these spots are the direct result of non-fluctuating flows, combined with human activities (e.g., bathing, urination, dishwater disposal, boat loading, and unloading). Without slight fluctuations of river level, which act to "wash" the beaches, the spots and resulting impacts build up over the course of just a few weeks. Thus, if a steady-flow regime was adopted, the comments requested that there be a study conducted to determine the best way to mitigate this issue.

Commenters suggested the LTEMP EIS should include a detailed analysis of experimentally modifying the releases, or even possibly re-engineering the Glen Canyon Dam, to restore natural water and sediment flows to emulate pre-dam patterns when the appropriate

conditions prevail. This operating regime would also ensure that the basic elements of the ecosystem and natural habitat that existed prior to Glen Canyon Dam's construction could reestablish and ultimately thrive. The seasonally adjusted steady-flow regime is based on the natural rhythms of the pre-dam river. This type of flow regime is also referred to by commenters as natural, pre-dam, or regular high flows. It was asserted by commenters that this flow regime would act to redistribute sediment, under enriched conditions, which could, in turn, stimulate native fish spawning; restore habitats; rebuild beaches; stabilize and protect near-river cultural sites and archeological resources; enhance the recreational experience; and improve other sediment-related resources. It was further stated that initiating seasonally adjusted steady flow immediately would provide the downstream ecosystem with the best baseline from which to work in the near future should delays or suspensions in the EIS process occur.

The seasonally adjusted steady-flow regime calls for a combination of steady flows with precisely timed high flows corresponding to historic high-flow periods. Comments generally suggested that these high-flow releases should be conducted in spring (snow melt/spring run-off), summer (monsoon season), and winter (flood season). Alternatively, flows might involve a gradually increasing flood flow beginning in the late spring, followed by a gradual decrease in this flood flow in the early summer (April to July). It was also proposed that a seasonally adjusted steady-flow regime could possibly consist of steady flows for the summer, followed by a gradual down-ramping over several weeks in the fall, but making note that this should be done only if data exist showing this regime can help restore sediment-related resources. It was further added that there should be the option of no spike flow if there is not enough sediment inflow in a season. Still another comment suggested that flows be altered up or down in approximately 10-day intervals, with no daily fluctuations. A different comment, however, stated that even though these flows seem to have a beneficial impact on the overall ecosystem, high-flow experiments (HFEs) are expensive in terms of water bypassing turbines and the manpower needed to study the impacts. In addition, some commenters advocated minimum flows that are no less than the long-term average base flow of the river, and that parallel the seasons when those historic base flows occurred.

Some comments said that further study should be done on the effects of modified low fluctuating flow (MLFF) (the flow regime selected in the 1996 ROD). Other comments stated that these flows still jeopardize the continued existence of the native fish species (e.g., humpback chub and razorback sucker) and threaten to destroy or adversely modify designated critical habitat. Different comments stated that this operating regime, which resulted in the constraint of hydropower generation levels (e.g., maximum and minimum generation/flow and limits on up and down ramps) in favor of downstream concerns, has not produced the intended results. Specifically noted were statements made by Secretary Norton in her 2002 report to Congress that, "dam operations during the last 10 years under the preferred alternative of the MLFF have not restored fine-sediment resources or native fish populations in Grand Canyon, both of which are resources of significant importance to the program" and that, "This trend leads to questions about whether daily, monthly, or even annual patterns of dam operation alone are relevant to native fish recruitment or whether changes in the sediment and thermal regimes of the river imposed by regulation have had the greatest influence on native fishes."

In addition, comments noted that future study should include evaluation of the effects of releasing water at full power plant capacity on a constant basis, as well as using maximum power plant capacity in a fluctuating release regime beyond that of the MLFF regime.

Water Temperatures. Numerous comments expressed concerns about the water temperature of the Colorado River. It was noted that before Glen Canyon Dam was constructed, the natural flow cycle of the Colorado River included an annual temperature gradient from near freezing in winter months to above 80°F (27°C) in the late summer. After the dam was constructed, the temperature of the river has reached a relatively steady temperature of 45–50°F (7–10°C) as a result of the temperature of the released water, which is drawn from intakes positioned deep in the reservoir pool. Even though the colder released water eventually warms as it moves downstream, the seasonal warming trend has been essentially eliminated. Consequently, the aquatic ecology of the Colorado River has been effectively altered to the point where it is detrimental to the native fish populations. For example, the water temperature does not normally reach the level necessary, at least 60–63°F (15–17°C), to enable native endangered warm water fish (e.g., humpback chub, *Gila cypha*) to reproduce in the mainstem of the Colorado River, thus allowing nonnative species to displace native species.

As a result, some comments requested that Glen Canyon Dam be reconfigured to help restore pre-dam downstream conditions by releasing warmer water to the river. Possible suggestions included the use of a temperature-control device, selective withdrawal system, or multi-level water intake structure, which would allow water to be drawn from the shallower and warmer regions of the reservoir. In addition, it was noted that these strategies could be implemented to more closely simulate the annual temperature cycles of the river in its natural pre-dam state (or, at the least, temperature cycles that would allow endangered and other native species to successfully reproduce), offering more flexibility in the ability to respond to changing ecosystem concerns in the future.

On the other hand, a few commenters believed that the original ecosystem has been altered forever and efforts should not be made to recreate it. Instead, the created cold-water environment, which has reduced levels of particulates, sediment, and organics, should be maintained and its benefits enhanced. For example, the altered environment has allowed for the establishment of economically and recreationally beneficial trout fisheries. In addition, it was noted that increasing the temperature of the river would change the dynamics of the food web and increase the rates of colonization by invasive nonnative species (e.g., New Zealand mudsnail, *Potamopyrgus antipodarum*). Warmer river water temperatures would also allow warmwater species (e.g., striped bass, *Morone saxatilis*; channel catfish, *Ictalurus punctatus*; common carp, *Cyprinus carpio*; and perhaps largemouth bass, *Micropterus salmoides*) to move upstream from Lake Mead and become even more established, resulting in more competition for forage, breeding sites, and direct predation of endangered and native species.

Lake Powell Reservoir Water Levels and Quality. Comments recommended that the EIS evaluate the impacts of the reduced and continually dropping water levels in Lake Powell, due to factors such as drought and over-appropriation. This evaluation should assess the low water levels as the norm, rather than the exception, and the probability of the reservoir pool being completely exhausted during the timeframe of the proposed action. Also taken into

consideration should be the anaerobic bacteria, hydrogen sulfide, and super-saline and metal-rich sediments resulting from the lower water levels, which may find their way through the dam's bypass tubes, and how these factors might be mitigated. In addition, as the elevation of the reservoir continues to drop nearer to the penstocks, new pathogens, parasites, and other invasive or exotic species are more likely to invade the downstream ecosystem in Grand Canyon and complicate the conservation of endangered native species. One commenter requested that Lake Powell not be drained.

One commenter stated that a partially empty Lake Powell is a benefit for long-term dam and sediment management and Grand Canyon resource protection. Another commenter specifically requested that the Lake Powell reservoir should be kept below the 3,650-ft elevation and not be allowed to rise and fall continuously above and below this level. This would reduce the significant water loss due to evaporation and allow the Escalante River and side canyons of Glen Canyon above this water level (e.g., Willow and Davis Gulches, 40 Mile and 50 Mile Gulches, and Cathedral in the Desert) a chance to recover ecologically. In addition, keeping the reservoir at or below 3,650 ft would enhance the natural values of Rainbow Bridge National Monument. Another commenter requested that dam operations maintain water levels between 3,612 ft and 3,700 ft.

3.2.2 Sediment Resources

Loss of Sediment. In general, comments noted that the EIS needs to address sediment below Glen Canyon Dam because most of the resources of concern in Grand Canyon are reliant upon sediment in one way or another. The ongoing loss of sediments and organic nutrients, which is a direct consequence of Glen Canyon Dam operations and the presence of the dam, was of particular concern to commenters. It was noted that this loss had resulted in destruction of important wildlife habitats; reduction in nutrients needed to maintain native fish species (i.e., not allowing young fish to mature to reproductive age); loss of protection for near-river cultural sites and archeological resources; erosion of natural beaches and sandbars; and fewer and smaller areas for recreational users to camp or otherwise congregate.

Comments recommended that the EIS examine options for mechanically introducing additional sediment below the dam, to augment that which is periodically available from tributaries (e.g., Paria River, Little Colorado River, and other side streams), but seemingly below the threshold of effectiveness. Multiple comments suggested dredging the sediment directly from Lake Powell near Glen Canyon Dam and injecting it into the water that is released. A related comment indicated the importance of testing this sediment before it is released to ensure it is not contaminated. Different comments suggested augmenting the sediment supply by mechanically bypassing the dam altogether.

On the other hand, a few comments requested that the EIS address the operational and safety impacts of coarse sediments and increased turbidity in the water flowing through Glen Canyon Dam. One comment specifically noted that sediment augmentation would create muddy waters that would have negative consequences on the algae (e.g., diatoms and *Cladophora*) that serve as a critical part of the food base for fish.

One group of comments specifically stated that the LTEMP EIS should go beyond a focus on mass sediment balance and fish, for this metric is not sufficient to represent the issue. Instead, the EIS needs to focus on whether the sediment adequately benefits, protects, and/or improves the individual resources along the Colorado River. It was further noted that a positive mass sediment balance is not very meaningful if that sediment is not located where it is most needed.

Beaches and Sandbars. The importance of beaches to Grand Canyon ecological resources and the recreational experience was explicitly mentioned in multiple comments. These commenters requested that the remaining beaches be preserved, and that research needs to be conducted on how to best restore and maintain beaches and sandbars over the long term. For example, investigations should be done on the built-up beaches to see if they are truly stable or actually more prone to erosion from rain and wind. Several comments requested that the optimal operational plan for rebuilding and maintaining sandbars (year-round steady flows), identified by Wright et al. (2008) of the U.S. Geological Survey (USGS), be tested in an effort to determine what the best-case scenario is for not only eliminating or minimizing further beach erosion and facilitating redeposition of sediment, but also maintaining the integrity of cultural resources in situ, eliminating adverse impacts on native species, forcing the retreat of encroaching vegetation, and assisting in re-propagation of native riparian plant communities.

In addition, it was requested that the recommendations from the GCMRC for optimizing the results of future HFEs should be incorporated; specifically mentioned was the design of controlled floods for optimal sandbar deposition to be based not only on threshold levels of sand enrichment, but also on reach-averaged bed-sand median grain size.

3.2.3 Aquatic Resources

Overall, commenters recommended that the LTEMP EIS provide the predicted outcome for native species, as well as nonnative and invasive aquatic species, and their habitat.

Native Aquatic Species. The reasons offered for the decline of native fish were cited to include dramatic changes in the thermal, sediment, and hydrologic regimes of the river that are a direct result of the construction and operation of numerous dams (including Glen Canyon Dam) in the basin, introduction of nonnative predatory and competitive fish species, and introduction of diseases and parasites. It was noted that there were originally eight native fish species found only in the Colorado River Basin and that occurred in Grand Canyon National Park. Of these species, three — the Colorado pikeminnow (*Ptychocheilus lucius*), roundtail chub (*Gila robusta*), and bonytail chub (*Gila elegans*) — have been extirpated from Glen and Grand Canyons. Another, the razorback sucker (*Xyrauchen texanus*), is listed as endangered and has not been observed in the Grand Canyon since 1991. The humpback chub is listed as endangered and the flannelmouth sucker (*Catostomus latipinnis*) is a candidate for listing; both species persist in the Grand Canyon. The remaining two, bluehead sucker (*Catostomus discobolus*) and speckled dace (*Rhinichthys osculus*), appear to be doing reasonably well in the Grand Canyon, although much remains to be learned about their ecology and population dynamics.

Commenters asked that the EIS identify specific baseline objectives for sediment and nutrient concentration, temperature gradients, flow characteristics, and nonnative fish suppression that are believed to stimulate recovery of critical habitat for the aforementioned Grand Canyon native fish. It should then evaluate how each alternative will achieve these objectives. Comments specifically noted the need to address the recovery and reestablishment of native fish habitat, the humpback chub population in the Little Colorado River, establishment of a second humpback chub population downstream of Glen Canyon Dam, lack of progress on a management plan to reinstate the razorback sucker, and reintroduction of other native fish stocks that are actively subject to management, population enhancement, and study in the Lower Colorado River Multi-Species Conservation Plan (MSCP). Also mentioned was the wealth of new scientific information that was not available or known when the 1995 EIS was completed.

Continued studies were requested to address to native fish species, notably in the lower River, as to their numbers, condition, spawning habits, and adaptability to the colder water in the mainstem of the Colorado River, versus their normal spawning area in the Little Colorado River that has warmer water. Some comments suggested simply allowing native fish to naturally thrive 10 to 50 miles downriver where warmer conditions prevail.

Commenters specifically requested that the LTEMP EIS focus on improving the inventory, monitoring, and restoration of rare taxa and endangered species. These activities would involve continued inventory, with particular focus on rare and declining species; reintroduction and restoration of missing and declining species; restoration of missing and altered habitats in the Colorado River ecosystem; and restoration of the range of native fish species to the entire flowing portion of the Colorado River ecosystem.

Humpback Chub. Multiple comments specifically discussed the documented decline in and low absolute number of the humpback chub since the last EIS was completed in 1995. Commenters cited a 2005 USGS publication, based on research by the GCMRC, that theorized the downward trend in the humpback chub population may have coincided with initiation of interim operating criteria and ROD flows. However, other comments went on to state that since publication of that USGS report, significant new science and information has been developed indicating that the humpback chub population is actually a persistent and increasing reproducing population in the Grand Canyon, and that the current adult population substantially exceeds the recovery goal.

Overall, and regardless of whether the comments cited a downward or upwards population trend, many commenters stated that the LTEMP EIS needs to conduct a major reassessment of this species. It was stated that this evaluation must include further study with monitoring of production and recruitment trends, including translocation. Analysis of the condition factors responsible for the survival of these fish and health of their critical habitat, as recommended by the U.S. Fish and Wildlife Service (USFWS), should also be conducted. Moreover, factors relevant to habitat, such as feeding habits, water quality, age class, genetics, and migration patterns for all periods of the humpback chub's life span need to be documented. In addition, the LTEMP EIS should determine the population level and changes in biological parameters that would trigger a cessation of handling humpback chub, so as to avoid incidental take of the remaining population.

One commenter explicitly noted that, according to the USFWS's Reasonable and Prudent Alternative (RPA) identified in its Biological Opinion of Glen Canyon Dam operations, if sufficient progress had not been not made to remove humpback chub and razorback sucker jeopardy by 1998, then seasonally adjusted steady flows were to begin at Glen Canyon Dam. In addition, the RPA stated that in low-water (drought) years, dam releases should be regulated using the seasonally adjusted steady-flow alternative.

Many comments suggested that the EIS address the steps necessary for full humpback chub population recovery. Comments requested that the EIS explore increasing the range of the critical habitat designation in the Little Colorado River, to further promote translocation programs for the humpback chub up this tributary. Different comments discussed improvement and management of the food base, especially in the upstream regions of the river below Glen Canyon Dam. Other comments expressed concern over the lack of progress or protocols developed for locating an appropriate site in the mainstem Colorado River below Glen Canyon Dam or in one of Grand Canyon's tributaries for a second population of humpback chub, as mandated by the 1996 ROD. Neither has a management plan for the Little Colorado River been implemented to protect the critical habitat of the humpback chub from pollution, reduction of instream flows, or habitat fragmentation due to unforeseen geologic events such as debris flows or landslides. Additional issues that commenters felt needed to be addressed include the required habitat conditions needed and/or how modifications to the habitat will be implemented to achieve suitable habitat conditions. One commenter suggested relocation of the chub to other rivers where they can thrive.

Commenters stated that the EIS should examine and report on the adverse consequences of water warming and sediment augmentation, specifically, as to how it affects the food base (i.e., algae), potential influx of additional nonnative species (e.g., catfish and bass) from Lake Mead, and proliferation of parasitic invasive species, which could increase the potential of disease for the chub. On the other hand, some comments mentioned that, although the Colorado River itself is now too cold for young humpback chub, it not too cold for adult chub; thus, the cold water released from Glen Canyon Dam has actually saved the Grand Canyon population of humpback chub from the fate endured by the Upper Colorado River populations of humpback chub, which are being consumed and outcompeted by warm-water nonnative fish species.

Trout. Many comments emphasized the fact that the dam has changed the environment and ecology of the river. It is now a cold-water environment to which the native species are not adapted. Numerous comments discussed this fact and its connection to the unresolved relationship between the abundance of trout in the Colorado River and the threat to the humpback chub population.

One group of comments reported that the trout are the primary reason for the humpback chub's decline as a result of competition for forage, competition for spawning sites, and predation of the humpback chub by the trout. Some of these comments directly attribute the HFEs as a reason for the enhanced trout population, because these events result in reductions in humpback chub habitat and food supply, as well as promote the conditions in which trout thrive. In general, this group of commenters believes the EIS should recommend that dam operations

not be modified in any way to intentionally benefit nonnative fish habitat. In addition, comments seemed to agree that the EIS should evaluate any and all reasonable mechanisms for nonnative fish suppression as necessary to improve habitat conditions for native fish. Specifically referred to was the practice of mechanical harvesting (e.g., electrofishing), which is a proven technique that has been successful at controlling nonnative fish below Glen Canyon Dam. Some comments also related to the range covered by these suppression methods, suggesting that all nonnative fish species be removed beginning at the base of the dam all the way down to the mouth of Lake Mead.

A second group of comments noted that this altered and now cold-water environment is perfect for trout (e.g., rainbow trout, *Oncorhynchus mykiss*, and brown trout, *Salmo trutta*); and, short of removing the dam, these commenters believed that this fact will not likely change. Thus, the LTEMP EIS should include research that specifically addresses the beneficial effects of trout to the overall river ecology and Grand Canyon user experience. These comments specified that any management actions or experiments that purposely cause damage to the resident rainbow and brown trout populations should not be undertaken simply on the assumption that there are too many trout downstream of Glen Canyon Dam, or because trout are "not native." Thus, programs for capturing and killing trout should be ceased, particularly above Lees Ferry. Some comments mentioned an alternative solution that would allow for electrofishing to be conducted just below the Lees Ferry fishery (and down about 17 miles to an area near Soap Creek, where Tribal concerns take over). Doing this maintains a management barrier to trout going down river and adversely impacting the chub, but allows the trout to be captured and brought up river to Lees Ferry (e.g., on motorized boats that can navigate the rapid between Lees Ferry and Soap Creek). Others suggested reducing the number of smaller trout (e.g., allowing unlimited fishing of trout smaller than 14 inches), which not only reduce the size of the fish in the Lees Ferry fishery but also migrate downstream into the Grand Canyon where they interfere with the native fish in the lower river. Still others suggested that if the trout must be removed from the river, specifically downstream from Lees Ferry, they should be restocked elsewhere or utilized for human food. Another possible solution that was suggested was the introduction of triploid brown trout, which are reproductively sterile but grow larger and much faster than wild trout, as a supplement to the wild trout in Lees Ferry. This method could also act as way of reducing the excessive spawning that created a large amount of small wild trout.

Some commenters noted that the impact of rainbow trout, specifically on chub, is questionable at best; instead, the main culprit in humpback chub predation is the channel catfish (*Ictalurus punctatus*), followed by the brown trout. This group of commenters does not generally support mechanical removal of the rainbow trout and feel the suppression programs should be reconsidered. It was mentioned that based on current science, there was no guarantee that the native fish would benefit from or even survive regardless of whether or not the trout are killed. Some of these commenters requested that stomach content surveys should be part of any trout removal program, for it is suspected by certain commenters that trout seem to actually feed off the myriad of insects, and not the native fish. In addition, it seemed to some that the practice of removing nonnative trout in one reach of the river, while concurrently protecting and maintaining a healthy population in another reach, is contrary to resource protection within the National Park system. It was also noted in the comments that some of the other suppression

actions, such as returning to peak-power flows in an attempt to reduce rainbow trout spawning success, will likely only accelerate the rate of sediment loss.

One commenter noted the importance of trout as a part of the overall food web, specifically with respect to common mergansers (*Mergus merganser*), bald eagles (*Haliaeetus leucocephalus*), and river otters (*Lontra canadensis*) that feed on trout. Still other comments simply stated that all killing and stocking of nonnative trout below Glen Canyon Dam should cease, citing that this practice is a disrespect of life and waste of taxpayer money and manpower. Another commenter asked that time, effort, and money would be better spent finding a way to restore water flow along the Little Colorado River, rather than trying to manage or eliminate trout in the mainstem Colorado, so that it can behave more like a natural river for the native fish. Still other comments suggested the money wasted on the flows from power generation to protect endangered fish could be spent building a fish hatchery and releasing them into some of the tributaries not threatened by other fish species.

Other Nonnative and Invasive Aquatic Species. Besides the aforementioned trout, bass, and catfish, comments noted a few nonnative invasive species that should be addressed in the LTEMP EIS. This list includes: New Zealand mudsnails, quagga mussels (*Dreissena bugensis*), and the Asian tapeworm (*Bothriocephalus acheilognathi*). These species have shown increases in number and rates of colonization as a result of the temperature changes in the river and changing dynamics of the food web. It was also noted that the Asian tapeworm, in particular, was discovered in the ecosystem after the issuance of the 1996 ROD, and thus, constitutes new information to be addressed in the EIS.

3.2.4 Terrestrial Resources.

Comments on terrestrial resources focused on wildlife and vegetation of riparian habitats along the Colorado River in Grand Canyon National Park.

Birds. Comments requested that the LTEMP EIS provide resource planning information for neotropical migratory bird management, explicitly noting the endangered southwestern willow flycatcher (*Empidonax traillii extimus*). In addition, a focus should be placed on beach restoration that conserves habitats for numerous birds, including migratory species, nesting songbirds, waterfowl, and other wetland species. Finally, a few comments noted the LTEMP EIS should address important food web maintenance needs, such as conservation of species that support nesting peregrine falcon (*Falco peregrinus*) and bald eagles in the project area.

Native Plant Species. The basic comment related to native riparian plant communities was that redeposition of sediment would result in repropagation of these areas. However, some commenters do not feel this result is desirable or beneficial. Some native species, such as arrow weed (*Pluchea sericea*) and coyote willow (*Salix exigua*), have proliferated and dominated some beaches to the extent that they are no longer usable by campers. Thus, some beaches lose more campable area to vegetation encroachment than to sediment erosion.

Nonnative Plant Species. Comments stated that, since 1963, dam operations have encouraged the encroachment of nonnative vegetation, including such tree species as tamarisk (*Tamarix* spp.) and camel thorn (*Alhagi maurorum*), along the shoreline.

Specifically with respect to tamarisk, some comments stated that these nonnative species are invasive, have developed a hold on the river ecosystem, pushed out native vegetation and habitats, and draw much-needed water from the Colorado River. Other comments discussed the tamarisk beetle (*Diorhabda carinulata*) that has recently entered the Grand Canyon; an occurrence that these commenters feel will elicit a watershed-scale change for the river corridor ecosystem in the Grand Canyon. In anticipation of further tamarisk defoliation and death by the these leaf-eating beetles, some commenters felt that the LTEMP EIS should investigate measures that can enhance restoration of native riparian shade trees, which also act as anchors stabilizing the silt and sand substrates on beaches, sandbars, wash fans, or other similar locations along the mainstem of the Colorado River. In addition, research will need to be performed on the tamarisk leaf beetle as it relates to dam releases and future adaptive management efforts.

3.2.5 Tribal and Cultural Resources

Overall, comments requested that the LTEMP EIS focus on improving the inventory, monitoring, and restoration of cultural, historical, and archeological resources. Enhanced sediment supplies and facilitation of transport downstream were specifically mentioned as necessary in order to protect the fragile and nonrenewable archaeological sites along the river corridor.

There were numerous general statements regarding the overall decline and destruction of cultural resources and tribal heritage as a result of Glen Canyon Dam. It was noted that the magnitude and timing of river fluctuations have a significant impact on the cultural record and traditional cultural properties of the 11 associated tribes that live in and around Grand Canyon.

Commenters expressed overall concern about the unique historic and archeological resources and character of the Colorado River. It was noted that, in general, there are fewer of these resources since the 1996 ROD and resulting Glen Canyon Dam operations. Commenters primarily attribute this loss to reduced sediment loads in the river and increased erosion of beaches that expose these resources.

3.2.6 Recreation

Fishing. Multiple comments noted that the Colorado River system and its tributaries provide a home for many endangered, threatened, and sensitive fish species, as well as other native nongame and game fish. Game fish, in particular, have important recreational and economic value to the area.

In general, comments stated strongly that it was essential that a comprehensive fishery management plan, covering the Colorado River between Glen Canyon Dam and Lake Mead, be an integral part of the LTEMP EIS. This plan would include the restoration, recovery, and

maintenance of native fish along with the recovery, sustainability, and enhancement of the fishing in the once blue-ribbon Lees Ferry trout fishery and the Colorado River area through the Grand Canyon (including Bright Angel Creek). Comments noted that the LTEMP should also address the maintenance and management of the associated aquatic food base and threat from invasive nonnative species (e.g., warmwater fish and vegetation). It also should include experimental management actions based on comprehensive, measurable, and defined objectives. It was strongly suggested that there should be a single plan covering the river and its tributaries that is collectively developed by the relevant federal, state, and tribal agencies, along with the participation of affected public organizations and private parties. In addition, the administrative geographic divisions within the area of the plan should be managed by the entities responsible for those divisions as determined by federal, state, and tribal laws, regulations, and treaties.

Comments stated that scientific information and recent studies have allowed for a better understanding of the relationship between dam operations and rainbow trout response. Specifically cited was the Arizona Game and Fish Department (AGFD), which believes that management of Glen Canyon Dam is possible without loss of angling opportunities or detriment to the quality of the fishery (as defined in the fish management plan). Numerous commenters admitted there is a fine balance between maintaining a quality trout fishery in Lees Ferry and protecting or enhancing native fish downstream. Commenters seem to be confident that this balance can be achieved through adequate coordination among resource managers, and LTEMP EIS alternative(s) should be identified that best address this balance.

With respect to the Lees Ferry trout fishery specifically, comments noted that it is located in a clear and cold water section of the river no longer suitable for native fish, but is ideally suited for trout. Comments noted the desire for maintaining larger size fish in Lees Ferry. It was suggested that this could be done by changing the fishing regulations in the Lees Ferry section, to allow unlimited or a possession take of smaller fish (under 14 in.), while maintaining catch-and-release rules for all fish over 14 in. (e.g., by barbless flies). Similarly, other comments suggested allowing outfitter-led rafting trips to include dedicated fishing excursions, with unlimited take-and-keep, through the Grand Canyon below the Lees Ferry reach. These would likely help remove the smaller fish that are detrimental to the native species, thereby benefiting both the fishery and the native fish. Alternatively, the management plan could include information for different methods of controlling trout numbers by reducing reproduction and/or survival of young-of-the-year and juveniles.

Numerous commenters voiced strong concerns over the fact that trout are being removed and killed, and requested this practice be stopped. Commenters noted that one of the primary reasons people come to the Glen Canyon area of the Colorado River is to fish in trophy trout waters. They believe that the practice of mechanical trout removal is not supported by science and results only in a serious loss to the state of time, money, revenue, and effort. Section 3.2.3, Aquatic Resources, discusses the humpback chub–trout issue in more detail.

Finally, some commenters noted that the high and inconsistent daily water flows has made the walk-in area unfishable and sometimes, dangerous. Thus, fishing enthusiasts request consideration of a more consistent river flow (i.e., between 9,000–16,000 cfs to improve the quality and experience of fishing in this area.

Boating and Rafting. Comments stated that rafting and boating on the Colorado River through Grand Canyon is a unique and special experience that should not be diminished. The LTEMP EIS should consider flows that preserve this natural experience.

Comments also identified Lake Powell as a vital boating recreation area. The lowered water levels diminish the users' experience, thus reducing visitation rates to the detriment of the local economy. However, another commenter asked that the LTEMP EIS address the water quality of Lake Powell and consider monitoring the recreational use on the lake, including boaters and shoreline activity. The comment noted significant amounts of sewage and refuse along the shoreline. Education and attention must be paid to this area to preserve the water in the river.

Also mentioned was the Castle Rock Cut, which allows the NPS, concessionaires, and recreational boaters departing from Wahweap Bay (location of the lake's largest marina) access to the greater Lake Powell at a reduced boat travel distance of more than 10 miles. Minimum safe water elevation for passage through the Castle Rock Cut is 3,612 ft. When lake levels are allowed to recede below this elevation, considerable additional costs are incurred by all boaters who need to find an alternate route. The associated costs include fuel expenses, equipment maintenance, and time; travel by alternate routes also results in significant increases in water and air pollution, greater facilities and equipment maintenance costs, and increased emergency response times.

Camping. Comments stated that it was imperative that beach habitat be protected and maintained to preserve the river ecosystem; provide a landscape that is restored to natural pre-dam conditions as closely as possible; and ensure the presence of numerous campable sandbars throughout the river corridor. It was also stated that the erosion of natural sandbars and camping beaches has progressed under all previous Glen Canyon Dam flow regimes. This erosion is a major concern, because as beaches recede and disappear, camping options for river-runners and hikers (who reach the river and decide to camp) are reduced. This, in turn, exacerbates crowding and congestion and negatively affects the quality of the recreational wilderness experience. In addition, comments noted that the availability and carrying capacity of the beaches in the river corridor are directly related to the number of launches (both private and commercial), so this also needs to be taken into consideration.

Thus, comments requested that the LTEMP EIS assess water levels and flows in a way that balances the needs of both river and shoreline users. That is, the proposed flows and flow experiments should be designed to ensure a year-round navigable river, as well as to build up sediment and ensure a sufficient number, size, and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

Comments mentioned the fact that camping space was being lost due to plant growth in the riparian zone. It was stated that some beaches lose more campable area to vegetation encroachment than to sediment erosion. Building sandbars could force the retreat of encroaching vegetation. In addition, comments raised concern over the impacts of reduced campable area on

sensitive resources in the Old High Water Zone and the capacity of the ecosystem to absorb visitor impacts.

Safety and Navigability. Comments requested that more and improved information be reported regarding river corridor visitation, visitor safety, and accidents (including types and frequency). Commenters also felt that water quality and disease issues are poorly understood and underreported.

In general, comments stated that the wide range of water releases, which result in high and inconsistent daily water flows, can make both wade fishing and boat fishing very challenging, and oftentimes, dangerous or impossible. Fishing enthusiasts request consideration of a more consistent river flow (i.e., between 9,000–16,000 cfs) to improve the quality and experience of fishing in this area. Some boaters and rafters indicated that they consider a minimum flow of no less than 8,000 cfs necessary to ensure navigability and safety. Thus, any and all flow regimes should acknowledge the potential for adverse operational and boating safety implications.

To the extent practicable, comments also requested that the release regime structure be known in advance. This would allow recreational users to discern that a rise in the river could occur within a certain number of hours after a major sediment increase becomes evident. This would also enable users to take precautions against a rapid rise in water level. The LTEMP EIS should also address the operational and safety impacts of coarse sediments flowing through Glen Canyon Dam, specifically during low reservoir levels.

Wilderness Values. Commenters stated that the Grand Canyon and its neighboring canyons on the Colorado River are some of the most majestic places on earth. Park areas that were specifically noted: Grand Canyon National Park, Glen Canyon National Recreation Area, and Marble Canyon. The fundamental purpose of all parks is to provide for the enjoyment and preservation of park resources and values, including visitor use. The wilderness experiences and benefits specifically noted by commenters 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. Thus, the LTEMP EIS needs to clearly define the resources and values of the Colorado River Basin, assess the impacts of different alternatives against them, and propose ways to protect and preserve this environment as much as possible.

3.2.7 Climate Change

The Colorado River watershed is likely to become warmer and drier in coming years, which will have a wide range of effects. Thus, commenters stated that potential climate change impacts should be integrated into all aspects of the LTEMP EIS, including, but not limited to, water resources, wildlife habitats and communities, recreational use, and cultural sites. Also included should be a basin-wide discussion on how to address these impacts through water management adaptation and mitigation. It was suggested that the DOI partner with National Oceanic and Atmospheric Administration (NOAA) to ensure the most up-to-date climate modeling is applied in evaluating each alternative's flexibility in relation to climate variability.

Comments noted that particular attention should be given to evaluating alternatives against scenarios in which Lake Powell reservoir has not only dropped to dead pool and the dead pool filled with sediment, but remains at dead pool over multiple years.

Comments cited Reclamation's recent publications (DOI 2011c; Reclamation 2011) that project climate change impacts in the Colorado River basin and suggest that in the quest to develop a long-term plan for Glen Canyon releases, it would be prudent for the agencies to consider the extremes of hydrologic variability. Extreme and long-term droughts may significantly change Colorado River flows by midcentury, and commenters urge the agencies to anticipate these circumstances in their plans. Thus, the EIS should proactively address the potential for drought, similar to that experienced in the past several years (prior to 2011), while also taking into consideration forecasted water needs and sources. For example, plans exist to draw water from the system at or above Flaming Gorge and/or the White River for diversion to the East Slope of Colorado. One commenter felt it noteworthy to add 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 addition, commenters noted that the LTEMP EIS should heed the two Secretarial Orders that address climate change in federal planning and to also utilize rigorous science (Secretarial Order 3289, *Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources*, and Secretarial Order 3305, *Ensuring Scientific Integrity within the Department of the Interior*).

3.2.8 Air Quality

Comments were received regarding concern over the air quality impacts associated with adjustments to hydropower operations. Comments requested that the LTEMP EIS quantify the impacts from any changes in hydroelectric output, including impacts from replacement power resources. Depending on the source of this replacement energy, it could have negative impacts with respect to increased level of nitrous oxides, sulfur oxides, and greenhouse gas emissions.

3.2.9 Socioeconomics

Colorado River resource stakeholders would likely be affected in different ways and to different degrees by various Glen Canyon Dam management decisions. Commenters generally asked if the LTEMP EIS will look to the affected stakeholders to measure or determine economic feasibility. If this was not to be the case, commenters inquired about how the federal government plans to determine economic feasibility on behalf of nonfederal stakeholders, and if the costs of federal impact mitigation would be considered within determinations of economic feasibility.

Recreational Economics. Commenters asked that the LTEMP EIS take a hard look at the socioeconomic impacts of dam operations on recreational resources, such as fishing, boating, rafting, camping, and other tourism. A full valuation of the socioeconomic impacts on recreational resources affected by dam operations is an essential part of the EIS process, when

the economic implications of alternatives are examined. Commenters noted that, particularly in a time when our economy is doing poorly, the recreational assets of this area should be protected and improved. Self-sustaining recreational activities utilizing these assets, such as the blue-ribbon trout fishery, have a considerable positive impact on the economic viability and livelihood of the local communities. These benefits include: support and patronage for local businesses (e.g., restaurants, sporting equipment stores, lodging, etc.); income and employment for the local area population, including many Native Americans who make up a substantial part of the work force; and even revenue for the state (i.e., license fees). Thus, if there were not the potential for award-winning fishing or exceptional Grand Canyon River-running opportunities, there would be little to support the local economy and the area would suffer financially.

In addition, a few commenters requested that economic values be assigned to sediment in the system. In other words, beaches, camping space, cultural resources protection, archaeological site cover, and species habitat would be included in a cost-benefit study. Replacement cost or offset value of these resources (e.g., beaches) for recreationists could be determined.

Non-Use Values. Comments recommended that the LTEMP EIS provide a thorough non-use value analysis. Non-use values should be incorporated by managers into decision making. One commenter stated that non-use values as measured by contingent valuation analysis, if considered at all, must have the lowest priority afforded to those assessments by the decision-maker. This commenter stated that they believed contingent valuation is a deeply flawed methodology for measuring non-use values, one that does not estimate what its proponents claim to be estimating. Thus, this commenter felt that current contingent valuation methods should not be used in assessment of non-use values or benefit–cost analysis.

Tribal Socioeconomics. Comments noted that since 2004, 57 tribal entities began receiving the benefit of the CRSP resource through long-term firm contracts with the Western Area Power Administration (Western). Many of these tribal communities are in some of the most economically stressed areas of the country. The LTEMP EIS should evaluate the impacts on these communities as well as other CRSP firm electric service customers from operational changes or alternatives that may seek to further restrict Glen Canyon Dam hydropower generation. In addition, mitigation measures should be recommended and evaluated.

3.3 Dam Operations and Hydropower

3.3.1 Dam Operations

Comments generally stated that the current operating plan for Glen Canyon Dam is inadequate — studies and experiments have 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. The dam must be operated in a manner that is not detrimental to natural, cultural, or recreational resources in the river corridor, but still satisfies power demands from Glen Canyon Dam. One commenter stated that the LTEMP EIS must also address Glen Canyon Dam's operations and impacts in the full spectrum of its lifespan. Intelligent and informed dam operations and flow management can help moderate those impacts. One commenter mentioned a

pivotal part of the LTEMP EIS would be defining a mutually acceptable approach to studying, assessing, and managing a balance among resources and reducing uncertainties surrounding impacts of dam operations. Dam operations must be carefully considered in the context of an ecosystem approach and the respective tradeoffs they may elicit.

Commenters stated that water conservation and efficiency should be taken into account as a part of dam operations, especially considering how operations can change in light of the declining water volume in the Colorado River due to drought, seepage, evaporation, and increased demand and usage. One commenter stated that all reasonably supported hydrologic and catastrophic scenarios over a century time-window should be explored in conjunction with evaluating alternatives. Similarly, the adequacy and capability of dam operation under the event of probable maximum floods, the opposite extreme to a severe and sustained drought, should be evaluated. Multiple commenters stated that the LTEMP EIS should study and evaluate the full use of power resources at Glen Canyon Dam, as was required during the summer of 2010. Commenters added that it is also important for future operational plans to permit adaptation as new scientific findings emerge and as other variables in the system change materially. One comment urged an assessment of senior-perfected water rights and an evaluation of current water use to avert major basin-wide complications.

Comments stated that the LTEMP EIS needs to provide a better integration with the one- and five-year operating plans that were required to be developed according to guidelines published in the Glen Canyon Operating Criteria (DOI 1997). It was also stated in many comments that the LTEMP EIS should result in a long-term (greater than 15 years) operations change, and not just short-term experiments. In addition, comments called for dam operations to achieve compliance with numerous federal environmental and resource management laws and statutes associated with Glen Canyon Dam operations, including the GCPA. Other comments asked that the integrity and standard operating procedures of Glen Canyon Dam, as they were originally planned and executed upon completion of the dam, be maintained and preserved.

Comments discussed how historically, flood control storage had not been a high priority for managers of the Colorado River system, requiring just 5.35 million acre feet annually to be available system-wide at the beginning of each year. It was this low requirement that led to a problem at Glen Canyon Dam in 1983, when high spring runoff was released over the spillway. A faulty design in the spillway caused hydraulic pressure to excavate bedrock. Dam managers were forced to abandon the spillway's full use, and overtopping was narrowly avoided when inflows subsided. Reclamation forecasted that if Glen Canyon Dam had failed when full, it would have had a catastrophic effect on communities downstream, overtopping and perhaps overcoming the Hoover Dam.

Comments indicated that the LTEMP EIS needs to include a full assessment of the impacts, emphasized as severe and adverse, of equalization water releases as established in the *Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead EIS* (Reclamation 2007) on the downstream resources in the Grand Canyon and the entire Colorado River system. Comments specified the desire for proactive, rather than the current reactive, management of the dam, which would anticipate the future need for equalization flows, predict changes in average yearly releases, and account for the possibility

of planned release events, such that the goals of both the LTEMP and GCDAMP are achieved. They also requested that these plans not confound the results of regular HFE events. In addition, this analysis should ensure that any equalization flows be implemented in a way that is consistent with the mandates of the GCPA, the ESA, and other laws and regulations. Larger flows can and should be released over a two- or three-year period instead of a single year as currently planned. This longer term of releases would still satisfy the criteria for moving water from Lake Powell to Lake Mead, but would do it in a manner that better protects Grand Canyon's resources. Commenters specifically mentioned the adverse effects of high equalization releases observed in 2011 on sediment resources.

3.3.2 Hydropower Production

Comments recognized that hydropower provides a clean, low-cost source of energy that can be relied upon for long-term, stable production of domestic energy. Comments recommended that the LTEMP EIS provide the predicted outcome for hydropower (e.g., capacity, generation, and revenue) and assess the costs and benefits from management policies and dam operations to water and power users and to natural, recreational, and cultural resources. In addition, a comment specified that the LTEMP EIS analysis should take into consideration impacts on the hydropower resource since operations changed in 1991 due to interim flows. However, it was also stated that the LTEMP EIS should not have a bias toward hydropower, which would be in violation of the mandate of the GCPA.

On one hand, some comments indicated that the Glen Canyon Dam generation capacity is currently constrained by maximum and minimum flow and ramp rate releases; thus, flexibility and resource diversity is reduced. Reduced generation capability also requires that other, less environmentally desirable resources be used as sources of energy, to replace the hydropower resource that is unavailable. Thus, the dam should be operated in such a manner as to provide for the best production of electricity. Other comments state that Glen Canyon Dam should stop altering its flows to accommodate the power demand, especially for the large cities in the area. These commenters think that protecting the resources of one of our best National Parks should be a top priority. Another comment suggested determining the cost to consumers of hydropower production at steady flows and then developing and conducting a survey to assess the willingness of those consumers to pay more for their electric power in order to preserve Grand Canyon.

Comments noted that large and frequent fluctuating flows designed to maximize hydropower erode sediment, adversely affect the canyon ecosystem, diminish beaches, and expose centuries-old cultural and archeological sites along the Colorado River. Some comments acknowledged that some moderate fluctuation of river levels is acceptable, but should be adapted to climate conditions, such as drought or high precipitation and storage levels in the reservoirs. Moreover, it was mentioned that daytime flows should be kept at a level that allows wading and fishing on beaches and sandbars upstream from Lees Ferry, but not so low that they negatively affect the aquatic food base available to both native and nonnative fish.

In general, it was noted that the magnitude and timing of river fluctuations will have a significant impact on the ecology, cultural and archeological resources, and recreational value along the river corridor. Comments requested that these factors be considered in determining

flow. In addition, comments requested that, to the extent practicable, the release regime should be known in advance and public input considered.

In contrast, one commenter mentioned that aquatic plants, such as *Cladophora* and diatoms, are actually evolved to benefit from daily fluctuating flows, and indeed, do worse under steadier flows. Thus, some modest relaxations of restrictions on daily flow fluctuations could be good for the ecosystem and should be considered.

Comments discussed the fact that steady flows do not change the amount of hydropower production at Glen Canyon Dam; however, they may reduce power revenues by shifting production away from higher-revenue peaking power rates. Thus, it was suggested that the LTEMP EIS explore means of replacing this peaking power and its revenue stream, particularly with another sustainable sources such as utility-scale photovoltaic facilities. Alternately, if water customers are encouraged to further reduce consumption, there would be more flexibility in release schedules, and consequently, reduced demand and downstream impacts.

Comments identified that the overall goal of the LTEMP EIS needs to be the design of a downstream mitigation plan that addresses the resources downstream of Glen Canyon Dam, while still maintaining the dam's capabilities as a hydropower facility. If studies are conducted with this goal of maximizing all resources, the result will be hydropower coexisting with endangered fish recovery, habitat protection, and recreational resource enrichment.

One commenter requested that resources from the dam's operations should be used to specifically mitigate the loss of river and canyon resources. The mitigation measures suggested may include creating access points for ingress and egress to the Green, San Juan, and other rivers in the area, which would be used to provide offsite river use opportunities in the surrounding rivers.

3.4 Geographic and Temporal Scope of the LTEMP EIS

Many comments supported limiting the scope of the LTEMP EIS to the Glen and Grand Canyon areas. It was noted that extending the geographic scope beyond this area raises significant additional issues that may not be directly associated with the operation of Glen Canyon Dam, and may affect the operation of Hoover Dam. In addition, the water and fish species in Lake Mead are already subject to a federally approved and active conservation plan, the MSCP. Thus, one commenter stated that to include Lake Mead National Recreation Area within the scope of the LTEMP EIS would be beyond the scope of the GCPA and applicable law, and duplicative of an existing conservation program.

One commenter explicitly asked that upstream effects of the Glen Canyon Dam also be considered, including the effects of lower reservoir elevations on the ability to enter the lake from tributaries.

Other commenters recommended the geographic scope of the LTEMP EIS include the entire Colorado and Green rivers system, both upstream to Cataract Canyon and downstream to

include Grand Canyon, Lake Mead, and Hoover Dam. These comments consider this area to be a single ecosystem, whose components are inextricably linked and must be managed in concert. Failing to include Lake Powell and its major tributaries, particularly Cataract Canyon, would translate into less attention being paid to the sources of water and nutrients, as well as important scientific controls for understanding and predicting changes in Grand Canyon, such as anoxic waters, systemwide nutrient flux, food-base delivery, invasive species (e.g., quagga mussel) threats, recreation use (boating, fishing, etc.), and economics.

Other comments indicated that the Glen Canyon Dam was the "linchpin" of the Colorado River; thus, the geographic area covered in the LTEMP EIS should include the entire basin. In addition, the entire Colorado River system can be considered an integrated "ecoregion," so it is important to consider and include impacts throughout the system in planning for the future of Glen Canyon Dam.

A common theme among the comments was that Grand Canyon National Park is a national treasure and a natural resource to be held in trust for the world's generations to come. Some comments addressed the proposed 10- to 15-year management plan as being too narrowly drawn, pointing out that the current drought could last at least another decade; a 100-or-more-year plan would not be inappropriate, allowing for a broader look at such influencing factors as climate change, aridity, and catastrophic, maximum flood events. A comment addressed the finite lifespan of Glen Canyon Dam and the need to develop a plan for when it might no longer be able to provide uninterrupted water delivery.

3.5 Policy and Regulatory Concerns

Comments urged the use of scientifically justifiable and credible management decisions, without the influence of special interest groups; there is previous and ongoing scientific research from other dams; the GCMRC, NPS, Reclamation, and other research organizations; and individuals that can be used to inform decisions on Glen Canyon Dam and monitor progress toward goals. Comments also requested the testing of hypotheses with robust scientific experiments.

Comments stated that a successful approach to the LTEMP EIS includes: (1) taking a comprehensive look at the challenges and opportunities facing the region, including documenting the affected environment; (2) exploring the full range of potential solutions and their environmental impacts; (3) fully considering public issues and concerns; and (4) choosing a preferred alternative that will restore the environmental, recreational, and cultural resources of the Colorado River Basin. Also, operational implementation of recommendations should be practical. The LTEMP EIS would be a living document, responding actively to new information.

Comments strongly suggested that all alternatives must comply with the numerous laws, regulations, mandates, the Law of the River, and policies that affect the operation and management of Glen Canyon Dam, Grand Canyon National Park, and Glen Canyon National Recreation Area; the ecology and wildlife of the area (considering, in particular, endangered species, habitats, and the ESA); and the tribal, cultural, environmental, and recreational downstream resources of the Colorado River ecosystem.

3.5.1 NEPA Compliance

Comments were concerned with the timeframe for providing scoping statements, requesting an extension of 45 to 90 days to allow interested parties additional time to respond, citing the complexity of the issues and the insufficient time to research the available materials.[1] Another factor in the request for an extension was the number of holidays in the response period, overlapping both the Thanksgiving and winter holidays. A comment also addressed the need to complete the LTEMP EIS and to issue the ROD. Given the scope, duration, and importance of the LTEMP EIS, there should be sufficient time given for stakeholders to review the relevant development documents and implementation plans.

One comment addressed other ongoing federal activities that could inform or even replace the LTEMP EIS, such as the HFE Environmental Assessment and the Non-Native Fish Control Environmental Assessment; this comment also suggested that the GCDAMP should be able to make management decisions concerning Glen Canyon Dam. A comment said that GCMRC's work in restoring riparian ecology and meeting the NEPA's conditions should be given priority in management decisions.

3.5.2 GCPA Compliance

Comments discussed the National Park Service Organic Act of 1916 and its requirement that national parks remain unimpaired for the enjoyment of future generations, and that the LTEMP EIS should have, as its first priority, the restoration, protection, and improvement of Grand Canyon; any other considerations are secondary. Comments noted that the NPS manages Grand Canyon National Park to conserve its scenery, wildlife, and cultural and historic resources, and the LTEMP EIS should benefit the park and its resources. Comments expressed the goal that no further harm should be done to the Grand Canyon ecosystem.

Many comments urged compliance with the GCPA and quoted it with regard to the operation of the Glen Canyon Dam, that it should be operated "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." Some comments addressed protecting and fostering native vegetation and native fish; the elimination of non-native fish; beaches and sediments; and the health of the river ecology as consequential outgrowths of GCPA compliance. This raised the question of funding the restoration of flora and fauna and whether this should be the responsibility of the GCDAMP.

Comments stated concern that the dam is operating today essentially as it was prior to the passage of the GCPA and that fish recovery goals have not been met. A portion of a 2002 Report to Congress by Former Secretary Norton was quoted in a comment: "The first population estimate of humpback chub in the Grand Canyon suggests that in 1982 there were 7,000 to 8,000

[1] The comment period subsequently was extended from December 31, 2011, to January 31, 2012.

humpback chub larger than 200 mm. Approximately ten years later, in 1992, it was estimated that there were approximately 4,000 to 5,000 humpback chub larger than 150 mm. In 2001, there were approximately 2,000 to 3,000 humpback chub larger than 150 mm. While there is some question over the accuracy of the absolute numbers, there is little question that the population of humpback chub in the Grand Canyon has declined over time. The decline in the abundance of fish larger than 150 mm appears to be the result of a sustained decline in recruitment beginning in 1992."

Comments addressed the deterioration of downstream resources even after the passage of the GCPA. Other comments stated that the obligation placed on the operation of Glen Canyon Dam was to cause the least possible damage to these downstream resources. Comments said that restoration of the pre-dam shoreline should be a paramount management goal.

Other comments urged compliance with the intent of the GCPA, interpreted in those comments as hydropower's taking a secondary role to the tribal, natural, cultural, and recreational environment of Grand Canyon. Comments mentioned that the underlying purpose of Glen Canyon Dam, authorized by the Colorado River Storage Project Act of 1956, was to regulate the flow of the Colorado River for water and supply, with hydropower listed as an incident to these purposes. Comments also stated that there has been a longstanding debate as to where hydroelectric power generation falls in relation to the environmental and societal objectives of the GCPA.

On the other hand, comments said that power production is a primary purpose of the Glen Canyon Dam and that it must be balanced with other purposes, water delivery and allocation obligations, exportation, statutory requirements, and economic development in the area. One comment pointed out that the Secretary of the Interior is limited in his ability to change elements of the dam's operations by the priorities the GCPA places on water storage, allocation, delivery, and the required compliance with the Law of the River; annual and monthly releases are constrained by water supply considerations, water delivery requirements, and the avoidance of anticipated spills. Some comments suggested that the Colorado River Compact be revisited to reflect the current limitations of the river and changing societal demands.

3.5.3 ESA Compliance

Comments noted that four of Grand Canyon's eight native fish species have become extirpated from the Grand Canyon since Glen Canyon Dam began operating, that a fifth is heading toward extirpation, and that a sixth is considered a species of special concern. Native birds, mammals, reptiles, and amphibians have also been affected. Comments said that in a report to Congress, the Secretary stated that recovery goals to bring the dam into compliance with the ESA had not yet been met.

A comment discussed the development of a recovery maintenance program for the humpback chub, an endangered species, which would parallel the LTEMP EIS process. One comment said that the elements contained in the GCDAMP's Humpback Chub Comprehensive Report should be used as a starting point for discussions regarding a Recovery Implementation Program to include the Adaptive Management Working Group (AMWG) and collaboration with

the Upper Colorado and San Juan Endangered Fish Recovery Implementation Plan and the Lower Colorado River MSCP to avoid duplication of effort.

3.6 LTEMP Approach and Considerations

3.6.1 Adaptive Management

Many comments noted that the overall LTEMP should take an adaptive management approach, which is based on continually adapting practices based on ever-changing information, and operated in concert with the rest of the Colorado River Basin. The aim of this approach should be to preserve, protect, and improve the natural, cultural, and visitor-use values of the Grand Canyon National Park and Glen Canyon National Recreation Area, which has been drastically altered by the presence and operation of Glen Canyon Dam. One group of comments specifically stated that the LTEMP EIS must mandate the completion and implementation of a conceptual ecosystem modeling plan. The same group called for a management plan that explicitly addresses the protection of humpback chub against toxic contamination or chemical spills. In contrast, one commenter voiced the opinion that humans should not attempt to "manage" the environment or its resources.

3.6.2 Ecosystem Management

Some commenters wanted the LTEMP to take an ecosystem management approach, as mandated by agency policies, management plans, and strategic plans. This approach is appropriate for protecting archaeological resources because the priority is to protect them in place. An ecosystem management approach would link several models together, such as a flow–sediment model; a nutrient dynamics model for carbon, nitrogen, and phosphate; a water-quality model (including temperature, inorganic constituents, and microbes); an aquatic food-base model; a coupled river continuum and landscape-based river corridor habitat model; a wetland and riparian vegetation development model; population models of trophically significant biota; a trophic-relations model; a human goods-and-services model (including cultural concerns, hydroelectric and recreational economics, and non-use values); and an administrative model that tracks stewardship goals, objectives, projects, and costs in relation to the overall ecosystem model.

3.6.3 Experimentation

The majority of commenters stated that scientific studies and monitoring of conditions in the river corridor, particularly with regard to sediment and river flows (e.g., range and variability), should continue until more data are compiled to adequately analyze the impacts of different flow regimes on the resources analyzed in the EIS. In other words, the experiments should be given adequate time to be properly tested and adjusted. In addition, the LTEMP EIS needs to clearly distinguish between what is considered proposed experimental versus management actions related to Glen Canyon Dam operations.

Some commenters strongly suggested the experimental flows be determined by the information derived from and the needs of science and be based on comprehensive, measurable, and defined objectives, with a specific focus on preserving, protecting, and restoring the resources of Grand Canyon. The process for developing management and experimental programs under the LTEMP EIS should also be considered. It should be sufficiently flexible to assure quality and non-biased reporting and avoid rushing to completion. In addition, comments noted that evaluations should be based on how well the flows mimic the natural hydrograph (which is also noted as the principle behind the recommendations from the USFWS in its 1994 Biological Opinion) and consider endangered species, cultural interests, and commercial/private viability. Conversely, one comment stated that the experimental flows, in general, have produced little solid scientific information and have not only wasted a lot of generation power and water, but also destroyed a blue-ribbon trout fishery.

Some commenters voiced concern that there are currently no control sites for the experiments; thus, the EIS should consider establishing such controls as a top priority in further experimentation. One comment suggested including Cataract Canyon as a scientific control study area. In addition, scientific knowledge, data, lessons learned, and other relevant information from other regulated rivers (e.g., the Green River below Flaming Gorge Dam) should be used in the LTEMP EIS process.

Multiple comments supported the continuation of HFEs. They specifically remarked that HFEs should be carried out in a way that helps determine if the sediment would be moved up to a high-enough elevation to be of assistance in protecting and recovering the shoreline environment below the Glen Canyon Dam, as opposed to simply rearranging or changing the shape of the shoreline and beaches. One commenter asked that computer modeling of power plant capacity HFEs be performed to see if sand would be moved up to a high-enough elevation for beach/ecosystem/dune benefits, and, if this modeling showed a benefit, Reclamation should conduct power plant capacity HFEs. Another commenter specifically requested that trout response be monitored and accounted for in the experimental design. In contrast, other comments indicated that HFEs have failed to produce any long-term discernible benefit to the beaches and sandbars, since any deposition created by these artificial floods largely disappears within six months.

With respect to timing of these events, comments in support of these experiments mentioned that HFEs should be done on a regular basis when sufficient sediment is in the river system and the Lake Powell water supply permits. One comment indicated the belief that the more frequent the high flows, the greater the benefit, because finer sediments that are important in binding together high-flow deposits (making them more persistent) wash through the system quickly. Other comments suggested that HFEs should be conducted in a pattern that would closely mimic pre-dam river behavior/flows (which is basically the same as the seasonally adjusted steady-flow regime described below). Another commenter requested that HFEs not occur in the fall, as they scour the algae and other plant life, which are a critical part of the food base for fish, from the bottom of the river at the time of year when the sun is not reaching the bottom of the canyon (as it does in spring) and there is little opportunity for recovery.

Comments indicated the magnitude of HFEs should be increased, when the Lake Powell water supply permits, because current HFEs are not sufficiently large. Experimental high flows are needed to better understand the effect of flows of about 60,000 cfs for the development and refinement of sediment, geomorphological, and vegetation models, and for ecosystem stewardship. Such flows are still far lower than those that occurred nearly every year in pre-dam times. Direct observations, by the Grand Canyon Wildlands Council, Inc., of high flows of those magnitudes in the early 1980s suggested thresholds in riparian vegetation scouring, sandbar rejuvenation, ponding of tributary mouths, mobilization of debris boulders, and many other factors; thresholds that have yet to be recognized by the existing HFE program. Multiple comments requested the testing of experimental flows at least above the 41,000-to-45,000 cfs range, if hydrologic events/conditions allow.

In addition, several comments specifically mentioned that efforts to restore sediment to the river system should not be limited to "experiments," but need to be a part of the dam management plan. Other comments requested that a protocol be established for expedited approval of higher-volume dam releases when the Paria, Little Colorado, or other major sediment sources are injecting large amounts of sediment into the main river. Increased flows during these times would take maximum advantage of natural sediment augmentation opportunities and be more effective at moving sediment than simply trying to get high flows to pick sand up off the river bottom. Finally, one comment requested that the LTEMP EIS include a proactive plan to occasionally get the lake level to spillway elevation, so that short-duration HFEs that utilize some spillway water can be made.

Commenters felt that it was important for the LTEMP to establish and implement long-term monitoring programs and activities, including any necessary research and studies on conditions in the river corridor, to track the progress and determine the effect of actions on the natural, recreational, and cultural resources. This will also ensure the dam is operated in a manner consistent with relevant acts, policies, and legislation.

3.6.4 Baseline Conditions

Comments requested that the current state of management and all proposed management actions be evaluated against the baseline of the pre-dam state of the Colorado River. This is the only way to evaluate the complete impact of MLFF, since comparing other alternatives to MLFF would not provide a complete assessment. Some comments are strongly opposed to MLFF, pointing out that this regime has hurt the downstream riparian environment, threatened the existence of cultural sites and native fish species, and failed to achieve the goals of the GCPA.

3.6.5 Desired Future Conditions

Commenters indicated that the LTEMP and EIS should clearly state the desired future conditions (DFCs) for all river-related factors under consideration, and utilize those DFCs for evaluation of alternatives. DFCs, framed qualitatively and quantitatively, should consider water flow; hydroelectric generation; water and air quality; climate change impacts; sediment; vegetation; noxious weeds; terrestrial and aquatic wildlife; birds; missing, declining, and

endangered species (including a timeline for restoration); cultural resources; recreation; Indian Trust assets; societal processes; Native American concerns; environmental justice; and the National Wild and Scenic Rivers System.

Comments recognized that the DFCs need to be consistent with the letter and intent of the GCPA and other laws, regulations, and plans, such as the NPS Organic Act, NPS management policies, and the General Management Plans for Grand Canyon National Park and Glen Canyon National Recreation Area. This will require balancing the differing goals and competing interests.

According to the comments, DOI, in conjunction with the GCDAMP, is developing qualitative DFCs for key downstream resources to guide recommendations for the operation of Glen Canyon Dam; the final recommendations and goals might be adopted by DOI and could provide a useful framework for developing the LTEMP EIS. Some commenters wanted the DFCs to be adaptable to material changes, unacceptable impacts, new knowledge, new scientific findings, and whether a DFC is achievable.

3.7 Alternatives

It was noted that a clear delineation between what is considered management versus experimentation must be determined prior to beginning the LTEMP EIS and incorporated into the alternatives. Comments expressed some general concerns regarding alternatives. Various comments pointed out that alternatives must be consistent with the many laws, regulations, and policies that govern water delivery, quality, and releases; natural and cultural downstream resource preservation; recreational use at Grand Canyon National Park and Glen Canyon National Recreation Area; protecting endangered species; environmental considerations; and hydropower generation. Comments recognized that there may be competing goals among the laws and regulations, policy conflicts in need of resolution, and management responsibilities that must be prioritized.

Alternatives must also consider climate change. Many comments also said that alternatives should look at the entire Colorado River ecosystem to consider such matters as flora; fauna; sediment conservation; habitat restoration that would conserve migratory and nesting songbirds, waterfowl, and other wetland species; beaches and sandbars; climate change; reduced inflow; cultural sites; boating safety; river navigability; recreation; and water delivery obligations in developing LTEMP alternatives.

Selected alternatives must be economically feasible and should include thorough and rigorous socioeconomic analysis to enable managers to understand the value of system components. For example, in evaluating sediment removal, decision makers should know the estimated cost of analyzing, permitting, building, and operating a sediment replacement system under various flow regimes and be able to compare it to values for operating the hydropower plant at peaking flows.

For each alternative being considered, commenters wanted the environmental impacts and predicted outcomes on park and other resources and values (i.e., nonnative species; hydropower capacity, generation, and revenue; non-use values) described and analyzed. This would enable comparison to NPS targets for ecosystem patterns and process and facilitate decision making. Some commenters specifically stated that DFCs should be used as the benchmark against which alternative performance should be compared. Comments called for all alternatives to be scientifically defensible and credible with well-defined hypotheses. The possible negative or positive effects of uncertainty in scientific analyses or statements that are unsupported by data should be discounted, since they may introduce bias. Alternatives could build on prior research, such as that performed by the GCMRC.

Comments expressed concern that GCDAMP might be locked into a single flow regime for the next 10 to 15 years. Also, comments pointed out that there have been major changes in the riparian and riverine ecosystems since Glen Canyon Dam was constructed, and there will need to be changes in dam operations and management activities to restore Grand Canyon National Park resources and values.

One commenter suggested that GCDAMP stakeholders be integrated into the development of alternatives for the LTEMP EIS using structured decision making to develop some or all of the alternatives for the LTEMP EIS. The use of this approach would help fully integrate the AMWG/Technical Work Group stakeholders in the development of alternatives and the initial assessment of the performance of those alternatives.

3.7.1 Proposed Alternatives

While many commenters provided suggestions for what the LTEMP should achieve in terms of resource goals, several also put forward specific suggested alternatives to be considered in the EIS. One comment pointed out that the range of alternatives considered is generally at the agency's discretion and is reviewed under a rule of reason that requires an agency to set forth only those alternatives necessary to permit a reasoned choice. Reclamation may diverge from the directive to generate the most power possible only to the extent that peer-reviewed science demonstrates that downstream resources will be improved. Another commenter asked for a distinct and clear definition of the term "reasonable" as it relates to alternatives, and how it would be measured.

Grand Canyon First! Adopting a "Grand Canyon First!" strategy was advocated in many comments. In this alternative, consideration of the ecology and wildlife of Grand Canyon would be the paramount consideration, restoring Grand Canyon to as close to its historical state as possible. This alternative would recognize the GCPA as the primary source to inform the LTEMP EIS and that the operations of Glen Canyon Dam should help to preserve the natural and cultural resources of Grand Canyon. The alternative describes objectives but not an operational regime to achieve those objectives.

Fill Lake Mead First. In this proposed alternative, primary water storage would shift from Lake Powell to Lake Mead, using Lake Powell as a backup for seasonal and flood control purposes. According to the commenters, there would likely be less water lost to evaporation and

seepage, and there would be greater flexibility for implementing Grand Canyon restoration strategies. Comments pointed out that both lakes are at half-capacity, and that filling Lake Mead would expose more of Glen Canyon and open a new section of the river for recreational use.

Run-of-the-River. Commenters suggested that the dam could be re-engineered to a modified run-of-the-river design. This would restore natural water and sediment flows to the greatest extent possible. In this proposed alternative, considered but rejected in the 1995 EIS process, the old river bypass tunnels could be reconnected or new tunnels could be opened to bypass Glen Canyon Dam. This alternative would utilize elements of the "Fill Lake Mead First" alternative above. Some comments said this may be the only alternative that ensures the long-term restoration of the Colorado River ecosystem.

Decommission Glen Canyon Dam. An extension of the Run-of-the-River alternative is to decommission the dam, either leaving it in place or removing it. This was mentioned in many comments. If left in place, dam levels would be equalized to upstream inflows. Lake Powell water levels would drop, and the sediments would begin to cut new banks and form a new channel that would flow around and through Glen Canyon Dam. Comments advocating the decommissioning of the dam mentioned the benefits of opening currently submerged areas to new recreational activities; restoring the environmental, recreational, and cultural resources of the Grand Canyon and the Colorado River basin to their pre-dam conditions; and positively affecting the health of the Colorado River ecosystem.

If the dam were dismantled and removed, a number of steps would be required, including preparing for sediment removal from the former reservoir, avoiding the potential failure of an aging infrastructure, and a variety of land and water management activities. One comment mentioned replacing the lost hydropower with solar power in the Wahweap Basin. Should the dam be decommissioned, one commenter said that the upper basin development scheme may be too ambitious and should be reevaluated to improve water efficiency and to include best management practices overall.

Frequent High-Flow Releases Separated By Steady Flows. A number of commenters advocated various steady-flow alternatives (seasonally adjusted or year-round steady flows) that incorporated regular or periodic high flows triggered by sediment inputs from tributaries. Commenters stated that science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources, including the beaches, native fish, and cultural sites. This flow regime will not compromise in any way the Law of the River or the Colorado River Compact, because it is concerned with regulating the types of flows and not the volumes of water distributed to the states.

Comments stated that seasonally adjusted steady flows need to be a well-defined, key component of proposed LTEMP alternatives. The seasonally adjusted steady-flow alternative would be a close approximation of the pre-dam hydrography; and it can be designed to comply with the Law of the River. This flow regime needs to be sufficiently long — more than two months in the fall — to produce a biological signal that is followed by a full synthesis of impacts

on biological, physical, social, economic, and cultural resources. Seasonally adjusted steady flows still need further testing to determine system response and to test USFWS's reasonable and prudent alternative, but some comments suggested alterations at 10-day intervals to correspond with inflows over a 10-day period; the effect would be as if the dam did not exist.

Commenters also suggested evaluating year-round steady flows as a viable alternative. This alternative was presented as the "best case scenario" for preserving sand based on Wright et al. (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. One commenter suggested steady flows as part of a 12-year series of 3×4-year experimental blocks (described below), in which 2 steady-flow alternatives would be tested.

Pre-1996 ROD Operations. One commenter suggested that pre-1996 ROD operations be considered as one alternative to allow for a better understanding of the effects of MLFF operations.

Full-Powerplant Capacity Operations. Two commenters recommended that the LTEMP EIS consider the impacts of operating the dam at full power plant capacity on a constant basis and a fluctuating-flow regime that allows for maximum power plant capacity releases.

Modified Low Fluctuating Flows. This alternative serves as a "no action" alternative, and commenters agreed this alternative should be evaluated in the EIS. Some comments said that further study should be done on the effects of MLFF (the flow regime selected in the 1996 ROD). Other comments stated that these flows still jeopardize the continued existence of the native fish species (e.g., humpback chub and razorback sucker) and threaten to destroy or adversely modify designated critical habitat. Different comments stated that this operating regime, which resulted in the constraint of hydropower generation levels (e.g., maximum and minimum generation/flow and limits on up and down ramps) in favor of downstream concerns, has not produced the intended results.

12-Year Experiment of 2 Steady-Flow Alternatives. One comment suggested a 12-year series of 3×4-year experimental blocks. The first four-year period would be a seasonally adjusted steady flow. The next four-year block would be MLFF. The final four-year block would be year-round steady flow. All three flow regimes would include high-flow releases under sediment-enriched conditions. After 12 years, the 3 regimes would be analyzed to determine which had the most favorable results consistent with the GCPA.

Species Community and Habitat-Based Alternative. This proposed alternative is intended to contribute to the conservation or recovery of endangered or extirpated species, such as the humpback chub, razorback sucker, southwestern willow flycatcher, and Kanab ambersnail (*Oxyloma haydeni kanabensis*). It would also contribute to the conservation of other non-listed aquatic and riparian species (including flannelmouth sucker, bluehead sucker, and speckled dace) to reduce the need to list them under the ESA. This would include an ESA Recovery Implementation Program focused on supporting native species communities that ensures that their habitat-based needs are met. This alternative would include a management program for the

trout at Lees Ferry that also provides for protection of humpback chub and other native fish populations downriver, and a quality recreational fishery at Lees Ferry. The alternative describes objectives (but not an operational regime) to achieve those goals.

Stewardship Alternative. Commenters suggested consideration of a stewardship alternative that utilized a flow regime that would best serve Grand Canyon and be aligned with the GCPA, with no consideration given to hydropower sales. The alternative describes objectives (but not an operational regime) to achieve those goals.

Related comments recommended consideration of an alternative that involves mechanically augmenting sediments; timing spring releases to coincide with native fish spawning periods; varying water temperatures as they varied before Glen Canyon Dam; implementing selective temperature control; removing nonnative fish; repatriating extirpated species; removing tamarisk and restoring the native riparian plant community for sensitive bird species; implementing low steady flows in summer and fall and peaking flows for shoreline deposition; and identifying and implementing replacement power without increasing carbon emissions and without constructing other dams or pump-back hydropower facilities.

3.7.2 Suggested Alternative Considerations

The following considerations related to alternatives were submitted by one or more commenters. These considerations are aspects or elements of alternatives that commenters felt were important to consider.

Augment sediments. Many commenters suggested mechanically augmenting sediment and sand to enhance camping beaches and sandbars along the Colorado River.

Implement a temperature control device. Commenters suggested that the EIS should consider an alternative that evaluates the efficacy of installing a Temperature Control Device (TCD) onto Glen Canyon Dam's intake structures. This device would allow water to be drawn from different depths of the reservoir to provide temperature control flexibility and improved water quality. A TCD would also maximize experimental flexibility and thus, the potential for achieving a positive result for native fish recovery and ecological restoration. It was noted that some of the risks associated with the TCD could be overcome by incorporating other operational strategies (such as sediment importation) into the system to disadvantage hunt-by-sight predators, and by initiating a periodic-spike flow. It was further suggested that the LTEMP EIS team consult with the USFWS to help address the costs, benefits, and risks associated with a TCD.

Provide bubblers in forebay. Bubblers in the dam's forebay would break down the thermocline and increase the release temperature. This was offered as an inexpensive temporary method to elevate water temperatures downstream, which could be used to test hypotheses about the benefits and detriments of temperature changes.

Do not mechanically remove trout. Many commenters wanted alternatives that did not include mechanical removal of trout.

Mechanically remove brown trout only. Some commenters advocated mechanical removal of brown trout only because this species is more likely to feed on native fishes than is the rainbow trout.

Control trout to improve fishery and benefit humpback chub population. Include trout control in alternatives by reducing reproduction or preventing migration into certain areas, with the intent of protecting humpback chub.

Implement greater fluctuations to dry trout redds in spring. Fluctuations can be used to control trout numbers by exposing trout spawning areas and killing eggs.

Restore extirpated and other native species to Grand Canyon. Comments requested a river corridor ecosystem that matches the natural conditions as closely as possible, including a biotic community dominated in most instances by native species.

Relocate more humpback chub to tributaries. Tributaries tend to have higher water temperatures than the main river corridor, and this could provide a healthier environment for the humpback chub. Bright Angel Creek should be considered as a possible relocation spot if the habitat there meets the humpback chub's preferences.

Paria River sediment check dams. To enhance turbidity conditions downstream for reduction of trout predation.

Continue research and experimentation. Overall, comments were in favor of conducting research on the impact of dam operations on the Colorado River ecosystem. Comments addressed the need for longer-term and more aggressive experiments.

Modify monthly and annual flows. Alternatives should consider changes to the current annual and monthly release volumes. Alternatives should employ the inherent flexibility in the Colorado River Compact for designing water releases. A commenter noted that the Compact does not require a particular annual release volume, but rather, it requires that the "... states of the upper division will not cause the flow of the river at Lees Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of 10 consecutive years reckoned in continuing progressive series beginning with the 1st day of October next succeeding the ratification of this compact." In addition, there are no legal requirements mandating particular monthly release patterns over a given year.

Release equalization flows in ways that minimize impacts and provide benefits. The adverse impacts of 2011 equalization flows were mentioned by several commenters. It was suggested that alternatives should consider adjusting timing and magnitude of equalization flows to coincide with available sediment from the Paria and Little Colorado Rivers to help rebuild beaches in the Grand Canyon. It was also suggested that equalization flow releases should be implemented over several years rather than in a single year, as currently envisioned.

Implement high-flow releases in rapid response to sediment inputs. Comments called for HFEs as a part of all alternatives. Commenters specifically mentioned the need to respond

rapidly to sediment inputs to conserve sediment. High flows released on a regular basis when sufficient sediment is in the river system can help build beaches, improve other sediment-related resources, and increase carbon storage in the old high-water zone. In addition, the finalized HFE Protocol Environmental Assessment should be incorporated into the design of all LTEMP alternatives.

Implement high-flow releases that are greater than 45,000 cfs. Comments suggested considering introducing variability by changing the level and timing of HFEs, to include more than just 41,000–45,000 cfs flows or releases in early spring. Sediment science suggests that flows of 60,000 cfs and more would be extremely beneficial for the sediment-based resources in Grand Canyon. Increase the magnitude of high flows for experimental sediment, geomorphology, and vegetation management, when the Lake Powell water supply permits. Flood events are a natural occurrence of free-flowing rivers; before the construction of Glen Canyon Dam, annual spring snow melts averaged 55,000 cfs. Controlled floods were introduced in Grand Canyon to mimic those highly variable pre-dam flood events. Experimental beach habitat-building flows could be undertaken during the historic hydrographic peak, the monsoon season, and winter flood events.

Reduce flow fluctuations. Commenters suggested consideration of reducing flow fluctuations to reduce impacts on ecological resources and improve navigability and the safety of boaters and other downstream recreational users.

Establish minimum flows of 8,000 cfs. Flows of no less than 8,000 cfs have been suggested by commercial operators as a minimum for safety and convenience; however, private boaters could probably go with a lower flow for both safety and convenience.

Adjust ramping rates. Some commenters requested that ramp rates not be increased and that down ramps should be slowed even further. Other commenters requested that increased down-ramp rates should be considered to increase hydropower operational flexibility.

Restrict camping on certain beaches with alternative camp shelving in lieu of beaches. This suggested alternative consideration would allow for testing impacts on recreational users and monitoring sand losses.

Store water underground. A comment suggested transferring the contents of Lake Powell and Lake Mead to underground storage locations to avoid losing water to evaporation. The commenter stated that there are abundant nearby natural underground locations that could accommodate the volume of water from six years of the Colorado River's annual flow.

3.8 Other Issues

The following various other issues were raised in comments and may or may not be considered in the preparation of the EIS:

- Give the NPS authority to protect Grand Canyon National Park.

- Amend the Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations of Lake Powell and Lake Mead (2007) to include consideration of the requirements of the GCPA.

- Continue to engage a professional facilitator in GCDAMP meetings.

- Post revised instructions for using NEPA and Reclamation's Department Manual on Reclamation's web site before developing a scoping report.

- Establish a higher funding cap for GCDAMP activities to allow successful completion of the work to be accomplished under the LTEMP, There is now a much better understanding of program needs, and the funding needed to complete it.

- Eliminate the lottery for obtaining river permits so that individuals have the opportunity to enjoy the Colorado River wilderness. Ensure fairness in the wait list so that those applying for their first permit receive priority over those re-applying.

- Address irrigation from upstream states, so there is a healthy flow of water that reaches the lower Colorado River system.

- Ensure that the team leaders who are developing the LTEMP EIS go down the Grand Canyon as a part of the EIS process. This will allow them to see firsthand what is happening down there, because this place is so complex, and some of the issues can only be understood fully if you see them with your own eyes.

- With the availability of a huge amount of very cheap clean safe fusion power in the future, the possibility of removing and mining the sediments in Lake Powell impoundments may one day become a windfall resource.

3.9 Stakeholder Involvement

Overall, comments requested that agency responsibilities be clearly defined, communication be improved, mechanisms be created for productive information-sharing, and project redundancies between NPS management programs in Grand Canyon National Park (i.e., resource monitoring and translocations of native fish) and the GCMRC be eliminated. The LTEMP EIS should clarify the role and level of involvement of each agency in preparing, commenting on, and finalizing the LTEMP EIS, as well as the decision-making and implementation process to follow. Some comments were concerned with improving federal communication and outreach to non-federal constituents, partners, stakeholders, and the general public. In particular, one comment, concerned about the growing regional population and a potentially unsustainable water supply, called for informing the public, planners, and local and state governments of estimates of water availability and the studies used to determine those estimates. Improved communications would also include distinguishing between proposed

experimental and management actions in the operation of Glen Canyon Dam; stakeholders would then be better able to determine whether and to what extent a proposed action should be accepted as necessary to gain experience and knowledge in reservoir operations and environmental resources, without waiving rights established under the Law of the River.

A specific plan for stakeholder involvement was presented by one commenter: (1) set clear goals and involve stakeholders in developing a collaborative process; (2) use professional neutrals when appropriate and commit to building common ground; (3) incorporate joint fact-finding to deal with scientific uncertainty; (4) produce collectively supported written agreements; and (5) build long-term adaptive management capabilities.

A commenter, aware that Grand Canyon is a world-renowned riverine resource, wanted DOI to act in the public's interest, guided by the most rigorous interpretation of the laws, regulations, and policies that govern Grand Canyon and the operation of Glen Canyon Dam. Recreational, hydropower, and GCMRC's interests should not dominate public interest. The perceived bias toward hydropower interests is discussed in more detail in Section 3.9.2.

3.9.1 Tribal Involvement

Commenters indicated that they want the 11 American Indian Tribes affiliated with Grand Canyon and the Colorado River to be involved respectfully and substantively in the LTEMP development stage and beyond, rather than asking for their input after plans have been made. Tribal voices, values, perspectives, and knowledge need to be heard and incorporated in the LTEMP. Tribes should also participate in the development of desired future conditions and management actions.

Ancient habitations, arts, artifacts, and sites that are central to tribal traditions are located in Grand Canyon. Comments said this requires that the tribes fully participate in the development and ongoing decision making regarding the Colorado River ecosystem, so that tribal spiritual and cultural needs are considered side-by-side with rigorous scientific and other considerations. One comment pointed out that if tribes are to have this role, they should be provided with funding for their monitoring programs.

3.9.2. Representation of Various Interests

Based on the comments received, there are stakeholders who are under-represented, over-represented, or not represented at all. The commenters clearly hoped that this situation would be corrected. The LTEMP EIS process should not reflect only one part of a community, but should consider future generations and protect their future experiences. The public needs to have a voice in the process, which should consider the social challenges the region faces as well as the short- and long-term environmental challenges. Many of the comments said that the primary interest should be in the preservation of the cultural and natural downstream resources, and that interest is best represented by the NPS, USFWS, and the tribes.

A commenter noted that the seven basin states should participate in developing LTEMP EIS alternatives and would likely propose their own alternative; another commenter said that the AMWG is dominated by representatives from the basin states, hydropower marketers and consumers, as well as environmental and recreation interests. These groups have no legal responsibility, yet have been given de-facto decision-making authority for determining the fate of the Colorado River ecosystem. One commenter stated that because the Grand Canyon Trust has brought lawsuits against some other members of the AMWG, it should be removed from participation in the AMWG. Even though some comments stated that recreational interests are overrepresented, other comments stated that it is disproportionately low, as is tribal participation. According to these comments, both recreational and tribal interests should have greater representation and a stronger role in the decision-making components of the management program.

There are representatives on the AMWG working for nonnative fish protection, and 1 of the 12 goals of the AMWG is to "Maintain a naturally reproducing population of rainbow trout above the Paria River, to the extent practicable and consistent with the maintenance of viable populations of native fish"; yet nonnative fish protection is not mentioned, directly or indirectly, in the GCPA.

Many comments perceived a bias in favor of hydropower and water supply interests in the timing and quantity of water releases as well as the decision-making process, stating that the GCDAMP has been and continues to be controlled by water and energy groups whose self-interest lies with avoiding long-term change and maintaining the status quo; these groups are not dedicated to, or even concerned with, the protection and recovery of downstream resources. Although the GCPA makes specific reference to preserving flows to meet water delivery obligations, it does not do so with regard to hydropower generation. Yet, commenters pointed out that 1 of the GDCAMP's 12 goals in its strategic plan is to: "Maintain power production capacity and energy generation, and increase where feasible and advisable, within the framework of the Adaptive Management ecosystem goals."

Comments stated that issues affecting hydropower generation are heavily debated among the AMWG, and also said that the concern of hydropower companies should be with their marketing and distribution plans and mitigation strategies in compliance with the GCPA, but they should play no role in determining how, when, or if the mitigation strategies are implemented. For instance, comments stated that Western exerts "undue influence" on the GCDAMP's direction and decisions; Western's goal (maximizing power generation) is perceived to be contrary to the habitat needs of the river corridor through Grand Canyon National Park and the Colorado River's natural hydrography. For instance, comments noted that beach habitat-building flows introduced in 1996 could have improved or mitigated damage done to the beaches, but the GCDAMP was "overwhelmed by the lopsided [hydropower] membership." Past management decisions have been seen as considering hydropower generation or the economic impacts of Lake Powell and Lake Mead. A further issue is that GCDAMP funding comes from hydropower revenue, which creates a conflict of interest in recovery management choices and decisions.

3.9.3 Grand Canyon Monitoring and Research Center

Many commenters pointed to the USGS's GCMRC as the leading research body for the Colorado River; it has contributed substantially to the body of knowledge about the river. Those comments advocated the involvement of GCMRC as a central and significant resource in the development and implementation of the LTEMP and LTEMP EIS. GCMRC and its previous findings and research capabilities can inform decisions and the identification of desired future conditions; develop and evaluate alternatives; provide expertise on flow regimes and sediments; and develop scientifically credible solutions for the Colorado River ecosystem.

Comments noted that GCMRC should be used to monitor progress toward goals. The GCMRC already conducts experiments and has studied the downstream impact of dam releases extensively, and it would provide an objective, scientific approach to the LTEMP process. The objectivity of the GCMRC could prove useful in balancing competing interests. A comment was concerned about objectivity and independence, though, and suggested that the GCMRC be reorganized outside of the DOI to mitigate against agency bias and shortcomings.

One comment requested that current and former GCMRC employees and consultants be surveyed on their views of the Center's scientific rigor, efficiency of experiments, follow-through with regard to scientific findings, and leadership. The survey should also address competing objectives and their influence on management actions and the efficacy of the response to the findings in the report *Downstream: Adaptive Management of Glen Canyon Dam and the Colorado River Ecosystem* (NRC 1999).

One commenter suggested a new approach to managing scientific research, with competitive proposals to be administered by the National Science Foundation and excluding from consideration current federally employed or GCMRC-contracted scientists for a period of five years to allow for the perspective of a fresh and respected group of scientists.

3.9.4 Glen Canyon Dam Adaptive Management Program (GCDAMP)

Commenters recognized the significant role the AMWG plays in recommending management actions on dam operations; because of this, there should be a more balanced stakeholder group than currently exists. Some commenters expressed concern that the AMWG favors water development and power generation interests and does not always reflect the ecological, cultural, and recreational values of Grand Canyon. Commenters expressed concern that the LTEMP process might be "blocked, slowed, or stymied" by the water and power voting blocs on the AMWG. Thus, they called for a fair balance among advocates of water supply; power production; and protecting, mitigating adverse impacts on, and improving Grand Canyon National Park and Glen Canyon National Recreation Area. In any case, the AMWG is comprised of stakeholders with an in-depth knowledge of the complex issues, and DOI should be encouraged to examine its recommendations.

Commenters said that the GCDAMP Science Advisors should play a key role in evaluating alternatives. The Science Advisors could be asked to review science planning and the credibility of NPS and GCMRC programs and could play a role in advising agency-level

managers in integrating findings into improved Colorado River ecosystem stewardship and collaborating to reduce or eliminate redundant research efforts. If the work scope of the Science Advisors is to be expanded, the membership would need to be reconfigured and more funding made available. Commenters recommended that a wholly independent scientific body be commissioned; that body would work with NPS, USFWS, and the tribes to achieve goals congruent with the GCPA.

Many comments addressed the organizational structure, functionality, and management of the GCDAMP, suggesting that it be replaced with a structure that would base its advice and decisions primarily on scientific principles. A change in the structure might also allow for the accomplishment of GCDAMP's mission and goals. One commenter was concerned about the costs incurred thus far with no significant and sustainable changes in dam operations, evidenced by two decades of similar agenda topics still awaiting resolution; topics have increased in complexity, but the outcomes (no change) are the same.

Commenters wanted a group that has the ability and willingness to act adaptively based on what has been learned. Commenters also claimed that the GCDAMP evades recommendations that would create legal conflicts among the NPS Organic Act, the ESA, NEPA, and the GCPA. Collaboration and consultation among the science and policy experts of the basin states, GCDAMP representatives, the AMWG, the Technical Workgroup, the Science Advisors, and the GCMRC could move issues beyond an individual stakeholder interest in the Colorado River.

Comments suggested that the GCDAMP include only DOI's responsible agencies such as Reclamation, NPS, and USFWS, and the 11 affiliated tribes as sovereigns; all other agencies and interests should participate on the same tier as public citizens. Some comments said that the responsible agencies should include only those with primary jurisdiction over the management of downstream cultural and natural resources in Glen Canyon National Recreation Area and Grand Canyon National Park. On the other hand, one comment stated that Reclamation should have no role in decision making when GCPA compliance is an issue.

Although the GCDAMP was promoted by many commenters, one commenter believed that the program shields DOI from those criticizing its lack of progress on mitigating the downstream impacts of Glen Canyon Dam. Another group of comments pointed to a scholarly article by researchers in the field of public dispute mediation, in which the researchers identified six shortcomings of the GCDAMP: (1) an inadequate approach to identifying stakeholders; (2) a failure to provide clear goals and involve stakeholders in establishing the operating procedures that guide the collaborative process; (3) inappropriate use of professional neutrals and a failure to cultivate consensus; (4) a failure to establish and follow clear joint fact-finding procedures; (5) a failure to produce functional written agreements; and (6) a failure to manage the GCDAMP adaptively and cultivate long-term problem-solving capacity (Camacho et al. 2010).

One comment called for transparent and measurable regulatory targets through effective leadership within DOI and GCDAMP; an independent audit of the GCDAMP would measure its performance against its charter, its strategic plan, and the goals of the GCPA.

According to some comments, water issues have become so complex that the common citizen has effectively been removed from the process, which argues for the establishment of an independent commission or a reinvigorated GCDAMP. Stewardship of the Colorado River ecosystem, in full accord with the GCPA, was also mentioned in comments, with a scientific advisory committee to integrate and coordinate science activities. A suggestion toward improved stewardship was to develop an annotated administrative history of Colorado River ecosystem management so that new participants would have a ready resource to understand the core issues; such a history is under consideration by the AMWG.

It was suggested that the AMWG could meet twice a year with a 30-day comment period prior to each meeting. Technologies exist today, such as interactive telephone and video conferencing, that did not exist during the earlier EIS process, and using such technologies would enable more stakeholders to be heard.

4 INTERAGENCY COOPERATION AND GOVERNMENT-TO-GOVERNMENT CONSULTATION

Reclamation and NPS initially invited 25 federal, tribal, state, and local government agencies to participate in preparation of the LTEMP EIS as cooperating agencies. To date, 15 agencies and tribes have expressed an interest in participating as cooperating agencies and efforts are underway to establish Memorandums of Understanding. These 15 agencies include the Arizona Game and Fish Department, Bureau of Indian Affairs, Colorado River Commission of Nevada, The Havasupai Tribe, The Hopi Tribe, The Hualapai Tribe, Kaibab Band of Paiute Indians, The Navajo Nation, The Pueblo of Zuni, Salt River Project, USFWS, Upper Colorado River Commission, Utah Associated Municipal Power Systems, Western Area Power Administration (Western), and the Yavapai-Apache Nation. Regular meetings with cooperating agencies are planned as the LTEMP EIS is developed.

In accordance with the requirements of Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments," Reclamation and NPS are coordinating and consulting with tribal governments, Native American communities, and tribal individuals whose interests might be directly and substantially affected by activities being considered in the LTEMP EIS. This government-to-government consultation has just begun.

5 FUTURE OPPORTUNITIES FOR PUBLIC INVOLVEMENT

Scoping is the first phase of public involvement provided under the NEPA process. The public will have future opportunities to be involved during the preparation of the LTEMP EIS. The lead agencies will release information to the public at various times during LTEMP EIS development including a presentation of the results of scoping and a description of draft alternatives once these have been identified.

The public will have an opportunity to review and comment on the draft EIS. At this time, Reclamation and NPS anticipate releasing the draft EIS for public review in late 2012; a

90-day comment period will be provided. The public also will have an opportunity to review and comment on the final EIS when it is published.

Information about all opportunities for public involvement in the LTEMP EIS, including announcements of public meetings and releases of documents for review, will be maintained on the project website (http://ltempeis.anl.gov) and will be announced via the email subscription list, press releases, and social media (Twitter and Facebook).

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APPENDIX: CORRESPONDENCE RECEIVED FROM THE PUBLIC ON THE SCOPE OF THE LTEMP EIS

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Note to Reader: The comments contained in this Appendix were entered into and exported from an online comment database. Greetings, salutations, concluding thank you statements, and personally identifying information have been removed, except in letters provided as attachments to comments. In some cases, the comment system translated commenter input into stray characters that were undecipherable; we have attempted to represent those comments as accurately as possible, but in some cases, ambiguity concerning the commenter's intent remains.

1

Having lived in Utah and Arizona for many years and being a long time visitor of Lake Powell and the Grand Canyon, I have a great deal of respect and love for the area of Glen Canyon Dam.

I have frequently been a visitor and avid boater of Lake Powell. I visit the Grand Canyon multiple times a year. I have also taken the river trip between the dam and Lees Ferry area. In short, I feel passionately about the decisions that will affect the areas that I frequent and love.

The opinions shared by many are filled with passion and emotion for protecting the areas associated with the Colorado River Basin. I am one of moderation. I do not want Lake Powell drained. I do not want the Grand Canyon destroyed. I would prefer that many of the so-called environmentalists groups across the nation to stay out of the input as I often feel they are just high-paid lobbyists earning their bread and skipping the butter and go home to their house in the great outdoors that is not in Arizona.

I have learned that often the difference between an environmentalist and a developer is often that the environmentalist already has his home in the outdoors....

I have read, with interest, the results from the first "practice" controlled release flows from Glen Canyon Dam.... two years later it was basically - a zero success. Although, I personally believed it to be a GORGEOUS site watching those waters flush as though racing through the red sandstone walls in a free-fall.

I do not believe that a flood control, silt-control, Hoover Dam saving measure such as Glen Canyon Dam should be the "black sheep" on the Colorado River. Yes, it changed things down stream. Yes, it changed things up stream. That happens everywhere mankind goes. I do not believe that a few releases in the late spring should be happening so that river rafters have beaches to camp on... or plants have earth to grow in, or scientists have things to study.

I do not believe Glen Canyon will ever return to its former state - even if the dam were removed.

I do not believe that the Grand Canyon will EVER return to its former state - even if we remove all mule trains from Bright Angel trail, return the Havasupai to Indian Gardens or let the National Park Service destroy every historical structure on the south and north rim.

I think scientists, water-hydrologists, desert enthusists, humpback-chub lovers, salt cedar haters(of which, I profess, I am)should ALL take a deep breath, step back and stop trying to return everything to its natural state. We've done the damage. LET IT GO.... and find ways to coexist.

Do I think repairs should be done? Some. I believe the effort to remove Salt Cedars is fabulous although I haven't the time or the body parts to help in the week long effort that is required.

I think that simulating spring run-off is laudable - unless we are in drought sequences. If the lake level reaches a minimum level - then and only then perhaps a fake flood would be great.... but to what objective? Dirt movement only? Will the flood wash away the new habitats developed for the Humpback Chub? Will trout be washed further downstream?

Sometimes, it seems the only objective appears to be returning the Canyon to its original state. Original of when? Original to Powell's arrival? Original to Cardena's arrival? Original to the Native American arrival?

Personally, the cost of the scientific studies doesn't seem to justify the end result. If releasing water didn't give continued desired reults under Babbit.... why will it work better now? Unless, the truly only useful result is to employ more people in the Park Service and Department of the Interior to study the actions.

Please, first determine the list of possible successes. Guaranteed successes. Then, let us know the cost. Until then, proceed with caution... and moderation.

2
Testing, please ignore.

I removed the 'How Did You Hear' questions from the comment form for this document. I am submitting a comment to confirm that the comment form does not have any glitches after the change.

3
Simply put no mechanical removal of trout from the Colorado river. Lees Ferry is a fishing institution, at one point it was one of the top fisheries for trout in the world. I do not favor the huge waste of money that this entails, there is no scientific data that supports this type of waste. It is a waste of resources in both fish and manpower as well as a waste of money. Enough is enough. The chub will not benefit from the killing of trout, the dam changed the environment it's a cold water environment, not a warm water often flooded environment. DO NOT WASTE MY TAX DOLLARS.

4
"May I encourage you to get involved in Glen Canyon Dam operations/Colorado River management plans being presented to the public, currently in Environmental Impact Statement scoping meetings during November, and in the near future? I am worried about future

management changes being considered by the Bureau of Reclamation and the National Park Service. As the process goes, the time is right now for the public to get involved. Comments will be accepted until some time in December, but don't wait too long.

Everyone who loves the river, the ecology of the river as it exists today, and the rainbow trout fishery in the river as it exists today, should be aware, involved, and perhaps a little bit alarmed.

My worry is that the Park Service will get approval for ramping up a process of mechanical removal of rainbow trout from the river. This means electroshocking the river from boats and removing and killing all rainbow trout which float to the surface. Mechanical removal of trout has happened in the Colorado before, especially around the Little Colorado river inflow, but the worry is it will be extended upstream. It is not likely trout removal would be allowed to extend upstream past the Pariah creek and in to Lee's Ferry, but it is still important to push back against these plans.

The Park Service and the Bureau of Reclamation have listened to regional Indian tribes in the past, who do not like this waste and disrespect of life, and they have put a temporary moratorium on electroshocking the river. There is no reason they should not be listening equally as closely and carefully to anglers who love the river, and who actually spend time enjoying the river.

Can you please raise this issue with all angler friends, and people who love the river, and who accept the reality of river conditions. No amount of dam discharge modifications will change the fact of cold, clear water released from Lake Powell. The ecology of the river is perfect for rainbow trout, and short of removing the dam that will not change. Why should we fight nature, which is telling us that rainbow trout are beloved by the river? Why can't we accept and find value in the positive role trout have in the river as it exists? The beneficial effects to overall river ecology (bald eagles, osprey, mergansers, and river otters immediately come to mind) could be researched and approved of.

The argument the river managers have for removing trout is competition or predation on an endangered fish species, the humpback chub. Because we are for rainbow trout it does not mean we are against the humpback chub. There is very little scientific evidence correlating rainbow trout population numbers with chub population decreases. It is the physical conditions of the river which have changed and hurt the chub, not competition with rainbow trout. A revolting, wasteful war on trout does not help chub. And using the trout for fertilizer, as some have suggested, does not lessen the impact of disrespect to life and the river caused by mechanical removal. Push back against the idea of overly aggressive mechanical removal of trout from the river."

This dissertation was submitted to a blog of fisherman that I personally am proud to be a part of. I fully agree with it's content and as a fly fisherman that has enjoyed many years of quality rainbow trout fishing at Lee's Ferry Do not want to see that jeopardized with frivolous counter actions.

5

I wanted to voice my concern about the proposed managment of the Colorado river from Glen Canyon south to Lees Ferry. I feel this is a one of a kind river that is now suited for trout. The dollars that this fishery provide support families and businesses. The trout bring enjoyment to those that fish there. Like it or not, endemic species are not suited to live in the river with the current temperatures. The dam provides power to millions and it would be a waste to not allow Trout to live and grow where they will do best. Please consider these words as you move forward.

6

In regards to the Colorado River below Glen Canyon Dam. I understand there is some discussion about removal on non-native trout in the river below the Dam in an effort to help the native fish. Although I appreciate the value of native fish in our river systems it would be a waste, in many aspects, to reduce or eliminate trout which are thriving under current conditions. The simple fact that this stretch of river is a "tail water" from a very deep lake creates a very cold water river. The conditions here are perfect for a species like trout to thrive. As the water warms, further down stream, more habitable conditions exist for native fish. What is wrong with allowing native fish to naturally thrive 10 to 50 miles down river where wamer conditions prevail?

From an economic standpoint, trout in the river have much more draw to sportsmen than native fish like suckers and chub. Marble Canyon and surrounding area, including Page benefit greatly from revenue generated by fisherman fishing for trout in and around Lees Ferry.

I also really dislike the idea of wasing life. The Rainbow trout have thrived in the river. The fish that are there now have not been planted or stocked in the river. They were naturally spawned and have been for more than 15 years. It seems like a sad waste of life to kill these fish in any wasteful way.

Please do not kill the beautiful rainbow & brown trout in the Colorado River. They are a great asset to our state in many ways.

7

The habitat has changed forever on the Colorado River. There is no guarantee that the native fish will survive regardless of what we try to do. However the rainbow trout fishery must be kept intact. The trout seem to feed off the myriad insects, not the native fish. It would be a travesty to target the trout. They give much pleasure to sport fishermen and the state benefits greatly, ie license fees , etc, etc, etc. Can't we all just get along?

8

We believe, and encourage the relevant Federal agencies, to study and evaluate the full use of power resources at Glen Canyon Dam. We fully anticipate submitting future comments on this matter.

9

As an avid fisherman, the fishery at Lees Ferry and throughout the Colorado River is particularly special to me. The Grand Canyon (and its neighboring canyons on the Colorado River) are some of the most majestic places on earth and to be able to pursue a passion in that environment is nothing short of spectacular.

I hope that the NPS will consider more protection for the wild trout that live in the river than has been occurring in recent times. Please understand that I fully comprehend all the arguments about the native species and concern over predation by the wild trout. However it comes down to basic biology.

The native species have lived for thousands of years in a river that is warm and muddy for a large portion of the year until the creation of Glen Canyon Dam created Lake Powell and the phenomenal tailwater fishery below it. Genetically, these fish simply are not surviving well in a now articial environment. Man has forever altered the landscape in the southwest by placing dams across the Colorado River. Instead of fighting against nature's efforts to make the best of a bad situation, we should work within the new environment with the species that can best thrive in the new (relatively) conditions. Shocking rainbow (and brown) trout and killing them will not bring back the native species. In fact, nothing short of blowing up the dams will, and while I could personally support that type of efforts at native species restoration, we all know that will never happen in our lifetimes.

The best that can now be done is to manage the river for the maximum benefit both to the species currently living there and to the visitors that come to see (and some to fish) this destination every year. I can guarantee that economically, it is in the best interest of this area to have this phenomenal fishery available. Last year, several friends and I made the trip from Tennessee to Arizona. This trip was originally motivated by my desire to fish in the Grand Canyon. While I love the canyon simply for the grand scale and sheer beauty, it will be the fishing that brings me back time and again.

Again, please consider discontinuing efforts at removing the wild trout from a river in which the native species can no longer thrive due to huge changes in water quality, both chemistry and temperature. I look forward to returning to this amazing fishery and hope to find it as I remember, full of beautiful wild trout...

10

Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

Please Grand Canyon Monitoring and Research Center (GCMRC) be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

In short:

1) Develop a high flow/steady flow alternative;

2) Involve GCMRC in the science development; and

3) Look at the long-term.

11
I advocate regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows which will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites.

12
Develop a “Grand Canyon First!” alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

Ask that Grand Canyon Monitoring and Research Center (GCMRC) be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

In short:

1) Develop a high flow/steady flow alternative;

2) Involve GCMRC in the science development; and

3) Look at the long-term.

13
Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

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In short:

1) Develop a high flow/steady flow alternative;

2) Involve GCMRC in the science development; and

3) Look at the long-term.

14
Glen Canyon Dam operations should not harm the Grand Canyon, period!

15
Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

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In short:

1) Develop a high flow/steady flow alternative;

2) Involve GCMRC in the science development; and

3) Look at the long-term.

16
Hello, My husband and I had the immense pleasure of taking a 14 day raft trip this past June, thru the Grand Canyon. We observed and learned a tremendous amount of information about the River and how the current processes work, both from our guides and thru observation. As we understand, the process of water release is under evaluation and possible re-design. From what we learned, we would like to suggest that you consider these points: 1) follow current science that indicates that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources. Our wildlife, ancient ruins, flora, and the shores of the river, need a plan that works as close as possible to what happened naturally pre-dam. 2) include the Grand Canyon Monitoring and Research Center in all sciene development and evaluation committees, as they have the knowledge to help make decisions that are best for all concerned 3) Look at a solution that will be best long term, not more experiments.

17
Develop a “Grand Canyon First!” alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

Ask that Grand Canyon Monitoring and Research Center (GCMRC) be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

In short:

1) Develop a high flow/steady flow alternative;

2) Involve GCMRC in the science development; and

3) Look at the long-term.

18
As a retired person who travels extensively in the South West I am very concerned about the protection of the Grand Canyon and neighboring environments. The Glen Canyon Dam has major effect on the Grand Canyon and surrounding areas. Water flow needs to minic natural flows as much as possible. Therefore in developing the EIS alternative please:

Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

Grand Canyon Monitoring and Research Center (GCMRC) be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

19
Greetings, I have three issues that shoudl be adressed in the DEIS.

1. Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

2. Involve the Grand Canyon Monitoring and Research Center (GCMRC) in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

3. The EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

20
Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

The Grand Canyon Monitoring and Research Center (GCMRC) should be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

21
I live near and spend a lot of time in the Grand Canyon, and its preservation is extremely important to me and millions of other Americans. Regulating the types of water flows from Glen Canyon dam and not the volumes of water distributed to the states is crucial to preserving the Canyon. Science has proven that regular high flows most closely mimic pre-dam conditions and perform the best for Grand Canyon resources. I ask that the Grand Canyon Monitoring and Research Center (GCMRC) be involved in the development of dam operations alternatives and analyzing the pros and cons of different flows, and that the LTEMP EIS result in a long-term (greater than 15 years) operations change, and not just a short-term experiment.

22
One important position is that the welfare of the Grand Canyon come first - scientific studies consistently show that seasonally adjusted flows are critical for the ecosystem of the Grand Canyon. This has not been the case in the past, but the current study is a perfect opportunity to correct this serious oversight.

I also think that the Grand Canyon Monitoring and Research Center (GCMRC) must be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes. The EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment. Thank you for including my comments in the development of the management plan.

23
It is important to keep the park as healthy as possible. no damage should be incurred on flora or fauna because of this project. the only way to insure that is to keep the Grand Canyon Monitoring & Research Center involved in the development & operations of the dam. keep in mind the long-term, and don't just do a short-term experiment.

24
Just finished a trip on the river (Nov. 8, 2011)

Loved the experience of not hearing motors on the river. Thanks for making this option available.

25
Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely

mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

Have the Grand Canyon Monitoring and Research Center (GCMRC) involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

26
The ecological systems within the Grand Canyon have been affected greatly by the Glen Canyon Dam--all negatively. The best alternative would be to circumvent the dam. However, I understand this is not possible at this time. Therefore, the U.S. should develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact.

Additionally, the Grand Canyon Monitoring and Research Center (GCMRC) must be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

Finally, the LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

27
Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic predam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states. The Grand Canyon Monitoring and Research Center (GCMRC) needs to be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes. The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

In short: Develop a high flow/steady flow alternative; Involve GCMRC in the science development; and Look at the long-term.

28
As a resident of Arizona for the 45 years, there is no more precious jewel in our state to me than the Grand Canyon. The history of the creation of Glen Canyon Dam and its subsequent impact on the canyon have been startling in their lack of appreciation for the importance of not interferring with the life of the Canyon.

Therefore, I strongly urge the NPS to: 1. Develop a high flow/steady flow alternative, as the current method is very destructive. 2. Involve the Grand Canyon Monitoring and Resarch Center as an integral partner in developing scientifically sound methods for interacting with the Canyon. 3. Developing a long-term vision, as opposed to a short-term experiment.

29
As someone who loves river trips, I hope you keep the sediment for the beaches coming!

31
As a frequent visitor to the Grand Canyon and the four corners region I would like to comment. The Glen Canyon dam buried arguably some of the most beautiful places on the entire planet. It has outlived its usefulness given the multi year drought. The dam should be decommissioned and Lake Mead filled. This will cut in half the evaporation of water as the surface area will be reduced. The Colorado River compact needs to be reworked as it was based upon unrealistic assumptions of water levels.

This is all relevant for the Grand Canyon. The destruction of habitats cannot be seen or appreciated from the rim. To ignore this would be akin to protecting the top floors of a museum while letting the remaining 90% of the collection be destroyed by filling the basement storage areas with water.

If you cannot decommission the Glen Canyon dam please regard the comments of those most knowledgeable and begin phased releases to build up the beaches, lower the water temperature and restore as much habitat as possible.

31
I am a private boater who has periodically run the Colorado River through the Grand Canyon, starting in 1980.

I think this project if of vital importance to the future of not only river travel in GC, but also to the ecological and cultural aspects of the river corridor. The following are my general thoughts about desired features of the new management plan.

1. First, I believe you should grant an extension of the current 12/30 due date for comments -- perhaps as much as 90 days. The announcement for the scheduled meetings only came out on 10/17 and with the holidays coming on, this simply isn’t enough time for people to adequately research available materials and put together cogent responses.

2. Dam operations have always negatively impacted the river environment in GC, but intelligent flow management can help moderate those impacts, even if an unnatural ecosystem continues. And with work, it would be possible to achieve a balance between power and water interests/obligations and those of other players in this scenario such as me.

3. In addition to promoting conditions that do no more harm to the wider ecosystem and preserve cultural sites, a flow regime that promotes beach building and safe boating conditions should be a central goal of the new plan.

4. There is a lot of science already in hand on this topic, much of it accumulated by GC Research and Monitoring Center. The plan ought to accord with that science, and still be flexible enough to allow change as new facts and other circumstances emerge.

5. Tribal and river user interests are significantly under-represented in the current management scheme; that should change. Right now the power and water agencies have a clear upper hand in setting policy on dam releases and other issues.

6. The plan ought to at least examine the options that are out there for injecting more sediment into the river below the dam, even if none seem to me to be practical or affordable in today's political climate. It's still possible something could be done to augment the natural sediment flow, and the plan should at least explore what is out there.

7. There ought to be a way to have "quickie" higher volume releases when the Paria and LCR are pumping silt -- a time when beach building would be more effective that trying to get high flows to pick sand up off the river bottom.

8. The August 2008 GSA publication containing a USGS article, "Is There Enough Sand? Evaluating the Fate of Grand Canyon Sandbars", shows clearly that a steady medium volume release would -- over a long time -- re-build a great many of the beaches. That option should be at or near the top of the list, in my view.

32

My education in undergraduate school was in physics, chemistry, math and biology. My graduate level education is at a doctorate level in health care. On one of my private trips navigating the Colorado through Grand Canyon, I rode in a boat for 21 days with a NASA geologist (doctorate level, just the two of us), and I believe that experience, combined with an education that allowed me to understand what I was being told each day, gave me a level of education about the geology of Grand Canyon equivalent to many undergraduates in the subject.

I am writing to state that I believe Glen Canyon Dam should be operated in such a manner as to provide for the best production of electricity. At the moment, our nation needs the power.

I understand the hydroelectric generators at Glen Canyon Dam are probably used to regulate power on the grid. From what I have read and been told, fossil fuel and nuclear plants benefit from being run at a relatively constant power level and within a range that is optimum for the particular technology involved. In other words, each type of power plant is better run at a certain

constant level. On the other hand, the hydro plant at Glen Canyon Dam can be more readily turned up and down, adjusting for demand on the grid, making the entire electricity production system for the Southwest, more efficient. If the hydro plants are used optimally, less fossils fuel will be needed for a given amount of electric power production. This has several benefits, including but not limited to, reducing costs and pollution throughout the region.

In terms of geological time, Hoover Dam, Glen Canyon Dam, and the sediment accumulation behind them will all be washed down the river with no trace of their existence. As a long time boater on the Tennessee River, I use the locks on the TVA dams for moving my boats up and down river. I have inspected these structures up close. TVA dams are a little older than the big dams on the Colorado, and they are already showing a good deal of wear. No question about it, man made dams on the Tennessee and Colorado will quickly wear out and the empoundments behind them will soon silt up. By this, I mean in a low number of hundreds of years. In geological time, this is a blink of an eye. Therefore, those who want the dams gone will have their wish, perhaps not within their lifetimes. But they should not worry. The dams will be gone soon. In the mean time, we should make as much use of them as possible for their intended purpose, flood control, electricity production, and recreation.

There is another aspect to electricity production that many do not understand and I know about it because I live in Huntsville, Alabama which is a community with a high concentration of PhD scientist and engineers, perhaps the highest percapita in the nation. This is an engineer town. Much of what is done here is in connection with space and military projects. I have been told that fusion power is probably going to become a reality at some time in the future. It may be a while, but it will probably come about. A senior physicist told me that one of the chief problems is the relatively large capacity of an optimum nuclear fusion power plant will be about 90 gigawatts. That is approximately equal to the entire electrical power requirements of the New York City metro area or more than three times the present power production of TVA with all its nuclear, coal, and hydro plants combined from a single fusion unit. A problem with such large capacity power plants will be the electrical grid to handle this power from one focal point and the question of what to do with such a huge amount of electricity over and beyond the night time need which is when the least amount of power is normally reqired. Regulation of fusion power will be a significant challenge. One use might be the production of liquid chemical energy through electrolysis. Of course, this problem is far into the future. Nevertheless, policy makers should understand that the present problems with Glen Canyon Dam will recede into relatively minor ones, or entirely different from what they are today, at some point in time.

With the availability of a huge amount of very cheap clean safe fusion power, the possibility of removing and mining the sediments in Lake Powell empoundments may one day become a windfall resource. This is just a blue sky projection of how needs might change. Because we really don’t know what will happen, planners should understand that needs, science, and engineering will change.

Without an absolute understand of what may or may not happen hundreds of years in the future, I trust the present managers of Glen Canyon Dam, the Department of Interior, and the Department of Agriculture. Our professional resource managers are serious well trained and thoughtful

people. If they agree, we should go ahead and use Glen Canyon Dam for one of the chief purposes for which it was built. Wear it out producing electricity.

33
Colorado river management.

I think your time, efforts and (my) money would be better spent finding a way to restore water flow along the Little Colorado River rather than trying to manage or eliminate trout in the main stem Colorado. The water below Powell is clear and cold and constant in temperature. The Little Colorado could behave much more like a natural river if the water in it's headwaters was allowed to flow more freely. So find a way to provide enough water upstream for people. Allow the Little Colorado to flow with volume and fluctuate naturally for the native fish.

Come on. You all realize habitat is of utmost importance when restoring native species. Simply adding natural type habitat conducive to the natural fishes of the lower Colorado drainage would do far more than the "management" being proposed. Since GC dam is in place it doesn't make sense to micro manage the waters below.

As well take away GC dam or change the temp of the water below GC dam and stripers and other bass will come upriver and finish off ANY and ALL native fish with crayfish then finding a nice warmer habitat will ultimately wreak their own destruction.

34
I am all for the restoration of the native speices IF Glen Canyon Dam were going to be destroyed. The wild trout that now inhabit the river may have been stocked at one point but they are as wild now as rainbow trout in the Smokeys. Eliminating the trout in the Colorado River wouldn't help the chub because their native enviroment is not the cold clean water that now flows through the river. Destroying the trout would just ruin a viable trout fishery and do little to help the chub.

35
I would like to express my view to do whatever is possible to preserve Rainbow trout below the dam. I came to Arizona in 1954 and have enjoyed the "Lee's Ferry" area many, many times with my family. Now that I am retired, I plan to spend even more time in this area fly fishing for Rainbow trout. Count me as one concerned citizen in favor of fighting to maintain the Rainbow trout.

36
Glen Canyon Dam has been a disaster for the Grand Canyon since the day it was built. Due to the fact that it traps most of the sediment, the Colorado River has been unable to flow as it naturally should. This has caused erosion of beaches, sandbars, and wildlife habitat and endangered several species of native fish.

There are several important items which the LTEMP EIS ought to take into consideration. One is climate change which may well make it difficult for the Board of Reclamation to fulfill its obligations under the Grand Canyon Protection Act, amongst other laws.

Water conservation needs to be considered. Water has always been, and is becoming more of, a precious commodity in the SW. With the amount of water in the Colorado River declining due to drought and increased usage, changes to the dam's operations ought to be looked at for ways to increase water efficiency.

The Grand Canyon ecosystem ought to be considered. Ways to restore natural water and sediment flows ought to be explored. If this isn't done, the Grand Canyon ecosystem may never recover.

Finally, the problem with sediment is major. The plan currently in place (high-flow experiment) has not solved the problem. It is time to consider other ways to augment the sediment below the Dam.

37

The Long-term management plan for Glen Canyon Dam should make the protection and restoration of the Grand Canyon and water conservation its highest priorities.

The current plan of operation for Glen Canyon Dam was created with no consideration of the potential impacts of human-induced climate change. All alternatives in the LTEMP EIS need to take this factor into account and consider methods for ensuring the delivery of adequate water flows from Glen Canyon Dam to fulfill the BOR's obligations under the Grand Canyon Protection Act and other laws.

In a time of declining water flows in the Colorado River, the LTEMP EIS needs to analyze the impacts of these reduced flows on management of the Grand Canyon ecosystem, and consider changes in dam operations to increase water efficiency. This should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

The LTEMP EIS should assess the potential for restoring both natural water conditions and sediment flows by opening new tunnels to bypass Glen Canyon Dam. This was considered but rejected during the last EIS process. However, it may be the only way to ensure the long-term restoration of the Grand Canyon ecosystem.

With Glen Canyon Dam preventing most sediment from entering the Grand Canyon, there has been continuing erosion of beaches and sand bar deposits for decades. The "high-flow experiment" strategy now being used has not solved this problem. The LTEMP EIS should consider the feasibility of augmenting the sediment supply to Grand Canyon by mechanically bypassing Glen Canyon Dam.

38

In short, here are my recommendations:

1) Develop a high flow/steady flow alternative;

2) Involve GCMRC in the science development; and

3) Look at the long-term.

My explanation:

- Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.
- Ask that Grand Canyon Monitoring and Research Center (GCMRC) be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.
- The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

39

I wish I could make it to the meeting Tuesday night so I could learn more and express my opinion. But I can't, so I'm writing to tell you that I feel that the Glen Canyon management plan should protect and restore the Grand Canyon eco-system to a sustainable and working system. Of course it can't be returned to it's natural state completely. But it can be restored to a system that is healthy and sustainable. Also, I hope you take into account the health of the other eco-systems that have been affected by the dam, such as all the millions of little canyons surrounding the reservoir, the reservoir eco-system itself, the canyons that feed into the reservoir (such as Cataract Canyon), and all the canyons that feed into those canyons (such as Dark Canyon).

40

I am writing to respectfully request that you create a Glen Canyon Dam management plan that protects and restore the Grand Canyon environment, and also the eco-systems of the entire Glen Canyon area. Long term this will be best for the environment, for society, and for the economy. I think it would be worth it to lose the lake, to gain so many other recreational opportunities in a healthy and sustainable eco-system. Thank you for your consideration.

41

Develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the

beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

Ask that Grand Canyon Monitoring and Research Center (GCMRC) be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

In short:

1) Develop a high flow/steady flow alternative;

2) Involve GCMRC in the science development; and

3) Look at the long-term.

42

I feel the flow regime needs to stay consistent with the stated parameters of the Grand Canyon Protection act of 1992. With the exception that flows from the dam should not go below 9,000 cfs and not above 24,000 cfs. Ramp rates should not be increased and down ramps should be slowed even further. The management of flows should be base on the down stream natural and recreational resource with priority and then revenue power production. Beach building spike flows need to only happen when there is a sufficient supply of sediment coming into the river. This would be during the monsoon or at times of heavy spring run off with both the Paria and Little Colorado running and introducing a heavy silt load. This should occur no more than once every 12 years. I have a deep connection with the river and have seen the effects of the dam over time. I feel my comments if implemented would help sustain the beaches and habitat along the river. The Grand Canyons fragile riparian habitat along the river needs to be protected any way possible so that future visitors may enjoy the resource.

43

As a guide in Grand Canyon for twenty five years, I believe that periodic beach building floods and seasonally adjusted steady flows are the best way to preserve the Natural beauty, habitat, and cultural resources in Grand Canyon. Please emphasize these in the new LTEMP.

44

Glen Canyon Dam should be decommissioned so the Colorado River can run free. Until then, you should assess the potential for restoring both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam in order to ensure the long-term restoration of the Grand Canyon ecosystem.

45

Develop a "Grand Canyon First" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. And this flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

Ask that Grand Canyon Monitoring and Research Center (GCMRC) be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes.

The LTEMP EIS needs to result in a long-term (e.g., 15 years) operations change, and not merely a short-term experiment.

46

Please accept from Environmental Defense Fund these scoping comments for the Glen Canyon Dam LTEMP EIS. Although EDF has not played a direct role in the Glen Canyon Dam Adaptive Management Process or the Technical Work Group, we have been occasional observers over the past decade. Moreover, EDF has engaged in a number of efforts to improve management of the Colorado River at a basin-wide scale, including via Reclamation's Colorado River Basin Study and discussions between the United States and Mexico under the auspices of the International Boundary and Water Commission regarding Colorado River management.

First and foremost we urge the National Park Service and the Bureau of Reclamation (hereinafter 'the agencies') to implement the Grand Canyon Protection Act with a renewed intent to fulfill its purpose to adopt a flow regime that protects and preserves the natural, cultural, and recreational resources of the Grand Canyon National Park. The existing flow regime has been found deficient, and should be evaluated alongside a variety of alternatives that could better satisfy these objectives. We urge the agencies to avail themselves of the excellent resources of the Grand Canyon Monitoring and Research Center to use the best available science to evaluate possible flow regimes. Finally, Reclamation's recent publications projecting climate change impacts in the Colorado River basin (i) suggest that in the quest to develop a long-term plan for Glen Canyon releases, it would be prudent for the agencies to consider the extremes of hydrologic variability. Extreme and long-term droughts may significantly change Colorado River flows by mid-century, and we urge the agencies to anticipate these circumstances in their plans.

(i) See Reclamation, SECURE Water Act Section 9503(c)—Reclamation Climate Change and Water, Report to Congress, 2011, and Reclamation, Colorado River Basin Water Supply and Demand Study, Interim Report Number 1, 2011.

47

We live on the eastern edge of the Colorado Plateau and are frequent visitors to the Colorado River, GCNRA, Grand Canyon and many other parts of the region. I am a retired water rights and environmental lawyer and have studied the Colorado River since the mid-1970s.

Fifteen years of experience under the Modified Low Fluctuating Flow Alternative have shown that it is not a viable plan for future operations at Glen Canyon Dam. MLFFA-driven operations have hurt the downstream riparian environment, threatened the existence of ancestral sites and native fish, and do not achieve the resource protection goals of the GCPA Final EIS and ROD issued in 1996. Clearly, a different approach is needed.

Our scientific understanding of the River strongly suggests that seasonally adjusted steady flows are far less destructive to the downstream riparian environment--this approach merits full study in the draft EIS. Steady flow release schedules can easily be designed to comply with the Law of the River and can be supplemented by periodic high flows to build beaches and improve native fish habitat.

In order to move toward pre-Glen Canyon Dam conditions downstream, the EIS should also explore means of delivering sediments trapped behind Glen Canyon Dam to the downstream environment on a continuous basis. The EIS should also consider whether multi-level water intake structures would help restore pre-Dam downstream conditions by raising the temperature of release waters. Such structures could be operated to simulate (to a lesser degree) the annual temperature swings of the River in its natural state.

While steady flows need not change the amount of hydropower production at Glen Canyon Dam, they may well reduce power revenues by shifting production away from higher-revenue peaking power rates. The EIS should explore means of replacing this peaking power and its revenue stream, particularly with sustainable sources such as utility-scale photovoltaic facilities.

48

Please maintain and preserve the integrity and standard operating procedures of Glenn Canyon Dam as they were originally planned and executed upon completion of the dam.

Avoid any concessions to any and all specical interest factions, such as environmental groups like The Sierra Club, and other militant, radical, left wing activists, who, for their own selfish political and economic agendas, seek to upsurp and gain control of the sanctioned and well planned standard operation procedures which constitute the viability and sustainability of the original dam.

Periodic massive releases of water from the Dam in order to study the effects of sand and silt erosions below the dam are a complete waste of our taxpayers time and money, and serve only to waste a precious commodity from Lake Powell, our water.

Please refute and destroy any and all attempts by all social, political, and environmental activists who seek to gain any control of our dam, including the U.S. Fish and Wildlife.

49

When developing a management plan for Glen Canyon Dam, you must base it around what the natural flow regimes of the Colorado River are. Water releases should mimic the natural flow of the river in order to improve habitat and benefit species downstream. Furthermore, action should be taken to eventually decommission and remove the dam, which has significant damage to the Colorado River ecosystem.

50

As a user of the Colorado River below Glen Canyon Dam and Lake Powell, I have concerns with the management of this region and the ability of the managing agencies to ensure the long-term sustainability of this wilderness experience.

One of my primary concerns is the lack of sediment that flows down river from the dam. Secondly, I am concerned about the quantities in which water is released from the dam, and their deviations from what would occur had the dam not been constructed. I believe these two issues are somewhat interrelated.

Several studies have suggested that the beaches and other natural features within the LTEMP study area are eroding and new sand bars are not being formed. These studies have stated that the area is being starved of sediment. These sandy shoals, besides containing historical archaeological sites, provide wildlife habitat, and safe locations for water sports enthusiasts to camp or otherwise congregate. Further erosion would cause harm to several groups, including wildlife habitat destruction, lost opportunities to learn of past cultures that lived on the river, and possible safety hazards and economic losses for river users and tourism operators. Some of these effects many result in endangered habitats and/or irreversible losses.

Additional studies have suggested that the non-native Tamarisk has developed a hold on the river ecosystem and in addition to robbing the Colorado River of much needed water, it has pushed out native vegetation and habitats. Some of these studies further suggested that the holding back of river water in Lake Powell and the subsequent absence of regular flooding and swift currents in the canyon continues to enable the Tamarisk to grow unfettered. Attempts at releasing and encouraging the establishment of non-native species that consume the Tamarisk have not been as successful as initially hoped for.

Another study has remarked about how clear the waters are now, and that a fishery has been able to take hold below the dam due to the changed conditions. I believe this shows that we have significantly altered this once natural ecosystem.

There is no denying the benefits that the dam provides. From managing drinking and irrigation water supplies to ‘renewable’ hydroelectricity, the dam is a necessary evil on the river. Additionally the drought that has plagued the southwest for the last decade, if not longer, has put additional strains on how much water is retained vs. how much can be released and subsequently replenished. However, I believe it is possible to further mitigate the dams effects more thoroughly. River flows can be managed at the dam to more substantially ‘simulate’ spring snow melt and summer monsoon flooding by releasing more water. Water customers of Colorado

River water need to be encouraged to further reduce consumption, which would allow more flexibility in release schedules, and subsequently reduce the demands on the river supply down stream. I also believe it should be possible to dredge sediments from Lake Powell near Glen Canyon dam and inject them into the water that is released. Over time, the additional sediments carried down stream, combined with higher flows should work to rebuild the existing beaches, and aid in the creation of new sand bars and subsequently, new habitats.

Furthermore, the Grand Canyon Monitoring and Research Center needs to be an integral part of documenting the effects of any plans implemented in addition to verifying compliance with the goals and objectives of such plan. They have an existing base of knowledge and resources that makes them well equipped to be the arbiters in balancing the needs of all the interested parties.

I believe any long-term management plan should work to create a 'natural' habitat and subsequent user experience that shows we can be good stewards of our limited water resources while simultaneously ensuring the longevity of this pristine natural resource.

51

I attended the public presentation in Salt Lake City several weeks ago, carefully examined the handouts, and discussed the situation with various of your representatives. I am the Natural Resources Director of the Salt Lake League of Women Voters, and League does have strong positions on keeping our environment clean and healthy; but I speak for myself in this matter.

I have come to believe that Glen Canyon Dam should be managed differently in the future. Management has tried to manage the dam and river flows to both protect the environment and produce electricity. The outcomes for the environment have been less successful, but electric generation has been very successful till recently. The low water input from the Colorado, Green, and other rivers has been deleterious and has resulted in a loss of water behind the dam, enough to endanger the electical generation process.

Worse may be in store in future. On can't predict the weather, but historically, water flows were at a high when the Colorado River Compact was signed, and have decreased more or less steadily since then, including during and after the dam and lake construction. Methods of generating electric power that didn't exist when the dam was built are now available. Having given the total overview some lengthy thought, I have concluded that the dam and the water system should be used in future to maintain the local water-dependent environment, the Grand Canyon National Park and environs and the rest of the riverway, in better and more natural condition; land surrounding Lake Powell and the Glen Canyon Dam might be dedicated to manufacturing electric power with the newer technologies.

In addition, the EIS should proactively address Glen Canyon Dam and the river system's management if drought similar to the past several years (pre 2011) should occur. Although I said above one cannot predict the weather, climatologists are united in predicting general warming of the southwestern United States, and more drought. Thus I expect the EIS to include an "if drought then___x___" scenario.

The "if drought" scenario must take into consideration the kind of preemptive water grabbing that is currently in the forefront of water planners' minds as I write. I know of detailed plans to divert water from the system at or above Flaming Gorge and/or the White River for diversion to the East Slope of Colorado. Colorado's West Slope and high country counties are demanding access to more Colorado River drainage water. Plans have been made to divert water from the Green River for a nuclear power plant to be located at Green River UT; and a plan exists to divert Colorado River water to St. George UT in large quantities. Each diversion plan owns water rights sufficient for the presumptive claim, generally stating that "rights have not been exercised so far but are extant...." Regardless of the paperwork, there is not now, and never has been, enough water for all these additional uses to be satisfied. I don't believe it would require a drought to make the Glen Canyon Dam electric installation fail if these rights are all exercised.

I said earlier your planning should focus on sustaining "the local water-dependent environment." That includes the humans who currently live dependent on the water flows of the Colorado River. The "if drought" scenario must consider how to deal with the needs of the humans who depend at this time on water stored in Lake Powell, behind the dam. I believe it is your duty to apprise the public and planners of your carefully considered estimates for water availability. The southwest is basically very dry to be so heavily populated. Your EIS should state that you will take responsibility to inform local and state governments of these estimates and the studies used to obtain them. The greatest tragedy would be to have continued population growth and unsustained water supplies.

In summary: Your EIS should focus on managing the shrinking water supplies for the good of the water dependent environments and ecologies connected with it. If that kind of management is incompatible with water powered electrical generation, I recommend that be replaced, under your supervision, with renewable energy--resources are abundantly available on government land adjacent to the river and lakes. I recommend also that you take a proactive and if necessary preemptive position to protect the water supply to those living things that need it, including but not limited to humans. This anticipatory planning should also be part of the EIS.

52

Born as an Arizona resident I began fishing at the age of 12 yrs. old on the colorado river near lake havasu city. My favorite time of year to fish was in the time of trout stocking near Laughlin Nevada. I was very alarmed when I heard of the idea of removing rainbow trout from teh Glen Canyon area. There is no other place in the state thaty youcan find a trout fishery as abundant as this. The state of Arizona puts forth money every year to stock the trout species in various parts of the state. In areas where they obviously will never be able to survive past the winter season. I have lived in anchorage Alaska for a few years. Twin Falls Idaho for thrree years and have fisheed in California, Montana, Yellowstone National Park, and Washington. These states have natural trout fisheries throughout thier land. The Game and fish departments as well as the citizens of these states are very proud of what they have to offer and enjoy. These states and the people of these states profit from these fisheries financially as well as an emotional get away. There is no reason why the Game and Fish department of Arizona should take away that privelage by removing this species from Glen Canyon. It would be a waste of time, money and effort. In my opinion this would be a serious loss to the state financially. Removing this species from the area would cause financial upset to many companies. I work at sportsmans warehouse

of Phoenix. I am in charge of the cold water/fly fishing section of the fishing department. I know that Bass Pro Shop, Cabelas as well as Sportsmans Warehouse would see a huge impac on the fishing comunnity. I respect the idea of conserving the states naturall species. Although this is by far the worst idea I have ever heard of. Please do not continue on with this absurd idea.

53

I would like to encourage the N.P.S to continue to support the trout fishery at lee's ferry. Repudiate the nonsense that trout are detrimental to the Chubs, this is flawed logic at best it's like saying that Mammal ended the age of the Dinosaurs. The overwhelming cause of the chub decline is that the environment changed, the river was tamed by the hydroelectric dam that made the southwest an easier place to live, work and play. Gone are the days of massive flood and silty warmer water, it has been replaced by a cold clear beautiful river that at one point was the premier trout fishery in the west, if not the United states as a whole. The NPS support for the fishery is shamefully inadequate. As a tax payer I would like to see less waste on funds (the peoples money) and resources (trout that we paid to have put in the river). I fail to see any improvement for the chub by killing the trout, the science doesn't support your response. Leave the trout alone! In fact you should be tasked with improving their situation as the NPS you a charged with the support of the parks recreational uses, the is a major use of the park and you have neglected it, and now suggest to kill it off all together. In closing this is the NPS mission statement "the American people have entrusted the National Park Service with the care of their national parks. With the help of volunteers and park partners, we are proud to safeguard these nearly 400 places and to share their stories with more than 275 million visitors every year. But our work doesn't stop there.

We are proud that tribes, local governments, nonprofit organizations, businesses, and individual citizens ask for our help in revitalizing their communities, preserving local history, celebrating local heritage, and creating close to home opportunities for kids and families to get outside, be active, and have fun.

Taking care of the national parks and helping Americans take care of their communities is a job we love, and we need - and welcome - your help and support."

How is killing trout in the grand canyon incorporated into any of that

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54

I urge the LTEMP to follow historic flow regimes, allowing high flows that reflect historic seasonal high flows, to most closely mimic pre-dam river behavior/flows.

Seasonally adjusted steady flows will best protect the beaches, native streamside vegetation and enhance the reintroduction of endangered species.

The long term scientific monitoring required by the Grand Canyon Protection Act should lead to the protection and fostering of native vegetation, native fish and the elimination of non-native fish.

Besides the no-action alternative, the other alternative should be the long term, steady flow regimen. The most important third alternative would be to manage flows as if the dam did not exist.

There should also be research into how much of the power from the dam could be offset by energy efficiency measures instituted across the Southwest. The dam is simply an expensive response to our lack of convervation or efficient use of water or power.

55

1. When considering methods for delivery of adequate water flows please include CLIMATE CHANGE.

2. SEDIMENT AUGMENTATION - consider feasibility of augmenting the sediment supply to the Grand Canyon by mechanically bypassing the Glen Canyon Dam.

56

My concern is with maintaining the Lees Ferry world class fishing resource. I and my son have fished this area over a twenty year time period. Not nearly as often as I would like to but often enough. I realize there are a number of competing demands that will determine the flow rates emanating from the dam. I simply ask that due consideration be given to the health of the tail waters fishing area. There are precious few fly fishing steams in Arizona, and this is by far the best in the Northern Arizona area. It attracts fishermen from around the U S and beyond. Please work on a management plan that will help to save this resource.

57

The Colorado River is the source of Arizona's largest renewable water supply. The Arizona Department of Water Resources (Department) is the agency that represents the state's interest with regard to its apportionment of Colorado River water.

The state was greatly concerned when total reservoir storage began to drop precipitously in response to a critical and prolonged drought in the Colorado River Basin. The Department actively participated in the development of the Colorado River Interim Guidelines (Guidelines) for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead, adopted in 2007 by Secretary Kempthorne. The Guidelines were subject to public comment and revision through a National Environmental Policy Act Environmental Impact Statement process. The Guidelines were crafted to minimize shortages in the Lower Basin and avoid the risk of curtailment in the Upper Basin.

Interior's current effort 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 Federal law" should avoid impacting operations under the Guidelines.

The Department has represented the state on the Glen Canyon Dam Adaptive Management Workgroup (AMWG) federal advisory group, since it was formed. AMWG representatives

include a wide variety of affected stakeholders including tribes, state water, game and fish agencies, hydropower, and recreational interests.

AMWG stakeholders devote significant time and effort each year to understand the current scientific research, operating criteria, environmental, cultural and recreational resource needs that must be considered when developing dam operation recommendations to the Secretary. These recommendations balance complex, and sometimes competing resource needs.

In its Federal Register notice, Interior emphasizes the inclusion of stakeholders, including members of the Glen Canyon Dam Adaptive Management Program, in the development of the L TEMP. The Department encourages Interior to give great deference to recommendations from the AMWG stakeholders, given their indepth knowledge of the complex issues that must be considered in the development of this plan.

In November, 2010 the AMWG recommended qualitative Desired Future Conditions (DFC) to guide the development of recommendations concerning Glen Canyon Dam operations. This document was reviewed by the DOl agencies for consistency with existing law and policy, and is currently undergoing what is (hopefully) a final review, before being forwarded to the Secretary of Interior. The Department hopes that the AMWG will find the final recommendation acceptable to forward to the Secretary, and that the Secretary will then adopt the goals developed by his advisory group. These goals could provide a meaningful framework to guide development of the L TEMP.

The Department recommends that Reclamation and the Park Service prepare a scoping report that describes the issues identified during the scoping process and how those issues will be addressed in L TEMP development.

58

Grand Canyon Private Boaters Association (GCPBA) was founded in 1996 to provide a voice for the noncommercial boating community in the Grand Canyon. Our organization is currently comprised of approximately 400 paid members, and more than 2,500 internet subscribers. We are a non-profit 501(c)(3) organization, whose stated purpose is to:

Promote, encourage, and advocate for the interests of the non-commercial boating community on the river, particularly (but not limited to) access issues involving the Colorado River in the Grand Canyon

Our membership is directly affected by, and cares strongly about, the environmental, cultural, and recreational resources of the Grand Canyon (GC) river corridor, which are inherently impacted by Glen Canyon Dam operations. Therefore, on behalf of our membership as well as all future river corridor users, we offer the following initial comments on the Long Term Experimental and Management Plan (LTEMP, or the Plan) Environmental Impact Statement (EIS) now in preparation. A more complete submission will follow.

Summary

- Glen Canyon Dam operations continue to adversely impact, and prevent restoration of, the riverine environment in Grand Canyon.
- Complex issues will be involved in developing this management plan, yet GCPBA believes that a balance can be attained between ideal goals and real world considerations.
- Within that practical framework, dam operations should be structured in a manner that would help reestablish a healthy ecosystem in the river corridor.
- GCPBA seeks implementation of a flow regime that affords safe boating conditions, stabilizes remaining beaches, and supports reestablishment of now-depleted beach areas.
- Achieving that goal should entail a release program that accords with applicable science findings, in consultation with the GC Research and Monitoring Center (GCRMC).
- To the extent practicable, the release regime should be known in advance, approximate that of a naturally flowing river system, and include sediment and habitat preservation as central goals.
- Future operational plans should permit adaptation, as new scientific findings emerge and as other variables in the system change materially.
- GCPBA further recognizes there are equally important cultural and ecological values implicated in the Plan's formulation, adds its voice to others whose comments more strongly emphasize those issues, and believes that its views and recommendations will generally be consonant with theirs.
- GCPBA believes that future decision-making bodies and processes should include additional, more proportional representation by recreational and tribal parties.

Core Principles/Goals

- Reliance on Scientific Findings: LTEMP alternatives must be scientifically defensible and credible, with well defined hypotheses, and built on what has been learned from GCRMC and other prior related activity.
- Ecosystem Management/Plan Adaptability: The Plan should provide a foundation for an ongoing, science-based pursuit of long-term sustainability for the cultural, natural, and recreational resources of the GC river corridor. The Plan should serve as the catalyst for achieving an adaptive ecosystem management approach, which seeks 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." (Grand Canyon Protection Act, Section 1802a, 1992)
- Recreational Values: Beach utilization is a central component of the GC boating experience, yet beaches have been dramatically reduced in size and number by the dam's flow regimes. The Plan should ensure that the remaining beaches are preserved and restored, in order to maintain boaters' ability to transit all reaches of the river. As well, any new flow regime should acknowledge the adverse operational and boating safety implications of dramatic volume differentials.
- Operational Issues: The Plan should seek to establish a year-round navigable river, with dam releases modeled on natural seasonal flows. This would entail minimal day-to-day fluctuations, but flow changes—announced in advance—could be a part of this regime. Any such flow regime should incorporate occasional pulses of higher water that facilitate

sediment transport from the Paria and Little Colorado tributaries, with an effect resembling that of natural flash floods.
- Representation: Recreational and tribal parties have long-standing involvement in, and legitimate future concerns regarding, the Colorado River in Grand Canyon. These groups should be more fully and proportionately represented in the deliberative and decision-making components of the management program.

Recommended Actions

- Importantly, we strongly recommend an immediate extension of 45-60 days be granted, for preparation of scoping comments. The actual notification for this process was only made on October 17th, and the complexity of the issues and impending holidays argue strongly for more time to develop relevant input.
- Test the "best case scenario" presented in the article, "Is There Enough Sand? Evaluating the Fate of Grand Canyon Sandbars", GSA Today, Volume 18, Issue 8, August 2008.
- Ensure the Plan entails full reliance on the findings and capabilities of the GC Research and Monitoring Center.
- Develop a protocol for expedited approval of increased volume dam releases when the Paria, Little Colorado, or other major sediment sources are injecting large amounts of sediment into the main river.
- Ensure that the Plan limits the rate of increase/decrease in flow rates, to promote boater safety, and beach preservation and enhancement.
- Design intervening flows (between any scheduled high flow events) that maximize sediment retention on beaches and backwater areas, for the benefit of those traveling through the river corridor, preservation of cultural features, and maintenance of a healthy ecosystem favoring native biota.
- Ensure that minimum flows are no less than the long term average base flow of the river, and that they parallel the seasons when those historic base flows occurred.
- Consider options for introducing additional sediment below the dam, to augment that which is periodically available from tributaries.
- Increase representation of recreational and tribal parties in the deliberative and decision-making components of the new management program.

59

Please do not do anything to harm the rainbow trout population below the dam!

60

As a fly fisherman I travel to the cold water trout fishery below Glen Canyon Dam for the excellent fishing there. I spend money on food, lodging, guide services, travel expenses, and tackle. I do this because of the superb opportunity to catch really nice trout. If they were not there I would not support the local economy, the tackle manufacturers, and fly tying material suppliers throughout the country. There are precious few trophy trout waters in the southwest. The continued management of this fishery for trout is essential.

61

These are observations from someone who has lived in Page AZ for 16 years and uses the facilities and lake on a regular basis;

1. The experimental flows according to news reports have produced little solid scientific information and have wasted a lot of generation power and water.

2. The experimental flows have destroyed a Blue Ribbon Trout fishery that existed 15 years ago.

3. The money wasted on the flows from power generation to protect endangered fish could be spent building a fish hatchery and releasing them into some of the tributaries not threatened by other fish species.

4. Lake Powell is a vital recreation area that generates millions of dollars for the economy with the purchase of sporting equipment, lodging, travel and jobs. Lowered water levels reduce the visitation.

5. Long term plans should be influenced by sound scientific and business input not by environmental groups with an agenda. Glen Canyon and the Colorado River will never be what it was in 1800.

62
I have been taking GC river trips since 1968. I have a total of 54 trips. My most recent was in June of 2008. Most of my trips were as an oarsman for commercial outfitter, Grand Canyon Dories. Since 1981 all of my trips have been rowing my own boat on private trips.

I attended the SLC and the LV scoping meetings.

I have also read the bottom of page 65 of the USGS circular 1366 that I picked up at the LV meeting. (You might want to review it as well)

I understand the 8000cfs the commercial operators have suggested as a minimum for safety and convenience. We private boaters could probably go with a lower flow for both safety and convenience but what is really important is the flows that do the least amount of damage. I am of the opinion that the closer to a constant flow we can get the more likely there is minimal damage to the beaches. P65 seems to somewhat support this. (I'd always be interested in discussing this with your go with the flow expert). It seems that this constant flow should be near 9,000 cfs average. And as we all know averages are mathematical. We could have flows of 5,000 cfs and 13,000 cfs for equal periods of time and get an average of 9000 cfs or flow of 8000 cfs for 23 hours and 32,000 for one hour and still have an average of 9000 cfs. So fluctuations, and the minimum flow become important.

So a steady flow of about 9000 cfs seems to meet our goal of no further damages to the beaches and habitat.

Should we want to proceed to some beach building we get into auto triggers When Paria or LCR (or other side streams flash with heavy sediment loads. I know you have a concern for down stream boaters and campers when auto trigger events might take place. I do not find that a major concern for several reasons. There are already auto triggers for flow from the dam now, such as trouble on the grid by failure of another power generating plant. One more trigger should not

make a big difference. Boaters should be aware that they are camped on the flood plain of a river and that it is always subject to abrupt and unannounced fluctuations.

I do think there are ways to minimize the impacts down stream of an auto trigger of the LCR flashing and a subsequent release of water to keep the sand in suspension rather than allowing it to settle out too early.

I think advanced notice is out. I do think you could set parameters that would minimize the the effects of the ramp up or down. something like: the ramping would start say 8 hours after the event, with say no more than a 100% change in the next 8 hours and not to exceed 32,000cfs at any time. I am just making up numbers for illustrative purposes but something along these lines could work.

63
The thought of making the proposed changes is horrifying to me and to many of my friends. there are many reasons, I feel, that are significant. Here are a few:

The thought of humans “managing” resources is almost laughable. so far none of us has done very well.

The gains from removing rainbow trout to “ensure” a habitat for the chub is a great example. on one hand, some folks want to increase access for people and recreation. That is being done now very, very well. Then, others want to make sure the river is as close as possible to “the way it was” or the “way God intended” for it to be. Again, so ridiculous. Just look upstream at that big-ass dam and then try to sell that argument.

There are other areas to foster habitat for different species. Let’s explore some of the ones already proposed by game and fish and by residents who know far more about their land, their habitat, than any outsiders ever could.

Just because you have “studied” an area (primarily looking at statistics and some limited on-sight visits), just because you have a degree and just because you have pushed your trip on some other poor landowners, towns, counties and government agencies does not mean it must be good.

I have friends who have another radical theory: species go extinct. They come and they go. they have since life on earth began. Some say humans are the stewards of the “dumber” creatures. Some say perhaps humans are the natural catalyst to allow or deny survival of some species. In several ways, that view is supported by others...such as wildlife management.

In short, this is a dumb idea that should never have gotten this far. It just shows how skewed rational thought is compared to the folks affected.

A few dumb-ass people seem to be able to force their will onto many others, right or wrong. In this case it is wrong.

64

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implications of dramatic volume differentials. Operational Issues: The Plan should seek to establish a year-round navigable river, with dam releases modeled on natural seasonal flows. This would entail minimal day-to-day fluctuations, but flow changes announced in advance could be a part of this regime. Any such flow regime should incorporate occasional pulses of higher water that facilitate sediment transport from the Paria and Little Colorado tributaries, with an effect resembling that of natural flash floods. Representation: Recreational and tribal parties have long-standing involvement in, and legitimate future concerns regarding, the Colorado River in Grand Canyon. These groups should be more fully and proportionately represented in the deliberative and decision-making components of the man[agement program]. Representation: Recreational and tribal parties have long-standing involvement in, and legitimate future concerns regarding, the Colorado River in Grand Canyon. These groups should be more fully and proportionately represented in the deliberative and decision-making components of the management program.

Recommended Actions: Importantly, we strongly recommend an immediate extension of 45–60 days be granted, for prepara tion of scoping comments. The actual notification for this process was only made on October 17th, and the complexity of the issues and impending holidays argue strongly for more time to develop relevant input. Test the "best case scenario" presented in the article, "Is There Enough Sand? Evaluating the Fate of Grand Canyon Sandbars", GSA Today, Volume 18, Issue 8, August 2008. Ensure the Plan entails full reliance on the findings and capabilities of the GC Research and Monitoring Center. Develop a protocol for expedited approval of increased volume dam releases when the Paria, Little Colorado, or other major sediment sources are injecting large amounts of sediment into the main river. Ensure that the Plan limits the rate of increase/decrease in flow rates, to promote boater safety, and beach preservation and enhancement. Design intervening flows (between any scheduled high flow events) that maximize sediment reten tion on beaches and backwater areas, for the benefit of those traveling through the river corridor, preservation of cultural features, and maintenance of a healthy ecosystem favoring native biota. Ensure that minimum flows are no less than the long term average base flow of the river, and that they parallel the seasons when those historic base flows occurred. Consider options for introducing additional sediment below the dam, to augment that which is periodically available from tributaries. Increase representation of recreational and tribal parties in the deliberative and decision-making components of the new management program. Thank you for this opportunity to provide preliminary input into this important process. As GCPBA works to develop its more complete set of scoping comments, please feel free to contact me if I can provide any further information, or be of any service as you prepare the EIS.

65
By Federal Register Notice dated July 6, 2011 (76 Fed. Reg. 39435), the Department of the Interior through the Bureau of Reclamation (Reclamation) and National Park Service (NPS) published notice that it would prepare an environmental impact statement (EIS) and conduct public scoping meetings for the adoption of a "Long-Term Experimental and Management Plan (LTEMP) for the operation of Glen Canyon Dam". 76 Fed. Reg. 64104 (October 17, 2011)

The Department of the Interior (DOI) held six scoping meetings during November 2011 and sought comments as to the proper scope of the proposed EIS. The Arizona Power Authority (Authority) submits the following comments in response to that request:

The Authority receives and manages that portion of power produced from the Boulder Canyon Project (Hoover Dam and Power Plant) allocated to the State of Arizona a result of the Boulder Canyon Project Act of 1928. 43 U.S.C. ‘‘617 et seq. The Arizona Power Authority was statutorily delegated in 1944 with the responsibility for acquiring and marketing Arizona’s share of Hoover power. Id. The Authority contracted with and sells the Hoover power to 29 districts, utilities, cities, and towns in Arizona.

During the November 2011 scoping meetings, presenters offered information which indicated that DOI is considering including the Lake Mead National Recreation Area in the geographic scope of the LTEMP. The Authority believes that any attempt to include Lake Mead National Recreation Area within the scope of the LTEMP is inappropriate, duplicative of an existing conservation program, and beyond the scope of applicable law.

First, DOI notes that the alternatives to be considered in the EIS as indicated in the October 17, 2011 Federal Register notice should be “in keeping with the scope of the GCPA”. 76 Fed. Reg. 64104. The Term “GCPA” refers to the Grand Canyon Protection Act of 1992. P.L. 102-575, 106 Stat. 4669, 102 Cong. 2d sess. (1992). The Grand Canyon Protection Act of 1992 establishes additional operating criteria for the operation of Glen Canyon Dam to “project, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established.” Section 1802(a). That is, the GCPA focuses upon the impacts of the operation of Glen Canyon Dam upon Grand Canyon National Park and the Glen Canyon National Recreation Area: “[t]he purpose of the proposed LTEMP is to inform Departmental decisions and operate Glen Canyon Dam in such a manner as to improve and protect downstream resources in Glen Canyon National Recreation Area and Grand Canyon National Park.” 76 Fed. Reg. at 64104. The Lake Mead Recreation Area is not referenced either in the Act or in the DOI Federal Register notice and is not subject to the GCPA’s regulatory reach or regime.

The Lake Mead Recreation Area is also already subject to a relevant federal management program and Endangered Species Act (ESA) permits. Specifically, 57 entities, including the states of Arizona, California, and Nevada, Federal agencies, water and power users, municipalities, Native American tribes, conservation organizations, and other interested parties, came together in the late 1990’s and developed the Lower Colorado River Multi-Species Conservation Plan or “LCR MSCP.”

The LCR MSCP is a 50-year, multi-stakeholder, Federal and non-Federal partnership, responding to the need to balance the use of lower Colorado River water resources and the conservation of native species and their habitats in compliance with the Endangered Species Act (ESA). The LCR MSCP is a comprehensive approach to species protection developed after nearly a decade of work. The Bureau of Reclamation is the implementing agency for the LCR MSCP, while a Steering Committee made up of the Federal Participant Group , Arizona Participant Group, California Participant Group, Nevada Participant Group, Native American Participant Group, and Conservation Participant Group oversees LCR MSCP activities.

Congress approved the federal government’s participation in the LCR MSCP with passage of the Omnibus Public Land Management Act of 2009 (Omnibus Act). Public Law 111-11; 123

Stat. 1327 (2009). The Secretary of the Interior "is authorized to manage and implement the LCR MSCP in accordance with Program Documents". Section 9402(a). The Omnibus Act definition of "Program Documents" includes the LCR MSCP Implementing Agreement.
Section 9401(3 Section 2(B) of the Implementing Agreement defines the term "Lower Colorado River" to mean "the segment of the Colorado River within the planning area as provided." Section 9401(2).

Section 2(B) of the Implementing Agreement then defines the planning area for the LCR MSCP to include: "[t]he planning area for the LCR MSCP, as depicted on Figure 1-1 in the Habitat Conservation Plan (HCP) and the Biological Assessment (BA) and described in section 1.4.1 of the HCP and BA, is defined as areas up to and including the full-pool elevations of Lakes Mead, Mohave, and Havasu and the historical floodplain of the Colorado River from Lake Mead downstream to the Southerly International Boundary with Mexico. The historical floodplain includes all those lands that are or have been affected by the meandering or regulated flows of the Colorado River, which are delineated by significant changes in elevation between the floodplain and the adjacent uplands." That is, the Lake Mead National Recreation Area lies within the planning area for the LCR MSCP. Id.

The U.S. Fish & Wildlife Service also issued an Endangered & Threatened Species-Incidental Take Permit to the LCR MSCP. The permit authorizes programmatic activities to occur in the same geographical area as described in the Omnibus Act: "[t]he Lower Colorado River up to and including the full-pool elevations of Lakes Mead, Mohave, and Havasu and the historical floodplain of the Colorado River from Lake Mead to the Southerly International Border". Section 10 of Federal Fish and Wildlife Permit No. TE-086834-0 dated April 4, 2005 (Permit).

In issuing the Permit, the U.S. Fish and Wildlife Service found that the LCR MSCP is consistent with other conservation and regulatory programs on the River, including any program developed under the terms of the GCPA: (i) "H[abitat] C[onservation] P[lan] is consistent with and will complement other applicable conservation planning and regulatory programs and efforts addressing wildlife within the region; (ii) the taking of Covered Species authorized by this Permit will be incidental to the carrying out of otherwise lawful activities; [and] (iii) implementation of the HCP will, to the maximum extent practicable, minimize and mitigate the impacts of such incidental takings." Section F-1 of Permit. No duplicative regulation or over site under either the GCPA or ESA is necessary.

Next, one of the GCPA's primary concerns is the impact of operation of Glen Canyon Dam upon species of fish listed as endangered under the Endangered Species Act of 1973. 16 U.S.C. 1531 et seq. "The purpose of the proposed LTEMP is… and to determine whether to establish ESA Recovery Implementation Program for endangered fish species below Glen Canyon Dam". 76 Fed. Reg. at 64104.

With the exception of the Pike minnow, which is not present in the LCR MSCP Planning Area, all of the fish species of concern under the LTEMP, such as the razorback sucker, humpback chub, and bonytail chub, are Covered Species under the LCR MSCP and are already actively subject to management, population enhancement, and study in the Lower Colorado River by the LCR MSCP Steering Committee. See Section 2.C of the Implementing Agreement, LCR MSCP.

"The LCR MSCP Conservation Plan (see Chapter 5) includes a full range of conservation measures for all covered species". Section 1.4.2 Habitat Conservation Plan, LCR MSCP.

In summary, the waters/fish species in Lake Mead, which are also of interest under the proposed LTEMP, are already subject to a federally-approved and active conservation plan, the LCR MSCP. It would be beyond the scope of the GCPA and contrary to congressional approval of the LCR MSCP expressed by passage of the Omnibus Public Land Management Act of 2009 to expand the scope of the proposed EIS for the LTEMP to include or study the Lake Mead Recreation Area.

66

I am writing to express my strong support for the current LTEMP EIS. This is a critical and significant step in the ongoing process of protecting the multitude of downstream resources in Grand Canyon National Park. While I recognize and appreciate the importance of clean power generated through hydroelectric powerplants, I believe that protecting the environmental resources in the Canyon needs to take precedence over maximizing revenues from powerplant generation.

How the Colorado River flows through Grand Canyon are managed is the single biggest variable in protecting this National Park as mandated by the Grand Canyon Protection Act of 1992 and the 1996 Adaptive Management Program. It is remarkable how flows managed to protect any single one of the natural resources along the Colorado River, generally protect all of the riparian and aquatic resources. Sediment management protects and preserves aquatic habitat, terrestrial life, cultural resources, and recreational access to the river as delineated in the Colorado River Management Plan of 2006. It is critical that this EIS result in dam management alternatives that have these goals as the primary focus.

It is important to recognize that there is a finite amount of water passing through the system each year. Regardless of the time of day, the amount of fluctuations, or the season in which it is released, the annual inflow only has the capacity to generate a specific amount of power. The preferred alternative needs to recognize this and identify creative solutions to maximize resource protection, not maximize power generation with peaking flows.

The National Park System and each of the agencies and concessionaires who operate in National Parks are held to a higher standard than economic maximization. It is important that the Bureau of Reclamation be held to the same standard that was envisioned by the creation of the Grand Canyon as a National Park, World Heritage Site, and Natural Wonder of the World. Contrasting the economic gains of peaking power releases in a favorable manner with the environmental degradation that these flows create is simply not a reasonable outcome given what is at stake and the multitude of laws mandating protection as the primary objective.

Furthermore, the HFE's of the past years have demonstrated that we can successfully implement beneficial releases for the aquatic, riparian, and recreational resources. It is critical that the EIS alternatives incorporate parameters that allow for these releases to occur periodically as dictated by sediment inflow conditions and ongoing scientific data collection. They must also allow for adaptive management that includes larger experimental magnitudes that may have longer lasting

benefits. These processes have been shown to work and need to be part of the preferred alternative.

In addition to sediment management, reasonable river flows need to be maintained in order to provide recreational access for the public. For the safety and enjoyment of the rafting public, it is important that flows be limited to no less than 8,000 cfs.

Glen Canyon dam is necessary to support the American West. Let's choose to manage it in a way that demonstrates to the world that our priority is protecting Grand Canyon resources and recreational access to this treasure for ourselves and the generations to follow.

67

As an avid river runner and lover of Grand Canyon river system, I would strongly encorage the flow levels to be at or near 8,000 cfs to keep the beaches and river banks intact.

68

As a long time recreational user of the Grand Canyon and the river corridor, I think it is imperative that Glen Canyon dam operations do not adversely affect Grand Canyon National Park in a detrimental manner. I understand that the dam is there and is partly used for not just water storage, but power electric generation. I also understand that hydro power is a preferred method of providing peak demand. What is questionalble though, is using a dam such as Glen Canyon to blindly provide this peak power demand when it can so adversely affect one of the nations premier national parks. Also, as someone who has seen the changes dam operations have caused within the river corridor over an extended period of time (I did a lower end GC river trip in 1975, and my first complete trip in 1984) I can attest to the detrimental changes that have occured from large fluctuating flows. The moderate flows that began in the 1990's and the flow flows that have occured have all been steps in the right direction. Please do not sell out the health of Grand Canyon National Park for the sake of making a buck.

69

As a long time professional river guide and private river runner I support minimum flows of 8000 cfs with moderate fluctuations, continued environmental protection, and an emphasis on recreational access over power generation.

70

I am retired. I have lots of time to travel and fly fish. My wife fishes with me often. My 32 year old son fly fishes with me. We spend a lot of money going fishing. I used to go to Lee's Ferry to fish 3-5 times per year for two to five days at a time. I stayed in the motels there, ate at the restaurants and used the guiding services. Now I might go there once per year. Instead I make the longer trip to the San Juan River in New Mexico. This year we canceled our fly fishing club trip of 30 people to Lee's Ferry. Why? We do not go there much because of the present high water flow. We do not there because of the inconsistencies of the flow. The walk-in area can't be fished now. There is less area upstream to wade for campers, kayakers, etc. We never know what the flows are going to be. It also seems like people who are in charge 'care-less' about the fishery. They seem to base their decisions on changing flows on everything except the fishery.

When we fish the San Juan River in New Mexico, we are stopped by Fish and Game agents, not to see our licenses, but to ask us how we enjoyed the fishing there and what we thought could be done to make our fishing more enjoyable. Each year we go back there, we have noticed physical improvements to the river to enhance fishing. In a time when our economy is doing poorly, we should be promoting this fishery to help this local businesses. But even more important, Arizona has great asset in Lee's Ferry fishery. It should be protected and promoted when making decisions on water flows from the dam.

71

As a Grand Canyon river guide who spends approximately 100 days in the canyon, I would like to make it clear that I support the current LTEMP EIS. Though power generation is important, the environment and recreational use in Grand Canyon should take precedence over power plant revenues. Grand canyon is a special place and needs environmental protection and river flow is the biggest environmental variable. Large and frequent water fluctuations negatively impact the fragile canyon ecosystem. Glen Canyon dam is important and necessary to support the southwest. Please find a way to manage it in a way that protects Grand Canyon resources and recreational access to one of the world's treasures for generations to come.

72

I am writing to express my strong support for the current LTEMP EIS. This is a critical and significant step in the ongoing process of protecting the multitude of downstream resources in Grand Canyon National Park. While I recognize and appreciate the importance of clean power generated through hydroelectric powerplants, I believe that protecting the environmental resources in the Canyon needs to take precedence over maximizing revenues from powerplant generation.

How the Colorado River flows through Grand Canyon are managed is the single biggest variable in protecting this National Park as mandated by the Grand Canyon Protection Act of 1992 and the 1996 Adaptive Management Program. It is remarkable how flows managed to protect any single one of the natural resources along the Colorado River, generally protect all of the riparian and aquatic resources. Sediment management protects and preserves aquatic habitat, terrestrial life, cultural resources, and recreational access to the river as delineated in the Colorado River Management Plan of 2006. It is critical that this EIS result in dam management alternatives that have these goals as the primary focus.

It is important to recognize that there is a finite amount of water passing through the system each year. Regardless of the time of day, the amount of fluctuations, or the season in which it is released, the annual inflow only has the capacity to generate a specific amount of power. The preferred alternative needs to recognize this and identify creative solutions to maximize resource protection, not maximize power generation with peaking flows.

The National Park System and each of the agencies and concessionaires who operate in National Parks are held to a higher standard than economic maximization. It is important that the Bureau of Reclamation be held to the same standard that was envisioned by the creation of the Grand Canyon as a National Park, World Heritage Site, and Natural Wonder of the World. Contrasting

the economic gains of peaking power releases in a favorable manner with the environmental degradation that these flows create is simply not a reasonable outcome given what is at stake and the multitude of laws mandating protection as the primary objective.

Furthermore, the HFE's of the past years have demonstrated that we can successfully implement beneficial releases for the aquatic, riparian, and recreational resources. It is critical that the EIS alternatives incorporate parameters that allow for these releases to occur periodically as dictated by sediment inflow conditions and ongoing scientific data collection. They must also allow for adaptive management that includes larger experimental magnitudes that may have longer lasting benefits. These processes have been shown to work and need to be part of the preferred alternative.

In addition to sediment management, reasonable river flows need to be maintained in order to provide recreational access for the public. For the safety and enjoyment of the rafting public, it is important that flows be limited to no less than 8,000 cfs.

Glen Canyon dam is necessary to support the American West. Let's choose to manage it in a way that demonstrates to the world that our priority is protecting Grand Canyon resources and recreational access to this treasure for ourselves and the generations to follow.

73

I have been made aware of the new scoping process to determine how the river flow will be managed for years to come.

I would like to go on record that I support recreational access through beach building and moderated fluctuations with the minimum flow of 8,000 cfs. I believe this will allow for the environmental protection and the recreational access that is so much more important than power generation.

74

I am writing to express my strong support for the current LTEMP EIS. This is another critical and significant step in the ongoing process of protecting the multitude of downstream resources in the Grand Canyon National Park.

I support minimum flows of 8000 cfs, moderate fluctuations, environmental protection, and recreational access over power generation.

The preferred alternative needs to recognize that there is a finite amount of water passing through the system each year. Regardless of the time of day, the amount of fluctuations, or the season in which it is release, the annual flow only has the capacity to generate a specific amount of power. The preferred alternative needs to recognize this and identify creative solutions to maximize resource protection, not maximize power generation with peaking flows.

River flows need to be maintained in order to provide recreational access for the public. For the safety and enjoyment of the rafting public, it is important that flows be limited to no less than 8,000 cfs.

Glen Canyon Dam is important as a support to the American West. The dam flows need to be managed in a way that demonstrates to the world that our priority is protecting Grand Canyon resources and recreational access to this wonderful area for ourselves and the generations that will follow us.

75

I value the Colorado River as a precious water resource for our nation, as an ecological marvel and as a recreation resource. The Grand Canyon Protection Act requires managing agencies to use the best science to preserve the integrity of this mighty river. Having been in the Grand Canyon and on the river, I can testify as to the magnificence of the experience; I want future generations to be able to experience the Colorado in all of its greatness, along with its native flora and fauna.

You should develop a Grand Canyon first alternative that achieves the requirements of the Grand Canyon Protection Act and helps preserve beaches, native fish and cultural sites. A regular high flow/seasonally-adjusted steady flow alternative is imperative. This most closely mimics pre-dam conditions and is best for the river.

You should involve the Grand Canyon Monitoring and Research Center (GCMRC) in development of dam operations alternatives and analyzing pros/cons of different flow regimes. Science is your friend.

The LTEMP EIS should result in long-term (15 + years) operations change.

I hope you will act in the public interest by preserving the Colorado River in all of its glory for future generations.

76

I would like to provide my input for the scoping process concerning the management of Glen Canyon Dam. I understand there are many competing issues that must be addressed. I would like to see the maintenance of Lee's Ferry as a rainbow trout fishery take a significant place among these competing issues, with a goal of returning Lee's Ferry to the status of world renown Blue Ribbon Trout Fishery.

77

I am a regular fly fisherman at Lees Ferry along with my 3 grown sons and in the near future, thier sons. I am concerned that electoshocking the river or mechanically removing trout from the river will tremendously diminish this fishery that was once a blue ribbon trout river.

In 1998, myself, my three son and thier grandpa made an EPIC trip to the river and all three sons were hooked on trout fishing and the enjoyment brought by the Colorado River at Less Ferry.

Since that time we have frequented the river at least 3 times a year and now have a boat to travel upriver from Lees Ferry to camp and fish along the river. We have introduced fly fishing to many of their friends at Lees Ferry.

If the river is diminished in trout fishing excellance, we and many others will be forced to take our fishing (that means dollars to the local economy and state economy) to New Mexico and the San Juan River.

Please do not take measures at Lees Ferry and the Colorado River that will decrease the excellance in trout fishing that the river provides.

I would be glad to discuss this subject with anyone involved.

78

Well you make things difficult for the fishing ittpublic. Varying flows are unsafe at best. Light watercraft hav a very unsafe time. The high flows hav already cancelled two of our fly club outings and will do so again this year. Plz find a happy safe middle ground.

79

I will comment primarily on beach building flows, since that is the only thing I have adequate first hand experience with. I work down there in the canyon and as many before me have said, we have a problem with healthy beaches. I understand this will never be restored to pre-dam conditions as long as the dam is in place, but a couple of things are starting to seem obvious to me. This fall, after a long summer of high water, the water was quickly ramped down and we had huge beaches in places I have never seen them, and a lot of our regular camps were big and clean, so it was great. So it seems obvious that high flows are good at building beaches. However, my understanding is that it was ramped down fairly quickly, and indeed there appeared to be a big bench where these sandy beaches just dropped off into the water in a cliff. These calve away very quickly, especially when the flows are fluctuating. The bigger the fluctuation, the more beach it seems to take with it. The flows weren't fluctuating much this fall, but perhaps the rapid down ramping prevented a more gradual flat sandy transition from beach to water, so we were losing sand quickly. I imagine the GCMRC trips will study this and have some data. So to me it seems obvious that a lot of good work with beach building can be easily undone by fluctuating flows. So, I don't know how the canyon is looking these past couple of months, but it would be a shame to wash away the new beaches from last summer in another summer of fluctuating flows in 2012. Regardless of what the inflow and outflow of Lake Powell is projected to be in a given year, (and this could become very problematic in and of itself,) I think the health of the beaches should be a big consideration in how and when that water is released. Maybe no spike flow if there isn't enough sediment inflow in a season, but just steady flows for the summer, followed by a gradual downramping over a couple of weeks in the fall, if that is what the data shows can help build a nice flat beach to the water. Of course summer monsoons bring a spike flow with flash floods, but they are so sediment rich that they help in the long run, plus it is kind of a moot point because it isn't something we control anyway. Presumably, on a good year for sediment inflow, we would also start the season out, or end the summer season, with a spike flow to deposit that sediment which we could then manage over the course of the next year. I

have been all over the world, and I see the Grand Canyon as the world's greatest treasure. Our country should be proud to be the protectors of such a place, we should not take it lightly. When we keep chipping away at it, whether it be letting the beaches rot and wash away, or allowing uranium claims in the watershed to be explored, or any number of the issues that threaten us, we devalue this treasure we are meant to protect. River trips are often the highlight of people's lives, even if they only get to do it once. They will have fun no matter what the beaches look like, but there really may not be enough beaches for us to camp on if the trend continues. But the health of the system is, of course, valuable for its own sake, and not just what it does for us. I don't know what the current projection is on the cost to power consumers for steady flows, but the highest I have heard, from the WAPA representative at the scoping meeting, is 50 cents a month. That seems like a small price for power consumers to pay to protect an ecosystem of one of earth's treasures. Without the health of the Grand Canyon the local economy will weaken and it will cost everyone a lot more than 50 cents a month. Anyway this letter is unedited, so sorry if it's rambling, but this is what I have to say.

80
Living Rivers/Colorado Riverkeeper and Center for Biological Diversity are preparing scoping comments for the January 30, 2011 deadline of the LTEMP EIS.

However, in the interim, we would like to resubmit our scoping comments from 2007 sent timely during the LTEP EIS scoping process, which was ultimately suspended by the Department of Interior.

Please include these LTEP EIS scoping comments of our organizations from 2007 as part of the administrative record for the current LTEMP EIS.

February 28, 2007 Honorable Dirk Kempthorne Department of the Interior 1849 C Street, N.W. Washington DC 20240 Sent Via Fax: 202-208-6950

Re: Environmental Impact Statement for the Long-Term Experiment Plan for the future operations of Glen Canyon Dam Dear Secretary Kempthorne,

Living Rivers & Colorado Riverkeeper, and the Center for Biological Diversity request your immediate intervention into the Bureau of Reclamation's (Reclamation) Environmental Impact Statement for the Long-Term Experiment Plan for the future operations of Glen Canyon Dam (LTEP EIS).

While this National Environmental Policy Act (NEPA) process on Glen Canyon Dam's operations is long overdue, we fear that absent some significant retooling, Interior's approach to this EIS will only bring further damage to critical habitat and archeological sites within the Colorado River corridor of Grand Canyon National Park and Glen Canyon National Recreation Area.

As presently conceived this EIS does not sufficiently focus on the fundamental objective of recovering downstream resources. Nor does it appear this EIS will address the longstanding

stumbling blocks to the successful implementation of any preferred recovery alternative, which to this day continue to thwart valuable recommendations made in the past.

For more than three decades the public has been demanding that Reclamation aggressively respond to the devastating impacts Glen Canyon Dam's operations have brought to Glen, Marble and Grand canyons. This EIS itself is the result of the continuation of these efforts: part of the settlement agreement between the Center for Biological Diversity, et al., and yourself, is to address Reclamation's demonstrated lack of progress in achieving compliance with numerous federal environmental and resource management laws and statutes associated with Glen Canyon Dam's operations.

Our organizations had hoped that this agreement would have compelled Reclamation to finally address these matters through a comprehensive EIS process committed to recovery. However, it is clear from the scoping process underway to date, that Reclamation's interests lie more with going through the motions of compliance with the settlement agreement, and not resolving the issues underlying it.

With the exception of accumulating additional evidence to substantiate further litigation, as it now stands, this EIS will be yet another waste of the public's resources in support of Reclamation's ongoing failure to implement an actual recovery plan for this critical piece of the world's natural heritage being destroyed by the operations of Glen Canyon Dam.

We therefore request that you instruct Reclamation to restructure this EIS process in accordance with the recommendations below. This EIS process should then be re-launched to allow the public to be properly informed of the issues being addressed, and inviting them to contribute to something truly meaningful.

1. Accurately Represent the Baseline Issues

Reclamation must accurately articulate the severity of the issues at stake with this EIS to enable the public to adequately respond. This must include describing the nearly complete loss of the natural and cultural resources in Grand Canyon's Colorado River corridor as a result of the operations of Glen Canyon Dam, and Reclamation's failed efforts to comply with federal mandates to rectify them. This is the background and baseline situation that forced the initiation of a new EIS process, thus must be presented to the public for the NEPA process to be credible. Reclamation's omissions not only mislead the public about the issues in which they are being asked to comment, but help to reinforce a proposed action which only appears rational when viewed through such tainted lenses.

Although the impacts on Grand Canyon National Park are the sole impetus, and thus intent for this EIS, one is hard pressed to develop any grasp of these issues through Reclamation's materials. Reclamation also appears to actively avoid mentioning Grand Canyon whenever possible, preferring instead the term-"downstream resources."

This is far from a trivial matter. At best, it illustrates an ongoing pattern by Reclamation to shield the public from knowing the true impacts of Glen Canyon Dam, and at worst, reveals a

fundamental disconnect within Reclamation and Interior as a whole-as to what the real issues are, and how they should be addressed.

The superlatives associated with Grand Canyon are extensive. As such, Grand Canyon is one of Interior's most featured national parks. The ecology of its river corridor, too, was once unparalleled, as was acknowledged by your predecessor, Secretary Norton:

"The native fish community in the Colorado River in Grand Canyon was once one of the most unique in the world, supporting eight species that occurred nowhere else. Of the eight native fish species, three (Colorado pikeminnow, roundtail chub, and bonytail chub) have been extirpated from Glen and Grand Canyons; one — listed as endangered (razorback sucker) — has not been observed in the system since 1991; one (humpback chub) is listed as endangered; one (flannelmouth sucker) is a candidate for listing; and the remaining two (bluehead sucker and speckled dace) appear to be doing reasonably well in the Grand Canyon although much remains to be learned about their ecology and population dynamics." (2002 Report to Congress, page 23.)

Glen Canyon Dam's role in this demise of the Canyon's native fish is unquestioned. Be it the release of water of unnatural temperature, quantity, quality, and frequency; depriving Grand Canyon of sediment and nutrients needed for natural beaches and wildlife habitat; or so severely altering the aquatic ecology of the Colorado River allowing nonnative species to displace native species. Glen Canyon Dam has become a death sentence for the main artery that nourishes Grand Canyon National Park.

Such impacts clearly run contrary to the National Park Service Organic Act which compels Interior "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same by such means as will leave them unimpaired for the enjoyment of future generations." The dam's operations also run afoul of the Endangered Species Act of 1973. This is precisely why, in 1992, Congress passed the Grand Canyon Protection Act (GCPA) and forced Reclamation to complete its first EIS on Glen Canyon Dam's operations (1995), and established a monitoring and research program with a specific mandate that Reclamation alter dam operations to reverse this decline and work to recover all native fish species in Grand Canyon National Park.

But ten years after the GCPA was passed, Secretary Norton reported to Congress that Reclamation's efforts have failed to stem the population decline of the principle species it was mandated to protect:

"The first population estimate of humpback chub in the Grand Canyon suggests that in 1982 there were 7,000 to 8,000 humpback chub larger than 200 millimeters. Approximately ten years later, in 1992, it was estimated that there were approximately 4,000 to 5,000 humpback chub larger than 150 millimeters. In 2001, there were approximately 2,000 to 3,000 humpback chub larger than 150 millimeters. While there is some question over the accuracy of the absolute numbers, there is little question that the population of humpback chub in the Grand Canyon has declined over time. The decline in the abundance of fish larger than 150 millimeters appears to be the result of a sustained decline in recruitment beginning in 1992." (2002 Report to Congress, page 25.)

The failure of Reclamation's recovery efforts were further documented three years later by the United States Geological Survey's "State of the Colorado River Ecosystem in Grand Canyon" (SCORE Report) of October 2005.

"Overall, about 15%–20% of the adult humpback chub are dying each year. If this mortality rate and the dramatically reduced recruitment rate of young chub experienced since the early 1990s remain unchanged, there will be a decline in the adult population of humpback chub from the present 3,000–5,000 fish to a level of 1,500–2,000 adult fish over the next 10–15 years." (Page 45.)

"[D]am operations during the last 10 years under the preferred alternative of the MLFF have not restored fine-sediment resources or native fish populations in Grand Canyon, both of which are resources of significant importance to the program." (Page 208.)

"At the same time, nonnative fish have increased in both diversity and abundance. The reasons for the decline of native fish are commonly cited to include dramatic changes in the thermal, sediment, and hydrologic regimes of the river because of the construction and operation of numerous dams in the basin, the introduction of nonnative predatory and competitive fishes, and the introduction of diseases and parasites." (Page 208.)

"[I]t is clear that the restrictions on dam operations since 1991 have not produced the hoped-for restoration and maintenance of this endangered species. During the MLFF, basin hydrology has varied from drought to wet conditions and then back to drought conditions. Through these conditions, the decline of the humpback chub has continued. This trend leads to questions about whether daily, monthly, or even annual patterns of dam operation alone are relevant to native fish recruitment or whether changes in the sediment and thermal regimes of the river imposed by regulation have had the greatest influence on native fishes. Further, the issue of nonnative fishes and their potential to limit recruitment of native fish through predation and competition (although highly suspected by scientists as a significant factor) remains unresolved in Grand Canyon." (P. 208.)

"[T]he relatively stable habitat conditions created under the MLFF during protracted drought conditions, coupled with a coarsening of substrate in the river channel, appear to have greatly favored rainbow trout (Oncorhynchus mykiss), particularly in the Lee's Ferry reach, as reflected in their increasing numbers during the last decade." (Page 214.)

"Research and monitoring have conclusively demonstrated a net loss of fine sediment from the Colorado River ecosystem under the MLFF. Closure of Glen Canyon Dam eliminated about 84% of the sand that historically entered Grand Canyon." (Page 214.)

It's now been 15 years since the GCPA was passed, and Reclamation's dam operations have made no gains in recovering a single fish species in Grand Canyon. They have only reinforced what federal scientists already had told them: that without efforts to restore natural flows, water temperature gradients and sediment transport through Grand Canyon, there is no reason to believe that recovery can occur.

Despite the compelling evidence of poor performance, you yourself stated in December 2006, that the Glen Canyon Dam Adaptive Management Program (AMP) "is a cutting edge solution that provides an effective framework and process for integrating dam operations, downstream resource protection and management, and monitoring and research. We also are able to better safeguard natural resources and improve recreational opportunities at Glen Canyon National Recreation Area and Grand Canyon National Park."

The outreach materials also use the phrase "significant progress" when describing the AMP. However, when it comes to actually achieving what the principle objective of recovering endangered species, none of this is true. The public needs to know what the true state of play is in Grand Canyon, what cultural and ecological resources that have been lost due to the operations of Glen Canyon Dam and asked if they want to see it completely destroyed through continued implementation of activities such as those contemplated by the Long-Term Experimental Plan. If the public feels such losses are acceptable then end this fabled recovery exercise altogether. If not, then Interior must become serious about implementing an EIS that will achieve that result.

2. Accurately Assess the Failed History

A. Faulty Flows

Your positive spin on the AMP notwithstanding, the fact that this EIS process is underway at all is indicative that there must be problems with the program. As such, the EIS process must first conduct an independent audit to analyze how the performance of the AMP measures with the expectations of the GCPA and the AMP's charter and strategic plan.

One of the most critical aspects of the Grand Canyon Protection Act was to modify flows from Glen Canyon Dam to improve habitat conditions for native fish. Since the Act was passed, however, both Reclamation and the AMP have demonstrated resistance to implementing the flows and other recommendations from the US Fish and Wildlife Service (FWS) to achieve this objective. Even with a demonstrated reduction in native fish populations, Reclamation and AMP have been unwilling to implement a flow regime reflecting the river's natural hydrology, known as Seasonally Adjusted Steady Flows (SASF).

"It is my biological opinion that the proposed operation of Glen Canyon Dam according to operating and other criteria of the MLFF, as described in the Draft EIS and further modified by Reclamation's June 17, 1994, memorandum, 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." (Biological Opinion, page 3.)

"Operate Glen Canyon Dam according to operating and other criteria of the SASF alternative. Draft EIS Elements common to all alternatives, habitat and maintenance flows, and elements two through seven of the Reasonable and Prudent Alternative would be part of this recommendation. The SASF has been analyzed as completely as any other alternative in the Draft EIS and would not require any additional analysis." (Biological Opinion, page 42.)

Reclamation defended its position to ignore this recommendation in its 1996 Record of Decision on the Final Glen Canyon Dam EIS stating:

"the benefits from the Seasonally Adjusted Steady Flow Alternative were uncertain given the improvement in habitat conditions for nonnative fish this alternative would provide. Seasonally adjusted steady flows also would create conditions significantly different from those under which the current aquatic ecosystem has developed in the last 30 years and would adversely affect hydropower to a greater extent than the other two alternatives. The Modified Low Fluctuating Flow (MLFF) could substantially improve the aquatic food base and benefit native and nonnative fish. The potential exists for a minor increase in the native fish population." (1996 Record of Decision, Appendix G-12.)

The principle objective of most recovery strategies is to attempt to restore native habitat conditions, in this case stream flow, for the affected species. It was precisely the conditions of the previous three decades that had brought about this decline, yet Reclamation felt compelled to preserve as many of the unnatural conditions it created during this blip in history, as opposed to initiate flows more consistent with those of the previous three million years during which these species evolved.

While Reclamation argued that it wished to be cautious and not aggressively stress the system, they had already taken a significant step in altering Glen Canyon Dam's operating regime with the MLFF preferred alternative. The modifications to the hourly up and down ramping of river flows into Grand Canyon to meet the demands of the Western Area Power Administration (WAPA) had already somewhat altered the unnatural conditions of the past 30 years. What Reclamation and WAPA were not willing to do was support further flow restriction that would compromise hydroelectric revenue streams by an estimated 25 percent should the SASF be implemented as the preferred alternative.

While the Biological Opinion noted that during periods of high water, elements of MLFF may be appropriate to the extent they were consistent with the natural hydrograph, it was unambiguous regarding what to do during low water years, as has been experienced in the Colorado River for the past seven years.

"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, as described for those seasons in the SASF." (Biological Opinion, page 35.)

"If sufficient progress and good faith effort is occurring towards initiating experimental flows, implementation of experimental flows may occur later in 1997. If the Service believes there is not sufficient progress, Glen Canyon Dam would be operated as SASF flows during spring through fall (April to October) beginning in 1998." (Biological Opinion, page 32.)

In the last two FWS responses to Reclamation regarding sufficient progress on achieving this specific element of the Reasonable and Prudent Alternative (RPA) contained within the Biological Opinion, FWS clearly stated that progress was not being achieved.

"This element has not seen sufficient progress. Other than the controlled BHBF in 1996, there have been minimum efforts to develop experimental flows for native fishes. (Review of Sufficient Progress, May 27, 1999, page 3.)

"This element has not seen sufficient progress. We agree with your assessment that the delay in developing this element is largely attributable to the to the program being part of the adaptive management process, where multiple objectives, research and work assignments compete for time and attention of AMWG members. However, given the documented decline of humpback chub in Grand Canyon, additional delays in developing a program of experimental flows for native fish should not occur. (Review of Sufficient Progress, June 13, 2002, page 3.)

In light of this lack of sufficient progress, and the fact that flows have not exceeded 8.23 MAF since 2000, the RPA further states that "Glen Canyon Dam would be operated as SASF flows during spring through fall (April to October) beginning in 1998." (Biological Opinion, page 35.)

Further support for the urgency to embark on steady flows came in 2002 from Grand Canyon Monitoring and Research Center's (GCMRC) principle aquatic ecology partners:

"Descending hydrographs of spring and fall are the best periods for the growth of the aquatic food base. We recommend a decade of the SASF alternative, with spring beach building flows as the climate permits and unlimited hydropower ramping within 10% of the predicted seasonal mean. We feel these flows in combination with alien fish suppression and thermal modification of GCD could make Grand Canyon a sanctuary for native fishes of the Colorado River basin." (Benenati, et al., 2002, page 10.)

The frustration of FWS and others is far from surprising since there has been only one low and steady flow test carried out, that in the summer of 2000. Worse still, now seven years later, the analysis of this test has yet to be completed. This is very discouraging, as it has been 11 years since the first experimental test flow took place, and it was the 2000 experiment that demonstrated that humpback chub populations "may have benefited from substantial in-stream warming." (USGS Press Release, August 3, 2006.)

The 1996 test of a Beach/Habitat Building Flow (BHBF) at 45,000 cubic feet per second (cfs) was conducted with much fanfare, and is still highly promoted by Reclamation as a major accomplishment. However, as was reported five years ago by the American Geophysical Union concerning the experimental releases from Glen Canyon Dam to conserve sediment, "Work conducted since the 1996 controlled flood has shown that the multi-year accumulation hypothesis on which the EIS was based is false" (Eos, American Geophysical Union, v. 83, no. 25, page 237.)

The winter fluctuating trout suppression flows of 2004 and 2005 were a hastily conceived action in response to new information about declining humpback chub estimates. As pointed out by

Korman et al., June 2005, these experimental flows were proven to be ineffective and have been discontinued. Surprisingly, these flows have now been included as one of the four alternatives for the LTEP EIS submitted by AMP in December 2006. Constrained releases in the fall of 2004 and 2005 were used to test the conservation of sediment (6,500 to 9,000 cfs). This has proved useful to understand that sediment can be retained during low flows, but the experiment has not provided any direct evidence of habitat benefits to endangered fish.

In November 2004 a BHBF similar to what was undertaken in 1996 was carried out at 42,000 cfs to coincide with sediment inputs from the Paria River. This experiment was considered more successful than the 1996 BHBF experiment in distributing marginal amounts of sand, but still in insufficient quantities to have any lasting effect on critical habitat conditions. Moreover, the subsequent trout suppression flows removed any sediment gains that may have occurred.

Overall, AMP's flow experimentations have been ineffective and imbalanced, with most of the focus on failed efforts to conserve sediment. With the exception of a few months in the summer of 2000, Reclamation and AMP have ignored the principle directive by FWS to carry out steady flow experiments at various times throughout the year

To this day, when it is clear that some significant alteration of this failed flow regime must be implemented, there remains virtually no support from Reclamation or AMP to embrace establishing a flow regime consistent with the river's natural hydrology as was called for by the FWS 12 years ago.

In the AMP's "Assessment of the Estimated Effects of Four Experimental Options on Resources Below Glen Canyon Dam" (the alternatives submitted as scoping comments for this EIS on the Long-Term Experimental Plan), two of the four options would allow even less restrictions on dam operations than the current MLFF baseline. The other two would make only modest changes to the current practice, with just Option B mentioning the SASF alternative, and to be implemented for just one two-year period, and not beginning until August 2011.

B. Failure to Implement Selective Withdrawal

The 1994 Biological Opinion and the 1996 Record of Decision both stressed the need to implement a mechanism to warm the water released from Glen Canyon Dam (selective withdrawal or temperature control device). The water's constant 46 degrees (F) temperature is too cold for native fish, which evolved with an annual temperature gradient from near freezing in winter months to up to 80 degrees (F) in the summer.

In 1998 the AMP initiated environmental review for proposed modifications to Glen Canyon Dam's intake towers that would allow for selective withdrawal, but this was suspended without sufficient explanation. Parties concerned with the impacts warmer water may have on the nonnative trout fishery, as well as the project's overall costs, were seen as impeding the process. Public pressure and the continued decline of humpback chub numbers forced the NEPA process to be started anew in 2003. But here, too, the process became bogged down as cost concerns were again raised.

The situation which compelled selective withdrawal to be a core component of the AMP's strategic plan is only more serious now, but Reclamation and AMP have refused to complete the evaluation, much less get a temperature control device installed. The likelihood that such a capital investment would be required, and that warmer water may impact the trout population was known to both Reclamation and FWS when they included this common element in the ROD and RPA respectively, thus such concerns should not have impeded the implementation.

"Temperature modification has been identified as central issue to be resolved in order to develop a mainstem spawning population of HBC. Reclamation has been working diligently to accelerate the technical and administrative process necessary for construction of the selective withdrawal structure. Funding will be requested as a separate appropriation through the Federal budget process under Section 8 of the Colorado River Storage Project Act." (Reclamation Response to FWS Biological Opinion, April, 6, 1995, page 4.)

Only as a result of the recent settlement agreement is the temperature control device now slated to have its environmental review completed as part of the LTEP EIS.

C. Failure to Establish a Second Population of Humpback Chub

The RPA instructs Reclamation to establish a second population of humpback chub in the main stem Colorado River below Glen Canyon Dam, or in one of Grand Canyon's tributaries. Obviously the habitat of the main stem provides the most diversity and is the logical choice. This habitat is wide and abundant throughout Marble and Grand Canyon, and much preferable to a small and isolated tributary stream.

No protocols have been fully developed for locating an appropriate site on the tributary streams for a second population. For example, the habitat conditions required, water quality, consultation with the Havasupai Nation (Havasu Creek), and/or how modifications to the habitat will be implemented to achieve suitable habitat conditions. Nor have any studies been fully completed, or are past due, on the genetic differences between those near the Little Colorado River and other aggregations, as specifically requested by FWS.

D. Lack of Little Colorado River Management Plan

As the AMP has yet to recover habitat conditions in the main stem Colorado to allow for humpback chub to spawn, the Little Colorado River (LCR) remains their sole spawning habitat. As such, the RPA instructed Reclamation to develop a management plan for the Little Colorado River. While Reclamation claims the LCR lies outside its jurisdiction, this does not mean, as FWS has explained, that Reclamation could not have been instrumental within a 12-year period to ensure a plan is put in place.

E. Lack of Progress on a Management Plan for the Razorback Sucker

The Grand Canyon reach of the Colorado River was designated as critical habitat for the razorback sucker before 1995. FWS instructed Reclamation in the RPA to assist in developing a management plan to re-establish habitat to support viable populations in Grand Canyon National

Park. While a workshop has been conducted, it did not, as FWS stated, provide sufficient information to aid in the development of a plan and Reclamation has not been responsive to helping to identify recovery sites that provide spawning, nursery areas, floodplain, temperature and other aspects for restoration potential.

The directives set forth by the Grand Canyon Protection Act, the ROD and the RPA were clear, as were those set out in the AMP's charter and strategic plan, but Reclamation and the AMP refuses to work to meet even these basic benchmarks, much less exhibit the forward thinking and pro-active leadership to bring about resource recovery in Grand Canyon. How can the public expect that such resistance will be any less apparent in future management plans for operations at Glen Canyon Dam?

3. Failure of the AMP Administration and Science

A. Address the Lack of Appropriate Leadership

The ROD called for the establishment of the AMP as a stakeholder group to advise the Secretary of the Interior on implementation of Grand Canyon programs. Known as the Adaptive Management Working Group (AMWG), this group is dominated by representatives of the seven basin states, hydropower marketers and consumers, along with environmental and recreation interests. These representatives have no legal responsibility, but have been given de-facto decision-making authority for determining the fate of Grand Canyon's River ecosystem. While promoted as an all-inclusive mechanism to ensure everyone interested in Grand Canyon's recovery have their say, this big tent strategy has proven to be nothing more than a convenient buffer to defend Interior against critics who challenge the lack of progress on mitigating the impacts of Glen Canyon Dam.

As exemplified by AMWG's unwillingness to comply with RPA programs, the decline in humpback chub, the extirpation of the razorback sucker, continued loss of essential sediment, and accelerated degradation of archeological sites, the AMWG has clearly failed. After 12 years of squandering public funds at the expense of Grand Canyon's river ecosystem, AMWG's proposed action for the LTEP only further illustrates that the group is more focused on self-preservation than in the resource it is supposed to protect.

This EIS is the result of interventions by parties outside AMP, due to the AMP's lack of commitment to undertake their responsibilities as defined by their strategic plan, charter or the Grand Canyon Protection Act. There is no need for most of these "stakeholders" to have a seat at the decision-making table. The management process for the river corridor in Grand Canyon is guided by federal laws that are not in need of a stakeholder group's interpretation or obfuscation.

The primary interest in the preservation of cultural and natural resources downstream of Glen Canyon Dam resides with the National Park Service, the Fish and Wildlife Service, and the Tribes. Reclamation should have no role in the decision-making as it relates to GCPA compliance. This should have been quite evident as early as 1995 when Reclamation clearly stated it was not interested in recovery of endangered species, only removal from jeopardy.

"By definition, the elements of an RPA describe an alternative action, which will avoid the likelihood of jeopardy, as opposed to actions to achieve recovery. The elements of the RPA seem to be focused on recovery. Recovery actions should be included in the Opinion only as a conservation recommendation." (Reclamation Response to FWS Biological Opinion, April, 6, 1995, pages 2-3.)

"We fully recognize our responsibility under Section 7 of the ESA to not only avoid action which will result in jeopardy to listed species, but a Federal agency we are also directed to utilize resources in furtherance of the ESA through carrying out programs for conservation of endangered species." (Reclamation Response to FWS Biological Opinion, April, 6, 1995, page 3.)

This statement is farcical. Were it true:

The Biological Opinion it refers to would have been completed several years earlier, as Reclamation would not have dragged its feet on completing the original EIS, which commenced in 1989. No, only as a result to an act of Congress, the GCPA itself mandating completion of the EIS, did Reclamation finally, "recognize its responsibility under Section 7 of the ESA."

Reclamation would not have been quibbling with FWS over if and where such recovery objectives should be contained in an FWS Biological Opinion, or later arguing about subsequent recommendations in FWS's response to Reclamation's insufficient progress to the RPA. No, Reclamation would be embracing FWS advice on how recovery can best be achieved.

No settlement agreement mandating yet another EIS would have been required to resolve Reclamation's continued failure to comply with Section 7 of the ESA, and no letter such as this would have had to be written outlining the obvious deficiencies with Reclamation's recognition of its responsibilities under the ESA and GCPA.

It is long past due for Interior to remove Reclamation of any role relating to how Glen Canyon Dam will be operated to ensure compliance with the GCPA. You must immediately direct NPS and FWS to be Interior's primary voices cooperating with scientists in advising you as to how Reclamation must operate Glen Canyon Dam, as the GCPA states, "[T]o 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."

Reclamation and all as other parties are free to intervene as allowable by law, but they should no longer be utilized to create an unnecessary ad hoc group that has a proven track record of ineffectiveness and obstructionism.

B. Cease to Support the Competing Objectives

Since the time of drafting the first EIS for Glen Canyon Dam, completed in 1996, there have been two distinct forces working against recovery of native fish in Grand Canyon: hydropower generation and nonnative fish protection. Nowhere in the Grand Canyon Protection Act is there any direct or indirect reference to these interests, yet they have becoming a major force nonetheless. Both have representatives in the AMWG, and of the 12 goals in the AMP Strategic Plan, two accommodate these interests directly:

> Maintain power production capacity and energy generation, and increase where feasible and advisable, within the framework of the Adaptive Management ecosystem goals.
>
> Maintain a naturally reproducing population of rainbow trout above the Paria River, to the extent practicable and consistent with the maintenance of viable populations of native fish.

As noted above, one of Reclamation's primary rationales for adopting the MLFF was to preserve hydropower benefits that would have been lost had Reclamation followed the SASF recommendations of FWS. Nearly every issue affecting dam operations within the AMP program is heavily debated and influenced by hydropower interests. Whether it be a Beach/Habitat Building Flow (BHBF), that causes more water to pass through the dam in excess of what the generators can accommodate, or running low flows in the summer months far below what hydropower interests would prefer, hydropower interest represent a major stumbling block to independent scientific experimentation necessary to allow for species recovery in Grand Canyon National Park.

Efforts to find balanced flow regimes that benefits both endangered fish species and hydropower are irrational as the science shows clearly that steady-state water flows are more beneficial to native fish, whereas they compromise hydropower revenues. Additionally, as the primary source for AMP funding is to come from hydropower revenues, having these interests in the decision-making process regarding recovery management choices, adds further to this conflict of interest.

The Grand Canyon Protection Act clearly recognized that to achieve its objective of mitigating Glen Canyon Dam's impacts to achieve habitat restoration for endangered species, hydropower production and revenue losses would likely be incurred. Section 1809 of the Act, "Replacement Power," deals solely with this issue.

"shall identify economically and technically feasible methods of replacing any power generation that is lost through adoption of long-term operational criteria for Glen Canyon Dam as required by Section 1804 of this title. The Secretary shall present a report of the findings, and implementing draft legislation, if necessary, not later than two years after adoption of long-term operating criteria. The Secretary shall include an investigation of the feasibility of adjusting operations at Hoover Dam to replace all or part of such lost generation. The Secretary shall include an investigation of the modifications or additions to the transmission system that may be required to acquire and deliver replacement power." (Grand Canyon Protection Act, page 5.)

Furthermore, while the GCPA makes specific references to preserving flows to meet water delivery allocations, it makes no such reference as regards to power generation. Therefore, the only responsibility power interests should have is to undertake their own necessary planning for power sales and distribution, based on mitigation strategies necessary to achieve compliance with the Act. They should have no role in determining how, when or if any such strategies are implemented.

The same holds true for the protection of nonnative fish. The AMP wants to protect rainbow trout populations in one section of the river, while it is has spent upwards of $800,000 annually to remove them downstream.

It is known that cold-water and warm-water nonnative fish, such as rainbow trout and catfish, predate on juvenile humpback chub. (Marsh and Douglas, 1997; Gorman, et al. 2005.) Other studies have documented trout predation on threatened native fish, such as speckled dace and bluehead sucker. In January 2003, GCMRC's mechanical trout removal crew caught a rainbow trout with a flannelmouth sucker in its mouth (USGS press release of 3/4/2003).

While some assert that the real problem is brown trout predation on humpback chub, since an individual brown trout is more likely to include fish in its diet than an individual rainbow trout, the higher concentration of rainbows over brown trout causes rainbow trout to exert a higher overall impact on humpback chub. Estimates suggest that prior to recent trout removal near the Little Colorado River confluence, there were about 39 times more rainbow trout than brown trout. (SCORE Report, page 48.)

The National Park Service, which itself once stocked trout in Grand Canyon tributary streams, has abandon this practice altogether, and has even erected weirs in an attempt to impede trout populations from spawning in these tributary streams.

As has been demonstrated during the recent drought, the warmer water, combined with low levels of dissolved oxygen, from Glen Canyon Dam releases have contributed significantly to reducing rainbow trout populations above the Paria River, so much so that Arizona Game and Fish had contemplated a restocking program prior to threatened litigation. Putting in more fish when there's no food will merely force them to migrate downstream to survive, potentially exacerbating the problems for the humpback chub.

Attempting to preserve this nonnative trout fishery stands in direct conflict with a principle requirement of the AMP: to implement the selective withdrawal program to increase the water temperature being discharged from the dam. Nonnatives have thrived in the cooler waters, while the natives continue to decline.

Such counterproductive objectives and stakeholders must be removed from the AMP process.

C. Address the Lack of Scientific Rigor A central component of the original AMP design was the development and administration of an independent, peer-reviewed science program. This program would carry out unbiased scientifically credible studies to inform the AMP's decision-making process. A small science staff (less than 12) was to administer the program through the

competitive bidding process and to award research contracts to the most competent bidder. Both the bidding process and final reports were to be peer-reviewed to assure quality and non-biased reporting.

The GCMRC, the science management component of the AMP, is now operating much differently than established in the original guidelines set for this administrative component of the USGS. The science staff is very large and most programs are being done in-house with no independent peer-review.

Prior to the EIS the Glen Canyon Dam Environmental Studies program was seriously criticized by the National Research Council (NRC) for this same failure to meet accepted methods to assure scientific credibility. An independent review of the current AMP science program would reveal a loss of integrity and standing when the original model was abandoned in favor of what currently exists today in the GCMRC.

At a time when the Grand Canyon is about to lose another native fish species, the AMP has cut back on scientific work, seemingly at the request of the Western Area Power Administration, whose hydropower revenues are used to fund the science. The research for the 2000 Low, Summer Steady Flow (LSSF) represents one of the most blatant examples of how the AMP science program has been affected. First, the experiment was fast tracked, with limited opportunity for outside input or competitive bidding for the monitoring. Pre-experiment flow data was not compiled and therefore the design of the experiment may not have been properly formulated. Scientists did not start collecting data on the river until after the first spike flow occurred. Although the design of the experiment was released for the competition, the one proposed by the contractor was not accepted. Also, this experimental flow was originally proposed to benefit native fish with relatively low, steady flows in accordance with the Biological Opinion, but the final experiment allowed for less than the recommended time.

The 1995 EIS assumed that experimentation and recovery efforts would be achieved with firm attention paid to proper scientific protocol and management of public funds toward endangered species recovery in Grand Canyon National Park. This is not occurring. In fact the opposite is true. The AMP has enacted budget reductions and caps without supplemental funds to adequately maintain and preferably improve monitoring and research in Grand Canyon National Park. Finally, AMP is not providing adequate management leadership while the USGS/GCMRC is not contributing credible independent data required by the mandates prescribed by the ROD, RPA and subsequent charters and guidelines.

It's unfortunate that the same weakness observed by the National Research Council in 1999, are still as relevant today: "The adaptive management chapters of the strategic plans suffer from the following weaknesses: (1) lack of clarity of the Center's roles within the Adaptive Management Program; (2) inadequate discussion of competing goals and "visions;" (3) lack of clearly-defined linkages between adaptive management, ecosystem management, and social learning; (4) disparate management objectives and information needs; (5) inadequate definition of the core adaptive management experiment; (6) insufficient contingency planning; (7) insufficient decision analysis; and (8) uneven progress toward independent program review." (Downstream: Adaptive

Management of Glen Canyon Dam and the Colorado River Ecosystem, National Science Council, page 59.)

The AMP has run amuck with no clear leadership or direction. It's not that its mission has been unclear, but its structure is functionally incapable of achieving it.

Unless these shortcomings are addressed, revising its work plan through a new EIS will only exacerbate, not resolve, these problems. To that end, the AMP must discard AMWG and put in place an advice and decision-making apparatus based primarily on scientific principles. A wholly independent scientific body should be commissioned, that works with the Park Service, FWS and Tribes to achieve the goals of the Grand Canyon Protection Act. Reclamation must no longer play any leadership or advisory role, in the AMP process, merely furnish any necessary information, and follow through on implementing operational changes at Glen Canyon Dam.

4. Must Revise the Proposed Action

Reclamation states that the, "Adoption of a Long-Term Experimental Plan is needed to ensure a continued, structured application of adaptive management 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 were established." (Federal Register Notice of 12/12/2006.)

Given that no significant progress has been made, and neither Reclamation nor the AMP has demonstrated the willingness to carry out the structured application of adaptive management that has already been put before them, along with known contradictions and decision-making impediments, why would such a process be continued?

It should be noted that the LTEP being conceived through this EIS process itself is the result of the failure of the AMP to complete its assigned tasks. This plan was launched in 2004, with the goal of finalizing the plan in 2005. It was not to be taken on by Reclamation as a convenient mechanism under which to attempt to comply with the conditions of the 2006 settlement agreement.

Reclamation's proposal to undertake the LTEP only further illustrates its inability to address the totality of issues that Reclamation's policies are having on Grand Canyon National Park. While some experimentation may indeed need to continue, experimentation is merely a tool, and should not be an objective in and of itself. It is precisely such reasoning that has lead to the downward spiral of resources in Grand Canyon. So long as experimentation continues, Reclamation has felt that it has been fulfilling its duty to the public, although throughout this time the natural and cultural integrity of Grand Canyon's river corridor has only worsened.

The EIS's stated objective must be to develop alternatives that will bring about the preservation and recovery of the natural and cultural resources of the Colorado River corridor through Grand Canyon National Park and Glen Canyon National Recreation Area. To what extent Glen Canyon Dam's continued operations impedes or compliments this objective can then be evaluated through the standard practice of identifying the alternatives.

Further experimentation may or may not be warranted, but if so they should represent components of alternatives to achieve specific resource recovery and preservation objectives, not the objective of the EIS itself. Moreover, how and if the current elements and structure of the AMP are to be "continued" must be subject to the same principle: they must demonstrate how their continuation will help realize the successful implementation of the alternative, when history has proven otherwise.

5. Issues to be Addressed in the EIS

A. Reformulate the AMP's decision-making structure

To avoid repeating the past failings of the AMP, the EIS must contain an independent review of the AMP's progress to date in fulfilling its charter, strategic plan, the elements of the ROD and the RPA. This should include evaluating all experimentation to determine what baseline knowledge currently exists, and gaps if any need to be filled. All current and former GCMRC employees and consultants should be surveyed to determine their views on the efficiency and rigor of the experimentation to date and the leadership and follow through by GCMRC and the AMWG with regard to scientific findings. The review must address the issue of competing objectives, such as hydropower generation and exotic trout preservation, which have influenced management actions. How well the current AMP has addressed the 1999 National Research Council findings in Downstream: Adaptive Management of Glen Canyon Dam and the Colorado River Ecosystem should also be addressed.

These findings should be used in developing the framework for a new AMP decision-making structure to replace the AMWG comprised solely on those agencies with primary jurisdiction over the management of those downstream cultural and natural resources in Glen Canyon National Recreation Area and Grand Canyon National Park. The findings should also be used to establish a wholly independent GCMRC outside of the DOI to militate against agency bias in the quest for the best science to guide resource protection.

B. Consider climate variability and change

At an increasing rate, federal scientists are warning that DOI should prepare for flow reductions on the Colorado River in upwards of 10 to 40 percent as we continue through this century. The DOI must partner with National Oceanic and Atmospheric Administration to ensure the most up-to-date climate modeling is applied in evaluating each alternative's flexibility to climate variability. Particular attention must be given to evaluating alternatives against scenarios where Lake Powell reservoir has not only reached dead pool, but remains at dead pool over multiple years.

C. Identify appropriate timeframe

Based on the findings of the independent review, the EIS team should determine over what time frame, if any, the alternatives contained within this EIS should be implemented. Some proposals offered already for a ten-year timeframe are arbitrary, and are based on no scientific rational as to whether or not certain outcomes may or may not be determined within such a period. The

development of alternatives should focus first on determining what are the inputs necessary to achieve restoration and recovery, and then determine the appropriate timeline for delivery and evaluation.

D. Focus on native fish recovery

The EIS must identify specific baseline objectives for nonnative fish suppression, sediment and nutrient concentration, temperature gradients and flow characteristics that are believed to stimulate recovery of critical habitat for Grand Canyon native fish. It must then evaluate how each alternative will achieve these objectives for the humpback chub population in the Little Colorado River, the establishment of a second humpback chub population downstream of Glen Canyon Dam, the establishment of razorback sucker habitat, and lastly, habitat for reintroduced bonytail chub, roundtail chub and Colorado pikeminnow.

E. Provide for flows that mimic the natural hydrograph

Flow decisions should be evaluated in accordance with how well they mimic the natural hydrograph. This is the principle behind the recommendations from FWS in their 1994 Biological Opinion, but has yet to be embraced by the AMP. As a result, all of AMP's flow recommendations should be rejected as none ensure that seasonally adjusted steady flows will be initiated any time soon. Steady flows will improve the productivity of the aquatic food base at higher trophic levels, and create the greatest opportunity for establishing a second population for the humpback chub, and create habitat for the razorback sucker as called for in the RPA and the Strategic Plan.

F. Address sediment augmentation

Much of AMP's focus has been on marginal to failing efforts to push small amounts of sediment and organic debris around Grand Canyon, while providing no demonstrated benefits for the habitat conditions of endangered fish. There is an urgent need for sediment and nutrients to be introduced back into the mainstem. The prospect of mechanical sediment augmentation, which would place Lake Powell sediment, carbon and other nutrients into the Colorado River below Glen Canyon Dam, has been discussed by AMP, but not acted upon. Implementing an immediate plan for sediment augmentation must be addressed by this EIS.

G. Recommend temperature control device for selective withdrawal

The EIS must recommend the installation of temperature control devices onto Glen Canyon Dam's intake structures. This project is already eight years behind schedule, despite being a top priority in both the ROD and RPA. Recent discussions have suggested that an alternative is being evaluated to construct devices on only two of the eight intakes. This would allow for only minimal changes to the temperature of the water, and will likely prove to have little value for experimental or habitat recovery purposes. Reclamation modeling also shows that the increase of temperature from a two-unit TCD is too modest, and insufficient for sustaining warm temperatures over time. The EIS must recommend that all eight penstocks be retrofitted at one

time to maximize experimental flexibility, and thus the potential for achieving a positive result for native fish recovery.

H. Remove nonnative fish

The EIS should evaluate any and all reasonable mechanisms for nonnative fish suppression as necessary to improve habitat conditions for native fish. The EIS should recommend that all stocking of nonnative trout cease below Glen Canyon Dam and that dam operations not be modified in any way to intentionally benefit nonnative fish habitat.

I. Address potential water quality impacts

With the probability of Lake Powell's conservation pool being exhausted during the timeframe of the proposed action, the potential for significant changes in the chemistry and quality of water flowing into Grand Canyon cannot be ignored. Anaerobic bacteria, hydrogen sulfide, and supersaline and metal-rich sediments are just some of the existing substances that could find their way through the dam's bypass tubes. The EIS must evaluate what these impacts might be, and how they would be mitigated.

For example, Reclamation was compelled to deal with low dissolved oxygen levels from the turbines at Glen Canyon Dam last winter. A plume of oxygen-depleted water reached the penstocks at the dam. The oxygen was depleted by decaying organic matter, because the Colorado and San Juan rivers are eroding into the exposed sediment deposits of Lake Powell due to the drawdown of the reservoir. The US Supreme Court has decided (S.D. Warren v Maine) that threats to water quality are the responsibility of the dam operators to mitigate. The EIS should also address the operational and safety impacts of course sediments flowing through Glen Canyon dam during low reservoir levels.

J. Establish sediment distribution to protect archeological resources

Archeological resources along the river continue to be threatened by the lack of sediment. The terraces of sediment that host hundreds of the cultural sites continue to slough off and move towards the river. As a result, artifacts must be removed, as opposed to being protected in-situ as prescribed by historic preservation legislation.

The EIS should mandate that a comprehensive cultural site degradation abatement program be established throughout the entire river corridor in accordance with NPS standards. To the extent high flows are implemented, they should be in a range that greatly exceeds 45,000 cfs, in order to provide the greatest opportunity for distribution of sediment to the affected archeology sites.

Many of the sites now suffering the greatest impacts due to erosion are those above the 120,000 cfs terrace, thus flows of this magnitude must also be accommodated. Providing infill for the arroyos in the high benches of the river would be a great asset to the preservation of cultural sites. The benefits of sediment augmentation should also be examined to improve archeological resource stabilization.

K. Consider dam decommissioning

The most effective way to protect and restore the culture resources in Glen Canyon National Recreation Area and Grand Canyon National Park is to return all the natural processes which allowed these resources to evolve. The most effective way to achieve this is to decommission Glen Canyon Dam. As such, the decommissioning alternative must be evaluated.

L. Identify program funding sources

At current reservoir levels, it is possible that power generation, and thus CRSP and AMP revenue streams could be brought to a standstill by the time this EIS is completed. Two more years of flows at 50 percent of normal would lower Lake Powell to the point where power production is no longer possible. The potential for power revenue streams for AMP activities and research could be affected during the timeframe for the proposed action, thus the EIS must address how this may affect each of the alternatives. It must also address how funding will be made available for large capital expenses, such as selective withdrawal or sediment augmentation.

M. Establish a scientific baseline and conceptual modeling

There are currently no control sites for AMP experiments. In the book, Downstream: Adaptive Management of Glen Canyon Dam and the Colorado River Ecosystem, the National Research Council (National Academy of Sciences) has recommended that Cataract Canyon above Lake Powell would serve this purpose, but there has been no action on the part of the AMP or GCMRC to seize this opportunity. The EIS must mandate that establishing such controls be a top priority in further experimentation.

The EIS must also mandate the completion and implement a conceptual ecosystem modeling plan.

N. Complete a management plan for the Little Colorado River

Reclamation must ensure the development of a management plan for the Little Colorado River. This plan specifically should address a hazardous material component to protect humpback chub against toxic chemical spills. With the sole remaining Grand Canyon humpback chub population concentrated at the mouth of the Little Colorado River, they are particularly vulnerable to extinction should any water contamination accident or other stochastic event occur in this tributary. A chemical spill occurred at Lake Havasu last year affected the water of the reservoir.

Increasing the range of the critical habitat designation in the Little Colorado River should also be explored to further promote translocation programs for the humpback chub up this tributary.

CONCLUSION

The importance of an Adaptive Management Program to ensuring the future health and vitality of the globally significant Grand Canyon ecosystem cannot be overstated. However, growing

evidence demonstrates not only an ongoing decline in many key indicators, but an inability of Reclamation and AMP to manage the recovery tasks asked of them. Without major changes in how this program is operated, the public should prepare itself for the ongoing declines in the cultural and natural resource base of Colorado River below Glen Canyon Dam.

The launching of a new EIS process on Glen Canyon Dam operations affords an excellent opportunity to deliver to reverse this trend. Unfortunately, the Long-Term Experimental Plan proposed action illustrates that Reclamation is not yet serious about seizing this opportunity, but merely going through the motions in an effort to comply with the settlement agreement.

Grand Canyon National Park, and all those who cherish it, deserve better. The future of Grand Canyon is at a critical decision point. We hope you, as its principle steward, will take the corrective actions outlined above so that a truly valuable EIS process can get underway, and the Colorado River ecosystem through Grand Canyon can finally get on the road to recovery.

Sincerely yours, John Weisheit, Conservation Director Living Rivers & Colorado Riverkeeper
Michelle Harrington, Rivers Program Director Center for Biological Diversity

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The National Park System and each of the agencies and concessionaires who operate in National Parks are held to a higher standard than economic maximization. It is important that the Bureau of Reclamation be held to the same standard that was envisioned by the creation of the Grand Canyon as a National Park, World Heritage Site, and Natural Wonder of the World. Contrasting the economic gains of peaking power releases in a favorable manner with the environmental degradation that these flows create is simply not a reasonable outcome given what is at stake and the multitude of laws mandating protection as the primary objective.

In addition to sediment management, reasonable river flows need to be maintained in order to provide recreational access for the public. For the safety and enjoyment of the rafting public, it is important that flows be limited to no less than 8,000 cfs.

Glen Canyon dam is necessary to support the American West. Let's choose to manage it in a way that demonstrates to the world that our priority is protecting Grand Canyon resources and recreational access to this treasure for ourselves and the generations to follow.

It is important to recognize that there is a finite amount of water passing through the system each year. Regardless of the time of day, the amount of fluctuations, or the season in which it is released, the annual inflow only has the capacity to generate a specific amount of power. The preferred alternative needs to recognize this and identify creative solutions to maximize resource protection, not maximize power generation with peaking flows.

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I wish to echo the "official" comments of the Grand Canyon Trust:

First and foremost, please develop a "Grand Canyon First!" alternative, one that achieves the requirements of the Grand Canyon Protection Act. Science has consistently concluded that regular high flows under sediment-enriched conditions combined with seasonally-adjusted steady flows will most closely mimic pre-dam conditions and perform the best for Grand Canyon resources-including the beaches, native fish, and cultural sites. This flow regime will not compromise in any way the Law of the River or Colorado River Compact. It is all about regulating the types of flows, not the volumes of water distributed to the states.

To this end, the Grand Canyon Monitoring and Research Center (GCMRC) should be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes. Finally, the LTEMP EIS needs to result in a long-term (i.e., 15 years) operations change and not merely a short-term experiment.

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What follows are two letters Living Rivers composed in 2004 during the preparation of an Environmental Assessment for a Temperature Control Device at Glen Canyon Dam. The first is a letter sent to Michael Gabaldon, who was the Chair of the Adaptive Management Working Group. The second letter was addressed to Nancy Coulam during the formal scoping period.

Living Rivers provided these comments in good faith and built a coalition of supporters to demonstrate public support for restoring the Grand Canyon ecosystem. The main ask of the letter was to initiate a Supplemental EIS.

In the end, Reclamation suspended the environmental assessment and a Temperature Control Device for Glen Canyon Dam was never built.

Since we are now in yet another scoping period and for an EIS, Living Rivers considers that it is appropriate to resubmit our scoping comments from 2004 to be part of the administrative record of the LTEMP EIS.

Please be advised that we will submit comments specifically to the LTEMP EIS that will address our concerns about operations at Glen Canyon Dam since 2004.

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March 3, 2004

Michael Gabaldon
Deputy Director of Operations
Bureau of Reclamation, Building 67
6th and Kipling
Denver, CO 80225-0007
RE: Supplemental Environmental Impact Statement for the Operations of Glen Canyon

Dear Mr. Gabaldon,

Living Rivers, Colorado Riverkeeper, American Whitewater, Arizona Wilderness Coalition, Bluewater Network, Californians for Western Wilderness, Center for Biological Diversity, Colorado Plateau River Guides, Escalante Wilderness Project, Friends of the Animas River, Friends of Arizona Rivers, Friends of the Earth, Friends of the River, International Rivers Network, Outdoor Adventure River Specialists, Inc., Tag-A-Long Expeditions, Inc., River Runners for Wilderness, Southern Utah Wilderness Alliance, Waterkeeper Alliance and Wilderness Watch are extremely concerned about the failure of the Glen Canyon Dam Adaptive Management Program (AMP) to mitigate sufficiently the adverse impacts of the operations of Glen Canyon Dam on the Colorado River ecosystem in Grand Canyon National Park.

The most recent AMP report, submitted to Congress in 2002, and subsequent scientific conclusions clearly indicate that the AMP has made little progress in meeting the mandate of the Grand Canyon Protection Act (GCPA). Nor has the AMP met the goals established in the 1995 Environmental Impact Statement (EIS) for Glen Canyon Dam, the Record of Decision (ROD), the Biological Opinion that analyzed the environmental impacts of Glen Canyon Dam, nor subsequent objectives set by the AMP itself.

The AMP has failed because the original EIS has inappropriate limitations, the AMP administrative process is ineffective, and the AMP lacks responsible leadership from the agencies of the Department of Interior (DOI): Bureau of Reclamation (BOR), National Park Service (NPS), US Geological Survey (USGS) and US Fish and Wildlife Service (USFWS). Unless these fundamental deficiencies are corrected, the dedicated efforts of all involved will continue to fail to restore the ecosystem in Grand Canyon National Park.

At the same time, scientific evidence shows that the AMP can not succeed in meeting program goals while constrained by the limitations set by the current EIS. It is evident that unless additional, more effective management options are implemented, the AMP serves only the purpose of documenting the decline of the Grand Canyon river ecosystem. Thus, more than enough evidence exists to require the immediate preparation of a supplemental environmental impact statement (SEIS), to examine in detail and anew the impacts of Glen Canyon Dam based on the significant failures of the present efforts and the myriad of changed circumstances that affect the Colorado River system.

Since the release of the ROD in 1996, it is almost certain that the razorback sucker has joined the growing list of endangered species that have become extirpated in the Grand Canyon ecosystem. Grand Canyon National Park now faces the extirpation of yet another endangered species, the humpback chub. The ROD specifically foresaw the need for the recovery of this native fish, as well to establish a second population of humpback chub and to reestablish a population of the razorback sucker. Yet, scientific evidence indicates that neither objective will occur. The humpback chub's alarming decline and the failure to reinstate the razorback sucker tops a growing list of new scientific information that was not available or known when the 1995 EIS was completed.

Based on past failures, new information and new realities, which we detail below, the Bureau of Reclamation, together with her sister DOI agencies, is obligated to undertake the process dictated by the National Environmental Policy Act [NEPA] in relationship to the operation of the Glen Canyon Dam. According to the regulations implementing NEPA: "agencies shall prepare supplements to either draft or final environmental impact statements if: (i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (ii) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 40 C.F.R 1502.9(c)

Here, the dramatic decline of the humpback chub, the extirpation of the razorback, the failure of the BOR and the AMP to abide by the terms of the Biological Opinion and to meet the goals of the Grand Canyon Protection Act, and the wealth of new information relevant to the recovery of these species and their habitat combine to require such a supplement.

Listed below are the primary areas of concern:

1. The AMP has failed to improve sediment balance that drives the physical ecological component of the ecosystem

New data collected since the EIS was completed confirms that the EIS needs to be modified to address sediment below Glen Canyon Dam. This is because the scientific community studying the native fish and involved in the recovery of these species, know far more about sediment dynamics than in 1992 when the EIS was developed. A core element of the ROD and the relevant Reasonable and Prudent Alternative (RPA) requires that BOR mitigate the impacts caused by the fact that sediment no longer enters Grand Canyon's river ecosystem. The plan required that experiments be conducted to conserve sediment in the ecosystem of the Colorado River. The first experiment took place in 1996 with subsequent attempts in the year 2000. In each case, efforts failed to produce permanent benefits of preserving beaches, stabilizing cultural sites, and enhance critical habitat conditions as intended. The report to Congress and all supporting sediment research since concludes that net sediment loss from the ecosystem will continue to occur. Natural sediment inputs, combined with organic nutrients, is a fundamental pre-dam ecosystem components necessary to sustain native fish species. Returning to peak-power flows, in a weak attempt to reduce rainbow trout spawning success, will likely accelerate further the rate of sediment loss.

There are other adverse environmental impacts of sediment loss below Glen Canyon Dam not previously anticipated. The continued loss of sediment and inability to regularly enhance beaches has brought about a change in NPS management strategies concerning cultural resource protection in the river corridor. While NPS policies favor the preservation of archeological sites in situ, the BOR now finds it necessary to consider immediate salvage operations to save what remains of sites threatened by further beach erosion. This will add federal costs to the program and increase tribal concern for these remnants of ancestral origin. These immediate and vital remedies were not considered in the original EIS.

The sobering conclusions regarding the inability to improve sediment resources have brought about discussions on how to augment sediment inputs in addition to reducing outputs. Any attempt to import sediment into the ecosystem below Glen Canyon Dam will be very costly and is not evaluated in the current EIS. In light of the inability to conserve sediment and meet Lower Basin water allotments as planned, options for improving the sediment and nutrient budget to benefit native fish and cultural sites must be explored in a SEIS.

2. The AMP is non-compliant with the Endangered Species Act and USFWS program recommendations

A. Razorback Sucker

The Biological Opinion uses urgent language to call for specific improvements of critical habitat for the humpback chub and the razorback sucker by 1998. The document states, “If the [Fish and Wildlife] Service determines a study design can not be developed that is expected to provide information to support removal of jeopardy to the razorback sucker and humpback chub populations in the Grand Canyon and associated tributaries, such will be considered new information and may be grounds for reinitiating formal consultation.” (p. 35)

Considering that a live, adult razorback sucker has not been observed in Grand Canyon for the last few years, many senior scientists believe that the razorback sucker has been extirpated from the Colorado River in Grand Canyon National Park. The lack of response to respect performance criteria gives ample evidence that jeopardy has not been removed, and is sufficient ground for reinitiating formal consultation and the NEPA process immediately.

B. Humpback Chub

Monitoring by the USGS through the Glen Canyon Monitoring and Research Center (GCMRC), has documented a major an alarming decline in humpback chub population. Since 1995, when the EIS was completed, the adult humpback chub population in the Little Colorado River has declined by 50 percent. Two years ago the GCMRC scientists estimated that the population could be as low as 1,100 fish. In April of 2003, the USFWS reported, “Results of this ongoing study indicate that despite low catch rates of nonnative fishes in the Little Colorado River, humpback chub continue to decline and that aging adults are not being replaced in the spawning population.” (Sponholtz, Pam and Randy Van Haverbeke)

It is undisputed that there has been a major decline in the population of adult humpback chub. Some federal scientists have recently argued that while humpback chub numbers have indeed declined, the present population is stabilizing. Yet, these scientists present no evidence to support this assertion. Privately, some of the same scientists are also saying that extirpation for humpback chub is quite likely. In any case, both this rate of decline and the low absolute number of fish, constitute a vastly different humpback chub assessment than was assumed in developing the original EIS, and the steps necessary for humpback chub recovery.

Furthermore, there has been no progress made in establishing a second viable population of humpback chub in Grand Canyon as mandated by the ROD. Nor has a Management Plan for the Little Colorado River been implemented to protect the critical habitat of the humpback chub from pollution, reduction of instream flows, or truncation of their habitat due to unforeseen geologic events such as debris flows or landslides.

The RPA states that if sufficient progress is not made to remove humpback chub and razorback sucker jeopardy by 1998, then Seasonally, Adjusted Steady Flows (SASF) must begin at Glen Canyon Dam. This has not occurred. Additionally, the RPA also stated that in low water (drought) years, dam releases should be regulated using the SASF alternative. This, too, is not occurring.

As razorback sucker and humpback chub recovery efforts represented one of the cornerstones of the original EIS process, this new information, combined with the information we are presenting, constitutes ground to start a SEIS process.

3. Persistent drought conditions are likely to further complicate achieving program goals and are not being adequately considered or addressed The Colorado River watershed is experiencing a fifth year of significant drought. Many climatologists are forecasting multidecadal drought conditions for the basin due to the occurrence of oscillating sea surface temperatures. This has already dropped the water level in Lake Powell reservoir by 113 feet to 44 percent of storage capacity. While specific flow recommendations were prescribed in the RPA for low water years, no assessment of management options has been conducted to address the impacts of sustained drought on achieving GCPA goals.

The reduced elevation of Lake Powell reservoir has already stimulated changes in water quality and the aquatic environment below the dam. The river's temperature has increased about 20 C, which is changing the dynamics of the food web and increasing the rates of colonization by exotic species such as the New Zealand mud snail. This particular alien species was discovered in the ecosystem after the ROD was signed. As the surface of Lake Powell reservoir continues to drop nearer to the penstocks, new pathogens, parasites and other exotic species are likely to invade the ecosystem in Grand Canyon and complicate the conservation of endangered native fish. Elevated temperatures raise questions about how this may affect alien fish populations and this predation threat to endangered humpback chub.

Furthermore, more water development projects for the Upper Basin are now being considered to fully deplete the already over-allocated waters of the Colorado River. Drought, consumptive loss, and synergistic effects of these two elements were not considered in the EIS. Predictions

confirm that due to factors such as drought and over-appropriation, low levels will become the norm, rather than the exception, for Lake Powell reservoir. As a result, the BOR and her sister agencies must revisit its review the environmental impacts of Glen Canyon Dam and update the analysis to account for this new development.

4. New information relating to implementation of a temperature control device has not been addressed

The drought situation has led to an increased concern over the unforeseen impacts associated with increased water temperature flowing into Grand Canyon from Glen Canyon Dam. While the original ROD encouraged managers to direct efforts to achieve warmer water temperatures to improve native fish recruitment, the EIS did not address in any detail the full range of impacts associated with such experiments. In 1999 uncertainty surrounding these impacts caused the BOR to shelve its plans to install a temperature control device (TCD) for Glen Canyon Dam's penstocks. Only the threat of legal action associated with the declining humpback chub population has resurrected the proposal. Although in 2003 the AMP Science Advisory Panel recommended full TCD testing and possible construction, along with flow modification and extensive research/monitoring, DOI has taken no action until just recently and even than, the agency suggested a program that is much downscaled. The Environmental Assessment for the proposed TCD is not adequate because of incidental take and other critical habitat factors for humpback chub that has changed since the implementation of the ROD.

Another concern surrounding the TCD involves the impact of the parasitic Asian tapeworm, which could proliferate and heighten the potential of disease for the humpback chub. Since the Asian tapeworm was not discovered in the ecosystem until after the ROD, it too constitutes new information to be addressed in the SEIS.

Certainly, some of the risks associated with the TCD could be overcome by incorporating other operational strategies, such as importing sediment into the system to disadvantage hunt-by-sight predators, and by initiating a periodic spike flow. These were not addressed in the original EIS, and therefore will also need to be incorporated into the SEIS process.

5. Credibility of the AMP science program is in question

A central component of the original AMP design was the development and administration of an independent, peer-reviewed science program. This program would carry out unbiased scientifically credible studies to inform the AMP's decision-making process. A small science staff (less than 12) was to administer the program through the competitive bidding process and to award research contracts to the most competent bidder. Both the bidding process and final reports were to be peer-reviewed to assure quality and non-biased reporting. The GCMRC, the science management component of the AMP, is now operating much differently than established in the original guidelines set for this administrative component of the USGS. The science staff is very large and most programs are being done in-house with no independent peer-review.

Prior to the EIS the Glen Canyon Dam Environmental Studies program was seriously criticized by the National Research Council for this same failure to meet accepted methods to assure

scientific credibility. An independent review of the current AMP science program would reveal a loss of integrity and standing when the GCMRC model was abandoned in favor of what currently exists today in the GCMRC.

At a time when the Grand Canyon is about to lose another native fish species, the AMP is cutting back on scientific work, seemingly at the request of the Western Area Power Administration, whose hydropower revenues are used to fund the science. The research for the 2000 Low, Summer Steady Flow (LSSF) represents one example of how the AMP science program has been affected. First, the experiment was fast tracked, with limited opportunity for outside input or competitive bidding for the monitoring. Pre-experiment flow data was not compiled and therefore the design of the experiment may not have been properly formulated. Scientists did not start collecting data on the river until after the first spike flow occurred. Although the design of the experiment was released for the competition, the one proposed by the contractor was not accepted. Also, this experimental flow was originally proposed to benefit native fish with relatively low, steady flows in accordance with the Biological Opinion, but the final experiment allowed for less than the recommended time.

The original EIS assumed that experimentation and recovery efforts would be achieved with firm attention paid to proper scientific protocol and management of public funds toward endangered species recovery in Grand Canyon National Park. This is not occurring. In fact the opposite is occurring. The AMP has enacted budget reductions and caps without supplemental funds to adequately maintain and preferably improve monitoring and research in Grand Canyon National Park. Finally, AMP is not providing adequate management leadership while the USGS/GCMRC is not contributing credible independent data required by the mandates prescribed by the ROD, RPA and subsequent charters and guidelines. Together, these factors warrant immediate preparation of an SEIS.

6. Inability of the AMP decision-making process to address fundamental resource recovery requirements is limiting progress

The ROD called for the establishment of the AMP as a stakeholder group to advise the Secretary of the Interior on implementation of Grand Canyon programs. The application of the ROD is the sole responsibility of the AMP. The AMP has been, and continues to be, controlled by the water and energy groups, groups whose self-interest is to avoid long-term change from the status quo. These groups necessarily are not ultimately dedicate to the protection and recovery of the Colorado River and the native fish it should support.

While the make-up of the group has provided for a bias toward representing water and energy interests, it was anticipated that the program's mandate to mitigate downstream impacts of dam operations would ensure that sufficient attention would be given to the needs of the resource. This has not occurred, as exemplified by the failure to undertake RPA programs, the decline in humpback chub, the extirpation of the razorback sucker, continued loss of essential sediment, and accelerated degradation of archeological sites. A key reason for this continued program failure is that the AMP decision-making process continues to demonstrate a clear bias toward minimizing loss of hydropower. Also, the AMP evades recommendations that would create legal

conflicts between the Organic Act, Endangered Species Act, NEPA and even GCPA. The workings, the make-up and the ineffectiveness of the AMP must be reevaluated in the SEIS.

Evidence to support prejudice for one resource over another recently occurred when the trout population suppression flows were modified in a fast-track manner without proper consultation or due process within the AMP. Moreover, the current Sunday flow regime has proved to be inadequate for true trout suppression and demonstrates the concerns over hydropower prejudice for efforts to conserve endangered species. There has also been a recent suggestion for a flow regime of 5,000 to 25,000 cfs for year 2005. These proposed flows, the environmental impacts of which have never been addressed, are outside the range prescribed for the conservation of natural and cultural resources by the ROD and the Biological Opinion.

Flow experiments, especially those designed to benefit humpback chub recruitment have been of limited duration, and as such generated inconclusive results. Results of the LSSF were inconclusive because data was neither collected prior to initiating the flows nor afterwards. In this particular experiment the flow was not timely, or sufficient enough for the food web to adjust and respond. The RPA recommended, "experimental flows will be conducted for a sufficient period of time to allow for experimental design, biological processes to function, and for variability inherent in riverine ecosystems to be expressed" (p. 36).

Overall, the AMP is failing to achieve GCPA goals because the ROD and subsequent program design do not allow for meaningful adjustments in key, aquatic ecosystem elements. The program continues to focus on treating the symptoms of ecosystem decline rather than what is actually causing the decline. In other words, the habitat is in dramatic decline and the AMP is doing nothing meaningful — is failing to make any hard choices — to bring the habitat closer to pre-dam conditions. These critical ecosystem elements are well documented and include:

A. Natural hydrograph that would redistribute sediment during the spring run-off and stimulate native fish spawning.

B. Natural thermograph with warmer summer water temperatures and colder winter temperatures.

C. Annual inputs of sediment, nutrients and woody debris to create generally turbid water conditions.

Again, these failures underscore the need to take a renewed look at a process that has not served the Colorado's native fish and has not followed the guidelines, recommendations and requirements set forth to achieve recovery of these species.

7. Our concerns for the First Nations

The AMP has not fully engaged the process that threatens their cultural and natural heritage in Grand Canyon. They have also been given a minimal amount of resources to monitor their cultural properties in Grand Canyon. This is a violation of the trust that was developed with the

tribes during Glen Canyon Environmental Studies and is allowing the government to continue to minimize the value of these tribal resources.

8. Recommendations

Based on the above, the following steps are legally required as part of the effort to protect and restore native fish and their critical habitat to the Colorado River below Glen Canyon Dam.

A. The AMP must immediately recommend to the Secretary of Interior that preparation of a SEIS to assess the environmental impacts of the operation of Glen Canyon Dam begin within six months.

B. A SEIS could take several years and there are a number of interim actions the AMP must take, both in terms of science and in the operations, to help impede the further decline of natural and cultural resources in the Grand Canyon while we await a new ROD.

C. Because the SEIS could take several years the AMP must undertake interim actions within six months to help forestall the further decline of natural and cultural resources in the Grand Canyon until a new ROD is issued.

1. Reorganize the AMP to be proactive so that it is comprised of only the responsible agencies and sovereigns: BOR, NPS, USFWS, and the Tribes. (Participation by other stakeholders would be available through public process as explained below in #2.)

2. Require the AMP meet twice a year with a 30-day comment period prior to each meeting. This program would use interactive communication and video technology that was not available during the 1996 EIS process and would provide for more stakeholders to be heard.

3. Reorganize GCMRC to be an administrative organization outside of the DOI. This would remove or militate against agency bias and shortcomings, and be a positive step toward a truly independent science organization. Competition and protocol development should follow NPS guidelines for science activities within national parks.

D. Humpback Chub population and habitat monitoring

All reports and analyses by the AMP have focused on humpback chub numbers, and not the relative condition of the fish or health of the critical habitat. This must change. While some of this data has been collected, there has not yet been any ongoing analysis on the condition factors of the humpback as recommended by the USFWS. Additionally, factors relevant to habitat such as feeding habits, water quality, age class, genetics, and recruitment and migration patterns for all periods of the humpback chub's life span need to be documented. The new AMP must also determine the population level and changes in biological parameters that would trigger a cessation of handling humpback chub so as to avoid incidental take on the remaining population.

E. Follow the Biological Opinion for the Humpback Chub and the natural river hydrograph

As a baseline, all flow decisions should be evaluated by how well they mimic the natural hydrograph. So far, the AMP has ignored this fundamental principle of river ecology. Without it there will likely be no hope of establishing a second population for the humpback chub, or of restoring its critical habitat as called for in the RPA and required by law. AMP should continue intensive alien fish suppression at the Little Colorado River reach.

F. Expand the critical habitat throughout the Grand Canyon, including the tributary streams and the Glen Canyon reach.

G. Develop a scientifically sound monitoring program that extends current non-GCMRC programs through the SEIS process so continuity of ecosystem data sets is achieved. These data sets should be linked with water quality, lower and higher trophic levels, riparian vegetation and beach sand monitoring. GCMRC monitoring programs should be delegated to past or present contractors for one year and then all contracts should be opened for competitive bidding under the new AMP and the SEIS. If these contractors do not want the work then the Grand Canyon Science Center will conduct the monitoring as protocols dictate.

H. Initiate a comprehensive, cultural site degradation abatement program throughout the entire river corridor in accordance with NPS standards.

I. Initiate development of a River Management Plan for the Little Colorado River as called for in the RPA.

In conclusion, the Grand Canyon is treasured by the citizens of the world and the natural values that make up this spectacular place must not be compromised any further. We urgently request serious and immediate action to address these matters. We look forward to receiving a detailed response to this letter explaining the steps you will take to further the goals of the Grand Canyon Protection Act, the Biological Opinion and RPA, NEPA, and the protection and recovery of the Colorado's endangered native fish and their critical habitat, as is required by law. Thank you in advance for your efforts to meet your statutory obligations.

Sincerely, John Weisheit
Living Rivers Conservation Director
The Colorado Riverkeeper American Whitewater
Arizona Wilderness Coalition
Bluewater Network
Californians for Western Wilderness
Center for Biological Diversity
Colorado Plateau River Guides
Escalante Wilderness Project
Friends of the Animas River
Friends of Arizona Rivers
Friends of the Earth
Friends of the River
International Rivers Network
Outdoor Adventure River Specialists

Tag-A-Long Expeditions
River Runners for Wilderness
Southern Utah Wilderness Alliance
Waterkeeper Alliance
Wilderness Watch
End of March 3, 2004 comment letter to Mr. Michael Gabaldon.

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Beginning of April 2, 2004 scoping letter to Nancy Coulam.

April 2, 2004

Ms. Nancy Coulam
Bureau of Reclamation
125 South State Street, Room 6103

Salt Lake City, UT 84138-11027

RE: Scoping Comments for proposed Temperature Control Device at Glen Canyon Dam

Dear Ms. Coulam,

Living Rivers, the Colorado Riverkeeper, and the undersigned organizations submit the following scoping comments pertaining to the Temperature Control Device (TCD) at Glen Canyon Dam as published in the Federal Register on February 17, 2004.

First, we find the notice in the Federal Register to be utterly vague, with no direct reference to the TCD environmental review process. Additionally, due to a Federal District Court order suspending public access to the Bureau of Reclamation via email and web pages, the public has been further inconvenienced in learning about this process. We therefore request that the scoping period be extended for at least another 30 days to adequately involve the public in this critical mater affecting the ecological integrity of Grand Canyon National Park. We also request that the Bureau of Reclamation seek consultation with the US Fish and Wildlife Service concerning the application of a TCD program for operations at Glen Canyon Dam.

While the 1996 Record of Decision (ROD) on the 1995 Glen Canyon Dam Environmental Impact Statement (EIS) addresses the need to pursue temperature control strategies at Glen Canyon Dam, it did so amidst a climate of much different information than presently exists. In fact, four years later the scientific controversy surrounding viability of such a proposal caused the Bureau of Reclamation to abandon its plans for this temperature control device (TCD). As noted below, even more information now exists to reinforce the concerns raised four years ago. This new information not only calls into question the merits of an independent TCD proposal, but the ROD's applicability to guiding Glen Canyon Dam operations as they pertain to endangered species recovery in Grand Canyon National Park. We therefore request that the proposed TCD be evaluated through an Environmental Impact Statement as opposed to the more

cursory Environmental Assessment (EA) presently contemplated, and that this EIS, or a supplemental EIS, also address the areas of new information unknown or unforeseen when the 1995 EIS was prepared.

The initial EIS and ROD recommended pursuit of temperature modification strategies for Glen Canyon Dam releases amidst a range of other dam management proposals aimed at recovering endangered native fish at Grand Canyon. However, the Glen Canyon Dam Adaptive Management Program's most recent report to Congress, submitted in 2003, along with subsequent scientific conclusions clearly indicate that these programs have made little progress in meeting the mandate of the Grand Canyon Protection Act (GCPA). Nor have they met the goals established in the EIS, ROD, the Biological Opinion that analyzed the environmental impacts of Glen Canyon Dam, nor subsequent objectives set by the AMP itself.

The AMP has failed because the original EIS had inappropriate limitations, the AMP administrative process is ineffective, and the AMP lacks responsible leadership from the agencies of the Department of Interior (DOI): Bureau of Reclamation (BOR), National Park Service (NPS), US Geological Survey (USGS) and US Fish and Wildlife Service (USFWS). Unless these fundamental deficiencies are corrected, the dedicated efforts of all involved will continue to fail to restore the ecosystem in Grand Canyon National Park.

At the same time, scientific evidence shows that the AMP can not succeed in meeting program goals while constrained by the limitations set by the current EIS. It is evident that unless additional, more effective management options are implemented, the AMP serves only the purpose of documenting the decline of the Grand Canyon river ecosystem. Thus, more than enough evidence exists to require the immediate preparation of a supplemental environmental impact statement (SEIS), independent of the current TCD proposal, to examine in detail and anew the impacts of Glen Canyon Dam based on the significant failures of the present efforts and the myriad of changed circumstances that affect the Colorado River system. Since the release of the ROD in 1996, it is almost certain that the razorback sucker has joined the growing list of endangered species that have become extirpated in the Grand Canyon ecosystem. Grand Canyon National Park now faces the extirpation of yet another endangered species, the humpback chub. The ROD specifically foresaw the need for the recovery of this native fish, as well to establish a second population of humpback chub and to reestablish a population of the razorback sucker. Yet, scientific evidence indicates that neither objective will occur. The humpback chub's alarming decline and the failure to reinstate the razorback sucker tops a growing list of new scientific information that was not available or known when the 1995 EIS was completed.

As outlined below, the TCD must be evaluated through an EIS process, and this should be done in concert with a supplemental EIS process to address new information and new realities, which are also detailed below. The Bureau of Reclamation, together with her sister DOI agencies, are obligated to undertake such processes dictated by the National Environmental Policy Act (NEPA) in relationship to the operation of the Glen Canyon Dam. According to the regulations implementing NEPA: "agencies shall prepare supplements to either draft or final environmental impact statements if: (i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (ii) there are significant new circumstances or information

relevant to environmental concerns and bearing on the proposed action or its impacts." 40 C.F.R 1502.9(c)

Here, the dramatic decline of the humpback chub, the extirpation of the razorback, the failure of the BOR and the AMP to abide by the terms of the Biological Opinion and to meet the goals of the Grand Canyon Protection Act, and the wealth of new information relevant to the recovery of these species and their habitat combine to require such a supplement.

Listed below are the primary areas of concern:

1. New information relating to implementation of a temperature control device has not been addressed

The current drought situation has led to an increased concern over the unforeseen impacts associated with increased water temperature flowing into Grand Canyon from Glen Canyon Dam. While the original ROD encouraged managers to direct efforts to achieve warmer water temperatures to improve native fish recruitment, the EIS did not address in any detail the full range of impacts associated with such experiments. In 1999 uncertainty surrounding these impacts caused the BOR to shelve its plans to install a temperature control device (TCD) for Glen Canyon Dam's penstocks. Only the threat of legal action associated with the declining humpback chub population has resurrected the proposal. Although in 2003 the AMP Science Advisory Panel recommended full TCD testing and possible construction, along with flow modification and extensive research/monitoring, DOI has taken no action until just recently and even then, the agency suggested a program that is much downscaled. An Environmental Assessment for the proposed TCD is not adequate because of incidental take and other critical habitat factors for humpback chub that has changed since the implementation of the ROD.

Another concern surrounding the TCD involves the impact of the parasitic Asian tapeworm, which could proliferate and heighten the potential of disease for the humpback chub. Since the Asian tapeworm was not discovered in the ecosystem until after the ROD, it too constitutes new information to be addressed in a SEIS.

Certainly, some of the risks associated with the TCD could be overcome by incorporating other operational strategies, such as importing sediment into the system to disadvantage hunt-by-sight predators, and by initiating a periodic spike flow. These were not addressed in the original EIS, and therefore will also need to be incorporated into an EIS process for the TCD.

2. The AMP has failed to improve sediment balance that drives the physical ecological component of the ecosystem

New data collected since the EIS was completed confirms that the EIS needs to be modified to address sediment below Glen Canyon Dam. This is because the scientific community studying the native fish and involved in the recovery of these species, know far more about sediment dynamics than in 1992 when the EIS was developed. A core element of the ROD and the relevant Reasonable and Prudent Alternative (RPA) requires that BOR mitigate the impacts caused by the fact that sediment no longer enters Grand Canyon's river ecosystem. The plan

required that experiments be conducted to conserve sediment in the ecosystem of the Colorado River. The first experiment took place in 1996 with subsequent attempts in the year 2000. In each case, efforts failed to produce permanent benefits of preserving beaches, stabilizing cultural sites, and enhancing critical habitat conditions as intended. The report to Congress and all supporting sediment research since concludes that net sediment loss from the ecosystem will continue to occur. Natural sediment inputs, combined with organic nutrients, are a fundamental pre-dam ecosystem components necessary to sustain native fish species. Returning to peak-power flows, in a weak attempt to reduce rainbow trout spawning success, will likely accelerate further the rate of sediment loss.

There are other adverse environmental impacts of sediment loss below Glen Canyon Dam not previously anticipated. The continued loss of sediment and inability to regularly enhance beaches have brought about a change in NPS management strategies concerning cultural resource protection in the river corridor. While NPS policies favor the preservation of archeological sites in situ, the BOR now finds it necessary to consider immediate salvage operations to save what remains of sites threatened by further beach erosion. This will add federal costs to the program and increase tribal concern for these remnants of ancestral origin. These immediate and vital remedies were not considered in the original EIS.

The sobering conclusions regarding the inability to improve sediment resources have brought about discussions on how to augment sediment inputs in addition to reducing outputs. Any attempt to import sediment into the ecosystem below Glen Canyon Dam will be very costly and is not evaluated in the current EIS. In light of the inability to conserve sediment and meet Lower Basin water allotments as planned, options for improving the sediment and nutrient budget to benefit native fish and cultural sites must be explored in a SEIS.

3. The AMP is non-compliant with the Endangered Species Act and USFWS program recommendations

A. Razorback Sucker

The Biological Opinion uses urgent language to call for specific improvements of critical habitat for the humpback chub and the razorback sucker by 1998. The document states, “If the [Fish and Wildlife] Service determines a study design can not be developed that is expected to provide information to support removal of jeopardy to the razorback sucker and humpback chub populations in the Grand Canyon and associated tributaries, such will be considered new information and may be grounds for reinitiating formal consultation.” (p. 35)

Considering that a live, adult razorback sucker has not been observed in Grand Canyon for the last few years, many senior scientists believe that the razorback sucker has been extirpated from the Colorado River in Grand Canyon National Park. The lack of response in respect to performance criteria gives ample evidence that jeopardy has not been removed, and is sufficient ground for reinitiating formal consultation and the NEPA process immediately.

B. Humpback Chub

Monitoring by the USGS through the Glen Canyon Monitoring and Research Center (GCMRC), has documented a major an alarming decline in humpback chub population. Since 1995, when the EIS was completed, the adult humpback chub population in the Little Colorado River has declined by 50 percent. Two years ago the GCMRC scientists estimated that the population could be as low as 1,100 fish. In April of 2003, the USFWS reported, "Results of this ongoing study indicate that despite low catch rates of nonnative fishes in the Little Colorado River, humpback chub continue to decline and that aging adults are not being replaced in the spawning population." (Sponholtz, Pam and Randy Van Haverbeke)

It is undisputed that there has been a major decline in the population of adult humpback chub. Some federal scientists have recently argued that while humpback chub numbers have indeed declined, the present population is stabilizing. Yet, these scientists present no evidence to support this assertion. Privately, some of the same scientists are also saying that extirpation for humpback chub is quite likely. In any case, both this rate of decline and the low absolute number of fish, constitute a vastly different humpback chub assessment than was assumed in developing the original EIS, and the steps necessary for humpback chub recovery.

Furthermore, there has been no progress made in establishing a second viable population of humpback chub in Grand Canyon as mandated by the ROD. Nor has a Management Plan for the Little Colorado River been implemented to protect the critical habitat of the humpback chub from pollution, reduction of instream flows, or truncation of their habitat due to unforeseen geologic events such as debris flows or landslides.

The RPA states that if sufficient progress is not made to remove humpback chub and razorback sucker jeopardy by 1998, then Seasonally, Adjusted Steady Flows (SASF) must begin at Glen Canyon Dam. This has not occurred. Additionally, the RPA also stated that in low water (drought) years, dam releases should be regulated using the SASF alternative. This, too, is not occurring.

As razorback sucker and humpback chub recovery efforts represented one of the cornerstones of the original EIS process, this new information, combined with the information we are presenting, constitutes ground to start a SEIS process.

4. Persistent drought conditions are likely to further complicate achieving program goals and are not being adequately considered or addressed

The Colorado River watershed is experiencing a fifth year of significant drought. Many climatologists are forecasting multidecadal drought conditions for the basin due to the occurrence of oscillating sea surface temperatures. This has already dropped the water level in Lake Powell reservoir by 113 feet to 44 percent of storage capacity. While specific flow recommendations were prescribed in the RPA for low water years, no assessment of management options has been conducted to address the impacts of sustained drought on achieving GCPA goals.

The reduced elevation of Lake Powell reservoir has already stimulated changes in water quality and the aquatic environment below the dam. The river's temperature has increased about 20 C, which is changing the dynamics of the food web and increasing the rates of colonization by exotic species such as the New Zealand mud snail. This particular alien species was discovered in the ecosystem after the ROD was signed. As the surface of Lake Powell reservoir continues to drop nearer to the penstocks, new pathogens, parasites and other exotic species are likely to invade the ecosystem in Grand Canyon and complicate the conservation of endangered native fish. Elevated temperatures raise questions about how this may affect alien fish populations and this predation threat to endangered humpback chub.

Furthermore, more water development projects for the Upper Basin are now being considered which would further deplete the already over-allocated waters of the Colorado River. The synergistic effects of drought and consumptive loss were not considered in the EIS. Predictions confirm that due to factors such as drought and over-appropriation, low levels will become the norm, rather than the exception, for Lake Powell reservoir. As a result, the BOR and her sister agencies must revisit its review the environmental impacts of Glen Canyon Dam and update the analysis to account for this new development.

5. Credibility of the AMP science program is in question

A central component of the original AMP design was the development and administration of an independent, peer-reviewed science program. This program would carry out unbiased scientifically credible studies to inform the AMP's decision-making process. A small science staff (less than 12) was to administer the program through the competitive bidding process and to award research contracts to the most competent bidder. Both the bidding process and final reports were to be peer-reviewed to assure quality and non-biased reporting. The GCMRC, the science management component of the AMP, is now operating much differently than established in the original guidelines set for this administrative component of the USGS. The science staff is very large and most programs are being done in-house with no independent peer-review.

Prior to the EIS the Glen Canyon Dam Environmental Studies program was seriously criticized by the National Research Council for this same failure to meet accepted methods to assure scientific credibility. An independent review of the current AMP science program would reveal a loss of integrity and standing when the GCMRC model was abandoned in favor of what currently exists today in the GCMRC.

At a time when the Grand Canyon is about to lose another native fish species, the AMP is cutting back on scientific work, seemingly at the request of the Western Area Power Administration, whose hydropower revenues are used to fund the science. The research for the 2000 Low, Summer Steady Flow (LSSF) represents one example of how the AMP science program has been affected. First, the experiment was fast tracked, with limited opportunity for outside input or competitive bidding for the monitoring. Pre-experiment flow data was not compiled and therefore the design of the experiment may not have been properly formulated. Scientists did not start collecting data on the river until after the first spike flow occurred. Although the design of the experiment was released for the competition, the one proposed by the contractor was not accepted. Also, this experimental flow was originally proposed to benefit native fish with

relatively low, steady flows in accordance with the Biological Opinion, but the final experiment allowed for less than the recommended time.

The original EIS assumed that experimentation and recovery efforts would be achieved with firm attention paid to proper scientific protocol and management of public funds toward endangered species recovery in Grand Canyon National Park. This is not occurring. In fact the opposite is occurring. The AMP has enacted budget reductions and caps without supplemental funds to adequately maintain and preferably improve monitoring and research in Grand Canyon National Park. Finally, AMP is not providing adequate management leadership while the USGS/GCMRC is not contributing credible independent data required by the mandates prescribed by the ROD, RPA and subsequent charters and guidelines. Together, these factors warrant immediate preparation of an SEIS.

6. Inability of the AMP decision-making process to address fundamental resource recovery requirements is limiting progress

The ROD called for the establishment of the AMP as a stakeholder group to advise the Secretary of the Interior on implementation of Grand Canyon programs. The application of the ROD is the sole responsibility of the AMP. The AMP has been, and continues to be, controlled by the water and energy groups, groups whose self-interest is to avoid long-term change from the status quo. These groups necessarily are not ultimately dedicated to the protection and recovery of the Colorado River and the native fish it should support.

While the make-up of the group has provided for a bias toward representing water and energy interests, it was anticipated that the program's mandate to mitigate downstream impacts of dam operations would ensure that sufficient attention would be given to the needs of the resource. This has not occurred, as exemplified by the failure to undertake RPA programs, the decline in humpback chub, the extirpation of the razorback sucker, continued loss of essential sediment, and accelerated degradation of archeological sites. A key reason for this continued program failure is that the AMP decision-making process continues to demonstrate a clear bias toward minimizing loss of hydropower. Also, the AMP evades recommendations that would create legal conflicts between the Organic Act, Endangered Species Act, NEPA and even GCPA. The workings, the make-up and the ineffectiveness of the AMP must be reevaluated in a SEIS process.

Evidence to support prejudice for one resource over another recently occurred when the trout population suppression flows were modified in a fast-track manner without proper consultation or due process within the AMP. Moreover, the current Sunday flow regime has proved to be inadequate for true trout suppression and demonstrates that concerns over hydropower prejudice for efforts to conserve endangered species. There has also been a recent suggestion for a flow regime of 5,000 to 25,000 cfs for year 2005. These proposed flows, the environmental impacts of which have never been addressed, are outside the range prescribed for the conservation of natural and cultural resources by the ROD and the Biological Opinion.

Flow experiments, especially those designed to benefit humpback chub recruitment have been of limited duration, and as such generated inconclusive results. Results of the LSSF were

inconclusive because data was neither collected prior to initiating the flows nor afterwards. In this particular experiment the flow was neither timely, nor of sufficient duration for the food web to adjust and respond. The RPA recommended, "experimental flows will be conducted for a sufficient period of time to allow for experimental design, biological processes to function, and for variability inherent in riverine ecosystems to be expressed" (p. 36).

Overall, the AMP is failing to achieve GCPA goals because the ROD and subsequent program design do not allow for meaningful adjustments in key, aquatic ecosystem elements. The program continues to focus on treating the symptoms of ecosystem decline rather than what is actually causing the decline. In other words, the habitat is in dramatic decline and the AMP is doing nothing meaningful — is failing to make any hard choices — to bring the habitat closer to pre-dam conditions. These critical ecosystem elements are well documented and include:

A. Natural hydrograph that would redistribute sediment during the spring run-off and stimulate native fish spawning.

B. Natural thermograph with warmer summer water temperatures and colder winter temperatures.

C. Annual inputs of sediment, nutrients and woody debris to create generally turbid water conditions. Again, these failures underscore the need to take a renewed look at a the whole process, not just the TCD proposal, as this process has not served the Colorado's native fish and has not followed the guidelines, recommendations and requirements set forth to achieve recovery of these species.

7. Our concerns for the First Nations

The AMP has not fully engaged the process that threatens the cultural and natural heritage of the First Nations in Grand Canyon. They have also been given a minimal amount of resources to monitor their cultural properties in Grand Canyon. This is a violation of the trust that was developed with the tribes during Glen Canyon Environmental Studies and is allowing the government to continue to minimize the value of these tribal resources.

8. Recommendations

Based on the above, the following steps are legally required as part of the effort to protect and restore native fish and their critical habitat to the Colorado River below Glen Canyon Dam.

A. The BOR must undertake an EIS for the proposed TCD. This EIS, or a supplemental EIS, must address all new information unknown or unforeseen when the original EIS was prepared.

B. As an EIS or SEIS could take several years and there are a number of interim actions the BOR and the AMP must take, both in terms of science and in the operations, to help impede the further decline of natural and cultural resources in the Grand Canyon while we await a new ROD.

C. Because an EIS or SEIS could take several years, the AMP must undertake interim actions within six months to help forestall the further decline of natural and cultural resources in the Grand Canyon until a new ROD is issued.

1. Reorganize the AMP to be proactive so that it is comprised of only the responsible agencies and sovereigns: BOR, NPS, USFWS, and the Tribes. (Participation by other stakeholders would be available through public process as explained below in #2.)

2. Require the AMP meet twice a year with a 30-day comment period prior to each meeting. This program would use interactive communication and video technology that was not available during the 1996 EIS process and would provide for more stakeholders to be heard.

3. Reorganize GCMRC to be an administrative organization outside of the DOI. This would remove or militate against agency bias and shortcomings, and be a positive step toward a truly independent science organization. Competition and protocol development should follow NPS guidelines for science activities within national parks.

D. Humpback Chub population and habitat monitoring

All reports and analyses by the AMP have focused on humpback chub numbers, and not the relative condition of the fish or health of the critical habitat. This must change. While some of this data has been collected, there has not yet been any ongoing analysis on the condition factors of the humpback as recommended by the USFWS. Additionally, factors relevant to habitat such as feeding habits, water quality, age class, genetics, and recruitment and migration patterns for all periods of the humpback chub's life span need to be documented. The new AMP must also determine the population level and changes in biological parameters that would trigger a cessation of handling humpback chub so as to avoid incidental take on the remaining population.

E. Follow the Biological Opinion for the Humpback Chub and the natural river hydrograph As a baseline, all flow decisions should be evaluated by how well they mimic the natural hydrograph. So far, the AMP has ignored this fundamental principle of river ecology. Without it there will likely be no hope of establishing a second population for the humpback chub, or of restoring its critical habitat as called for in the RPA and required by law. AMP should continue intensive alien fish suppression at the Little Colorado River reach.

F. Expand the critical habitat throughout the Grand Canyon, including the tributary streams and the Glen Canyon reach.

G. Develop a scientifically sound monitoring program that extends current non-GCMRC programs through a SEIS process so continuity of ecosystem data sets is achieved. These data sets should be linked with water quality, lower and higher trophic levels, riparian vegetation and beach sand monitoring. GCMRC monitoring programs should be delegated to past or present contractors for one year and then all contracts should be opened for competitive bidding under the new AMP and a SEIS. If these contractors do not want the work then the Grand Canyon Science Center will conduct the monitoring as protocols dictate.

H. Initiate a comprehensive cultural site degradation abatement program throughout the entire river corridor in accordance with NPS standards.

I. Initiate development of a River Management Plan for the Little Colorado River as called for in the RPA.

In conclusion, the Grand Canyon is treasured by the citizens of the world and the natural values that make up this spectacular place must not be further compromised. We urgently request serious and immediate action to address these matters, beginning with a new EIS process.

Sincerely, John Weisheit

Colorado Riverkeeper Access for All (CA) Alabama Environmental Council (AL) Alamosa Riverkeeper (CO) Allegheny Riverkeeper (PA) Alliance for Sustainable Communities (MD) Altamaha Riverkeeper (GA) American Whitewater Association (MD) Apalachicola Bay and Riverkeeper (FL) Arizona Wilderness Coalition (AZ) Audubon Upper Mississippi River Campaign (MN) Baja California Coastkeeper (Mexico) Biodiversity Conservation Alliance (WY) Black Warrior Riverkeeper (AL) Blackwater/Nottoway Riverkeeper (VA) Bluewater Network (CA) Bow Riverkeeper (Canada) Buckeye Forest Council (OH) Cahaba River Society (AL) California Save Our Streams Council (CA) Californians for Western Wilderness (CA) Camp Us (CO) Canyon Voyages (UT) Cape Fear River Watch, Inc. (NC) Cape Fear Riverkeeper (NC) Cascadia Rising Ecological Defense Network (OR) Casco Baykeeper (MA) Center for Biological Diversity (AZ) Central Lake Superior Watershed Partnership (MI) Chattahoochee Riverkeeper (GA) Chehalis River Council (WA) Choctawhatchee Riverkeeper (AL) Choqueyapu Riverkeeper (Bolivia) Citizens of Lee Environmental Action Network (VA) Clearwater Biodiversity Project (ID) Clinch Coalition (VA) Coalition for Jobs and the Environment (VA) Coastal Land Trust (CA) Colorado Plateau River Guides (UT) Columbia Riverkeeper (WA) Commencement Baykeeper (WA) Community Clean Water Institute (CA) ConservAmerica (NM) Cook InletKeeper (AK) Coosa River Basin Initiative (GA) Devil's Fork Trail Club (VA) DuPage River Coalition (IL) Earth Island Institute (CA) Electors Concerned about Animas Water (NM) Endangered Habitats League (CA) Erie Canalkeeper (NY) Escalante Wilderness Project (UT) Evergreen State College (WA) Eyak Preservation Council (AK) Eyes of Paint Branch (MD) Flagstaff Activist Network (AZ) Flint River Watershed Coalition (MI) Florida Wildlife Federation (FL) Forest Guardians (NM) Forest Watch (VT) Foundation for Global Sustainability (TN) Four Corners School of Outdoor Education (UT) Friends of Arizona Rivers (AZ) Friends of Blackwater (WV) Friends of Living Oregon Waters (OR) Friends of Milwaukee's Rivers & Riverkeeper (WI) Friends of the Animas River (CO) Friends of the Earth (DC) Friends of the Eel River (CA) Friends of the Gualala River (CA) Friends of the Nanticoke River (MD) Friends of the River (CA) Friends of the Riverfront (PA) Fundy Baykeeper (Canada) Galveston Baykeeper (TX) Georgian Baykeeper (Canada) Glen Canyon Institute (UT) Global Exchange (CA) Global Response (CO) Grand Canyon Private Boaters Association (AZ) Grand Riverkeeper (OK) Grand Traverse Baykeeper (MI) Great Egg Harbor Watershed Association (NJ) Great Lakes United (NY) Great Old Broads for Wilderness (CO) Green Party of Utah (UT) Greenaction for Health and Environmental Justice (CA) Hackensack Riverkeeper (NJ) Hells Canyon Preservation Council (OR) Holiday River Expeditions (UT) Housatonic River Initiative (MA) Hudson Riverkeeper (NY) Hurricane Creekkeeper (AL) Idaho Sporting Congress (ID)

International Rivers Network (CA) John Muir Project (CA) Kalamazoo River Protection Association (MI) Kansas Riverkeeper & Friends of the Caw (KS) Kern Valley River Council (CA) Kettle Range Conservation Group (WA) Klamath Siskiyou Wildlands (OR) Lake George Waterkeeper (NY) Lake Ontario Waterkeeper (Canada) Lands Council (WA) Lawyers for Clean Water (CA) Los Alamos Study Group (NM) Lower Mississippi Riverkeeper (LA) Lower Neuse Riverkeeper & Neuse River Foundation (NC) Maine Rivers (ME) Maricopa Audubon (AZ) Mattole Restoration Council (CA) Milwaukee Riverkeeper (WI) Montana River Action (MT) Morava Riverkeeper (Czech Republic) Narragansett Baykeeper (RI) National Forest Protection Alliance (MT) Native Forest Council (OR) Native Forest Network (MT) New Mexico Wilderness Alliance (NM) New River Foundation (NC) New York/New Jersey Baykeeper (NJ) Northern California River Watch (CA) Northwest Rafters Association (OR) Northwoods Wilderness Recovery (MI) Ocean Arks International (VT) Ocmulgee Riverkeeper (GA) Ohio Environmental Council (OH) Oregon Natural Desert Association (OR) Outdoor Adventure River Specialists (CA) Patagonia (CA) Patapsco Riverkeeper (MD) Patrick Environmental Awareness Group (VA) Pensacola Gulf Coastkeeper (FL) Pequannock River Coalition (NJ) Petitcodiac Riverkeeper (NB) Protect Our Public Lands (OR) Puerto Rico Coastkeeper (PR) Puget Soundkeeper Alliance (WA) Red Rock Forests (UT) Red Rock Foundation (AZ) Ridgeline & Open Space Coalition (CO) Riparian Improvement Organization (CA) River Project, The (NY) River Runners for Wilderness (CO) Riverhawks (OR) Russian Riverkeeper (CA) Sacramento River Preservation Trust (CA) Salt Creek Watershed Network (IL) San Diego BayKeeper (CA) Santa Barbara Channelkeeper (CA) Savannah Riverkeeper (GA) Save America's Forests (DC) Save Barton Creek Association (TX) Save the Illinois River (OK) Sea Shepherd Conservation Society (WA) Seeds of Simplicity (CA) Shundahai Network (UT) Sitka Conservation Society (AK) Sky Island Alliance (AZ) Society of Environmental Communicators (AZ) Solar Energy International (CO) South Riverkeeper (MD) Southern Appalachian Biodiversity Project (NC) Southern Appalachian Forest Coalition (NC) Southern Utah Wilderness Alliance (UT) Spirit of the Sage Council (CA) St. Johns Riverkeeper (FL)

End of April 2, 2004 letter to Nancy Coulam

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Thank you for your presentation to Desert Fly Casters in Tempe several weeks ago. Tourism displays a heavy economic footprint on our state and blue ribbon fishing could be one of the great drawing cards for people that come from all over the world to visit the Phoenix area during our beautiful fall, winter, and spring months. To expand our public relations in this area would in all probability increase the attendance of our visitors to large lakes, and particularly, the Colorado river at Lee's Ferry. Many serious fly fisherman including myself travel to Colorado, New Mexico, Wyoming, Montana and Idaho to name some favorite locations and spend money elsewhere when we would much prefer to spend our money here in this state. Gas is continuing to climb in cost and time factors make local fishing much more affordable, especially for retired folk. I have personally fished most of the larger trout rivers in the West and can honestly say that I would much prefer to spend time and money at Lee's Ferry.

Please consider carefully the amount of flows from Lake Powell so that fingerling trout can survive during the early months of the year. You of course know that well fed trout fry grow at the rate of 1" per month and the amount of available food is the key ingredient to growing trophy fish. New Mexico, Colorado and Montana are in the process of improving their fisheries to attract fishermen residing in other parts of the country. To provide heavier flows in the spring enables aquatic life to multiply and thrive. Hopefully, you will consider the thousands of resident fishermen and potentially tens of thousands of out of state diehards that would be interested in fishing for 20-25" trout on a beautiful day in Fall, Winter or Spring at Lee's Ferry.

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On behalf of our fly fishing club, we would definitely encourage the Glen Canyon Dam Long Term Experimental and Management Plan to actively promote maintaining and improving trout fishing on the Lee's Ferry area, and in the Colorado R. area through the Grand Canyon (including Bright Angle Creek). We feel a good trout fishery has significant economic and recreational value for the people of AZ and surrounding area. This now has become a cold water fishery, ideally suited for trout, and if promoted and maintained could become one of the best trout fishing areas in the country.

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I have lived, fished, and hunted in this state for over 2 decades including Lee's Ferry. I would like to see the following - Please manage the Lee's Ferry area as a Blue Ribbon C & R trout fishery with priority given to the quality of the fishery and not the native species that once lived there in a very different environment. I think this is a rare opportunity for Arizona to reclaim a world class fishery. Trying to manage any portion of the stream for the native populations that once lived there just does not make sense to me, it is a different river system from what it used to be, adapt as the wildlife has learned to. Please stop removing and killing trout from Bright Angel Creek and other tributaries where they have learned to thrive. I like the idea of thinning out the small fish populations in times of bust to provide a fishery with larger fish sizes.

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In writing this letter, I'm representing the thousands and thousands of anglers, both Arizona residents and world-wide residents who have an ongoing interest in the quality of fishing at Lee's Ferry below Glen Canyon Dam near Page, Arizona as well as a potential to visit and fish there many times in the coming years.

Unfortunately, while most of my fellow anglers are very concerned about the issues on the Colorado River below Glen Canyon Dam, they are not inclined to make the effort to write and let their thoughts be known. It's human nature to not get involved.

Nevertheless, this is an important issue for discussion and there is room for improvement.

I don't lose sight of the fact that power generation is the primary goal of the dam and as such, must be a productive resource for all of the power customers that benefit from this endeavor.

Over the many years I've been fishing at the Lee's Ferry locations, I've experienced water level fluctuations ranging from mild to flat-out dangerous. Any biologist can tell you that rapidly changing water levels in any river will affect the quality of the fishery. A more-level stream flow will ultimately be advantageous.

I would hope that the LTEMP will include both the recovery and maintenance of a Blue Ribbon trophy trout fishery as well as the restoration, recovery and maintenance of native fish..and at the same time, address the threat to both from invasive non-native warm water fish, vegetation and other invasive species.

Further consideration should be given to the impact of the fishery on the local economy, what little there is of it. A self-sustaining, trophy trout fishery will go a long way to help the economy and the many Native Americans who make up a substantial part of the work force there.

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I have an interest in the future discussions and direction of the Colorado River water management and specifically the Lees Ferry Rainbow Trout fishery. The Lees Ferry area is a wonderful place to visit for its history and scenery and for the rainbow trout fishing afforded. The recreational fishing also has the potential to add to the economic viability of the Marble Canyon/Lees Ferry area. This is a part of rural Arizona that has few economic opportunities so every small amount of employment and business is of economic value. It is very important to me and for my son and grandsons to give the rainbow trout fishery a higher priority than has been done in the previous years. The timing of water releases along with habitat preservation or improvement is very critical for improving the fishery and to create a better quality trout fishery. I have fished Lees Ferry since 1999, from 1 to 3 times a year. My experience over that time is a wide range of fishing quality. I have experienced "ups and downs" in fishing at Lees Ferry in terms of fish numbers and fish size. There has not been a consistent improvement for either numbers or fish size and Lees Ferry has lagged other tailwater fisheries in the region. The rainbow trout are now reproducing on their own and natural to the cold water fishery below Glen Canyon Dam. The wide range of water releases can make both wade fishing and boat fishing very challenging and at times of high water releases can make fishing dangerous or impossible. If provided improved water conditions, it seems reasonable to me that fish sizes would steadily increase over time. I urge you to give greater focus and allocation of resources to the rainbow trout at Lees Ferry. It has the potential for much improved trout fishing and related economic benefits.

89

As an aging member and long time angler I am keenly aware of the dwindling amount of prime fishing available to the private angler. The stretch of water below Glen Canyon dam is rare example of what the fishing potential in Arizona could be. It's history as an area accessible to not only the general public but especially to elderly anglers who no longer are able to wade the larger waters or travel to other states offering such Gold Medal fishery should be kept in mind when deciding its future.

The fluctuating water levels have severely limited the quality of the fishery below the dam. This wide variation in flows has over time reduced the quality of the fishing below the superb levels it had at its prime.

I am well aware that the primary purpose of the dam is not the providing of a fishery, yet that fishery provides a source of income to the population local to the area, especially the Native Americans of the area.

I realize that I can only speak as an individual, yet I strongly believe that there are many others I feel I represent who would voice similar concerns.

90

I have received your request for the Arizona Game and Fish Department (AZGFD) to serve as a Cooperator on the Long Term Experimental Management Plan (LTEMP) Environmental Impact Statement (EIS) associated with the operations of Glen Canyon Darn and its Adaptive Management Program. As the agency statutorily responsible for managing fish and wildlife resources and uses in Arizona under Title 17 of the Arizona Revised Statues, we have an obligation to conserve all of those resources in a manner that serves current and future generations of Arizonans. The Arizona Game and Fish Department has a long history of managing wildlife in Glen and Grand Canyons dating back to the early part of the twentieth century, and working with the Bureau of Reclamation and the National Park Service. Due to our deep rooted history in the Grand Canyon and our responsibility as the wildlife trustee for the citizens of the state of Arizona, we believe it is appropriate for the Department to serve as a Cooperator. We do so in the understanding that as a Cooperating Agency we are fully engaged with the lead federal agencies in identifying issues to be addressed, assembly of the necessary resource data applicable to our role as a wildlife managing agency, analysis of the data, and development and evaluation of alternatives. Many of the resources AZGFD is statutorily responsible for will be impacted as a result of the LTEMP EIS. As such, our expectations as a cooperator are high. We recognize that we are not able to make a federal decision on behalf of the Department of the Interior, but we are an allied management authority and have a role in developing mutually supportive and coordinated management.

In addition to our formal acceptance we wish to provide you with scoping comments that summarize AZGFD's primary concerns that we believe should be addressed during this EIS process. AZGFD personnel were pleased to attend and assist with scoping meetings held in Phoenix, Flagstaff, and Page, Arizona during the month of November. During the scoping meetings it was clear that the information provided by Argonne National Laboratory (ANL) was not current. While we do not question ANL's ability and understanding of the NEPA process, we do have concerns about their lack of depth of understanding at this time about each of the resources that may be affected by this EIS. As we look to explore experimental approaches and identify management actions for the next 15 to 20 years, it is critical that current information is applied to EIS-related decisions. This requires extending beyond information that is found in published literature. If ANL is contracted for the entirety of the NEPA process, as we expect that they may be, their role needs to be clearly defined and it is essential that they actively engage with all managers and scientists conducting work in the project area. We are not expressing displeasure with ANL nor a lack of confidence, but we do have expectations we hope we share

with other Cooperators that the information available to ANL, and in-turn to the public, is accurate and well-balanced.

There are a number of resource issues within our purview that AZGFD sees as important as LTEMP EIS scoping develops and as analysis of effects is conducted. The resources include:

The rainbow trout fishery at Lees Ferry The rainbow trout fishery at Lees Ferry was established and managed by the AZGFD, in concert with the Bureau of Reclamation, the Bureau of Sport Fisheries and Wildlife (now the Fish and Wildlife Service), and the Department of Interior, following the completion of Glen Canyon Dam. It is the premier place in Arizona where one can have the opportunity to fish on a big river for rainbow trout. Due to its unique location and its ability to produce larger rainbow trout, Lees Ferry has become a nationally recognized fishery that attracts anglers from all over the world. The AZGFD in coordination with other resource managing agencies is currently renewing the fish management plan for the Lees Ferry fishery. Newly acquired scientific information has allowed managers to better understand the relationship between dam operations and rainbow trout response. The Arizona Game and Fish Department believes that management of Glen Canyon Dam is possible without loss of angling opportunities or detriment to the quality of the fishery (as defined in the fish management plan) as a result of this EIS. We understand there is a fine balance between maintaining a quality trout fishery in Lees Ferry and protecting or enhancing native fish downstream. We are confident that this balance can be achieved through adequate coordination among resource managers and altemative(s) can be identified that best address this balance.

Threatened and endangered and other fish and wildlife native to the Colorado River Ecosystem. The Arizona Game and Fish mission is to conserve fish and wildlife resources and the habitat that those resources depend upon for the benefit and enjoyment of present and future generations of Arizonans. Conservation for AZGFD extends outside the margins of the river to riparian species like southwestern willow flycatchers, leopard frogs, and ambersnails. Competing resource needs and expectations among rainbow trout and other nonnative species and the endangered humpback chub and other native aquatic wildlife create a challenge for resource managers. The AZGFD has statutory responsibility to find a balance among those resources. Defining a mutually acceptable approach to learning about and managing toward a balance among resources and reducing uncertainties surrounding impacts of dam operations on such resources is pivotal to this EIS. Dam operations that negatively impact native and desired nonnative wildlife downstream and the habitat they rely on will be of concern for AZGFD.

Angling, boating, and other recreational activities in Glen and Grand Canyons. The Arizona Game and Fish Department is responsible for ensuring safe and enjoyable wildlife-related and watercraft recreational experiences for the citizens of Arizona and visitors to Arizona. Operations that risk the well being of boating and wading anglers, recreational boaters and wildlife watchers is a concern for AZGFD.

As the State Agency responsible for managing wildlife in Arizona, we greatly appreciate the opportunity to serve as a Cooperator with the Bureau of Reclamation and the National Park

Service, and other identified Cooperating Agencies. We are fully committed to assume the responsibilities of a Cooperating Agency, and have expectations of the deference afforded to a Cooperator and allied management authority. Enclosed you will find a signed form acknowledging our participation as a Cooperator on the LTEMP EIS. We believe that there are significant opportunities in crafting alternatives to improve both our knowledge of processes and management tools to foster continuing improvement of downstream resources. As a Cooperating Agency the Department can provide credible scientific information on the effects possible alternatives may have on fish and wildlife resources and the people that make use of these resources.

91

It is exceedingly important to me that Glen Canyon Dam is managed in a way that considers the recreational resources of the river corridor. Specifically I am referring to the beautiful beaches of Marble and Grand canyons. We need to have river flows that don't wreak havoc on existing beaches, but build and maintain them. To me this means flow patters of minimal fluctuations. Patterns of steady flows should also be implemented periodically. Beach Habitat Building Flows should be implemented when sediment triggers are reached. Lastly, and perhaps most importantly, scientific studies regarding sediment and river flows should continue. It is imperative that we proceed through science to gain knowledge from this dynamic system.

92

I and my son and friends have beeonfishing lees ferry for many years and have noticed a dremaic decline in he size or raimbow trout and he number. I would wish to voice my consern for the rivers future. It has always been a blue riben fishery but he consen change in waer level during the day is ellarming. In a single day the level will change as much has 20 feet, areas that were under water are now exposed. Fish cannot sustain in this condition!!! I know that the dam is generating electric power but something has to be done about the fishery which attracts fishersmen from all over the us.

93

I am the president of the Hooked on Fishing Club in Sun City Grand, Surprise, AZ. Over the past 8 years our club regularly takes fishing trips to Lee's Ferry below Glen Canyon Dam in Arizona. We have a huge interest in the quality of the fishing at Lee's Ferry and the issues on the Colorado River.

We realize that the manjor function of the dam is to provide power to many customers.

But we have noticed over these years the rapid water level changes that occur during a day of fishing. I am sure you know that these rapid level changes affects the quality of fishing in any river. A consistent river flow would improve the quality and restore Lee's Ferry as a Blue Ribbon trout fishery.

Our club would hope that you would consider both the maintenance and recovery of this trout fishery as well as the restoration and recovery of native fish. We also hope you would address the threat of invasive non native fish, vegetation, and other invasive species.

Please consider the impact of a Blue Ribbon fishery on the local economy. A self sustaining trophy trout fishing area could considerably help the economy and the local Native Amerians who make up a major portion of the work force.

94
Grand Canyon River Guides, Grand Canyon River Runners Association, Grand Canyon River Outfitters Association, Grand Canyon Private Boaters Association, American Whitewater

STANDING: The Colorado River as it flows through Grand Canyon National Park provides opportunities for one of the world's most sought after whitewater experiences, with close to 24,000 visitors running the river annually. The above-named five groups are intimately involved in recreational activity in the river corridor of the Grand Canyon, and have common interests with respect to Grand Canyon river management. Our groups are directly impacted by operations of the Glen Canyon Dam, as it regulates the volume of water in the Colorado River through Grand Canyon. This document represents those common interests, and thus provides a set of core considerations that we urge upon those drafting the Environmental Impact Statement (EIS) for the Long Term Experimental and Management Plan (LTEMP) for Glen Canyon Dam.

NATURE OF IMPACT: The volume and flow patterns of the Colorado River have several principal effects on river-based recreation, the recreational experience, and the resources we wish to protect. First, erosion of natural sandbars and camping beaches has progressed under all flow regimes employed to date. This erosion is a concern because as beaches recede and disappear, camping options for river-runners (as well as backpackers who reach the river and decide to camp) are reduced, which exacerbates crowding and congestion and negatively affects the recreational/wilderness experience. Campable area reduction also results in impacts to sensitive resources in the Old High Water Zone. In turn, these conditions reduce the capacity of the ecosystem to absorb visitor impacts in ways consistent with NPS and tribal river corridor management plans. Finally, the magnitude and timing of river fluctuations also have a significant impact on the riverine ecology as well as the cultural record and Traditional Cultural Properties of the eleven associated tribes who live in and around Grand Canyon. Enhanced sediment supplies are necessary to facilitate aeolian transport in order to protect the fragile and non-renewable archaeological sites along the river corridor. As river stewards, we care deeply about the protection and preservation of all the resources that make Grand Canyon so unique.

GOAL: The foundational goal of any Plan should be to do no further harm to the Grand Canyon river environment. The operation of Glen Canyon Dam has had a profound adverse impact on Grand Canyon river conditions — ecological, cultural, and recreational. A fundamental test for all future decisions should be whether any proposed action will serve to (at a minimum) preserve or (to the extent practical) restore and improve the values for which Grand Canyon National Park was created.

DECISION-MAKING PRINCIPLES: The submitting organizations respectfully offer the following recommendations for the development of the Long Term Experimental and Management Plan Draft EIS. We believe it is possible for the EIS team to develop a flow management program that effectively balances the competing interests now involved, and satisfies the following principles.

1. Responsible Ecosystem Management: In combination with the "do no harm" ethic stated above, this should be the prime goal, and an over-arching consideration in all decisions. A Plan that embodies this element will result in a healthier river corridor that is in concert with the provisions of the 1992 Grand Canyon Protection Act and the Endangered Species Act.

2. Adaptive Management-Based Scientific Method: All decisions on dam operations should be based on the best available scientific findings, and application of the scientific method. The experimental aspect of the Plan should provide for further data accumulation, hypothesis testing, and modification of key Plan components over time, in order to further optimize goal attainment. Alternatives must be scientifically defensible and credible, with well defined hypotheses. The Grand Canyon Monitoring and Research Center (GCMRC) should be considered a central resource for this aspect of the Plan, together with other pertinent ongoing scientific investigations in the Grand Canyon corridor.

3. Desired Future Conditions (DFCs): The Plan should clearly articulate DFCs for all river-related factors under consideration, and utilize those DFCs for evaluation of alternatives. Future operational plans should permit adaptation of DFCs, as new scientific findings emerge and as other variables in the system change materially. The DFCs should be tied to the NPS Organic Act, NPS Management Policies, and the goals and objectives articulated in GCNP and GLCA General Management Plans.

4. Honor Pre-Dam Flow Patterns: The final Plan must ensure that minimum flows meet long term average legal obligations. However, within those parameters, the Plan should generally seek to establish a year-round navigable river, with dam releases experimentally modulated in a way that emulates pre-dam patterns when the appropriate conditions prevail.

5. Rebuilding Sandbars: Current findings suggest an optimal flow regime would principally rely on steady flows (in the 8,000 - 11,000 cfs range), with appropriately timed higher volumes to facilitate rebuilding and maintaining sandbars. Accordingly, the Plan should take maximum advantage of natural sediment augmentation opportunities from the Paria and Little Colorado River watersheds. The Plan should contemplate testing the best case scenario presented in the article, "Is There Enough Sand? Evaluating the Fate of Grand Canyon Sandbars", GSA Today, Volume 18, Issue 8, August 2008. The goal here would be to eliminate or minimize further beach erosion, facilitate re-deposition of sediment, maintain the integrity of cultural resources in situ, eliminate adverse impact on native species, and assist in re-propagation of native riparian plant communities.

6. Safety & Navigability: To the extent practicable, the structure of the release regime should be known in advance. That is to say, recreational users (boaters and backpackers who may be camped riverside) should know that a rise in the river could occur a certain number of hours after a major sediment increase becomes evident to them as they boat. This would enable them to take precautions against rapid rise in water level.

ADDITIONAL FACTORS: Other components of the Plan should include consideration of:

1. Recreational Capacity: Proposed flows may have an effect on the recreational carrying capacity of the river corridor, which in turn directly impacts the quality of the recreational experience. Carrying capacity is the basis for launch limits incorporated into the 2006 Colorado River Management Plan (CRMP). It would be important to rely on NPS input in this regard.

2. Tamarisk Leaf Beetle Mitigation: In anticipation of further tamarisk defoliation by the Diorhabda Elongata beetle, the Plan should anticipate whether there are measures that can enhance restoration of native riparian shade trees along the mainstem in order to prepare for this watershed-scale change. Again, coordinating with NPS managers and Dr. Todd Chaudhry, the new Watershed Stewardship Program Manager for the park, will be important.

3. Economic Issues: Grand Canyon river running has a significant economic impact on Page, Flagstaff, Kanab, Fredonia, and other portions of the region, through employment, direct outfitting, supplies, equipment, transportation, and lodging. Prior evaluations have dealt principally with the power generation or reservoir balancing implications of dam management. A full valuation of the socio-economic impacts to recreational resources impacted by dam operations is an essential part of the DEIS process when the economic implications of alternatives are examined. Non-use values should also be assessed and incorporated by managers into decisionmaking.

4. Temperature Moderation: In furtherance of ecological restoration, the EIS should actively evaluate the efficacy of options that would provide temperature control flexibility and improved water quality. A selective withdrawal structure or other methodology could potentially offer more flexibility in ability to respond to changing ecosystem concerns in future years, if benefits could outweigh the potential negative effects. The LTEMP team should consult with the U.S. Fish and Wildlife Service to address the costs, benefits, and risks associated with a Temperature Control Device (TCD).

5. Further Sediment Augmentation: The EIS should examine options for introducing additional sediment below the dam, to augment that which is periodically available from tributaries if it becomes clear that sediment resources cannot be restored and maintained through other means.

6. Representation in Future Decision-Making Activities: Future decision-making bodies and processes should include additional, more proportional representation by recreational and tribal parties. In addition, the final Plan must also incorporate tribal perspectives and values into the decisionmaking process in a meaningful, synergistic way, in order to achieve a balanced outcome during the life of the Plan.

CONCLUSION: This document should not be considered as a complete summary of concerns and recommendations from the signatory organizations. Each organization will be submitting their own detailed comments for use in formulating the Draft EIS, yet those additional materials will not be in conflict with this presentation. And it is our hope that the reviewing body will take note of the fact that five river stakeholders with such diverse goals have come together to recommend a set of commonly-held principles for river management in the Grand Canyon. We trust these joint recommendations will be regarded with additional weight because they represent the views of such major components of the Grand Canyon river community.

95

We, the population of the U.S. and everywhere else, are in a situation we all wish was situated differently but it is not. And that is, we have reached the point that that our Wildlife is no longer wild, it is farmed. And if it is not farmed, it will cease to exist. This is not the place to argue the point, only to display it because it affects what choices should be made regarding the Lees Ferry Fishery and its part in the management of Glen Canyon Dam. We are not taking down the dam. Interesting conversation, but it is not going to happen. So, we have created an "imposed environment" as opposed to the natural one that existed before the Dam was constructed. And when we imposed that environment on the Colorado, we did so because the act was to benefit people. In the process of doing this, changes and opportunities occurring because of the imposed environment were to be dealt with in some meaningful and useful fashion. There are several issues from power management to Tribal concerns. My concern here is that the Fishery is as much a concern as are any of the others as it is part and parcel of what has been created. The Fishery and the river running to Lake Mead has a recreational value (no small thing) and an economic value as a result. Among the concerns is maintenance or the native fish (Chubs) but the non-natives (Trout) are frankly no less important. People have come to expect it and rely on it. It is not the Chubs driving the recreational and economic values, it is the NNF TROUT. They, along with the Dam are now part of the imposed environment. They are both there, they both have benefit and they both need to be part of an integrated plan. The Fishery needs to stop being an afterthought if it is convenient to think about it and its needs. There has to be a better way to manage and that is the point, to accept that the Fishery is one of the concerns and take a long term view of its part in the overall management plan (LTEMP EIS) just as we do with the other concerns. Indeed we are all concerned with the Endangered Species Act and animals affected, in the this case the Chub. None of the above is intended to ignore that component. What has in fact occurred to this point in time is proof that the Chub can survive quite well in the presence of the Trout and vice versa via intentional management opportunites already afforded through the efforts supported by the Glen Canyon AMWG. And that ought to encourage a Management Plan that balances all of the concerns from power generation, to Tribal Issues and including the Lees Ferry Fishery.

96

As a fly and spin angler I have enjoyed the recreational area at Lee's Ferry and would like to have the LTEMP continue to improve what has been called "the cathedral of fly-fishing in North America". The Blue Ribbon fishery with its abundant rainbow trout has declined in recent years and last year with continuing drought 23,000 cfs discharge from the dam required a change in plans for several of our groups and ourselves. These flows are dangerous for wading and even boating for most of us. The seven states that depend on the hydroelectric power from the Colorado river remain a primary concern since drought has severely effected the ability to reach the allocations of their Compact. But the dam which creates the power also created the fishery and the fishery must be considered in any planning process. Concern regarding the endangered humpback chub has rushed scientific study and consideration of further removal of rainbow trout to limit predation. I would encourage further study with monitoring of production and recruitment trends including translocation of the chub since it would appear that there may be some improvement in their numbers (GCMRC). I would discourage a rapid attempt at resolution of this multifactorial problem. Restoration, recovery and maintenance issues such as these

require a comprehensive fishery management plan which will coordinate the interests of all the stakeholders.

97

I'm writing this letter to express my concern to the BOR and NPS about the water flow management of the Colorado River in The Lee's Ferry area and its effect on the potential world class rainbow trout fishery that exists there.

As an avid outdoors person and angler I am drawn to the Lee's Ferry area for the beauty of its geological features and the awesome Colorado River and the fishing that it offers. So many Arizona natives and others throughout the western U.S. are familiar with and appreciate this great angling resource in spite of its ups and downs over the past several years. My wife and I will make at least a couple of trips there every Winter season; she is a watercolor painter and loves what she sees there. I do some hiking, but spend most of my time trout fishing in the walk-in areas.

Although the river serves many interests, surely the water resources could be managed in a way that would allow this wonderful fishery to flourish and reach its potential.This would involve maintaining the flow rate at a moderate level- between 9000- 16000cfs, and avoid periodic scouring of the river bed with extreme water releases which are so damaging to fish habitat.

When you are in the process of creating the Long Term Experimental Management Plan and Environmental Impact Statement, please remember that many, many people place the greatest of values on this fine fishery. If the Colorado were to lose it, there would be a lot of empty water- and a lot of broken hearts.

98

This is a comment for the Lees Ferry LTEMP. In the 1980s and early 1990s the Lees Ferry trout fishery was one of the top 2 or 3 fisheries in the country. It was considered world class. Fishers fron all over the world came to Marble Canyon to fish. This was a great boost to the local economy. Local motels and resturants were full. Native craftpersons sold items on the roadside. Things were booming. And the fishing, well, it was outstanding. Trout to 20 inches were common. The largest trout I caught in 1992 was 27 inches. In the 1980s fish were even bigger. With proper management, these waters could be returned to the outstanding fishery they once were. Instead, recent water management has seemed to be deliberately trying to ruin the trout fishery, unfortunately with some success. Since the late 1990s trout populations have crashed and Lees Ferry now has the reputation of being a very mediocre fishery, not one worthy of an extended trip. The result is that many of the fishing guides have left the area. The local native craftpersons are not selling anywhere near as much. The local economy is depressed. With proper water management, Lees Ferry could be returned to something like its former glory. The benefits to the local economy would be substantial. People would come to fish and many would likely stay to take in local sites like Page and the Slot Canyon. I remember fondly those late winter days in 1989 when I would drop a fly in front of a 20 inch feeding rainbow and watch as she moved slightly to take my offering. The fight was fantastic and the scenry was outstanding.

Where else could you get that unique combination. I urge you to adopt a water plan that would help restore this fishery.

99

I am writing to express my strong support for the current LTEMP EIS. We need to continue with this responsible management plan. By mandating reasonable river flows no less than 8,000 cfs and moderate fluctuations, the current plan maximizes environmental protection within Grand Canyon National. With the reasonable river flows and moderate fluctuations, this plan also supports safe and enjoyable recreational access for the rafting pubic. Please choose to continue with the current LTEMP EIS ideals to protect Grand Canyon resources and recreational access to this national treasure and wonder of the world.

100

I have lived and worked in and around Grand Canyon and the Lees Ferry trout fishery for 40 years. I have witnessed and worked in the science field through the GCES years and into the Adaptive Mangaement Program. I am pleased to see that maybe, finally the system will be addressed and the recreational trout fishery considered within the overall plan, not just an accessory. This is, ultimately, the final goal of the Adaptive Management Program, wether it is recognized or not. It is directerd by the plan that a “blue ribbon” trout fishery by maintained in the Lees Ferry reach. What this is must be determined. Secondly, goals must be set for the management of Humpback Chub. Without these two things in place we are wondering in the dark on the management of these species. This opened ended approach we have been dealing with allows for agencies such as Fish and Wildlife to attempt to influence reckless litigation driven management actions that are unfounded in science and have to clear goal in mind.

This brings me to one of the more agregious instances of this, the Paria to Badger removal of rainbow trout. The impact of rainbow trout on chub is questionable at best, even in the reach inhabited by chub-the Little Colorado River. This removal is 60 miles from the stronhold of chub and wether they want to acknowledge it or not, there is really not a viable mainstem population of chub in MArble Canyon. Additionally, 2011 saw the greatest recruitment of rainbow trout in the Lees Ferry reach ever, with a population of 1.3 million age 0 fish in November of 2011. By all estimates-Arizona Game and Fish and Grand Canyon Monitoring and Ressearch Center biologists-the most trout that can possibly be removed from this reach is 10,000-20,000. An insignificant and inconsequential number. But not an insignificant price tag-$110,000. This follows on the heels of a project to try to get at the natal origins of RBT in Grand Canyon in November 2011. This project tagged 12,000 fry in the Lees ferryt reach and calls for a similar effort in 2012. While thge removal will not help the chub, it may confound the results of this natal origins project by influencing the movement of these trout downstream, thereby opening this potential data up to question.

It is simply time for a comprehensive plan, with clearly established goals such as chub numbers and determining what is a blue ribbon trout fishery to be established.

101
As one who grew up on BuRec and Corps projects-Shasta/Canyon Ferry- and came late to the Colorado, I hope that you will pay attention to those of us have been fortunate enough to have been on the Colorado River in a real boat. You do have an opportunity to restore/preserve the quality of what is left of the west. You have heard/read(hopefully)the words of JW Powell- west of the 100th meridian the 160acre deal won't work. Right now, as you well now, the is barely enough water to fill ONE reservoir, let alone both. Get your act together-NOW.

102
It is of utmost importance that all the LTEMP alternatives follow the Grand Canyon Protection Act of 1992, which 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."

103
The downstream environment below Glen Canyon Dam needs serious attention to preserve the native species in those areas. The government needs to do everything in their power to meet mandates of the Grand Canyon Protection Act. Preserving the balance of environment and recreation is vitally important in that area. Grand Canyon National Park sets the standards for so many of our recreation areas. It should be a positive role model. Please do what you can to preserve the Grand Canyon for future generations.

104
I have been river guiding for seven years, and one of my favorite places to raft is through the Grand Canyon. Actually, it's one of my favorite places to be in the whole world. I can't imagine limiting water acces to the canyon for nay reason. To be bale to raft down the river and enjoy the canyon we love, we need flows of 8000 cfs, with moderate fluctuations, environmental protection. I very strongly urge you to choose recreational access over power generation.

105
First, I urge you to ensure that all of the LTEMP alternatives consider the intent of the 1992 Grand Canyon Protection Act. The Act clearly outlines the following: "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."

Second, the LTEMP should include adaptive ecosystem management, which is based on continually adapting practices based on ever-changing information.

Third, the LTEMP EIS should involve the Grand Canyon Monitoring and Research Center (GCMRC). GCMRC has amassed a significant body of knowledge under the Glen Canyon Dam Adaptive Management Program. This knowledge should be used in the development and

evaluation of scientifically credible, well-defined alternatives that best protect the Colorado River ecosystem.

Fourth, solicit the input of the 11 native tribes affiliated with the Grand Canyon and the Colorado River IN THE DEVELOPMENTAL STAGES. Simply asking native tribes for input AFTER decisions have been made IS NOT SUFFICIENT. Cultural values provide another lens for preserving and managing the Colorado River ecosystem. Science is not the only perspective that should be considered. Further, native tribes should receive funding to carry out tribal monitoring programs.

Fifth, the LTEMP's Purpose and Need for Action Statement should be modified. The language of the Statement should reflect the purpose of the Grand Canyon Protection Act. Further, the reference to hydropower should be deleted, as hydropower is "an incident of the foregoing purposes [water storage and water delivery].

Sixth, scientific knowledge and information from other dam managed rivers (for example, Flaming Gorge Dam) should be utilized in the LTEMP process.

Seventh, LTEMP alternatives should be focused on protecting and preserving ALL downstream resources (such as cultural sites, beaches, etc.), expanding beyond just sediment and fish.

Eighth, the Desired Future Conditions (DFCs) that were developed by the Adaptive Management Program and the Department of the Interior should be used to develop LTEMP alternatives.

Ninth, the LTEMP alternatives should include Beach Habitat Building Flows. The final EA for the High Flow Experimental Protocol should be completed and included as a key component.

Tenth, river flows that follow high flow experiments should maximize sediment retention. Retaining the beaches that are built during experimental flows should be a key part the vision.

Eleventh, include climate change in the consideration of possible actions. Is a Temperature Control Device (TCD) necessary given the erratic climate from year to year? Is it possible to build a sustainable Humpback chub population under erratic climatic conditions?

Twelfth, the LTEMP alternatives should include the evaluation of steady flows.

106

I am writing as a member of the river guide community that takes 20,000 people per year to see this natural wonder of the world. I would like to express the importance of considering the science that has already been collected in designing the LTEMP. I think it is of utmost importance to remember the Grand Canyon as an amazing and beautiful place and not just a source of hydropower. The Grand Canyon Protection Act has already stated this but it is important for all of you to remember this act when creating the alternatives for the LTEMP. We are lucky to have Grand Canyon within our borders and as the amazing place that it is, it deserves the protection of it's resources placed above uses such as hydropower. Please protect

Grand Canyon for future generations to enjoy. Finally, if you have not spent time in the bottom of this amazing place, please take the time to go there before making any major decisions!

107

Please protect as much as possible the environment downstream from Glen Canyon Dam, both Glen Canyon and the Grand Canyon.

108

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 is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

Change the Purpose and Need for Action Statement for the LTEMP 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 which is an ancillary benefit of the dam.

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. 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.

The LTEMP 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.

Clearly define agency responsibilities, improve communication, create mechanisms for productive information sharing, and eliminate project redundancies between Grand Canyon National Park and the Grand Canyon Monitoring & Research Center.

Ensure that the 11 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 decision making—a distinct failure of 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 tribes view all canyon resources as culturally significant.

Funding for monitoring and management of cultural resource should be restored. In order to comply with the Grand Canyon Protection Act, federal laws, statutes and executive orders, the importance of protecting and preserving these fragile, non-renewable resources and Traditional Cultural Properties for the benefit of future generations must not be minimized.

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.

Improve the structure and functionality of the Glen Canyon Dam Adaptive Management Program 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.

RESOURCE ISSUES:

Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come.

Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to

accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

Focus 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 protects and preserves the individual resources along the Colorado River.

The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

Examine the role of time and climate change in the system.

Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

FLOW SUGGESTIONS:

Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives.

Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention.

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.

Include an LTEMP alternative to test steady flows.

Consider an alternative that includes a seasonally adjusted steady flow alternative that includes sediment triggered Beach Habitat Building Flows, and based on the closest approximation of the pre-dam hydrograph.

We need a scientifically credible, well-designed steady flow experiment of sufficient longevity to produce a biological signal (more than two months in the fall) that is followed by a full synthesis of impacts to biological, physical, social, economic and cultural resources.

Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

Test the "best case scenario" presented in the article, "Is there enough sand? Evaluating the fate of Grand Canyon sandbars" as proposed by USGS scientists.

Design an alternative based on the best chance of viability for rebuilding and maintaining sandbars.

109

I encourage you to take into give a lot of weight to the natural ecosystem and steps that can be taken to maintain or even roll back man caused impacts to the ecosystem of the river and canyon. I have been a user of the wilderness on foot and on the river and these are some very memorable experiences. I hope that that will be protected for future generations.

110

I recently heard that a study is being conducted on the long range planning for the management of the Colorado Rivwer below the glen Canyon Dam. I moved to Arizona five years ago from Wisconsin. I have been a avid fisherman for over 45 years. I have been pleasantly surprised about the quality of fishing in Arizona, particularly the Lee's Ferry fishing area. I have fished there six times in the last two years. Mostly I fished the "walkin" area and on one occasion fished upriver via boat. This water is some of the best fishing I have ever experienced. The water clarity is excellant. The water temperature is very steady. Both of these are very important for the health and productivity of rainbow trout. The one item not present is a fairly steady flow of water that allows the habitat to be stable for the trout. I hope that water flow is a area of study in your research. This part of Arizona and the Colorado River is a national treasure. The development of this area as a fishing destination as well as river travel, power generation and water supply management should all receive equal consideration in your study. I have taken many friends to fish Lee's Ferry and they have brought their friends. This could be a world class fishery that would be a boon to the local economy. While I would like to keep it a secret that would not be fair.

111

I have been periodically fishing Lee's Ferry below Glen Canyon Dam for over 20 years. During this time it has continuously appeared that the sport fishery here has not been adequately considered (or considered at all) in the management decisions concerning the reservoir/river. The fishery here is the premier fly fishing destination in Arizona and as such should be accorded more consideration in decisions effecting its status/health.

112
I would like to support the alternative that best protects the cultural, natural and recreational resources of the Colorado river in Grand Canyon National Park. I've been down there for 30 years. In the 1980s I saw the wildly fluctuating daily flows of 5000 to 30,000 CFS rip the sand right off the beaches and carry that sand down to further fill in Lake Mead. Beaches were destroyed, habitat for native fishes were destroyed, camping sites were destroyed and diminished. Nothing good came from this flow regime. The natural forces have been at work for millions upon millions of years to create what we see before our eyes in the Grand Canyon and we shouldn't let someone (From the warmth and safey of his easy chair or from someone who peers into the Canyon and then say's "Okay let's go".), in the blink of an eye, proclaim that it is okay for us to tear to shreds the beaches and backwaters of this Canyon for a little more money. For a little more profit. That is small, small thinking and the Grand Canyon does not deserve small thinking.

113
Please consider the following comments for your scoping of the LTEMP Draft EIS:

1. ALL dam flows should be part of the LTEMP, not just the experiments. Yearly required releases and Equalization Flows should be included, and planned for, in such a way that benefits resources in the Grand Canyon.

Plan for yearly releases and equalization flows in a way that they are part of, and in concert with, the LTEMP-- not instead of of LTEMP flows. Anticipate upcoming need for equalization flows, or change in average yearly releases. Learn from the lesson of 1983 and be proactive in managing the dam such that LTEMP goals are achieved, not thwarted: For long term dam & sediment management and resource protection in Grand Canyon, an always partially empty Lake Powell is a benefit.

Include a proactive plan to occasionally get the lake level to spillway elevation, so that short duration High Flow Experiments utilizing some spillway water can be undertaken. Use the spill time/HFE to achieve required flows.

2. Assign dollar values to sediment in the system... Beaches are worth bucks!! Use those values in cost/benefit analyses for High Flow and Steady Flow experiments as offset to power revenues.

Test the sediments accumulated behind the dam for toxicity. If not toxic (or treatable), come up with a proposal for a short slurry line from behind the dam, to below the dam.

3. Try High Flow Experiments later in the Spring/Early Summer (late May-early June historic high flow period) to see trout response (also during the monsoon and winter floods). If later Spring/Summer/Winter HFEs benefit trout, then try a year round steady flow experiment with well-timed Spring trout suppression flows.

Do computer modeling of powerplant capacity High Flow Experiments to see if sand would be moved up to high enough elevation for beach/ecosystem/dune benefits. If so, conduct powerplant capacity High Flow Experiments.

4. Change GCDAMP group and procedures so that, when adopted, the LTEMP will have a chance to run its course and not be blocked, slowed, or stymied by the water & power voting bloc.

114

I will express my concern over the critical need to consider the economic and recreation importance of the Lees Ferry rainbow trout fishery. The Ferry is an important nationally recognized quality trout fishery. Fly-casters from throughout the country travel to this revered place to experience the beauty that is Glen Canyon and pursue magnificently colored, hard fighting trout. A management option must be chosen that will protect the Lees Ferry fishery for future generations and protect the many people's jobs who depend on it.

I do not believe rainbow trout in the Lees Ferry reach are impacting the humpback chub. I did have the opportunity to spend a considerable amount of time doing fish work in the canyon and sampled thousands of rainbows. Some were randomly killed and stomach contents observed. Never once did we find any evidence of predation of chubs. The main culprit in chub predation is the channel catfish, followed by the brown trout. This is evidence based and not idle speculation.

Lees Ferry trout have been shown to have a high fidelity for waters of their origin. They do not migrate up and down the river but stay relatively close to home. Because of this, Lees Ferry trout are not providing an upstream source of fish moving down into potential chub water.

Finally, a multi-level intake structure in Lake Powell would devastate the chub population by warming the waters of the Colorado River. This would allow a plethora of warm-water species to move up stream and become even more established. This would result in more competition for forage, breeding sites, and direct predation. Species that would move up from Lake Mead would include; stripped bass, channel catfish, carp, and perhaps largemouth bass. The native fish population would be decimated.

In conclusion, an alternative must be chosen that gives careful consideration to maintaining a health, vibrant rainbow trout fishery at Lees Ferry.

115

I am 83 years old and a licensed professional engineer in California. I have made many serious hikes in Grand Canyon over a 50 year period and have rafted the Colorado through the canyon as a private boater with my own equipment more than 50 times. In addition, I was a charter member of the Colorado River Constituent Panel for the several years that it operated some years ago, and I actively participate and support the work of many of the organizations that have the goal of keeping the Canyon and river in world class condition. I have reviewed many of the documents relating to the proposed draft EIS and I agree with all of the points made by the Grand Canyon River Guide organization. Certain of their members have studied this subject academically for

years and their comments echo what the existing legislation governing the operation of Glen Canyon Dam requires. I am attaching their statement below, and repeat that I fully support their recommendations.

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

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 . . .

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://wwwpaztcn.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 Adpative Managment 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 gullying/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 alterntatives 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 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.

Lynn Hamilton Executive Director Sam Jansen Adaptive Management Work Group representative Jerry Cox Technical Work Group representative Nikki Cooley President Latimer Smith Vice President Kim Fawcett Director Robert Jenkins Director Ariel Neill Director Roger Patterson Director Greg Woodall Director Kelly Wagner Director

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The LTEMP EIS should evaluate a range of alternatives that includes more than one which incorporates a flow regime that does not maximize and/or favor power generation. In particular, an alternative that focuses on recreational values should be analyzed. In addition, an alternative that evaluates ecological values should be analyzed. It is important to recognize that management for recreational values may be drastically different from management for ecological function. At a minimum, all action alternatives should include a minimum base flow of 8,000 cfs. The flow

regimes should be prescribed by the overriding value for which the river will be managed. Fluctuations in the flow regimes should match these same management values. For example, if a recreational alternative is preferred, then the flow regime should not include ramp rates that exceed those used in the recent past (@1,00-1,500 cfs/hr). If the ecological alternative is preferred, then a flow regime that is more similar to the natural hydrological function of the river (spring floods) should be adopted. Experimental flows should continue until more data is compiled to adequately analyze the impacts of different flow regimes upon the resources analyzed in the EIS. Please keep me informed as this EIS proceeds.

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[Photo on original-see Attachment] 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).

[Photo on original-see Attachment] 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).

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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 . . .

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://wwwpaztcn.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 Adpative Managment 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, 4The 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 gullying/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 alterntatives 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 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.

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My greatest concerns are the sand within Grand Canyon corridor, water flows, beach restoration and critical habitats for native species. I would very much like to see the primary focus shift away from power demands and water allocation and, instead, to mimicking Colorado River's natural behavior as closely as possible. I think much more time needs to be spent figuring out how best to restore the corridor to its pre-dam state. We need to learn how to flush sand to beaches and keep it there. I think, with this focus in mind, a great deal of tourism could be brought to the river. If the water levels are high enough for boaters, and there are beaches on which to camp, and if tourists can see the natural, unadulterated beauty of Grand Canyon and its native species, enough money can be made to keep the corridor healthy. Besides being more economically sound than raping the river, it's just the right thing to do. Get it back to how it's supposed to be.

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In regards to future operations of the Glen Canyon Dam it is critical that decision makers consider the downstream effects of Glen Canyon Dam operations on Glen Canyon National Recreation Area and Grand Canyon National Park. In the past little attention has been paid to these areas. Decision makers MUST consider endangered species, human and cultural issues, recreational uses, and protection and recovery in the corridor below the Glen Canyon Dam. In addition decision makers need to follow the ground rules set down in the Gand Canyon Protection Act. This is a Congressional Mandate set down to protect one of the planets most awe inspiring locations. The people of our country pushed to protect the Grand Canyon so that future generations will have the opportunity to experience it in a condition that is as unaltered as currently possible. Not following the ground rules of the Grand Canyon Protection Act is simply not acceptable. In regards to specific flows from the Glen Canyon Dam, some flow regimes need to be further explored to determine their effects on the corridor below the dam. Specifically, constant flows must be examined in a way that could lead to determining if they could be an asset to protecting and recovering the overall environment below the Glen Canyon Dam. Likewise, High Flow Experiments need to be a part of the plan to determine if they too can be of

assistance in protecting and recovering the environment below the Glen Canyon Dam. Good luck with the process and do not choose an alternative that allows the rich get richer at the expense of one of our planets greatest treasures. It is very simple- PROTECT GLEN CANYON NATIONAL RECREATION AREA AND GRAND CANYON NATIONAL PARK.

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Please develop plans and use science to restore the natural resources of the Grand Canyon. This could nclude following releases of regular high flows under sediment-enriched conditions meant to rebuld beaches and near shore habitat for nature fish. Also, use season adjusted steady flows for humpback club spawning and rearing in the mainstem. Please remove non-native fish so native fish may survive. Please give NPS authority to protect the Grand Canyon National Park as dictated by federal law.

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Lets keep in mind that the Trout should be ytour first priority when it comes to managing the water flow at Lees Ferry. This s a great fishiery and I would hate to see it slip away. There are not that many places that compares to Lees Ferry when it comes to fishing; especially in Arizona. Protect the fish, and not give in to interest groups whose only interest is in themselves!

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I have lived in Arizona about as long as Glen Canyon Dam has been in place. Yes it did alter much in the Colorado River below it, but it has also been good for the southwest. The dam has provided for growth and development that might not have been possible. The communities rely on the power and water available from the damn. When we are not working we have wonderful recreational opportunities at Lake Powell for boating and fishing. Below the damn we have the Glen Canyon National Recreation Area (GCNRA) with a great fishery and beautiful views to experience. Lee's Ferry is the kick off point for many rafting trips through the Grand Canyon. The Challenge that we face is to protect what we have come to rely on and enjoy while securing a place in the future for the historical past, living and cultural. The living includes all forms of creatures and plant that do and have called this area home. The cultural includes the historical sites both new and old that hold special and spiritual meanings those who directly or indirectly have experienced this national treasurer. My comments to the LTEMP scoping process will be most directly focused on the recreational fishing from Glen Canyon Dam to the entrance to Lake Meade with a heavier focus on the fishery from the Dam to Lee's Ferry. In the 1980s to the very early 1990s this fishery was known as a World Class Blue Ribbon Fishery and has been cited as such in a number of government reports. This recognition carried over into the very early 2000s, though from the early 1990s the experience was definitely deteriorating. Experimentation with flows to build sediment downstream, fluctuating flows, and other management decisions all took their tolls on the food base for fish both in the GCNRA and below.

As a long time fisherman of this river my goals is to see it return to a Blue Ribbon Fishery, a fishery where the fisher on a typical day may catch a reasonable number of trout in the range of 20–30 inches, healthy with good girth and stamina. A reasonable number would be 5–10 in this range along with a number trout of a lesser size. Such a day of fishing along the natural esthetics of the region would make fishing the GCNRA the ultimate fishing experience. Proper

management of the dam and fishery can be accomplished while balancing the delivery of water, hydropower, cultural values and conservation as is provided for under the Federal Fish and Wildlife Coordination act. There also need to be a comprehensive fishery management plan for the Colorado River between Glen Canyon Dam and Lake Meade. As a part of the LTEMP a plan should be developed and implemented for the entire fishery. This plan should include components to recover and maintain a Blue Ribbon Fishery in the Glen Canyon Dam to Lee's Ferry and components to support restoration, recovery and maintenance of native fish throughout the river. Many of the components are identical such as improved food base for all species. The rainbow trout and the endangered Hump Back Chub consume basically the same diet, improving the food base for one will improve it for the other, especially when commenced in the upstream regions of the river below Glen Canyon Dam. Fall High Flow Experiments (HFE) need to be reconsidered. These high flows are set to occur at the time of year when the sun is not reaching the bottom of the canyon. The HFE's will scourer the algae and other photosynthesis plant life from the bottom of the river. These plants are critical to the development of diatoms which is the food for scuds (gammarus) and chironomids and in turn are food for both native and on-native fish. The HFEs are set to occur when a satisfactory account of sediment is deposited in the Colorado River at and below the confluence of the Paria River, typical late August to September. It would be better for the ecosystem if HFEs were schedule in late spring to redistribute the sediment downstream. No food base studies were conducted with the only fall HFE event; however these studies were conducted after Spring HFE and found the loss of food base for native and non-native fish. For the spring HFE it required four to six months to rebuild. Here is an incident where balance needs to be considered: balance the immediate need to move sediment down river with great loss to the food base and little opportunity to rebuild for many months with a delayed HFE which has a loss of food base but a quicker opportunity to rebuild.

Lastly, the LTEMP cannot ignore the economic impact recreational activities offer to local communities along Lee's Ferry and Marble Canyon, with fishing being a large component. Coconino County of Arizona has the highest unemployment and lowest average wage in the continental United States. The lodges in this area employ a range of 55% to 80% Native American workers. Returning this fishery to a Blue Ribbon Fishery would have direct and major impact on the livelihood of the communities. These communities developed after the completion of Glen Canyon Dam. The river was stocked with rainbow trout on numerous occasions with the assistance of the United States Government and that of the State of Arizona. Business grew and prospered with the support of these government actions. A program to return the fishery to Blue Ribbon status will take a major step forward to not only preventing further decay but would foster an economic turnaround. The communities are entitled to this if only under a doctrine of laches.

I sincerely pray these comments are received and accepted in the spirit they have been made. They come from an individual who dearly loves the sport of fly fishing, an individual who treasures his time outdoors in the scenery given to us by our Father. An individual that desires the protection of all that is natural: plant life, animal life and human God given rights. Yes the terrain was altered by the construction of Glen Canyon Dam and it has continued to be altered by continued human interventions; however, no one right to existence can be superseded by the right of another not even an older life form over a new life form which has become established in the community of the ecosystem.

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Living Rivers and Colorado Riverkeeper submit the following scoping comments, which were originally presented to the Bureau of Reclamation during a public scoping meeting held in Henderson, NV for Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead (Shortage Criteria).

We submit this proposal for the purpose of including a Dam Removal Alternative in the LTEMP EIS.

The proposal is called the One-Dam Solution. The original booklet (with graphics) is available on the World Wide Web at this url:

http://livingrivers.org/pdfs/TheOne-DamSolution.pdf

Below is the text, endnotes, and NGO endorsements of the document.

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THE ONE-DAM SOLUTION

July, 2005

THE FOLLOWING GROUPS (144) SUPPORT THE ONE-DAM SOLUTION:

A Critical Decision, Alabama Environmental Council, Alaska Coalition, American Wildlands' Animas Riverkeeper' Appalachian Forest Coalition, Audubon Society of Greater Denver' Ballona Institute, Black Warrior Riverkeeper, Blackwater/Nottoway Riverkeeper, Bluewater Network, Boulder Regional Group, Buckeye Forest Council, Californians for Western Wilderness, California Save Our Streams Council, Casco Baykeeper, Castle-Crown Wilderness Coalition, Center for Biological Diversity, Choqueyapu Riverkeeper, Citizens of Lee Environmental Action Network, Citizens Progressive Alliance, Coalition for Jobs and the Environment, Coastal Law Enforcement Action Network, Cold Mountain, Cold Rivers, Coloradans for Utah Wilderness, Colorado Plateau River Guides, Colorado White Water Association, Columbia Riverkeeper, Conservation Northwest, Coosa River Basin Initiative, Devil's Fork Trail ClubDogwood Alliance, Earth Action Network, Ecology Center, Electors Concerned about Animas Water, Endangered Habitats League, Erie Canalkeeper, Flagstaff Activist Network, Forest Guardians, Forest Watch, Forests Forever, Foundation for Global Sustainability, Four Corners School of Outdoor Education, Free the Planet, Friends of Living Oregon Waters, Friends of the Animas River, Friends of Blackwater Canyon, Friends of the Earth, Friends of the Eel River, Friends of the Estuary at Morro Bay, Friends of Hurricane Creek, Friends of the Milwaukee River, Friends of the Nanticoke River, Friends of Yosemite Valley, Gifford Pinchot Task Force, Glen Canyon Institute, Goods From The Woods, Grand Canyon Private Boaters Association, Grand Riverkeeper, Great Egg Harbor Watershed Association, Great Old Broads for Wilderness, Greenaction for Health and Environmental Justice, Green Delaware, Green Party of Utah, Green Party of York County, Hells Canyon Preservation Council, Hudson Riverkeeper, Hurricane Creekkeeper, Indiana Forest Alliance, Inland Empire

Waterkeeper, International Rivers Network, International Society for Preservations of the Tropical Rainforest, Johnson County Green Party, Jumping Frog Research Institute, Kern Valley River Council, Kettle Range Conservation Group, Land Institute, London Canalkeeper, Lone Tree Council, Los Alamos Study Group, Louisiana Bayoukeeper, Lower Neuse Riverkeeper, Maricopa Audubon, Milwaukee Riverkeeper, Montana River Action, Morava Riverkeeper, National Organization for Rivers, National Water Center, New Riverkeeper, New River Foundation, Northwest Rafters Association, Northwoods Wilderness Recovery, Neuse River Foundation, Ogeechee-Canoochee Riverkeeper, Orange County Coastkeeper, Oregon Natural Desert Association, Outdoor Adventure River Specialists, Outward Bound West, Patapsco Coastkeeper, Patrick Environmental Awareness Group, Puerto Rico Coastkeeper, Raritan Riverkeeper, Red Rock Forests (now Canyonlands Watershed Council), Restore: The North Woods, Ridgeline & Open Space Coalition, River Runners for Wilderness, Riverhawks, Rocky Mountain Peace and Justice Center, Russian Riverkeeper, Sacramento River Preservation Trust, Salt Creek Watershed Network, San Diego Coastkeeper, San Luis Obispo Coastkeeper, Santa Monica Baykeeper, Satilla Riverkeeper, Save the Illinois River, Siskiyou Project, Snake River Alliance, South Riverkeeper, South Yuba River Citizens League, Southern Appalachian Forest Coalition, Southern Utah Wilderness Alliance, Spirit of Sage Council, Swan View Coalition, Taking Responsibility for the Earth and Environment, Taxpayers for the Animas River, The Clinch Coalition, The River Project, Umpqua Watersheds, Upper Coosa Riverkeeper, Upper Neuse Riverkeeper, Ventura Coastkeeper, Virginia Forest Watch, Waterkeepers of Austrailia, West/Rhode Riverkeeper, Western Lake Erie Waterkeeper, Western Lands Project, Western Watersheds Project, Wetlands Action Network, Wild South, Wild Virginia, Wild Wilderness, Wilderness Watch, Wildlaw

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“We’ve got to rethink the use of water. But if you think it’s [the drought] going to go away, the people that think well, we’re going to go back to a wet cycle, don’t bet on it.” Stewart Udall, former Secretary of the Interior, December 2003.

SUMMARY

Life in the Southwest depends on the Colorado River. Preserving this resource requires achieving a sustainable balance between water supply and demand. However, population growth and climate change are disrupting this equilibrium and pushing the management of this resource to its limit.

Federal laws and water projects regulating the consumption of Colorado River water do not adequately reflect this imbalance. Current laws allocate more water to the basin states than the river actually provides. More federal dams have been built than are needed wasting at least 13 percent of the river’s flow annually.(1) Sediment backing up behind dams represents a multi-billion-dollar management challenge that has so far been ignored. Meanwhile hundreds of millions of dollars are being invested in failed efforts to manage environmental problems resulting from dam operations.

At the heart of these challenges lie the nation's largest reservoirs, Lake Powell behind Glen Canyon Dam near the Utah/Arizona border and Lake Mead behind Hoover Dam on the Arizona/Nevada border. Combined they cause the loss of 10 percent of the Colorado's annual flow(2), while declining surplus flows render the future filling of these reservoirs an unlikely occurrence.

Grand Canyon National Park, which lies between Glen Canyon Dam and Lake Mead, has seen its native ecosystem devastated by dam operations. Four native fish are now extinct, one is in jeopardy and another is of special concern. Glen Canyon Dam has trapped the sediment necessary to maintain habitat and beaches for wildlife and recreation, as well as the stabilization of archeological sites. So far, measures to reverse the decline of these park resources as directed by the 1992 Grand Canyon Protection Act have failed.

The desire to prevent the further filling of Lake Mead with sediment played a major role in influencing the construction of Glen Canyon Dam. However, sediment is now reducing Lake Powell's storage and if left unresolved will compromise the safe operation of Glen Canyon Dam, as well as Hoover Dam should Glen Canyon Dam fail.

As the Bureau of Reclamation now explores strategies to address the operations of Lake Powell and Lake Mead under low reservoir conditions, it is critical that the scope of this analysis be expanded. A far more comprehensive review must be undertaken that explores the overall relevance of these two facilities for storing and distributing scarce Colorado River water, including:

1. Reducing the use of inefficient above-ground water storage facilities, while expanding the use of underground storage to minimize evaporation losses. Regional aquifers could provide greater storage capacity than Lake Powell and Lake Mead combined.(3)

2. Employ Lake Mead as the principal water storage and distribution facility for water delivery to the lower basin states. Lake Powell storage is in excess of current and future needs resulting in unnecessary evaporative losses to a limited water supply.

3. Employ Lake Mead as the starting point for transporting sediment around the lower Colorado River system.

4. Updating federal laws, especially the Colorado River Compact, to reflect the Colorado River's limitations and changing societal demands.

Developing a forward-looking policy on the future operations of Glen Canyon and Hoover Dams is critical to meeting the immense challenges facing Colorado River managers. It is not something to be relegated to a stopgap response to immediate concerns, but must be a central component of the federal government's fulfillment of its legal responsibility to provide leadership and direction for the management of the Colorado River. To this end, it is vital that a comprehensive Environmental Impact Statement be conducted on the future operations of these dams, and that this be done in consort with other water conservation measures to preserve the economic, ecological and cultural vitality of the Colorado River region.

COLORADO RIVER

The Colorado River is central to the economy of the Southwest. The basin spans 242,000 square miles as it descends 1,450 miles from the Rocky Mountains to the Gulf of California in Mexico. More than 25 million people utilize water from the Colorado River, including the metropolitan areas of Los Angeles, Las Vegas, Phoenix, Salt Lake City, Denver and Albuquerque. Agriculture consumes on average 70 percent of the river. Industry and households consume the rest. In an attempt to meet increasing demands, the Colorado River has become the most regulated river in North America. Nearly every tributary has been dammed.

THE COMING CRISIS

Colorado River flows have averaged just 60 percent of normal since 2000. Even with the average snow-pack in the spring of 2005, reservoir levels are unlikely to reach 60 percent of full capacity this year. These flows will barely accommodate current demands, doing little to overcome the storage deficit created by the region's use of nearly two gallons of water for every one gallon that nature has provided.(4) Absent a dramatic change in long-term weather patterns, a substantial reduction in Colorado River water use will soon become a necessity.

History shows that the current drought is not unusual. Over the past century the Colorado River experienced reduced flows around 1900, the 1930s and 1950s.(5) Moreover, the present downturn represents a minor reduction in precipitation when compared to severe droughts that occurred between 900 and 1300.(6)

During the more recent droughts, Colorado River water users were spared serious shortages because supply still far exceeded demand. This is no longer the case. As water use continues to increase there will be little, if any, surplus water to be placed in storage.

The National Academy of Sciences estimated that over the past century the Colorado River's average annual flow was 14 million acre-feet (MAF) (an acre-foot equals 325,851 gallons).(7) However, analysis using tree-ring data concludes the average annual flow of the Colorado River over the past 400 years is approximately 13.5 MAF.(8) With current Colorado River water use at approximately 12.6 MAF annually and rising, it will soon become clear that reservoir storage capacity will far exceed what can be used.(9)

Even more alarming is the Department of Energy's prediction that climate change will cause Colorado River flows to decline 14 percent by 2010, and 18 percent by 2040.(10)

While a brief period of higher flows may bring temporary respite, permanent shortages are likely to become the norm. It is therefore essential that solutions be crafted before such shortages occur.

FLAWS IN THE SYSTEM

WATER OVER-ALLOCATED

While managers and scientists debate whether Colorado River reservoirs will ever fill again, the drought has highlighted an 83-year-old problem that policy makers have ignored: more Colorado River water is allocated than the river actually produces.

In 1922 the federal government, acting as water master for the Colorado River, entered into an agreement, the Colorado River Compact, with seven western states to divide the river's total flow into two portions: the Upper and Lower Basins. The Upper Basin comprises the states of Colorado, New Mexico, Utah and Wyoming. The Lower Basin states are Arizona, California and Nevada. Th e Upper and Lower Basins were each awarded 7.5 MAF of water annually. In 1944 a treaty agreement awarded the Republic of Mexico 1.5 MAF, with 0.75 MAF coming from each basin.

Climate history reveals that this combined allocation of 15 MAF is 11 percent above the 400-year average of 13.5 MAF.(11) The U.S. Geological Survey and others report that the period from 1906 to 1921, partly used to formulate the Compact allocation, had been the wettest period of the 20th century if not the wettest period in nearly 800 years.(12)

In 1979 the Government Accounting Office advised Congress that unless aggressive management policies were pursued, the Colorado River system would begin to fail on the supply side by the year 2000.(13) Since 1999 system-wide storage has declined more than 40 percent.(14)

Department of Energy research predicts that by 2010 the Upper Basin will not be able to meet its full water delivery allocations to the Lower Basin 20 percent of the time, dropping to nearly 40 percent of the time thereafter.(15) Despite these warnings, there has yet to be any substantive movement to correct the over-allocation problem.

INEFFICIENT WATER STORAGE

The federal government has constructed more than 40 major dams on the Colorado River and its tributaries, principally for storing and diverting water. These reservoirs have a combined storage capacity equivalent to four and one-half years of the river's average annual flow, but they also cause the loss of up to 13 percent of these flows.(16)

Studies show that an optimum relationship exists between the basin's annual water flow and its storage capacity, since more reservoirs and canals cause more water to be lost to evaporation and seepage. Optimal water storage for the Colorado River was calculated to be about 30 MAF.(17) However, this analysis could not sway the momentum toward building fewer dams.

Lake Powell and Lake Mead are the most inefficient components in this system. Their locations are known for extremely low humidity, high summer temperatures and strong winds that

maximize evaporative losses. Since its completion in 1963, Lake Powell has lost approximately 21.1 MAF to the atmosphere and Lake Mead, completed 30 years prior, has lost 57.1 MAF.(18)

In addition, the porosity of the rock that surrounds the reservoirs compounds the water loss through seepage. The problem is most pronounced at Lake Powell, where the surrounding sandstone is soft and extremely permeable resulting in 18.7 MAF being lost. At Lake Mead, where the rock is more resistant, about 1 MAF has been lost.(19) It is believed that some percentage of the seepage may return as the reservoirs recede, but it is unclear how much and how soon.

This water is incredibly valuable. Based on recent wholesale prices for untreated Colorado River water, Lake Mead and Lake Powell annually lose on average $350 million worth of water to evaporation.(20)

THE LOOMING PROBLEM OF SEDIMENT

The Colorado River is the most sediment-laden river in the country. Prior to the construction of Glen Canyon Dam, sediment had already filled ten percent of Lake Mead.(21) When Glen Canyon Dam was built, engineers estimated that its river outlet tubes would be compromised by sediment within 100 years, affecting the safe operation of the dam.(22) The Bureau of Reclamation reiterated this in 2002.(23)

Hydrologists and geomorphologists warn that sediment could affect dam operations even sooner.(24) Lake Powell's declining level (92 feet below full pool in July 2005) has exposed more than 100 miles of sediment deposits in the tributaries flowing into the reservoir. These streams are reworking or remobilizing these deposits and advancing them towards Glen Canyon Dam.

Additionally, the side canyons and tributaries of the Colorado River contain six decades of accumulated sediment that are poised to be flushed into the reservoir. A major flood, as experienced in the past, could carry this material in one large event, rapidly diminishing the operational life of the reservoir.(25)

The National Academy of Sciences estimates that 44 million tons of sediment enters Lake Powell every year, or 84 tons per minute.(26) In order for Glen Canyon Dam to be sustained over time, the annual inflow of sediment will need to be dredged and removed.

The Glen Canyon area is one of the most remote and rugged landscapes in North America. Developing and maintaining such a massive dredging, hauling and disposal program would be very costly. If the sediment is moved to the most environmentally responsible location, the Colorado River delta, transportation costs alone could be $2.6 billion annually.(27)

Sediment represents the most serious long-term problem facing the Colorado River water storage system and must no longer be ignored.

THE UNDERGROUND SOLUTION

The most efficient way to store water in a dry climate is below ground where water is not exposed to the atmosphere's evaporative forces. While large reservoirs such as Lake Powell and Lake Mead can collectively cause the loss of upwards of 17 percent(28) of the water reaching them each year, storing this water underground can reduce these losses to as little as one percent once delivered to recharge facilities.(29)

Methods to introduce surface water into aquifers include direct injection using mechanical pumps and percolation in or near dry riverbeds. The primary losses associated with such recharging of underground reservoirs occur while moving the water to where it will be injected or absorbed. To minimize evaporation and conserve electricity, percolation methods can be intensified during winter months and mechanical injection methods during mild months when demand for electricity is reduced.

The arid regions dependent on the water resources of the Colorado River are endowed with natural underground locations which combined could accommodate six years of the Colorado River's annual flow.(30) Some of the largest aquifers are located adjacent to existing aqueducts such as the Central Arizona Project and the California Aqueduct. Along these aqueducts about 26 MAF of storage capacity is available for California and at least 15 MAF for Arizona. Another 25-46 MAF of storage may also be available via additional aquifers in Arizona. While Nevada and Utah's groundwater storage potential is not as well endowed or explored, they too are engaged in recharge activities in and around Las Vegas and Salt Lake City. They also could utilize the significant storage potential in Arizona and California as water banks to be used as credits against surplus withdrawals from the river.(31)

Some infrastructure to utilize aquifers for Colorado River water storage has been in place for nearly 20 years. The main factor inhibiting its expanded use is that above-ground reservoirs are being used instead. By shifting to a program to maximize underground storage, nearly all the water that would otherwise be stored in Lake Powell and Lake Mead could become available for artificial recharge. This could save 809,000 AF of water annually that would otherwise be lost to reservoir evaporation and seepage.(32)

By eliminating Lake Powell and employing Lake Mead principally to capture the annual floods for water distributed to recharge locations it is estimated that approximately 5 MAF of annual ground water recharge capacity would be necessary to capture surplus flows at Lake Mead.(33) Present recharge capacity for Colorado River water is in excess of 1.3 MAF per year.(34) Costs associated with expanding programs of artificial recharge would not be inconsistent with ongoing investments in aqueduct and pipeline development.(35)

Recharging these aquifers could also reverse the mounting problems associated with their rapid depletion, including higher pumping costs, property damage, contamination from invading seawater and plumes of human-induced pollution. In Las Vegas, for example, aquifer levels have dropped 300 feet in some areas.(36) Although ground subsidence cannot be reversed, recharging these aquifers with Colorado River water will prevent further damage. A rising water table would also revive desert riparian zones and springs that benefit wildlife habitat.

While the benefits of expanding groundwater recharge present a strong case for evaluating the future role of storage reservoirs along the Colorado River, there is already a compelling need to examine the merits of the system's most troublesome facility, Glen Canyon Dam.

RETHINKING GLEN CANYON DAM

UNNECESSARY & UNCERTAIN WATER STORAGE

Glen Canyon Dam was built to aid the Upper Basin states to deliver 8.23 MAF of water annually to the Lower Basin.(37) The rationale was that during periods of drought, Lake Powell's storage would allow the Upper Basin to fulfill this commitment without impacting its own water use.

However, a Bureau of Reclamation model demonstrated that Glen Canyon Dam's contributions to meet these deliveries are negligible.(38) Lake Mead alone would have provided all of the storage needed for the Lower Basin until recently. Not until autumn of 2004, 41 years after Glen Canyon Dam was completed, had the water stored in Lake Powell been a factor in supplementing Upper Basin water delivery to the Lower Basin.(39)

While it may appear that Lake Powell has for the first time been fulfilling its intended purpose, this has come at a significant cost. Obtaining that 23.5 MAF (the amount in Lake Powell when the drought began in July 1999) of water in Lake Powell after 41 years resulted in 35.7 MAF being lost to evaporation and seepage. This combined loss represents just 40 percent efficiency for long-term water storage.(40)

Additionally, the refilling of Lake Powell will be a rare occurrence. When the reservoir began filling in 1963, there was less demand on available water. This allowed an average surplus of 2.6 MAF annually to flow into Lake Powell, filling it in 17 years.(41) Demand has since increased nearly 100 percent in the Upper Basin and is projected to average 5.4 MAF by 2020.(42) Subtracting this annual projected use by the Upper Basin from the river's average annual flow of 13.5 MAF, then subtracting the 8.23 MAF that Glen Canyon Dam must annually release downstream leaves no surplus to help refill the reservoir. This average annual surplus goes into the red when accounting for the Department of Energy's anticipated declines in river flows due to climate change.(43)

REVIVING GRAND CANYON'S ECOSYSTEM

The river ecosystem in Grand Canyon National Park began declining as Lake Powell began to fill in 1963. Since then, river resources in the park have steadily deteriorated to a state of near collapse. If more effective measures are not taken soon, the integrity of this ecosystem will be forever compromised. The operation of Glen Canyon Dam has caused four of the Canyon's eight native fish species to become extinct. A fifth is headed in this direction and a sixth is now considered a species of special concern. Native birds, mammals, reptiles and amphibians along the river corridor have been affected as well.(44)

In an effort to reverse this decline, Congress passed the Grand Canyon Protection Act in 1992. In 1995 an Environmental Impact Study (EIS) established mitigation measures relating to Glen

Canyon Dam's operations.(45) Since the recovery program began, and after more than $223 million has been spent, one native fish disappeared from the Canyon and another has declined to nearly unrecoverable levels.(46)

As outlined in a recent report to Congress by the Secretary of the Interior,(47) no progress has been made toward meeting the mandate of the Grand Canyon Protection Act, the objectives of the EIS, or the recovery goals which attempt to bring the dam into compliance with the Endangered Species Act.(48)

In addition, the core of the National Park Service Organic Act(49) to leave [national parks] unimpaired for the enjoyment of future generationsis being violated as resources continue to deteriorate in Grand Canyon National Park.

A major limitation of efforts to restore Grand Canyon thus far has been the inability to deliver sediment and nutrients to the ecosystem.(50) With nearly all the sediment trapped behind Glen Canyon Dam, there has been a continued decline in the food base and backwater habitat for endangered fish, disturbances at archeology sites and a loss of camping beaches. Resource managers have been prohibited from examining the solution that offers the greatest chance of habitat recoveryrestoring the river's natural processes by decommissioning Glen Canyon Dam.

SEDIMENT COSTS

Water managers must develop a program to manage the sediment entering Lake Powell. As there is no feasible method to flush this sediment through Glen Canyon Dam, not to mention the dams downstream, sediment must be mechanically removed.

The overall scale of such a project in design, implementation and cost would rival any of the Colorado River water projects to date. Like Hoover Dam, it would be an unprecedented undertaking. A range of alternatives will need to be explored, including allowing the sediment to flow downstream and removing it from Lake Mead.

From the standpoint of convenience, Lake Mead affords much easier access to the sediment than Lake Powell. Superior transport systems are already available at Lake Mead, both highway and railroad. Topographically, Lake Mead offers a better range of disposal sites with fewer constraints should a pipeline/slurry system be preferred. Should it be deemed appropriate to transport the sediment to nature's intended destination, the Colorado River delta, the distance from Lake Mead would be half as far as from Lake Powell.

Managers must also assess the value of the sediment toward achieving compliance with federal laws guiding endangered species recovery in Grand Canyon National Park. Sediment augmentationmoving sediment around the damhas already been discussed as a necessary next step to reverse Glen Canyon Dam's impacts on Grand Canyon.(51) However, such augmentation approaches may not contain necessary nutrients like carbon, which is essential to rebuilding a healthy, native food web in Grand Canyon.(52)

GLEN CANYON DAM'S IMPACTS ON GRAND CANYON'S ECOSYSTEM

1. The water below the dam is constantly cold at 47 degrees Fahrenheit. The natural river fluctuated seasonally from near freezing to 80 degrees Fahrenheit. 2. River flows fluctuate daily between 8,000 and 20,000 CFS (cubic feet per second). Naturally they would fluctuate seasonally from 3,000 to 100,000 CFS. 3. The dam has trapped the sediment required to maintain sandbar habitat and supply nutrients to the food web. 4. The dam blocks fish migration, limiting their genetic integrity and habitat diversity. 5. Non-native fish inhabit this new environment and compete with the native fish.

UNCERTAIN POWER

FAR FROM IRREPLACEABLE

When Lake Powell is at full or near full, Glen Canyon Dam can on average generate enough power to service 389,000 homes.(53) Declining reservoir storage has caused power production to drop 40 percent.(54) Production could fall to zero should below normal inflows persist and water consumption remain unchanged.(55)

Glen Canyon Dam's customers normally enjoy a 40 percent subsidy over the prevailing market rates. Now they must obtain replacement power at competitive rates.(56) Substitute power is readily available and will continue to absorb Glen Canyon Dam's shortfalls, even if power generation falls to zero.

Since 2000, declining power revenues from Glen Canyon Dam have brought repayments on federal loans for Colorado River infrastructure to a near standstill.(57) While periodic high flows may help power production and enhance revenues for a short time, climate change and increased water demand have rendered power generation from Glen Canyon Dam far from certain.

To the extent electricity is produced, this comes at a cost of water lost to evaporation and seepage. This water itself has economic value and would provide a comparable revenue stream should the dam be decommissioned. More importantly, there is no substitute for the lost water. Since scarcity of water was the driving force behind construction of Glen Canyon Dam, recovery of this water should influence the dam's future.

TOURISM

Lake Powell and the surrounding Glen Canyon National Recreation Area contribute to a tourism economy centered at Page, Arizona. However, visitation there has declined nearly 50 percent over the past 15 years.(58) Low reservoir levels restricting boater access have accelerated these declines. In November 2004, Aramark, the area concessionaire, was forced to close facilities that had previously been open year-round.(59) The National Park Service (NPS) has invested heavily to improve facilities. Despite spending $22 million in 2004 alone,(60) NPS was unable to keep boat ramps fully operational. These problems will continue as lower reservoir levels likely become the norm.

A portion of the Navajo Nation shares its border with Lake Powell and contributes to the tourism industry as well. Their concession contractor, Antelope Point Holdings, opened a marina in 2004, but declining reservoir levels prevented the launching of boats. While modifications have been made, a cliff prevents the marina from operating when the reservoir is about 115 feet low, a reoccurring problem should low water levels persist. The Navajo Nation's desire to construct a water pipeline from the Colorado River, however, can proceed without Lake Powell.

Recreational trout fishing in the Colorado River below Glen Canyon Dam has experienced a decline in visitation similar to that of Lake Powell, from 52,000 angler days in 1983, to 25,000 in 1999.(61) A recent survey of visitors spending the night at Page revealed that Lake Powell boating was not the only attraction. More than 50 percent of respondents were not engaged in water recreation on Lake Powell.(62) This is likely due to the town's central location along a widely used tourist route between the Grand Canyon and other popular national parks, national monuments and recreation areas.

Prior to Glen Canyon Dam, the Colorado River through Glen Canyon was emerging as a tourist destination on its own. Glen Canyon was one of the most spectacular features of the American landscape. Even now, Aramark and others are attempting to attract visitors by publicizing the uncovering of Glen Canyon's natural features at a diminishing reservoir.

The restoration of Glen Canyon by decommissioning Glen Canyon Dam could spawn a river recreation industry comparable to what now exists in Grand Canyon National Park. Hiking, biking and other land-based activities could also be as popular as they are elsewhere in the Canyon County of the Colorado River.

ELIMINATING CONCERNS FOR SAFETY

Glen Canyon Dam has a dangerous safety record. In 1983, snowmelt caused an emergency situation that nearly ended in dam failure. A faulty design in the dam's spillways led to hydraulic pressure excavating bedrock and forced dam managers to abandon the spillways' full use. Luckily, disaster was averted when inflows subsided prior to water overtopping the dam.(63)

The Bureau of Reclamation has forecasted that if Glen Canyon Dam failed when full, a wall of water 580 feet high would enter Grand Canyon.(64) A wave 68 feet high would overcome Hoover Dam and begin a flood that would subside eleven days later. Such a failure could devastate critical water distribution and transportation networks for Arizona, Nevada, Southern California and Mexico, along with the homes and businesses of tens of thousands of people.

Historically, flood control storage has not been a high priority for managers of the Colorado River system, requiring just 5.35 MAF annually to be available system-wide at the beginning of each year.(65) It was this low requirement that allowed the 1983 problems at Glen Canyon Dam to materialize. By eliminating Lake Powell and operating Lake Mead for efficient ground water diversions, nearly four times the current flood control protection could be achieved.(66)

INDIAN NATIONS

Glen Canyon Dam inundated the cultural heritage of the First Nations upstream and is slowly eroding what remains downstream in Grand Canyon National Park.

Navajo, Hopi, Zuni, White Mesa Ute, Southern Paiute, Kaibab Paiute, Shivwits Paiute, Havasupai, and Hualapai all have connections to the Colorado River in Glen and Grand Canyons, including sacred sites and artifacts dating back 10,000 years. Reports on roughly 2000 sites submerged by Lake Powell describe shelter caves, dwellings, granaries, irrigation systems, rock art panels, burials, ceramics, and projectile points.(67) Included were revered sacred sites of the Navajo for ceremonies and prayer, such as Rainbow Bridge National Monument, a 291-foot-high natural bridge.

The operation of Glen Canyon Dam currently affects some 264 archeological sites in Grand Canyon. Fluctuating river flows in response to hydropower demands destabilize riverbanks where the sites reside. These fluctuating flows disturb the cultural properties in the process. Furthermore, a failure of Glen Canyon Dam would completely obliterate some 964 known cultural sites.(68) Federal laws require the preservation of these ancestral artifacts and National Park Service and First Nation policies require that artifacts and burials be preserved in place.

Only a few remaining medicine people are truly aware of what has been submerged under Lake Powell. Some still say that choking the river with a dam brought disharmony and discontent to their people and only with the restoration of these sacred sites can their physical and spiritual health become restored.(69)

FEDERAL RESPONSIBILITY

The Colorado River passes through seven states as well as many national parks and monuments before entering Mexico. The complexity of interstate, tribal and international agreements places the federal government at center stage in charting management strategies for the Colorado River. Congress has passed much legislation pertaining to its management, forming a body of law referred to as The Law of the River. Many of these laws are no longer effective. They fail to achieve a sustainable balance between water supply and demand, and to adequately protect fragile ecosystems associated with the river. It is critical that Congress revisit this legislation and remedy the problems that have developed. In 1922 Congress approved the Colorado River [Interstate] Compact that quantified Colorado River water allocations for each state and, in 1944, Mexico. Unfortunately the Compact greatly over-estimated the amount of water actually available within the watershed and allocated 3-4 MAF more than the river can now provide.

Congress passed the Colorado River Storage Project of 1956, and the Colorado River Basin Project Act of 1968, authorizing water projects that impounded or diverted water on nearly every tributary.(70) These projects increased system-wide storage to 62 MAF, well beyond the level of diminishing returns. The legislation did not include a plan or a source of funding to manage the removal of sediment from the reservoirs.

In response to public concern over the impacts of Glen Canyon Dam on the resources of Grand Canyon National Park, Congress passed the Grand Canyon Protection Act (GCPA) in 1992.(71) This act directed the Secretary of the Interior to complete an Environmental Impact Study (EIS) on the operations of Glen Canyon Dam. The GCPA also directs the Interior Secretary to protect, mitigate adverse impacts to, and improve the natural, cultural, and recreational resource values downstream from the dam, for which Grand Canyon National Park and Glen Canyon National Recreation Area were established. On average $11 million is being spent annually in efforts that have failed to reverse declines in native species, and to restore sandbar and beach deposits.

Additionally, the National Park Service Organic Act of 1916 provides clear Congressional guidance to protect resources like Grand Canyon. Units of the National Park System are managed to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same by such means as will leave them unimpaired for the enjoyment of future generations. (72)

Lastly, the Endangered Species Act(73) requires the US Fish and Wildlife Service to protect and provide recovery for endangered species. Since the GCPA was passed the Razorback Sucker has been extirpated and the Humpback Chub population is in serious decline.

RE-EXAMINE THE COLORADO RIVER COMPACT

Since the Colorado River Compact was approved in 1922 over-allocation, reduced supply and population growth have greatly altered the ability of the Compact to serve its intended purposes.

The goals of the Compact are to provide for equitable division and apportionment of the use of the waters of the Colorado River System; to establish the relative importance of different beneficial uses of water; to promote interstate comity; to remove causes of present and future controversies; and to secure the expeditious agricultural and industrial development of the Colorado River basin, the storage of its waters, and the protection of life and property from floods.(74)

The Compact has not achieved an equitable division of water for the constituency. With the river providing on average 13.5 MAF (instead of the 15 MAF allocated by the Compact), and with Mexico receiving 1.5 MAF, just 12 MAF remains for the two basins. The Lower Basin is guaranteed 6.75 MAF (7.5 MAF minus its 0.75 MAF contribution to Mexico). Thus, in the best of circumstances the Upper Basin could on average count on just 5.25 MAF (13.5 MAF of river flow minus 7.5 MAF of Lower Basin consumption minus its own 750,000 AF contribution to Mexico) or 22 percent less than the Lower Basin.

The Compact lacks provisions for addressing real shortages. The lowering of Lake Powell and present climate conditions render this an immediate possibility today, and medium- to long-term supply and demand trends suggest that this situation is not likely to improve in the future. If Lake Powell is empty there may be times when the Upper Basin may not be able to meet its 8.23 MAF obligation to the Lower Basin.

A responsible attempt to craft a new agreement that reflects the reality of river supply must be initiated. This could be done by adjusting allocations annually to reflect actual river flows. It is becoming more evident that the current system, which evaluates the allocation to the Upper Basin after its delivery to the Lower Basin has been satisfied, has needlessly delayed prudent approaches to ensure balance in the system and to meet the challenges of future shortages.

The Compact establishes the most important use of Colorado River water to be domestic and agricultural purposes, with other uses subservient. The destruction of Grand Canyon's river ecosystem illustrates how important environmental considerations are as well. But nothing illustrates the environmental challenge more clearly than the demise of the Colorado River delta, where reduction in flows has caused the ecosystem to virtually disappear.(75) Future discussions of allocation must therefore include environmental flows.

The decommissioning of Glen Canyon Dam and the expansion of aquifer storage systems is not only consistent with this priority, but actually better facilitates the achievement of Compact purposes. Lake Mead can capture surplus water and ensure its storage for the Lower Basin, in the reservoir and through groundwater aquifers. Furthermore, as noted in Article VIII of the Compact, only 5 MAF of storage is needed in the Lower Basin to safeguard its perfected rights. Lake Mead on its own clearly satisfies this requirement.

The Compact does not provide for an equitable and timely means to reduce allocations. In order to avert major complications a basin-wide evaluation of current water use, coupled with an assessment of senior-perfected water rights, needs to be conducted. With this information, a systematic plan to allocate water rights between the states, Tribes and Mexico can be achieved, and will minimize future impacts to the economy and the environment.

CONCLUSION

Colorado River water managers have long ignored resolving administrative and structural problems affecting a critical component of the Southwest's water supply. Continued inaction will invite conflict, forcing a response to emerge from crisis as opposed to reason. More likely than not, reactionary decisions would compound the problem, merely providing an urgent response to solve a minor detail and avoiding movement towards a comprehensive solution for the watershed.

The leadership in the Bureau of Reclamation has not stepped forward in this regard. As concern over the present drought intensified, the agency merely stated that the reservoirs were performing as intended: delivering water in times of shortage.(76) Planners must re-examine how efficient the system really is based on the reality of increased demand and decreased supply. This must include how Colorado River water, whatever the amount nature chooses to provide, can be stored as efficiently as possible.

In so doing, planners should not be impeded by the other incidental uses of Colorado River water, such as power generation and recreation. The prevailing need is to manage the river's finite water supply as efficiently as possible. Though power production and recreation have substitutes, there is no substitute for Colorado River water.

Nor are there substitutes for the ecosystems impacted by water projects on the Colorado River. Grand Canyon National Park is a core element of our natural heritage and laws have been enacted specifically to ensure its protection. Nonetheless, dam operations continue to undermine the famous ecosystems of the Colorado River.

With these issues in mind, and in conjunction with a larger objective of achieving sustainable water management and ecological restoration on the Colorado River, it is recommended that future operations of Lake Powell and Lake Mead be explored in conjunction with a much broader evaluation to:

1. Pursue transfers of Lake Powell and Lake Mead storage to groundwater aquifers. 2. Develop a sustainable sediment management program for Lake Powell and Lake Mead. 3. Determine the costs and benefits of decommissioning Glen Canyon Dam to restore natural flows through Glen and Grand Canyons. 4. Identify new water allocation guidelines to reflect the amount of water the Colorado River actually provides, how it should be distributed and what amounts are needed to protect critical habitats in Grand Canyon and elsewhere.

ENDNOTES

1. Historic evaporation losses for Colorado River main stem reservoirs have averaged 1.8 million acre-feet (MAF) annually (not adjusted for the river's natural evaporation), 13 percent of the river's average annual paleoclimatic flow of 13.5 MAF. Bureau of Reclamation. Upper Colorado Region: Water Operations. Table LC-1 and UC-1. Colorado River System Consumptive Uses and Losses Report (1971-2000). The paleoclimatic stream flow of 13.5 MAF at the Compact Point (Lee's Ferry, Arizona) is based on a 400-year, tree- ring database. Stockton, C. W. and G. C. Jacoby. Long-Term Surface Water Supply and Stream Flow Trends in the Upper Colorado River Basin. Lake Powell Research Project Bulletin No. 18 (University of California at Los Angeles: Institute of Geophysics and Planetary Physics, 1976). A tree-ring reconstruction study completed in 2000 has proposed the long-term yield for the Colorado River is 13.2 MAF. Hidalgo, Hugo G., Thomas C. Piechota and John A. Dracup. Alternative Principal Components Regression Procedures for Dendrohydrologic Reconstructions. Water Resources Research, Vol. 36, No. 11 (November, 2000), 3241-3249.

2. On average, Lake Powell evaporates 516,000 acre-feet (AF) and Lake Mead evaporates 828,000 AF for a total of 1.34 MAF, 10 percent of the average annual paleoclimatic flow. See: Note 1 (Bureau of Reclamation).

3. Arizona has approximately 15 MAF of available groundwater storage along the Central Arizona Project at existing, direct aquifer recharge facilities. Robson, S. G. and E. R. Banta. Ground Water Atlas of the United States. U.S. Geological Survey Atlas HA 730-C (1995), figures 42 and 43. Online: http://capp.water.usgs.gov/gwa/ch_c/C-text3.html Tim Henley, Arizona Water Banking Authority. Personal communication, June 30, 2005. Another 25-46 MAF may be available in the state when considering nearby aquifer volume minus aquifer depletion as reported by the U.S. Geological Survey Ground Water Atlas (above). California has the potential to store 26 MAF of Colorado River water underground along the Colorado Aqueduct. California Department of Water Resources. California's Groundwater: Bulletin 118 (Updated in 2003 with

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5. Webb, Robert H., Gregory J. McCabe, Richard Hereford and Christopher Wilkowske. Climatic Fluctuations, Drought, and Flow in the Colorado River Basin. U.S. Geological Survey Fact Sheet 2004-3062 (June, 2004).

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7. Dawdy, David R. Hydrology of Glen Canyon and Grand Canyon, Colorado River Ecology and Dam Management: Proceedings of a Symposium May 24-25, 1990. Santa Fe, New Mexico (Washington D.C.: Academy Press, 1991), 46.

8. See: Note 1 (Stockton et al and Hidalgo et al).

9. Based on the 8.25 MAF delivered at the Compact Point (Lee's Ferry, Arizona) plus Upper Basin consumption of 4.4 MAF for a total of 12.65 MAF. Bureau of Reclamation. Upper River Region: Water Operations. Upper Colorado River Tributaries. Colorado River System Consumptive Uses and Losses Report (1996-2000), 14.

10. Christensen, Niklas S., Andrew Wood, Nathalie Voisin, Dennis P. Lettenmaier and Richard N. Palmer. The Effects of Climate Change on the Hydrology and Water Resources of the Colorado River Basin (2004), 1-2.

11. See: Note 1 (Stockton et al and Hidalgo et al).

12. See: Note 5 (Webb et al). Gray, Stephen T., Stephen T. Jackson and Julio L. Betancourt. Tree-Ring Reconstructions of Interannual to Decadal Scale Precipitation Variability for Northeastern Utah Since 1226 A.D. Journal of the American Water Resources Association (August, 2004), 947-960.

13. Government Accounting Office. Comptroller General's Report to the Congress. Colorado River Basin Water Problems: How to Reduce Their Impact CED-79-11 (1979), 1.

14. See: Note 4 (Bureau of Reclamation).

15. See: Note 10 (Christensen et al).

16. See: Note 1 (Bureau of Reclamation).

17. Langbein, Walter B. Water Yield and Reservoir Storage in the United States. U.S. Geological Survey Circular 409 (1959).

18. See: Notes 1 & 2 (Bureau of Reclamation).

19. Bureau of Reclamation. Upper Colorado Region: Water Operations. 24-Month Study Reports. (Lake Powell and Lake Mead bank storage columns.) Online: http://www.usbr.gov/uc/water/crsp/studies/index.html

20. With wholesale prices of Colorado River water of at least $258 per acre-foot, and average annual evaporation losses of Lake Powell and Lake Mead of 0.516 and 0.828 MAF respectively (not adjust-ed for the river's natural evaporation), and results in $347 million in economic losses. San Diego County Water Authority. Historic Water Transfer Agreement Gets Final Approval as QSA Falters. San Diego Water Authority press release (December 31, 2002).

21. Average annual rate of sedimentation in Lake Mead is estimated to be 102,000 AF, representing a total of 2.86 MAF deposited over the 28 years Hoover Dam operated prior to the completion of Glen Canyon Dam, or 10 percent of Lake Mead's storage capacity. Smith, W. O., C. P. Vetter, and G. B. Cummings. Comprehensive Survey of Sedimentation in Lake Mead, 1948-49. U.S. Geological Survey Professional Paper 295 (1960), 195 & 231.

22. Schultz, Ernest R. Design Features of Glen Canyon Dam: Paper for Presentation at ASCE April, 1961 Convention. (Phoenix: Bureau of Reclamation Construction Division), 30.

23. Spangler, Jerry. Draining Powell Called a Pipe Dream. Deseret News. Salt Lake City (June 18, 2002).

24. Dohrenwend, John C. Rapid Progradation of the Colorado and San Juan River Deltas into Lake Powell Reservoir, July 2002 to March 2004. Four Corners Geological Society Newsletter, April 2004. (Durango, Colorado), 4. University of Arizona. Exposed Upper Colorado River Delta is Rapidly Eroding into Lake Powell. University of Arizona press re- lease (May 7, 2003).

25. Graf, William L. The Colorado River: Instability and Basin Management. (Washington D.C.: Association of American Geographers, 1985), 34. Hereford, Richard. Valley-Fill Alluviation (ca. 1400-1880) During the Little Ice Age, Paria River Basin and Southern Colorado Plateau, U.S.A. Geological Society of America Bulletin v. 114 (2002), 1550-1563.

26. Andrews, Edmund D. Sediment Transport in the Colorado River Basin. Colorado River Ecology and Dam Management: Proceedings of a Symposium May 24-25, 1990 Santa Fe, New Mexico. (Washington D.C.: Academy Press, 1991), 68.

27. Annual sediment of 44 million tons would require approximately two million truckloads at standard loads of 22 tons per truck. The distance from Lake Powell's Hite Marina to the Colorado River delta is 1,300 miles round trip, requiring a fleet of 15,000 trucks working around

the clock. At $1 per mile per truck, the total operating costs alone would be $2.6 billion annually. Owner-Operator Independent Drivers Association. Cost Per Mile Worksheet. Online: http://www.ooida.com/Education%26BusinessTools/Trucking_Tools/Index.shtml

28. The average annual water flow entering Lake Powell since 1963 is estimated to be 10.9 MAF. When full, Lake Powell can cause the loss of 606,000 AF (1999). When the remainder of this water flows into Lake Mead, when it is full, another 1.23 MAF (1999) can be lost. Combined, this represents 1.84 MAF lost, or 17 percent of the 10.9 MAF inflows. Bureau of Reclamation. Upper Colorado Region: Water Operations. Historic Data: Lake Powell Inflows. Online: http://www.usbr.gov/uc/crsp/GetSiteInfo See: Note 9 (Bureau of Reclamation), 21 & 31.

29. Artificial recharge projects in Arizona using Colorado River water have reported evaporation losses of one percent or less. Central Arizona Project. Groundwater Recharge Projects: Operations. Online: http://www.cap-az.com/recharge/index.cfm?action=Aqua&subSection=70

30. Robson, S. G. and E. R. Banta. Ground Water Atlas of the United States. U.S. Geological Survey Atlas HA 730 (1995). Online: http://capp.water.usgs.gov/gwa/gwa.html

31. The Southern Nevada Water Authority currently has agreements to store 1.25 MAF in the state of Arizona. Southern Nevada Water Authority. Southern Nevada Water Authority Water Resources Plan (2005), 3:19.

32. Eliminating Lake Powell would save on average 414,000 AF of evaporation losses (516,000 AF of annual evaporation loss minus 102,000 AF lost (see Myers below) from river evaporation). Myers, Tom. Water Balance of Lake Powell: An Assessment of Groundwater Seepage and Evaporation. (Salt Lake City: Glen Canyon Institute, 1999), 3. Maintaining Lake Mead's useable storage (not including dead pool storage) to 5 MAF (1,007 feet above sea level), the minimum required by the Colorado River Compact would reduce its average annual evaporation from 828,000 AF to approximately 433,000 AF. Stanley, J. W. Chapter I: Reservoir Storage. Comprehensive Survey of Sedimentation in Lake Mead, 1948-49. U.S. Geological Survey Professional Paper 295 (1960), 87 & 90. Langbein, W. B. Chapter J: Water Budget. Comprehensive Survey of Sedimentation in Lake Mead, 1948-49. U.S. Geological Survey Professional Paper 295 (1960), 97.

33. The wettest decade of the historic record (1911-1920) had an average annual surplus of 5 MAF. California Department of Water Resources. Observed Natural Flow at Lee's Ferry. Colorado River Drought Information. Online: http://www.saltonsea.water.ca.gov/data/co_river.cfm

34. Along the Central Arizona Project, existing direct recharge projects have the ability to recharge approximately 900,000 MAF. Arizona Department of Water Resources. Permitted Projects December 31, 2003. Online: http://www.water.az.gov/recharge/PermittedFacilities.htm Virginia O'Connell, Arizona Water Resources Department. Personal communication, July 18, 2005. Along the Colorado River Aqueduct in California, existing direct recharge projects have the ability to recharge 450,000 AF, and other projects are currently under construction that will bring the total to 700,000 AF. Bill Hassencamp, Metropolitan Water District. Personal

communication, July 18, 2005. Mark Buehler, Coachella Valley Water District. Personal communication, July 18, 2005. Las Vegas Nevada has recharged as much as 32,000 AF in one year. Las Vegas Valley Water District. Las Vegas Valley Water District 2004 Artificial Recharge Annual Report (2004), 3.

35. Examples of ongoing planning and development for water projects include the Central Utah Project, the Animas-La Plata Project, the Colorado River Return Project, and the Navajo Water Supply Project.

36. Bartolino, J. R. and W. L. Cunningham. Ground-Water Depletion Across the Nation. U.S. Geological Survey Fact Sheet 103-03, (February, 2004).

37. Glen Canyon Dam only releases 8.23 MAF because the Upper Basin's Paria River (below the dam and above the Compact Point at Lee's Ferry, Arizona) contributes 20,000 acre-feet annually for a total of 8.5 MAF.

38. Rosekrans, Spreck. The Effect of Draining Lake Powell on Water Supply and Electricity Production. (San Francisco: Environmental Defense Fund, 1997).

39. Without Lake Powell the 21st century drought would have depleted Lake Mead in the fall of 2004. At that time (2004) the combined storage at Lake Mead and Lake Powell was equal to the capacity of Lake Powell when it was nearly full in July 1999 (23.5 MAF). Bureau of Reclamation. Lower Colorado Region: Water Operations. Historic Data: Lake Mead Levels. Online: http://www.usbr.gov/lc/region/g4000/hourly/mead-elv.html Bureau of Reclamation. Upper Colorado Region: Water Operations. Historic Data: Lake Powell Levels. Online: http://www.usbr.gov/uc/crsp/GetSiteInfo

40. In 1999, Lake Powell was nearly full and stored 23.5 MAF of water. Lake Powell's average annual evaporation is 414,000 AF (after deducting 102,000 AF for river evaporation were the dam not there) and the total after 41 years of operation is 17.0 MAF. The total lost to seepage at Lake Powell is 18.7 MAF, for a total of 35.7 MAF (evaporation and seepage). It has therefore required a grand total of 59.2 MAF to obtain the 23.5 MAF actually used. This 23.5 MAF is just 40 percent of the total. See: Note 9 (Bureau of Reclamation), 23 & 31. See Note 19 (Bureau of Reclamation).

41. Bureau of Reclamation. Upper Colorado Region: Water Operations. Historic Data: Lake Powell Inflow & Release. Online: http://www.usbr.gov/uc/crsp/GetSiteInfo

42. Bureau of Reclamation. Lower Colorado Region Water Operations. Colorado River Water Use Since 1906. Online: http://www.usbr.gov/lc/region/g4000/uses.html Department of the Interior: Bureau of Reclamation. Attachment K. Upper Basin Depletion Schedule. Colorado River Surplus Criteria Final Environmental Impact Statement (2000).

43. See: Note 10 (Christensen et al).

44. National Park Service: Grand Canyon National Park. Endangered, threatened, and sensitive wildlife of potential occurrence along the Colorado River in Grand Canyon. Online: http://data2.itc.nps.gov/nature/documents/ACF18EB.doc

45. Department of the Interior. Report to Congress: Operations of Glen Canyon Dam Pursuant to the Grand Canyon Protection Act of 1992, Water Years 1999-2001, Secretary of the Interior (May, 2002), 2-8.

46. Experts believe the fourth species to be extirpated (regionally extinct) in the Grand Canyon is the Razorback Sucker. National Park Service: Grand Canyon National Park. Grand Canyon National Park Profile (2004), 2. A total of $223 million has been invested in mitigating Glen Canyon Dam's impacts on Grand Canyon. Updike, Christopher N. and Steven P. Gloss. Confronting Social Impediments to Adaptive Management: Lessons from the Grand Canyon Ecosystem. Grand Canyon Monitoring and Research Center: Colorado River Ecosystem Science Symposium, (October, 2003).

47. See: Note 45 (Department of the Interior), 22-27. 48. U.S. Fish and Wildlife Service. Final Biological Opinion on the Operation of Glen Canyon Dam (January, 1995), 33.

49. The National Park Service Organic Act (16 U.S.C. l 2 3, and 4), as set forth herein, consists of the Act of Aug. 25 1916 (39 Stat. 535) and amendments thereto.

50. See: Note 45 (Department of the Interior).

51. National Academy of Sciences: Commission on Geosciences, Environment and Resources. River Resource Management in the Grand Canyon (Washington D.C.: Academy Press, 1996), 4. Bureau of Reclamation. Upper Colorado Regional Office: Glen Canyon Dam Adaptive Management Program. Fiscal Year 2006 Budget & Work Plan (March, 2005), 19 & Worksheet 4.

52. Haden, G. Allen, Dean W. Blinn, Joseph P. Shannon, and Kevin P. Wilson. Driftwood: An Alternative Habitat for Macroinvertebrates in a Large Desert River. Hydrobiologia 397 (1999), 179-186.

53. Based on the average annual output of Glen Canyon Dam (5,166,000 MWh), and average annual Arizona residential electricity use at 13,300 kWh per household. Southwest Energy Efficiency Project. Arizona: Energy Efficiency and Energy Consumption. (Boulder, Colorado: Southwest Energy Efficiency Project).

54. Bureau of Reclamation. Drought or Opportunity: Remarks Delivered by John W. Keys, III, Commissioner, Bureau of Reclamation, Colorado River Water Users Association, 2003 Annual Meeting, Las Vegas. Bureau of Reclamation press release (December 12, 2003). Power generation for 2004 from Colorado River Storage Project dams, of which Glen Canyon is the primary contributor, dropped 40 percent from when the reservoir was near full in 1999. Western Area Power Administration. Salt Lake City Area/Integrated Projects: Powerplants. Annual Report: Statistical Appendix (1999-2004). Online: http://www.wapa.gov/newsroom/pubs.htm

55. See: Note 51 (National Academy of Sciences), 65.

56. Western Area Power Administration. Continued Drought Brings Many Questions. Closed Circuit (May 28, 2004).

57. From 2000-2004 repayments to the federal treasury for projects in the Colorado River Storage Project Act averaged just $6.2 million on an outstanding loan due in 2050 of $2.6 billion. See: Note 54 (Western Area Power Administration).

58. National Park Service: Public Use Statistics Office. Visitation. Online: http://www2.nature.nps.gov/stats/

59. Aramark Corporation. Powell Resorts & Marinas Announces Seasonal Operating Schedule. Aramark press release (October 19, 2004).

60. National Park Service. $22 Million in Facility Improvement Projects Completed or Ongoing at Glen Canyon National Recreation Area. Glen Canyon National Recreation Area press release (October 4, 2004).

61. Jonas, Lilian. Lake Powell Preliminary Socioeconomic Impact Analysis. (Salt Lake City: Glen Canyon Institute, 1999), 27.

62. Ibid, 30.

63. Carothers, Steven W. and Bryan T. Brown. The Colorado River through Grand Canyon: Natural History and Human Change. (Tucson: University of Arizona Press, 1991), 26-29.

64. Latham, Stephen E. Glen Canyon Dam, Arizona: Dam Failure Inundation Study. (Denver: Bureau of Reclamation, 1998), 7-9.

65. Bureau of Reclamation. Lower Colorado Region: Water Operations. Flood Control Operation. Colorado River Interim Surplus Criteria, Final Environmental Impact Statement (2000), 1:20-21.

66. Operating Lake Mead at 1007 feet above sea level to reduce evaporative losses would leave on average 21 MAF of flood control storage, nearly four times the present 5.35 MAF system-wide requirement. Ibid, 1:17.

67. Geib, Phil R. Glen Canyon Revisited: University of Utah Anthropological Paper 119. (Salt Lake City: University of Utah Press, 1996), 1.

68. Grand Canyon National Park and Northern Arizona University. 1999 Summary Report: Archeological Site Monitoring and Management along the Colorado River corridor in Grand Canyon National Park (Executive Summary).

69. Luckert, Karl W. Navajo Mountain and Rainbow Bridge Religion (Flagstaff: Museum of Northern Arizona, 1977).

70. Colorado River Storage Project Act. 43 U.S.C. Chapter 12b 620-620o, April 11, 1956, as amended 1962, 1964, 1968 and 1980. Colorado River Basin Project Act. 43 U.S.C. Chapter 32 1501- 1556, September 30, 1968, as amended 1974, 1978, 1980, 1982, 1984 and 1992.

71. Reclamation Projects Authorization and Adjustment Act of 1992. Title XVIII-Grand Canyon Protection, Section 1803-1806.

72. See: Note 49 (National Park Service Organic Act).

73. Endangered Species Act. 7 U.S.C. 136; 16 U.S.C. 460 et seq. 1973.

74. Colorado River Compact. Signed at Santa Fe, New Mexico. Ratified by act of Congress December 21, 1928. 45 Stat. 1057. Congressional Record, 70th Cong. 2d Sess. At 324-325.

75. Newcom, Joshua S. Deciding About the Colorado River Delta: Rejuvenated Wetlands Raise New Issues About Where Flood Flow Should Go. River Report, Spring 1999 (Sacramento: Water Education Foundation).

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124

I live in Nevada. Since moving to Las Vegas from Steamboat Springs, Colorado 8 years ago, the best, most consistent, most spectacular scenery, most educational, and friendship making place has been Lees Ferry. From the first time I went out with a guide from Lees Ferry Angler to last Monday and Tuesday on my boat going up the Colorado, Lees Ferry has been and is a magical place. The fishing is truly amazing. Although this is a tailwater fishery, it is constantly changing. Most anglers would like more larger fish. Most anglers have trouble catching larger fish. If studies show that there too many small fish and this can be managed to have more larger fish, then set up a coordinated comprehensive plan.

The fishery needs to be preserved. Not just for me, but all the individuals that live and work in the area. I can truly say that I have met some amazingly friendly people in the Marble Canyon area. Their livelihoods depend on a healthy fishery. The economic impact of not preserving this fishery would be rippling. I personally bought a boat from Idaho and store it in Marble Canyon. I have stayed at each of the hotels, eaten at each of the restaurants and have paid for countless entry fees, camping fees, fishing and hunting licenses. The housing and property market, already hit this area hard, will collapse. The dollars brought into this community by tourists is vital.

The Glen Canyon Dam has changed the Colorado River area below and above it. Many native species have suffered because of the dam. Studies to look at the impact of human needs on a given habitat were not performed in a way that they would be performed today. The natural cycle associated with floods, droughts and a never ending worry of the unknown has been stabilized by

the dam for the good of mankind. The southwestern United States could not survive without the dams controlling the Colorado. By trying to re-create the flows, temperatures, sediment etc., we are trying to move backwards. Again we feel we can be mother nature and control the environment. The original ecosystem has been altered forever. We should not try and control it, but try and enhance the benefits the dam has created.

What the dam has created is a spectacular tailwater that is accessible to all for multiple uses. I am originally from New York and my father grew up in New York City. Just before he passed away, I was able to take him and my mother up the river to fish. After the perfect weekend my father said to me, "I never thought I would be able to experience the things we did this weekend". He also stated that he understood why I like fly fishing. It is a state of mind. A way to forget about everything going on in the crazy world and immerse yourself in the river and the amazing place it created.

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1. The Environmental Impact Statement shall include a historical "no action" alternative that evaluates the current state of management and all proposed management actions against the baseline of the river system in a pre-dam state. Understandably this historical research will be limited to the data collected and available prior to the construction of Glen Canyon Dam. Without this "alternate" to measure the various action alternatives no accurate assessment of the impact can be evaluated. Comparing any action alternatives to the current state of the river system would only assess the incremental changes from the current state, not the complete impact as compared to a natural river system.

2. The Environmental Impact Statement shall consider natural river flows based on historical river flows prior to the construction of Glen Canyon Dam.

3. Function of Glen Canyon Dam shall consider evaporation and seepage.

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I am a resident of Arizona who has visited Grand Canyon and Lake Powell numerous times.

I wish to state that all LTEMP alternatives should fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

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Economic values for sediment/sand as it relates to camp space, archaeological site cover/protection, and species habitat should be determined and included in any cost benefit studies. Replacement cost value of beaches for recreationists should be determined.

Individual rate payers cost for steady flows should be determined (10 cents per month?), and an attitude survey about the value/willingness to pay for Grand Canyon resource preservation should be conducted.

128
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 is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which specifically states, 4The 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."

The LTEMP 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

Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come.

Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives.

Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention.

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.

Focus 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 protects and preserves the individual resources along the Colorado River.

The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

129

The Colorado River is an important resource of the west and life as we know it today would not be possible without the dam and river management facilities that are currently in place. Man has changed the river from its original character and while many may view that as a negative; it is what it is. The river, in our or our children's lifetimes, can not be returned to any thing that resembles in orginal character. Therefore, I would expect the river would be managed to provide the benefits it provides today. First and formost it should be provide water and clean power to the west. The livelihood of a great many people depend upon the river; both adjacent to and distances from the river. A lot has been gained over the last 25 years in understanding how to manage the river. That knowledge needs to be taken forward and the river managed to continue to provide water, power and recreational benefits to the citizens of the west.

I have a particular interest in the recreation management and resources of the river. The river as it currently exists provides for some excellent cold water fishery below all of the dams, particularly Glen Canyon Dam at Lake Powell. I would like to see the area managed as a blue ribbon cold water fishery. The economic impact of such a well managed fishery can be enormous.

I understand there are competing interests in my statements, but within the available operations paraments of water, power, blue ribbon cold water fishery; the third should be accomplished to the best possible after meeting the obligations of the first two -- water and power.

130

I love the Grand Canyon. I work in the Grand Canyon as a river guide several times a year. I live each day, waiting to get back to the canyon. Now, to help others learn how to love the Grand Canyon and what the Grand Canyon experience has done for me.

I am not a "hyper touchy feely" type of person. Because the pay in the Grand Canyon is not enough, I spend the rest of the year working as a trial attorney. However I know the Grand Canyon for what it does for me all year in those few weeks I'm there.

It brings me back to nature. It brings me back to what is important in life. It takes me back to people and place rather than phone and email. It creates communication and relationships. It is a wonderful place. My main joy is watching others learn how this place can impact their life.

However, our, impact has been disastrous in the canyon. Since my first trip in the 80's till now, I'm amazed and embarrassed to what has happened to the canyon. Beaches we used to lounge around on are now gone. Football or volley ball is a rare occurrence because you can't find a place to play. Wildlife is changing or just plain disappearing. I have to search to point out wildlife when most times a talk ensued because wildlife was there.

I want the canyon to be back to what it was, what it should be, as much as possible. I want the "regulation" of the canyon to be done with a broad view to cover more than a corridor, but the ecosystem the canyon is part of. I want the canyon to be there forever so that the sons and daughters, the great grandsons and daughters of the people I take down, can experience what I feel.

In whole I support the submission of the Grand Canyon River Guides Association which I re-post below:

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 . . .

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://wwwpaztcn.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 Adpative Managment 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 gullying/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 alterntatives 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 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." (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.

I want my canyon, its nature, its history, its geology, its wildlife to be available, the way it should be forever. I want the canyon back.

131
I am a river guide in the Grand Canyon it is important to me to keep these resources, the Colorado River protected, it is my lively hood.

132
In the spring of 1970, I was invited to join a river trip through the Grand Canyon. That 18 day trip changed my life. I became a river guide and have rowed dories and rafts through the Canyon ever since. Floating the Colorado through Grand Canyon is without question one of life's most special experiences. The quality of this experience should never be diminished.

The LTEMPS Draft EIS should meet the requirements of the Grand Canyon Protection Act and benefit the beaches, cultural resources, and the complete ecosystem of Grand Canyon.

133
I have been a guide in the Grand Canyon for the last 30 years and have been a member of the river community for the last 37 years. In that time I have watched the operations of Glen Canyon Dam have destructive affects on the Colorado river through Grand Canyon. The LTEMP draft EIS should benefit beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act. We will never be able to manage the operations of the Dam to protect the canyon with out having adaptive management to better understand the science.

134
I have been/are both a private river runner, a river guide, a private grand canyon hiker, and a hiking guide. I think that the dam should be managed to to preserve the beaches, the ecosystems and the cultural resources of the grand canyon in order to fully meet the requirements of the Grand Canyon Protection Act. Specifically the dam releases should be a sustained steady flow. The daily tides of the current release pattern causes unnecessary erosion of the beaches. More difficult problem is water temperature. the current cold release from deep in the Powell Reservoir pool is detrimental to the native fish populations. Consideration should be given to taking water from higher and warmer in Powell reservoir.

135
I am a boatman in Grand Canyon and have been for 25 years. During this time I have witnessed the gradual but steady erosion of the beaches and riparian habitat throughout the canyon as a direct result of the operations of Glen Canyon Dam. The introduction of beach habitat building flows in 1996 brought some hope of improvement, or at least mitigation, but the adaptive management program was overwhelmed by the lopsided membership that was weighted toward power interests with no concern for Grand Canyon.

It is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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.”

136
LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act

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137
I am a river guide, working for Grand Canyon Expeditions since 1994. The LTEMP Draft EIS will benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act. Every little bit helps and flexibility is important to sustain the environment of Grand Canyon.

138
I am a frequent visitor and rafter (passenger). The LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

139
I have made two trips down the canyon with the Moki Mac company. They were two of the most memorable trips I have ever made. I hope that the LTEMP Draft EIS will benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

140
I would like to comment on the use for fishing of the Colorado river below Glenn Canyon Dam. We have been fishing there for many years and think it is one of the best places to fish in AZ. Trout love the cold water that comes out from the dam and have thrived and reproduced in this stretch of the river. We have seen all the changes as to water flow and how it effects the fishing and fish and would love to see it managed more for the fishing. I understand that you have to consider power, water down stream and all the other factors but would really like to see the fishing be included in the plan. It brings many dollars to an area that is quite limited in its income base and helps the economy in the whole area. The lower stretches of the river work well for Native fish but this area is just to cold to sustain other types of fish. It is best suited for the trout, who thrive in this part of the river. Please consider all the people that use this when you are making your plan.

141
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142
I’ve travelled through the Grand Canyon many times and each time I leave a piece of my heart there. I feel that the area and waters need to be very carefully protected.The LTEMP Draft EIS needs to benefit the beaches, cultural resources and the ecosystem of the Grand Canyon in order to fully meet the requirements of the Grand Canyon Protection Act.

143
There are a few key issues that my organization, Grand Canyon Whitewater, a concessionaire with Grand Canyon National Park, finds very important in determining a new plan. Our priorities include:

1. Maintaining a minimum flow of 8,000 cfs from Glen Canyon Dam. This is very important to our business, white water rafting solely in Grand Canyon. Below this minimum, boating in Grand Canyon becomes a challenge for various reasons. Maintaining this minimum would be in accordance with the '92 GC Protection Act which states that Glen Canyon Dam should be operated in a manner to protect and improve the values for which Grand Canyon National Park was established which INCLUDES visitor use.

2. Research best practices regarding beach building AND maintenance in Grand Canyon. We need more focus on what gives us long-term, real results. The beach building efforts in place have not given us the results that are desired, so we need to do more research into different plans that would help maintain beaches. Allowing for more time between beach building flows may help and allow the sediment to begin the lithification process before being wiped away.

Thank you for considering ALL groups associated with Glen and Grand Canyon.

144
I am a river guide. I believe the LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

145
I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

The LTEMP EIS should encompass the Colorado River from Cataract Canyon, through Glen Canyon and Grand Canyon, to Hoover Dam and beyond, as a single ecosystem whose components are inextricably related and must be managed in concert. Moreover, there needs to be direction for managing this Grand Canyon-Glen Canyon ecosystem in concert with the rest of the Colorado River Basin.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The LTEMP EIS process should make sure that the U.S. Geological Survey's Grand Canyon Monitoring and Research Center (GCMRC) plays an integral role in providing technical information for the scoping, determining desired future conditions, and developing alternatives. 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 science-based LTEMP EIS.

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.

The BOR and NPS 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 GCPA.

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 the Fill

Mead First proposal, 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.

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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

The LTEMP EIS should consider an alternative that evaluates the use of a temperature control device at Glen Canyon Dam. 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.

The LTEMP EIS should explore the potential for a restructured Glen Canyon Dam Adaptive Management Work Group, which would ensure 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 on the other.

This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

146

As a college professor with an expertise in river conservation and water resources management, I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole. I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, to "protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National

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I am a private boater and the LTEMP Draft EIS should benefit the beaches, waterways, and ecosystem of the Grand Canyon. This area is beautiful and it should be preserved in every possible for the future generations.

149
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150

In looking ahead at the Glen Canyon Dam draft EIS, I think the most critical issue, both from the legal and the practical standpoint, is Grand Canyon National Park. The operation of the dam has caused a wide variety of changes in the park along the river corridor, from extirpation of native species to the loss of beaches, to loss of cultural sites, to the many changes to the ecosystem resulting from the end of flooding.

The dam must be operated, as the Grand Canyon Protection Act requires, to protect those and many other values in the Grand Canyon. If that means circumventing the dam and exporting water only from Lake Meade, so be it. All the other interests — water, power, flat-water recreation — are subsequent, secondary and derivitive, and can not be given the same value as Grand Canyon National Park.

151

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152

I believe the LTEMP draft IES will benefit the colorado and the canyon realm. I am a river guide as well as a hiking guide, and Hopi native or Arizona. The Grand Canyon "is" my home.

153

In 1962 I went down the Colorado above Glen Canyon Dam just as the dam was beginning to fill. We camped along the river and walked the five miles to Rainbow Bridge. One of my most memorable moments was approaching Music Temple and hearing someone inside playing a guitar. It sounded like a full orchestra. Music Temple has been submerged for almost fifty years now, and it is my dream that the dam might someday be removed so the landscape can eventually revert to the way it was in 1960. When you prepare the EIS, consider the eventual removal of the dam.

154

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of

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156

We are the White Mountain Fly Fishing Club located in the White Mountains of Arizona. Our membership consists of predominately retired folks who have and still are active in enjoying and preserving our land and waters. We enjoy fishing the waters of Arizona for both native and non-native species. Our club has worked closely with Arizona Game and Fish, US Forest Service and the Fish and Wild Life Service to provide an enduring experience for present and future fishers. One project a number of our members assisted on was the Native Apache Trout recovery.

The White Mountain Fly Fishing Club is concerned about all fisheries in Arizona and specifically that of Glen Canyon and the Colorado River down to Lake Meade. The fishery on the Colorado River and more specifically in Glen Canyon is the only large river fishery in the State of Arizona. It was once a great Blue Ribbon Fishery. Though still a good fishing location it has lost its luster to many fishers. Our organization would like to see a plan to return the fishery to Blue Ribbon status, one where we can again catch fish approaching 30 inches in size, weighty and strong fighters along with a number of their smaller cohorts. Great fishing, the beautiful scenery of Glen Canyon and watching the native creatures that inhabit the canyon can provide a rare experience not available in many southwest American locations.

The members of our club also believe implementing a plan to rebuild the fishery should also take into account native aquatic species. Improving food base and habitat will benefit both native and non-native fish. Our desire is to see a management plan included in the LTEMP.

One other item is the fluctuating flows in the river. We understand these are necessary to balance the needs of hydropower, water usage and other interests however we would like to see the day time flows be kept at a level that allows wading and fishing on beaches and bars upstream from Lees Ferry as well as the walk-in area immediately below the Lees Ferry put in. This enhances the recreational experience. Further flows which are too low can negatively impact the aquatic food base available to both native and non-native fish.

Improvements in the fishing experience will also positively impact the local economy as more fishers and tourist are attracted to the Glen Canyon National Recreation Area. We have no doubt when the fishery is again perceived as a Blue Ribbon Fishery by the fishing community many more visitors will travel for a great experience. Recognizing and addressing all users and interested parties is consistent with the Federal Fish and Wildlife Coordination Act.

One of our members, Nick, has a picture on his front patio of a trip he made to Lees Ferry in the early 1980s. It is a picture of him holding a number of large trout he caught on that trip. They are most likely in the 5–10 pound range. Returning the fishery to those days is not only a benefit to the fisherman but to all associated with the Colorado River between Glen Canyon Dam and Lake Meade, including native species which reside in these waters.

Thank you for your efforts in helping restore this incredible fishery.

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Decommission the Glen Canyon dam. Save the Colorado River.

"Americans can always be counted on to do the right thing...after they have exhausted all other possibilities." Winston Churchill

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- The LTEMP EIS should encompass the Colorado River from Cataract Canyon, through Glen Canyon and Grand Canyon, to Hoover Dam and beyond, as a single ecosystem whose

components are inextricably related and must be managed in concert. Moreover, there needs to be direction for managing this Grand Canyon-Glen Canyon ecosystem in concert with the rest of the Colorado River Basin.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The LTEMP EIS process should make sure that the U.S. Geological Survey's Grand Canyon Monitoring and Research Center (GCMRC) plays an integral role in providing technical information for the scoping, determining desired future conditions, and developing alternatives. 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 science-based LTEMP EIS.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

The LTEMP EIS should consider an alternative that evaluates the use of a temperature control device at Glen Canyon Dam. 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.

The LTEMP EIS should explore the potential for a restructured Glen Canyon Dam Adaptive Management Work Group, which would ensure 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 on the other. This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies. Thank you for the opportunity to comment on the scoping phase of the LTEMP EIS. I look forward to a positive outcome.

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A) I feel the 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 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. The underlying project purposes authorized the Secretary of the Interior to "construct, operate, and maintain" Glen Canyon Dam:

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, I 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.

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 is clear that the LTEMP team at Argonne Labs are knowledgeable and experienced, and I assume 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.

Core members of the Bureau of Reclamation team should also 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. I,

therefore, urge that the new LTEMP 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.

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), equaled 2.1 to 3.7 million metric tons.

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).

I, therefore, consider 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 Adpative Managment 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.

Comments on Alternatives:

I wish to provide two kinds of comments about proposed alternatives—elements that should be applied to all flow regime alternatives that are considered within this Draft EIS, and my 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. 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.

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 decision making, 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 gullying/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 alterntatives 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 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:

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 my 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.

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PROTECTING AND IMPROVING ALL THE RESOURCES DOWNSTREAM OF GLEN CANYON DAM, TO MEET THE MANDATES OF THE GRAND CANYON PROTECTION ACT MUST OCCUR. Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come. Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion. Focus 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. Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives.

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I have visited Glen Canyon Dam; Lake Powell at both ends and in between; Grand Canyon National Park; and the entire Golden Circle many times since 1975 and have hiked in the area repeatedly. I'm familiar with the reasons why the dam was constructed, and continue to be inspired by the unsurpassed beauty of the region.

Although Lake Powell has provided extraordinary recreational opportunities and enjoyment for millions of vacationers, natural, historical, cultural and ethnographic treasures have been lost. Over decades, Lake Powell has silted up behind the dam; the natural river flow has been interrupted, with detrimental impacts on downstream fish and wildlife as well as riverbed erosion in the Grand Canyon. The operation of the Navajo Power Station near Page has led to extraordinary environmental pollution. All of these effects have been demonstrated and amply described in the scientific literature.

I support the testimony of the Glen Canyon Institute in its entirety and urge you to acknowledge the short- and long-term environmental and social challenges the region faces; explore the full range of potential solutions, including those proposed by the public; and select a plan to restore the environmental, cultural, and alternative recreational resources of the Colorado River Basin.

Furthermore and specifically, I urge you to resume the natural water and sediment flows as a first step toward the eventual elimination of the Glen Canyon Dam and to shift water storage to Lake Mead. This would go a long way toward reducing water evaporation, a factor in the ever growing water shortage in the region.

Thank you for the opportunity to comment on the scoping phase of the LTEMP EIS.

163

I'm not a religious man but after taking a 7 day motor trip down the Grand Canyon I cannot effectively argue against a supreme being, call it what you will. It is my hope that the canyon remain open and accessible to all, as this is a hugely valuable resource to be enjoyed by everyone, being one of the worlds wonders. Continue research into history and geology of the canyon to further our understanding to the beginning of mankind

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164

Management of the Glen Canyon Dam should allow water flow to a level that allows THE GRAND CANYON to continue in an "as close to historical state" as possible that has been maintained since the dam was constructed. Do not allow any degradation of the natural experience one experiences on a raft trip down the Colorado through THE GRAND CANYON. Some years ago my family rafted THE GRAND CANYON twice. This was the greatest family experience we have ever had. Both my Sons said at the end,"IF I EVER HAVE CHILDREN THIS IS THE ONE EXPERIENCE WE WILL DO TOGETHER". They both now have two children each and hope to raft THE GRAND CANYON. This is one of the most cherished places in America, allow it to flourish with water flow management that allows mankind in experience it's beauty with chartered rafting excursions.

165

The Federation of Fly Fishers (FFF) is the recreational fishing representative for the Glen Canyon Dam Adaptive Management Work Group. The FFF is an international organization with over 10,000 members. The FFF is dedicated to supporting and protecting native and wild fish habitats through their various conservation programs (www.fedflyfishers.org - Conservation) including the endangered fisheries initiative, the cutcatch program, native trout of the Southwest program, and our Native Fish Policy. We appreciate the opportunity to participate in the Adaptive Management Work Group and to provide comments for the Glen Canyon Dam Long Term Experimental & Management Plan Environmental Impact Statement scoping process.

It is essential that a comprehensive fishery management plan be an integral part of the experimental and management plan for the future operation of Glen Canyon Dam. A plan for the Colorado River and its tributaries should be collectively developed by the relevant Federal, State, and Tribal agencies along with the participation of impacted public organizations and private

parties. The plan should cover the aquatic life, principally fish, of the Colorado River between Glen Canyon Dam and Lake Mead including the River tributaries. However, as a comprehensive plan it should also include managing the associated aquatic food base as an essential component for the success of the plan. There should be a single plan covering the River and its tributaries with the administrative geographic divisions within the area of the plan managed by the entities responsible for those divisions as determined by Federal, State, and Tribal laws, regulations, treaties, etc.

As a comprehensive plan for managing the total fishery in a coordinated manner the plan would include the restoration, recovery, and maintenance of native fish along with the recovery and maintenance of a Blue Ribbon trophy trout fishery in the Lees Ferry reach of the River while addressing the threat to both from invasive non native warm water fish. It also should include experimental management actions based on comprehensive, measurable, and defined objectives.

The Lees Ferry trout fishery is a section of the River no longer suitable for native fish. In the past it had a well deserved reputation as a destination Blue Ribbon trout fishery with abundant trophy trout. It drew visitors from across the country and around the world who brought with them attendant economic benefits to the local Native American community that is largely dependent upon fishing related lodges and restaurants for employment. The status of the River for fishing has been allowed to decline over time and while it remains a unique Arizona trout fishery it no longer brings the large number of fishing visitors of the past. In lieu of being managed to be what it could be it has been the recipient of unrelated management actions rather than planned beneficial actions. We are supporting the implementation of a comprehensive fishery management plan in recognition of both the recreational and economic benefits that will be enhanced through such a plan.

166

I have been a river guide in Grand Canyon for 35 years. I have done all types of trips, motorized and non motorized, commercial trips, research trips, and private trips. It is very important that further monitoring of flow regimes considering endangered species, cultural interests, and commercial/private viability be considered. Flexibility in flows at or greater than power plant capacity (from Glen Canyon Dam) are very important to putting sand onto higher modern river terraces and rebuilding beaches used by recreational users of the river corridor. The more frequent the high flows, the greater the benefit. Also, less time between sediment input and relatively high flows is important, as finer sediments wash through the system quickly, but are important in binding together high flow deposits (making them more persistent). This can protect near river archeological resources as well as enhance the survival of the young of native species, and the recreational experience. Some fluctuation of river level (moderate) is acceptable, but should be adaptable to climate conditions (drought or high precip and, high or low storage levels in the reservoirs). Quite important, is the adaptability of management to continued input from the scientific and monitoring sector. Political considerations and influence are often not in the best interest of the ecology of the Colorado River and the near shore environment.

167
I am a full time river guide on the Colorado River through the Grand Canyon. I believe decisions regarding flow rate from Glen Canyon Dam should reflect the Park's dedication to protection of the environment and ecosystem below the dam first, providing navigable and safe flows for commercial and private boaters (8,000 cfs or above) second, and power demand last. The power the dam provides is a byproduct of the dam's construction, not a primary function.

168
It makes me sad to see the condition of Glenn canyon where the current dam has ruined lands and covers areas once available for exploring. I hope that one day we will restore canyon fully so that I may be able to backpack through it. It is a national tragedy that we have tried to hoard water that is escaping anyway and giving those of us who live in the southwest the false impression that water is endless. I urge you to consider filling lake mead first rather than have both canyons sit half empty.

169
I strongly support the position articulated by organizations like Grand Canyon River Guides; without reiterating it here, it is paramount that future management of Glen Canyon Dam respect the spirit of the Grand Canyon Protection Act, and actively prevent further degradation of the invaluable scenic, recreational, and ecological resources downstream of the dam.

170
The preferred alternative should be dam removal/bypass with power generation replaced by solar in the Wahweap basin.

Any other alternatives should mimic, to the best extent possible, natural flows in the river. This includes but is not limited to:

Peaking flows for shoreline sand deposition

Striving for water temperatures that mirror pre-dam variations

Consider sediment transport around the dam to restore the sediment-poor reach upstream of the Little Colorado

Extirpating the trout fishery in favor of historic fishes

In addition, all decisions should be made using best available science and realizing that Glen Canyon / Lake Powell loses significant volumes of water to seepage and evaporation that the Colorado River system no longer has in sufficient excess to allow for the loss.

171
As the Glen Canyon Dam operations have a significant effect on downstream recreational use the EIS should consider maintain or improving the quality of recreational experiences for users of

the Colorado River and focus on protecting, preserving, and improving all of the downstream resources, such as camping beaches, cultural sites, and flora & fauna.

172

I want to encourage alternatives that support downstream resources impacted by the Dam. I have made several trips down the colorado river through the grand canyon during the past 10 years. The loss of beaches and their related campsites and cultural resources has been alarming. The canyon is an incredible resource, providing recreation, education and opportunities for personal growth to all walks of people. The alternatives considered should address the problems the dam has caused downstream and provide solutions. In my opinion, the efforts to address this problem so far have been inadequate and limited in scope compared to the resources needed to correct the damage.

The daily flow fluctuations should be addressed and their impacts on the sand deposits evaluated and mitigated. Power productions is a side benefit of the dam and was not the main purpose. It should not dictate to the other resources. If the variable flow for power is needed then it's impact would need to be mitigated possibly though extended or more numerous high flows. Either way the grand canyons resources should be protected.

In addition, resources from the dams operations should be used to mitigate the loss of river and canyon resources buried under the waters of lake mead. These can be used to provide off site river use opportunities in the surrounding rivers. Such mitigation may include creating access points for ingress and egress to the Green, San Juan and other rivers in the area. Also, providing resource protection fund due to the increased impact on fewer available miles of river. Most rivers have more demand than supply and have instituted lottery systems. The Loss of glen canyon is the loss of a river resource that would otherwise be available and utilized.

173

I fly fish at Lees Ferry often, and camp up-river several times a year. My first concern is that the value of the fishery at Lees Ferry be considered. There are not a lot of jobs in the area and the lodges, guide services, restaurants, and gas stations are important employers. But this fishery would be worth preserving if it didn't bring in even a nickle. There is no place else on earth quite like it, and I don't just mean the scenery. There are other tailwaters, but there is no other Lees Ferry.

The science should be very rigorous. With such conflicting interests, unimpeachable science is essential if there is to be any hope of a real consensus. For example, stomach content surveys should be part of any rainbow trout removal program.

If trout must be removed from the river downstream from Lees Ferry, they should be restocked elsewhere or utilized for food. This is important from a public relations standpoint as well as an ethical one.

If you can convince the anglers who utilize Lees Ferry that their fishing is not under attack, they could be a valuable ally for habitat preservation. Most fly fishermen are sympathetic to the goals of preserving endangered species in general.

174
I am a geology professor at UNLV and part-time Grand Canyon river guide. I have been a geology interpreter and passenger on commercial river trips, I have been participant in a private Grand Canyon river trip in Grand Canyon and I have backpacked in the Canyon.

I am writing to express my support for the LTEMP Draft EIS, it will benefit the beaches, cultural resources, and the ecosystem of Grand Canyon and it is a step towards meeting the requirements of the Grand Canyon Protection Act. The Grand Canyon, it natural and cultural history is a treasure that must be protected for future generations of Americans.

175
I'm a Grand Canyon hiker, plus have floated the Colorado River through Grand Canyon 11 times since 1987, and have seen the impact of dam operations over time. The LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon and needs to fully meet the requirements of the Grand Canyon Protection Act.

176
Three areas of concern.(Glen Canyon Dam, Tamarisk, Irrigation). Glen Canyon should stop altering its flows to accomidate the power demand of the large cities in the area. The environmental damage is well documented as I'm sure you know. It was pointed out to me that Hoover Dam could very easily perform this ebb and flow task without any problems. The reasons why Glen Canyon is assigned this task are political. I would think protecting the resources of one of our best National Parks would be a top priority. Eradication of the invasive Tamarisk. (Salt Cedar) This plant has choked hundreds of miles of prime beaches, river corridors, native animal and plant species in the S.W states. There is a way to do it with the use of a biological control being used in certain areas now. (Tamarisk beetle). Irrigation from upstream states has to be addressed so there is a healthy flow of water that reaches the lower Colorado River system. I know this is a complicated issue but water flows need to be regulated as to provide for all users, not just the people who make money off of it.

177
Having been a passenger on 3 river trips down the Grand Canyon, and visiting both North and South Rims on several occasions, I would urge you to commit your efforts to ensure that the LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

178
As a person who has been through the Grand Canyon on the Colorado River, I am interested in keeping the river and Grand Canyon to the same or higher standard that I enjoyed when I had this adventure. Therefore, I support the Grand Canyon River Guides position on and changes to

the Long Term Experimental and Management Plan for the Glen Canyon Dam and associated areas.

179
Current Glen Canyon Dam management to increase beach size over the last 15 years has had minimal limited success. I have seen the effects in 4 different private river trips in that time frame. As the availability and carrying capacity of the beaches in the river corridor are directly related to the number of launches, both private and commercial, I urge that you reconsider your failed approach. The heavy costs associated with these attempts could be better utilized by learning from these failed attempts and then Stop...Back up...and consider new approaches.

180
The Grand Canyon is without a doubt the National Park Service's greatest treasure. A dory trip down the Colorado, through the Grand Canyon, is a life-changing experience never to be forgotten. I agree with the GCRG's talking points for the development of a Long Term Experimental and Management Plan Draft EIS for Glen Canyon Dam.

They are as follows:

FOUNDATIONAL ELEMENTS:

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 is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

Change the Purpose and Need for Action Statement for the LTEMP 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 which is an ancillary benefit of the dam.

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. 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.

The LTEMP 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.

Clearly define agency responsibilities, improve communication, create mechanisms for productive information sharing, and eliminate project redundancies between Grand Canyon National Park and the Grand Canyon Monitoring & Research Center.

Ensure that the 11 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 decision making — a distinct failure of 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 tribes view all canyon resources as culturally significant.

Funding for monitoring and management of cultural resource should be restored. In order to comply with the Grand Canyon Protection Act, federal laws, statutes and executive orders, the importance of protecting and preserving these fragile, non-renewable resources and Traditional Cultural Properties for the benefit of future generations must not be minimized.

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. Improve the structure and functionality of the Glen Canyon Dam Adaptive Management Program 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.

RESOURCE ISSUES:

Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come.

Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

Focus 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 protects and preserves the individual resources along the Colorado River.

The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

Examine the role of time and climate change in the system.

Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

FLOW SUGGESTIONS:

Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives.

Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention.

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.

Include an LTEMP alternative to test steady flows.

Consider an alternative that includes a seasonally adjusted steady flow alternative that includes sediment triggered Beach Habitat Building Flows, and based on the closest approximation of the pre-dam hydrograph.

We need a scientifically credible, well-designed steady flow experiment of sufficient longevity to produce a biological signal (more than two months in the fall) that is followed by a full synthesis of impacts to biological, physical, social, economic and cultural resources.

Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

Test the "best case scenario" presented in the article, "Is there enough sand? Evaluating the fate of Grand Canyon sandbars" as proposed by USGS scientists.

Design an alternative based on the best chance of viability for rebuilding and maintaining sandbars.

181

I love the Grand Canyon. Seems I'm always waiting to get back to the canyon. It brings me back to nature. It brings me back to what is important in life. It takes me back to the people and the place I fell in love with so long ago. It creates communication and relationships. It is a wonderful place. One of my great joys in life is watching others learn how this place can impact their life.

Our impact has been disastrous in the canyon. Since my first trip in the 90's until now, I'm amazed and embarrassed to what has happened to the canyon. Beaches have disappeared, some just gone. It appears that the canyon has been overgrown by bushes that should be washed away in seasonal floods. Wildlife is changing or just plain disappearing. I have to search to point out wildlife when it used to be that a talk ensued because wildlife was there. And I wonder what was it like before my first visit. What did the canyon look like in 1962? And then how much difference was there in '63? How much did the canyon change in the 20 years after that and how much has it changed in the last 50 years? I want the canyon to be back to what it was, what it should be, as much as possible. I want the "regulation" of the canyon to be done with a broad view to cover more than a corridor, but the entire ecosystem that the canyon is part of. I want the canyon to be there forever so that the sons and daughters, the great grandsons and daughters of all of us, can experience what I feel.

In whole I support the submission of the Grand Canyon River Guides Association which I re-post below:

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 . . .

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://wwwpaztcn.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 Adpative Managment 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 gullying/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 alterntatives 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 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.

I want the canyon, its nature, its history, its geology, its wildlife to be available, the way they should be forever. For all of us.

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As a private and commercial river runner since 1964 (130 trips) I have witnessed the changes in the flow patterns caused by Glen Canyon Dam. The river corridor has drasticly changed over the years and continues to change currently for the negative-loss of sand. IF THE CURRENT FLOW REGIMENS ARE MAINTAINED THE SAND WILL BE GONE IN THE NEXT 20 YEARS AND THERE WILL BE NO PLACE TO CAMP. This is extemely sad to me. All the experts have been studying this issue and know more then I do about the details and the best action. I STRONGLY SUPPORT THE POSITION OF THE GRAND CANYON RIVER GUIDES POSITION PAPER SENT TO YOU ALL AND WILL NOT BOTHER TO COPY IT HERE. PLEASE SERIOUSLY STUDY GCRG PAPER AND IMPLEMENT THEIR RECOMMENDATION.

183
As a citizen I value the opportunity to provide comments on projects and plans that affect such places as the Grand Canyon. I would encourage testing the optimal plan for sand bar storage (as referred to by Scott A. Wright, John C. Schmidt, Theodore S. Melis, David J. Topping, David M. Rubin of the USGS) in an effort to determine what the best case scenario is for sand bar development. As a recreational user of the Grand Canyon, these sand bars are very important as campground areas, beaches, and wildlife habitat.

Further, as I understand, evaluating such an option would be a comparatively simple exercise which will provide results with little uncertainty. Given this, it seems foolish to not evaluate such an option.

184
Reconfigure the Glen Canyon Dam to release warmer water to the river. re-establish native fish stocks.

185
I realize there are a lot of elements that need to be considered in the management of releases at Glen Canyon dam. Having followed this for nearly three decades, it is my observation that insufficient consideration has been given to how these releases affects Lake Powell water levels. Two million people visit Glen Canyon National Recreation Area each year, and 90% of those come to enjoy Lake Powell. Low water levels have grave impacts on these visitors's ability to enjoy the lake, and the park's and concessionaires' management of lake support facilities.

The Castle Rock Cut (CRC) allows the National Park Service, concessionaires, and recreational boaters departing from Wahweap Bay (the where the lake's largest marina resides) access to the greater Lake Powell at a reduced boat travel distance of more than ten miles. Minimum safe water elevation for passage through the CRC is 3612'. When lake levels are allowed to recede below this elevation, considerable additional costs are incurred by all boaters departing Wahweap marina. These costs include fuel expenses, equipment maintenance and time; resulting in significant increases in water and air pollution, facilities and equipment maintenance costs, and emergency response times.

I understand that Lake Powell is a reservoir, and that fluctuating water levels are necessary for it to fulfill its functional purpose and support downstream natural resources. What I am suggesting here is that policies regarding operation of the dam give significant consideration to managing releases in a manner that maintains water levels in the range between 3612' and 3700'. It should only be under extreme circumstances when lake levels are allowed to drop below this operation window.

Thank you for consideration of this minimum lake level elevation that is critical to most users of Lake Powell.

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I have been a joyful passenger on this river. I am writing because I care about protecting our wild places. I also believe that the LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act. Please protect this entire system for the good of our future.

187
I think it is very important that you listen and act on input from GRCG. The Grand Canyon is a beautiful place that needs to be protected for future generations.

188
RE: Glen Canyon Dam Long-Term Experimental and Management Plan EIS (LTEMP EIS)
Arizona State Council of Trout Unlimited proposes support of the EIS scoping study presently being done on the Colorado River/Grand Canyon Native Humpback Chub and other Native Fish /Along with the Lees Ferry fishery/ and operation of Glen Canyon Dam flows, with the following requests to be included in the EIS study:

The issues that this EIS scoping study should address are:

1. That the Lees Ferry fishery be maintained as a premium trout fishery for the benefit of all sportsmen who fish that area in the Colorado River.

2. That the Humpback Chubs and other native fish in the lower Colorado River below Lees Ferry be preserved for future generations.

3. That the Glen Canyon water flows be done in a manner that is not detrimental to either the Lees Ferry Fishery or the Native Fish in the lower Grand Canyon Colorado River area, but still satisfies power demands from Glen Canyon Dam and riparian issues in the Canyon.

4. That all interests in the Colorado River be considered and accomplished by scientific methods to include the following: a. All recreation interests on the Colorado River. b. Tribal issues. c. Glen Canyon Dam water flows and power generation. d. Maintaining both Lees Ferry as a premium fishery and preservation of the Native species of fish in the Grand Canyon Colorado River, and reduction of small trout in Lees Ferry and lower river.

5. Maintaining larger size fish in Lees Ferry as a premium fishery.

The following should also be included in the study, as possible ways of accomplishing the above:

1. Changing the water flows from Glen Canyon Dam that benefits all interests in the River (possibly to a more uniform flow rather than differing flows at different times). We understand that there are many issues that affect the flow such as power generation and water users' demand for water downstream.

2. Changing the fishing regulations in the Lees Ferry section, to allow unlimited or a possession take of smaller fish (under 14 inches) to possibly help remove the smaller fish from the River, thereby benefiting the Lees Ferry Fishery and the Native fish in the river. Propose maintaining catch and release of all fish over 14 inches, by barbless flies, in the Lees Ferry section of the river from the Glen Canyon Dam down to the Paria River. The barbless fly regulation should be maintained for all fishing (both fish over and under 14 inches) in the Lees Ferry section of the river down to the confluence of the Paria river. All regulations presently in place below the Paria river should be maintained.

3. Permitting rafting trips with the outfitters to include dedicated fishing trips, with unlimited take and keep, through the Grand Canyon, below the Lees Ferry Section, in addition to the present adventure trips that are conducted now (thereby helping to remove trout from the lower river that are detrimental to the Natives in the river).

4. Study the introduction of Triploid trout (which cannot reproduce, but grow larger and much faster than wild trout) as a supplement, but not to replace the wild trout into Lees Ferry, and way of reducing the excessive spawn creating a large amount of small trout that reduce the size of the fish in Lees Ferry premium fishery, and also migrate downstream into the Canyon and interfere with the Native fish in the lower river. If the introduction of Triploids to the Lees Ferry is determined to be a viable option, it would only be a supplement to the wild trout population and not a replacement of the wild trout. Also that the Triploids should be marked, to identify them from the wild trout and as a means of tracking any migration into the lower canyon area, and to assist anglers in Lees Ferry to identify any fish caught as wild or Triploid.

5. Continued studies of the Native fish in the lower river, as to their numbers, condition and spawning habits and adaptability to the colder water in the mainstream of the Colorado River, versus their normal spawning area in the Little Colorado river that has warmer water.

Any questions you may have regarding our comments can be directed to my attention at the contact information below.

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Thank you for the opportunity for the Fish and Wildlife Service (FWS) to assist in scoping to develop an Environmental Impact Statement (EIS) for the Adoption ofa Long-term Experimental and Management Plan for Operation of Glen Canyon Dam (LTEMP). The FWS provides the following comments to assist in scoping development and implementation of a structured L TEMP to determine the need for potential future modifications to Glen Canyon Dam operations, and to determine whether to establish an ESA Recovery Implementation Program (RIP) for endangered fish species below Glen Canyon Dam.

Our comments are in accordance with the Council of Environmental Quality regulations for National Environmental Policy Act (NEPA) that address cooperating agency status (40C.F.R.1501.6 & 1508.5), and resource planning and conservation responsibilities for fish and wildlife,including endangered species, the Lees Ferry trout fishery, and migratory birds, associated with the Endangered Species Act (ESA) and Fish and Wildlife Coordination Act (FWCA).

FWS Scoping Recmmnendation for an Alternative to be Developed for the EIS: FWS recommends inclusion in the LTEMP EIS of an alternative that provides for a RIP that would be focused on supporting native species communities that ensures their habitat-based needs are met. Consistent with the purpose of the proposed L TEMP, that being to inform Department of the Interior (DOl) decisions and operate Glen Canyon Dam in such a manner as to improve and protect downstream resources in Grand Canyon National Park (GCNP) and Glen Canyon National Recreation Area (GCNRA) while maintaining compliance with relevant laws, such as the Grand Canyon Protection Act (GCPA), ESA, Law of the River, and FWCA, a species community and habitat-based alternative would contribute to conservation or recovery ofhumpback chub, razorback sucker, southwestern willow flycatcher, and Kanab ambersnail. It would also contribute to conservation for other non-listed, aquatic and riparian species (including flannelmouth sucker, bluehead sucker, and speckled dace) to reduce the need to list them under the ESA.

Such a species community with a habitat-based alternative that includes conservation accomplishments for the previously noted fish and wildlife resources is supportive of the GCP A's commitment to operate Glen Canyon Dam in accordance with the Law of the River criteria and operating plans in such a manner as to protect, mitigate adverse impacts to, and improve the values for which GCNP and GCNRA were established, including, but not limited to natural and cultural resources and visitor use. In this regard, this species community and habitat based RIP would be similar to the conservation intent of the Lower Colorado River MultiSpecies Conservation Program (LCR MSCP) that the Bureau of Reclamation (Reclamation) is carrying out directly dowmiver for approximately 400 river miles. The species community and habitat-based benefits ofthis alternative would be developed and included in the LTEMP EIS in a manner that addresses conservation projects for listed and non-listed aquatic and riparian species consistent with management goals for GCNP and GCNRA.

This alternative is intended to include use of traditional ecological knowledge to assist in guiding its development under the cooperative planning leadership of Reclamation and National Park Service (NPS) in cooperation with interested Tribes and other entities. Further, it is intended to provide evaluations to meet FWCA requirements including endangered species, species of biodiversity concern including consideration of restoration of appropriate extirpated species, migratory birds, and management of the trout at Lees Ferry that provides for protection of humpback chub and other native fish populations dowmiver, and a quality recreational fishery at Lees Ferry.

In summary, this alternative needs to be consistent with the GCP A and other authorities pertaining to water allocation, release, and use under existing laws. As noted it would be consistent with the covered species and habitat-based focus of the LCR MSCP that adjoins the downstream terminus of this project and continues to the U.S.-Mexico Southerly International Boundary, which is carried out by Reclamation in cooperation with various stakeholders. This alternative needs to include substantive concerns and commitments with provisions to fully consider sacred areas of cultural significance to Tribes, so they can be incorporated and affect planning and decision-making, especially as they may concern non-native fish control as well as other resource planning work.

Recommendation for Application of the FWCA: The purpose of the proposed L TEMP for the Operation of Glen Canyon Dam, as noted in the Federal Register notice (10/17/11) is to inform DOl decision-making and operate Glen Canyon Dam for the improvement and protection of downstream resources in GCNRA and GCNP while maintaining compliance with relevant laws, including the GCP A, the Law of the River and ESA. To assist the NPS and Reclamation, the FWS recommends preparing a report pursuant to the FWCA that provides fish and wildlife resource planning information.

Section 2(a) of the FWCA establishes that whenever a Federal agency proposes to control or modify the waters of a river, such as the Colorado River at Glen Canyon Dam, for any purpose, that agency shall consult with the FWS regarding wildlife impacts and measures for improvement of wildlife resources. Section 2(b) requires that the reports and recommendation of the FWS on wildlife aspects of the project be made an integral part of the action agency's reports to Congress or other authorizing authorities. The FWS recommends preparing a report focused on planning assistance for native and non-native fish management, neo-tropical migratory bird management including the endangered southwestern willow flycatcher, other appropriate fish and wildlife resources, and management planning needs for the Lees Ferry trout fishery.

This report should include analysis ofthe conservation implications of potential alternatives for endangered humpback chub and razorback suckers and other native fish and aquatic organisms that are species of management concern for the NPS. It should recommend beach restoration alternatives that conserve migratory and nesting songbirds, waterfowl and other wetland species. Recommendations would address important food chain maintenance needs such as conservation of species that support nesting peregrine falcons in the project area. The FWCA report would provide planning information for the Lees Ferry trout fishery so that it can be managed by the Arizona Game and Fish Department (AZGFD) and NPS to control trout numbers by reducing reproduction and/or survival of young-of-year and juveniles. Measures may include reducing trout migration into the confluence area of the Little Colorado and Colorado rivers as well as areas below the Paria River confluence with the intent to protect humpback chub and other native fish from predation while supporting a trophy trout fishery at Lees Ferry.

The FWCA report will be consistent with planning information needs described in the FWCA including recommendations for preventing loss of and damage to fish and wildlife resources while providing for their development and improvement in connection with the proposed action as stated in the Federal Register notice. This should be applied consistent with the GCPA, the Law of the River, and the ESA in a manner that acknowledges FWCA requirements to address potential modifications to flows in the Colorado River associated with the Federal Register notice's intention" ... to develop and implement a structured, long-term experimental and management plan, to determine the need for potential future modifications to Glen Canyon Dam operations, and to determine whether to establish an ESA Recovery Implementation Program for endangered fish species below Glen Canyon Dam."

Work and preparation associated with the FWCA recommendations would be accomplished in compliance and in support of actions that consider revised dam operations and other actions under the jurisdiction of the Secretary of the Interior that would be considered within alternatives of the EIS. The FWCA report would analyze fish and wildlife resources in a manner sufficient to

support planning for alternatives development consistent with the intent of the FWCA for these resources and the respective responsibilities of the FWS and AZGFD in coordination with Reclamation, NPS, Tribes, and other interested entities.

Other Issues Related to Scoping: The spread of the tamarisk leaf beetle (Diorhabda sp.) along the Colorado River through the Grand Canyon raises concerns not previously addressed in management of Glen Canyon Dam. The beetle defoliates tamarisk, and, after several years of such defoliation, the plant may die. Significant death rates of tamarisk that currently act as anchors of silt and sand substrates on beaches, bars, wash fans, or other similar locations may impact the stability of such areas when exposed to variable flow conditions. The death of tamarisk stands in the Canyon may thus impact wildlife habitats and recreational opportunities of concern to NPS.

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I fully support the positions of the Grand Canyon Private Boaters and the Grand Canyon River Guides, and agree that any LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

To this end I cannot envision any operational parameters that will improve and restore the loss of sediment that has occurred without the addition of sediment from above the dam. Contributions of the Paria, the LCR and other side streams are plainly below the threshold of effectiveness in this role as demonstrated by repeated high flow experiments.

While one of the original goals of the dam was to slow sedimentation of Lake Mead, the operation of the dam increased the amount and rate of sediment delivered to the upper lake from the Grand Canyon river corridor, which under natural conditions would have (net) stayed on the banks and bottom. Now that the corridor has been scrubbed of substantial deposits of sediment, the volume of and carrying capacity of the dominantly clear water flows will not allow the minor amounts of sediments deposited in any high flow regime to remain in place for any significant amount of time.

All other biological and archaeological problems and conditions resulting from the changes initiated by dam operations hinge on the sediment problem. THE ADDITION OF SEDIMENT FROM ABOVE THE DAM is the only action I see that will enable other actions taken to "protect, mitigate adverse impacts to, and improve" the imbalance wrought by the historical operation of the dam, and I cannot envision any amount of continued experimentation will change that fact. Any LTEMP alternative that does not include the addition of sediment from above the dam will in my opinion simply continue to throw money at a set of ultimately unsolvable problems.

191
As a user of the Grand Canyon National Park, I am concerned about the over commercialization of the entire enterprise. The river flows are manipulated for maximum power generation, the river permits during the high demand seasons are dominated by commercial river companies, the air is constantly buzzing with helicopter tours, and the park is out sourcing more and more of the operation of the rim facilities with a goal of maximizing revenue. It no longer feels to me like a public park, and the management does not seem to value the wilderness experience. The management philosophy seems to have been co-opted by the Disney company, with a need to manage crowd control while providing services at every turn. Yes, you need to manage the crowds, but I would like to see more value placed on sustainable, wilderness values, and less on accommodating people with all the luxuries to which they have become accustomed. Its a National Park, not a spa destination. A good start would be to include the Colorado River as wilderness, instead of a silly exclusion, limiting things like over-flights, having the park operate more of the facilities, and restoring something like natural flows to the river.

192
When developing plans for the future of the Glen Canyon Dam, the Colorado River, and the Grand Canyon, please include the needs of everyone affected, not just the power companies. The native people who live there and the recreational users, including river runners, must be consulted and care taken to prevent actions that cause possibly irreversible damage.

My husband and I spent two weeks floating down the Colorado River through the Grand Canyon and it was wonderful. I took more than a thousand incredibly beautiful photos, we experienced peace and camaraderie and oneness with nature on that trip that is indescribable. Yet I know that the leaders of the trip had problems because of erosion of the sand. It was often difficult to find an overnight campsite that could accommodate our group of more than 30 people. We saw other river running groups on our voyage that were even larger.

The Colorado River is not owned by the power companies. The Grand Canyon and the Colorado River must be protected and preserved for the enjoyment of future generations of Americans.

193
The Grand Canyon, the Colorado River and surrounding area is the most awesome place in North America. You cannot do anything to alter this beauty and this sacred environment! People of the entire world should be able to benefit from this natural wonder that is here in our back yard. I cried the first time I stood at the edge of the canyon as I know many folks do. Not only would this be an offense to the citizens of the world but what about the plant and animal life? By altering this ecosystem you would damage the entire planet for centuries to come. Shame on any of you that would set a plan into action that would cause this catastrophic damage to our planet.

194
I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of

the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

The LTEMP EIS should encompass the Colorado River from Cataract Canyon, through Glen Canyon and Grand Canyon, to Hoover Dam and beyond, as a single ecosystem whose components are inextricably related and must be managed in concert. Moreover, there needs to be direction for managing this Grand Canyon-Glen Canyon ecosystem in concert with the rest of the Colorado River Basin.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

195

I would like to see river flows in the grand canyon regulated to provide for the best possible health of the river flora and fauna, the rebuilding and maintaining of the beaches, and the safety and enjoyment of recreational river users. I would like to see the continuation of seasonal "flood" releases. I would also like to see if the dam operators could find a way to introduce sediment into the river to more closely approximate historical conditions. I ask that the dam regulators consider the opinions of the many scientists who have performed a great deal of research concerning the health of the river's ecology and try to incorporate their recommendations into any dam release plan.

196

I have been a river guide and I believe the LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

197
There is only one thing that can save the river ecosystem in the Grand Canyon from the effects of the dam in Glen Canyon, and that is to let the river flow free. All else is nothing but window dressing that will do very little good, if any, and squander lots of public money in the process.

Let it flow.

198
I am in full agreement with the proposals from the Grand Canyon River Guides concerning the Draft EIS/Management Plan for Glen Canyon Dam and the Grand Canyon. Their proposals reflect the considered opinions and experience of the many of us who have floated and hiked the Grand Canyon, and have enjoyed the Lees Ferry trout fishery multiple times.

The Management Plan should not reflect the views of only a part of the community, but the participation and input from all users/participants. Future generations need to be carefully considered so that their future experiences are also protected.

199
The Grand Canyon is my favorite place on earth. I am very involved in protecting the Canyon, the Colorado as it runs through the Canyon, keeping drilling and mining away from the land near it. I implore you not to do anything at Glen Canyon Dam that would affect the Canyon adversely. This is one of the greatest wonders in the world, perhaps the most magnificent one that Mother Nature provided for us and we must protect it at all costs.

200
As a recreational boater I feel that the following points should be considered in the LTEMP EIS:

1. Define & ensure a substantial role for the Grand Canyon Monitoring & Research Center (GCRMC) within the LTEMP EIS process.

2. Maintain or improve the quality of recreational experiences for users of the Colorado River.

3. Focus on protecting, preserving, and improving all of the downstream resources, such as camping beaches, cultural sites, and flora & fauna.

4. The high flow protocol should be a well defined key component of LTEMP alternatives.

5. Design intervening flows (between high flows) that maximize sediment retention on beaches and backwater areas for the benefit of campers and native biota.

6. LTEMP alternatives must be scientifically defensible and credible with well defined hypotheses, building on what we have learned from GCRMC and LTEMP implementation.

7. The LTEMP must be based on an adaptive ecosystem management approach.

8. Include an alternative to test seasonally adjusted steady flows that includes sediment triggered beach and habitat building flows based on the closest approximation of the pre-dam hydrograph.

9. Consider minimum flows no less than the long-term base flow of the Colorado River.

10. Test the "best case scenario" presented in the article, "Is There Enough Sand, Evaluating the Fate of Grand Canyon Sandbars" as proposed by USGS scientists. Particularly in regard to rebuilding and maintaining sandbars.

(http://www.usbr.gov/uc/rm/amp/twg/mt...Attach_05e.pdf)

11. Consider options that include adding sediment below the dam consistent with a pre-dam sediment profile.

12. Consider triggering flood flows based partly on distributing sediments from the LCR and Paria Rivers when those tributaries are supplying large amounts of sediment.

13. Restore historic water quality regarding temperature profiles, pH, and native fish species.

14. Limit the rate of increase/decrease of flow rates to promote boater safety and beach preservation and enhancement.

201
Having hiked, rafted, floated, camped, viewed from a helicopter, the Grand Canyon throughout my life I am greatly concerned that the Secretary of the Interior understand that many of us throughout the USA want to be sure this resource is protected. We care deeply about protecting and improving all the resources downstream of Glen Canyon Dam in accordance with the mandates of the Grand Canyon Protection Act.

202
I am writing to express my interest and concern regarding Glen Canyon Dam Operations. As an outdoor enthusiast and avid boater I would like to see flows that attempt to mimic pre dam construction. Meaning an annual flood flow as well historic water quality regarding temperature profiles, pH, and native fish species. Also the addition of sediment below the dam to preserve beaches and restore the environment. A yearly flood flow based partly on distributing sediments from the LCR and Paria Rivers when those tributaries are supplying large amounts of sediment. The preservation and attempt to restore the Canyon as best as possible to pre dam state so that flora and fauna thrive and for future generations to experience.

203
RESOURCE ISSUES:

Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come.

Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

Focus 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 protects and preserves the individual resources along the Colorado River.

The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

Examine the role of time and climate change in the system.

Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

FLOW SUGGESTIONS:

Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives.

Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention.

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.

Include an LTEMP alternative to test steady flows.

Consider an alternative that includes a seasonally adjusted steady flow alternative that includes sediment triggered Beach Habitat Building Flows, and based on the closest approximation of the pre-dam hydrograph.

We need a scientifically credible, well-designed steady flow experiment of sufficient longevity to produce a biological signal (more than two months in the fall) that is followed by a full synthesis of impacts to biological, physical, social, economic and cultural resources.

Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

Test the "best case scenario" presented in the article, "Is there enough sand? Evaluating the fate of Grand Canyon sandbars" as proposed by USGS scientists.

Design an alternative based on the best chance of viability for rebuilding and maintaining sandbars.

204

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole. I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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. Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

The LTEMP EIS should encompass the Colorado River from Cataract Canyon, through Glen Canyon and Grand Canyon, to Hoover Dam and beyond, as a single ecosystem whose components are inextricably related and must be managed in concert. Moreover, there needs to be direction for managing this Grand Canyon-Glen Canyon ecosystem in concert with the rest of the Colorado River Basin.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The LTEMP EIS process should make sure that the U.S. Geological Survey's Grand Canyon Monitoring and Research Center (GCMRC) plays an integral role in providing technical information for the scoping, determining desired future conditions, and developing alternatives. 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 science-based LTEMP EIS.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

The LTEMP EIS should consider an alternative that evaluates the use of a temperature control device at Glen Canyon Dam. 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.

The LTEMP EIS should explore the potential for a restructured Glen Canyon Dam Adaptive Management Work Group, which would ensure 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 on the other. This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies. Thank you for the opportunity to comment on the scoping phase of the LTEMP EIS.

205

I moved to the Flagstaff area less than a year ago and have worked on both the North and South rim as well as volunteered in the Canyon. I have barely seen all the Canyon has to offer. I hope that the LTEMP Draft EIS will benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act so that I as well as others may have many more years of exploration in the Canyon!

206

River rafting in the Grand Canyon is an important experience for people from all over our country. We went on a river rafting trip last year and it was one of the greatest times we have had as a family. To be able to enjoy and experience the Colorado and the beauty of the Grand Canyon was wonderful and something our children will never forget. It is important for people to be able to experience the Grand Canyon in this way as there is no substitution for what we saw and enjoyed on our trip. By preventing Americans from being able to river raft the Grand Canyon with tour groups you are shutting them off from one of the most beautiful parts of our country. Our trip leaders were extremely careful about protecting the natural environment of the river and we left everything just as we found it at every stop. Please do not work to prevent Grand Canyon river rafting excursions.

207

Please ensure that operations follow the spirit and letter of the Grand Canyon Protection Act. Please ensure that science and not politics guide your decisions. Please ensure that 'adaptation' and 'management' are a real part of any Adaptive Management component. Please ensure that ALL stakeholders play a role in the decision making process. Please ensure that beach building flows are part of the operations. Please mitigate the destruction of beach resources by equalization flows.

208
I am a concerned citizen who is interested in maintaining/improving the private boaters experience in the Grand Canyon. I have never been through the canyon before but am interested in experiencing it first hand.

I understand that it could be a 10-15 year wait before I am able to actually get a private permit and float the canyon. A lot can happen in fifteen years with a dam controlled Grand Canyon.

Of particular concern is the loss of sediment in the river as a result of the dam. Will the pristine beaches that everyone loves to camp on still be there when I get my chance? One improvement that I would like to see is a program to re-introduce sediment downstream of the dam. This approach has improved conditions downstream of dams in other rivers around the world (Three Gorges Dam in China).

The controlling interests for the Glen Canyon Dam need to understand that while the dam provides water and power to its citizens, the Grand Canyon also provides citizens the opportunity to recreate which in my opinion is just as valuable as the water and power the dam provides.

209
I have used the Glen Canyon recreational area several times in the 1990's when my children were growing up. My youngest son (who is now serving the military) was the best fisherman in our family still fondly remembers our trip to the Lees Ferry area in the summer of 1996 when we fished the walk-in area. Besides the fishing the scenery was spectacular. I have recently retired and am planning on making trips to Lees Ferry on a regular basis, based on hearing that it is the one main "Blue Ribbon" trout fishery in Arizona. I hear this through the "White Mountain Fly Fishing Club" in Pinetop-Lakeside-Show Low area.

I was made aware of the issues of the LTEMP through the White Mountain Fly Fishing Club (WMFFC). We recently had speakers at the club from the Arizona Fish & Game (AG&F). I believe the issues of water flows are important for both the dam operators and the fish habitat. There appears to be room for improvement in management of water flows if all parties are heard.

I don't lose sight of the fact that power generation is the primary goal of the dam and as such, must be a productive resource for all of the power customers that benefit from this endeavor. (I recently retired from a major utility company in the Phoenix area and I know firsthand about a Utilities' juggling act of managing the grid, environmental concerns, energy efficiency, etc.)

Through the club and the recent AG&F presentations at our January meeting, I've heard that water level fluctuations are ranging from mild to dangerous. I am not a fish biologist, but is seems that rapidly changing water levels in any river will affect the quality of the fishery. A more-level stream flow will ultimately be advantageous.

I believe that future management of water flows should consider the impact of the fishery and the fishery on the local economy. A self-sustaining, trophy trout fishery will go a long way to help the economy and the Native Americans who make up a substantial part of the work force there.

I am writing this comment in the hope that the LTEMP will consider in future planning of water flows, both the recovery and maintenance of a Blue Ribbon trophy trout fishery below the dam as well as the restoration, recovery and maintenance of native fish.

I frequently volunteer to help the Arizona Fish & Game, White Mountain trail system, and Boy Scouts of America to help upgrade the Arizona forests, trail systems and streams.

My hope in providing this comment is that my voice will be heard.

210
I have been down the incredible Colorado through the Grand Canyon four times, twice as a commercial client (Moki Mac--incredible people and boating skills) and twice on private trips, also wonderful (extra days, extra hikes). I've been on rivers all my life and this one is absolutely the experience of a lifetime--the incredible beauty, the ruins and petroglyphs of the Indians, the tidy beaches, Havasu and the Little Colorado, the hikes, the geography, ad infinitum.

I would want all of the above to remain, whatever keeps the beaches nice, protects the history of the earlier peoples and helps the ecosystem of the Grand Canyon is totally necessary in the LTEMP Draft EIS and to meet the requiremtnts of the Grand Canyon Protection Act. This is one of the most precious of all our national parks, and I've been to and loved most of them. There is something spiritual about the experience here that is too important to minimalize.

211
Over the past 30 years, I have had the fortune to receive or participate in 4 private permits through the Canyon -- rowing a raft through the Canyon three times, and been a passenger once. In addition, I have been a passenger on about 10 commercial trips, which I have organized for a college alumni group that have featured a faculty member each time. I care a great deal about this precious resource.

In order to truly meet the requirements of the Grand Canyon Protection Act, it is important that the LTEMP Draft EIS should benefit the ecosystem, the beaches and the cultural resources of Grand Canyon.

212
I would like to say a few words about the up-coming, Long Term Experimental Management Plan and decisions thereof. My main points as a commercial and Private user of the Colorado River through Grand Canyon since 1982, and this incredible, diverse resource are as follows.

1.) The LTEMP must meet the the mandates and criteria of the Grand Canyon Protection Act and this should always be maintained as long as the Act is in Place. 2.) It is important to protect and maintain beaches for safe and comfortable camping for river trips AND consequently the cultural sites and their values. 3.) GCMRC should (as it has proven invaluable since at least 1991) continue to play an active and critical role in the LTEMP. Sound Science and experimentation is key in positive management. 4.) The Adaptive Management Program should be more balanced (non-compromising) while always maintaining willingness to create changes where needed

based on Sound Science. 5.) As a guide and "steward" of the resource I've observed a detrimental effect of "equalization flows" this past year and power should NOT take precedence in the over-all Management Plan, (i.e. W.A.P.A). The "scouring effect" of high flows take years to replace beaches (that also help protect cultural sites, and the wildlife habitat/s. 6.) Ideal flow alternatives could and should be met, for safety the ecosystem and the quality of this treasured, National Park and the river corridor through Grand Canyon. Flows should not drop below: 8,000 and/or fluctuate daily at high, rise and fall rates. Flows above 18,000 cfs tend to produce much, stronger erosive results. 7.) Beach building flows (flood-flows) should occur when sound science provides the trigger/s for proper, sediment transport. These flows could be based on high-moisture periods (monsoon cycles, winter and summer) and provided trigger/s from science.

213
The most important thing in this is to keep the Grand Canyon undamaged, this means controlling the dam flows so the water does nmot wash away all the soil, as it has for so long, which I have seen for myself thru five different trips thru the Canyon on a raft. This means we must follow the scientific studies, not ignore them. The Canyon is more important than power companies.

214
As a member of GCRG and a U.S. citizen who seeks the solace and wonder of the most remarkable place in the world, I am concerned about the LTEMP direction.

Stakeholders, scientists, and the public worked hard to pass the Grand Canyon Protection Act. I strongly believe that the LTEMP should parallel and support the content of the Grand Canyon Protection Act, to do what is best to preserve the environmental conditions below Glen Canyon Dam. This includes: maintaining big camping beaches; preserving and enhancing the native species (plant and animal) that still remain; better protect cultural sites through BHBF sand influx; improve scientific knowledge of enhancing the ecosystem and allow this information to guide management decisions. Protection of Grand Canyon, not exploitation should be paramount in guiding the LTEMP. Please make decisions that will preserve this Wild and Natural Wonder of the World for many, many future generations.

I support that GCMRC plays a critical role in continuing to gather and distribute scientific information. Furthermore, representative scientists have been wonderfully cooperative in disseminating information to the public, and continued efforts to do so create an informed public.

I think that Adaptive Management should not be forced to make compromises for the sake of WAPA profits. Adaptive Management should serve the Grand Canyon ecosystem and support the Grand Canyon Protection Act. Adaptive Management therefore should be truly "adaptive" to better manage the resources below Glen Canyon Dam, especially when new scientific information comes to light. Power administrators in particular should respect and adhere to this process.

I am concerned about the devastating effects that equalization flows have on campsite beaches and native fish. Water releases should better mimic the shape of a natural, pre-dam hydrograph,

with a flow scenario to include: relatively high spring/summer flows, lower late summer/fall flows, and steady low flows in the winter. Volume and duration of these flows should represent the amount of snowpack in the upper basin per water-year. In the post-dam scenario, any flows greater than about 18-20,000cfs should contain abundant sediment (ie: the sediment trigger reached) to aid downstream resources with beach-building and eddy scouring for fish habitat. I am concerned that high steady flows above 20,000cfs for long periods of time are only undermining all efforts put forth to enhance this ecosystem through flow management.

Please respect the Grand Canyon Protection Act and ensure that the LTEMP supports this Act.

215

I have copied the Grand Canyon River Guides comments because I belive in them. I am currently on the board as secretary/treasurer. I am also a second generation full time river guide with over 250 river trips through the Grand Canyon and a Grand Canyon river outfitter licensed by Grand Canyon NPS. 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 . . .

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://wwwpaztcn.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 Adpative Managment 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 gullying/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 alterntatives 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 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.

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1. Define & ensure a substantial role for the Grand Canyon Monitoring & Research Center (GCRMC) within the LTEMP EIS process.

2. Maintain or improve the quality of recreational experiences for users of the Colorado River.

3. Focus on protecting, preserving, and improving all of the downstream resources, such as camping beaches, cultural sites, and flora & fauna.

4. The high flow protocol should be a well defined key component of LTEMP alternatives.

5. Design intervening flows (between high flows) that maximize sediment retention on beaches and backwater areas for the benefit of campers and native biota.

6. LTEMP alternatives must be scientifically defensible and credible with well defined hypotheses, building on what we have learned from GCRMC and LTEMP implementation.

7. The LTEMP must be based on an adaptive ecosystem management approach.

8. Include an alternative to test seasonally adjusted steady flows that includes sediment triggered beach and habitat building flows based on the closest approximation of the pre-dam hydrograph.

9. Consider minimum flows no less than the long-term base flow of the Colorado River.

10..Test the “best case scenario” presented in the article, “Is There Enough Sand, Evaluating the Fate of Grand Canyon Sandbars” as proposed by USGS scientists. Particularly in regard to rebuilding and maintaining sandbars.

(http://www.usbr.gov/uc/rm/amp/twg/mt...Attach_05e.pdf)

11. Consider options that include adding sediment below the dam consistent with a pre-dam sediment profile.

12. Consider triggering flood flows based partly on distributing sediments from the LCR and Paria Rivers when those tributaries are supplying large amounts of sediment.

13. Restore historic water quality regarding temperature profiles, pH, and native fish species.

14. Limit the rate of increase/decrease of flow rates to promote boater safety and beach preservation and enhancement.

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I beleive the LTEMP must respect and meet the mandates of the Grand Canyon Protection Act. It is time the dam flows were managed to greater respect the downstream environment in Grand Canyon and help restore its natural flora & fauna, as well as historically large beaches that help protect them. Please also better protect cultural sites that line the river corridoor. GCMRC should play a critical role in all future processes along with intelligent & informed science and experimentation.

The Grand Canyon and Colorado River are one of our nation's top natural places. The area below Glen Canyon Dam should be managed with natural processes in mind, as a top priority, not with the devastating effects of equalization flows!! Enough interference - more Mother Nature!!

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I would like you to accept my following comments on the Glen Canyon Dam LTEMP - EIS. As a long-time resident of the area, former National Park Service Ranger, and Desert Ecologist, I feel my comments should be given consideration.

The Dam and water releases should follow the Grand Canyon Protection Act:

"to 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."

In addition, the recovery of canyon ecosystems above elevation 3650' should be given a priority by not allowing the reservoir to rise and fall continuously above this level. By keeping the reservoir below 3650 feet, the Escalante River and its irreplaceable side canyons will be given a chance to rocover from being drowned below full pool. In addition, keeping the reservoir at or below 3650' will enhance the natural values of Rainbow Bridge National Monument, and allow it's riparian canyon environment to recover.

By keeping the reservoir below 3650', the significant water loss due to evaporation would be reduced, in addition to allowing side canyons of Glen Canyon (above this water level) a chance

to recover ecologically. Recent long periods of low reservoir level, before the 2011 summer water level rise, have allowed remarkable recovery of the Escalante River and it's side canyons such as Willow and Davis Gulches, 40 and 50 mile gulches, and Cathedral in the Desert. The silt and mud deposits were flushed further downstream, allowing canyon narrows, glens, pools, grottos, alcoves and fledgling riparian habitat to re-emerge and start recovering after inundation. Keeping the reservoir below 3650' would allow a partial recovery of the immense ecological, archaeological, geological and scenic values that have been lost when the reservoir fluctuates from full pool.

In summary, I request that Dam operation follow the the Grand Canyon Protection Act. the Dam should be operated to protect downstream ecological values in Grand Canyon National park.

Also, above the Dam, the reservoir should be kept below 3650', in order to allow ecological recovery of the Escalante River system, and other side canyons of Glen Canyon and the San Juan River arm of Reservoir Powell.

219
I am a river rafter who has had the fortune of spending 14 days on the Colorado River through the Grand Canyon. It is extremely important To protect all the natural resources and natural enviroment downstream from the Glen Canyon Dam. Please see that this is protected for Generations to come.

220
Please conform to the Grand Canyon Protection Act.

Until the dam is demolished/decommissioned, management practices really should reflect what's best for downriver, under the circumstances. Consulting with people knowledgeable about the river makes good sense.

221
Please, Please Protect one of our countrys greatest and richest wonders!!!!!!!!! Not only for us and generations to come but for all the people that come from all over the world to marvel at the gift that we have been given. Please save the Canyon and the gift!!!!!!!!

222
I would like to see maintenance and improved quality of recreation experiences for users if the Colorado river. Also, I am advocatin for the preservation and protection of downstream resources like beaches, cultural resources and flora/fauna.

223
1) The LTEMP must meet the mandates of the Grand Canyon Protection Act. 2) I would like to see big beaches! 3) I would like to see better protection of cultural sites. 4) Please have the LTEMP successfully integrate cultural values into the canyon programs. 5) The GCMRC should play a critical role in planning for the ? 6) Sound science & experimentation should inform management decisions. 7) The Adaptive Management Program should be more balanced and

more adaptive. 8) I am concerned about the devastating effect of equalization flows. Thank you for considering these comments and those of other GCRG members.

224
As a Grand Canyon river guide for the last 30 years, I am concerned about the following:

1) The LTEMP must meet the mandates of the Grand Canyon Protection Act. 2) I would like to see big beaches for visitors and camping. 3) I would like to see better protection of cultural sites. 4) Please have the LTEMP successfully integrate cultural values into the canyon programs. 5) The GCMRC should play a critical role in planning for the canyon. 6) Sound science & experimentation should inform management decisions. Politcal agendas have no place in science. 7) The Adaptive Management Program should be more balanced. 8) I am concerned about the devastating effect of equalization flows.

225
Not river guides but dory passengers down the Colorado through the Grand Canyon in 1994, my wife and I have supported the GCRGs' efforts to keep the river safe from exploitation and over use, assuring its environmental integrity as a natural wonder and natural resource. The Long Term Experimental and Management Plan absolutely must not violate or transgress in any way the Grand Canyon Protection Act. For the preservation of the Canyon's ecology, its extraordinary cultural sites and values, every effort must be made to restore or revitalize the Canyon's flow and reestablish the Canyon's flora and fauna in face of the degradation of invasive species. Not a hydrologist but an active student of the environment, I understand that decisions made for the long-term well being of the Colorado River and its interaction with the Grand Canyon and resultant ecological systems cannot be subject to short-term political or economic influences, but must be made and confirmed through sound science and informed management.

226
As an individual who has had the opportunity to float the Grand Canyon from Lee's Ferry to Diamond Creek on 3 private 18 day trips between the years of 1996 and 2006, I have had an up close and personal view of many of the problems related to the impacts of Glenn Canyon Dam on The Grand Canyon. On a float trip between Cataract Canyon and Hite in 2008, I experienced the effects that sediment has had upon the 40 miles of river below Cataract Canyon. It is for these reasons that I am in complete agreement with the following comments.

I am writing to submit scoping comments on the Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS). I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

The LTEMP EIS should encompass the Colorado River from Cataract Canyon, through Glen Canyon and Grand Canyon, to Hoover Dam and beyond, as a single ecosystem whose components are inextricably related and must be managed in concert. Moreover, there needs to be direction for managing this Grand Canyon-Glen Canyon ecosystem in concert with the rest of the Colorado River Basin.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The LTEMP EIS process should make sure that the U.S. Geological Survey's Grand Canyon Monitoring and Research Center (GCMRC) plays an integral role in providing technical information for the scoping, determining desired future conditions, and developing alternatives. 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 science-based LTEMP EIS.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

The LTEMP EIS should consider an alternative that evaluates the use of a temperature control device at Glen Canyon Dam. 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.

The LTEMP EIS should explore the potential for a restructured Glen Canyon Dam Adaptive Management Work Group, which would ensure 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 on the other.

This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

227

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. As a annual visitor to the Grand Canyon/Glen Canyon region since 1999 and camping on the Colorado River, I have witnessed the deteriorating health of the Canyon and the Colorado River from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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, up to and including removing Glen Canyon Dam.

History has shown that the original decision to build Glen Canyon Dam at the destruction of Glen Canyon, arguably one of the most diverse, historical and beautiful canyons in this great nation, was done so with short term thinking, considered only immediate needs of a few, was ego driven, and lacked the insight of ecological consequences and the true long-term needs of the people in the Southwest. Please do your part to not allow poor decisions of the past to continue into the future. Please show what this country really values and really needs. You have the opportunty and a priviledge to leave a postive and lasting legacy. Do the right thing.

228

I am a recreational user of the Colorado River. I try to make a Grand Canyon River trip yearly, and would do more if the current regulations premitted multiple river trips annually.

I think the comments submitted by the Grand Canyon River Guides, Grand Canyon River Runners Association, Grand Canyon River Outfitters Association, Grand Canyon Private Boaters Association, American Whitewater present an in depth statement of the requirements for the long term health of the Grand Canyon River corridor.

The Grand Canyon is a place and I treasure every day I am allowed to visit. I would like for the environment to be protected is a manner that will allow my grand children enjoy a more natural and better Grand Canyon.

229

I have been fortunate enough to have rafted the grand canyon from beginning to end with a high school outdoor education group and have also done shorter week long trips as well. To experience the grand canyon from within is something so amazing and life changing that I hope it will remain an adventure choice for other individuals...young and old alike.

Please make sure that the LTEMP draft EIS will be beneficial to all beaches, the ecosystem of the Grand Canyon and cultural resources in order to completely meet the requirements of the Grand Canyon Protection Act

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230
Being a PhD/scientist and having worked with and for GCMRC and being a river guide and having a love for the beaches in the Grand Canyon I fully support the below:

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 is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

Change the Purpose and Need for Action Statement for the LTEMP 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 which is an ancillary benefit of the dam.

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. 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.

The LTEMP 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.

Clearly define agency responsibilities, improve communication, create mechanisms for productive information sharing, and eliminate project redundancies between Grand Canyon National Park and the Grand Canyon Monitoring & Research Center.

Ensure that the 11 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 decision making—a distinct failure of 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 tribes view all canyon resources as culturally significant.

Funding for monitoring and management of cultural resource should be restored. In order to comply with the Grand Canyon Protection Act, federal laws, statutes and executive orders, the importance of protecting and preserving these fragile, non-renewable resources and Traditional Cultural Properties for the benefit of future generations must not be minimized.

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.

Improve the structure and functionality of the Glen Canyon Dam Adaptive Management Program 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.

RESOURCE ISSUES:

Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come.

Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

Focus 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 protects and preserves the individual resources along the Colorado River.

The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

Examine the role of time and climate change in the system.

Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

FLOW SUGGESTIONS:

Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives.

Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention.

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.

Include an LTEMP alternative to test steady flows.

Consider an alternative that includes a seasonally adjusted steady flow alternative that includes sediment triggered Beach Habitat Building Flows, and based on the closest approximation of the pre-dam hydrograph.

We need a scientifically credible, well-designed steady flow experiment of sufficient longevity to produce a biological signal (more than two months in the fall) that is followed by a full synthesis of impacts to biological, physical, social, economic and cultural resources.

Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

Test the "best case scenario" presented in the article, "Is there enough sand? Evaluating the fate of Grand Canyon sandbars" as proposed by USGS scientists.

Design an alternative based on the best chance of viability for rebuilding and maintaining sandbars.

231

As a biologist and a client of a 2-week river trip through Grand Canyon, I value the scientific and cultural value of this unique asset. The Glen Canyon Dam must be operated in such a way that habitat is protected for endangered species and for responsible, sustainable human use. This means a commitment to the gathering and use of scientific data in management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) must be central to these decisions in defining and monitoring measurable outcomes.

Protecting the biota of Grand Canyon means preserving habitat in such a way that populations are viable in the long term, meaning that provision must be made for years that will be unfavorable to populations.

The Canyon and the greater region benefit from safe, sustainable, respectful tourism. Flows should be managed to allow safe boating, with flow maintained above 8,000 cfs. There should also be a commitment to ensuring water flow volumes that actually maintain or increase beach area, rather than merely meeting indirect measures such as mass sediment balance.

Input on these decisions should include the representatives of the Native American groups of the area. The cultural resources of Grand Canyon are deserving of study and protection, and funds for this should be restored.

232

While dam operations are important to many interests in the west, it is imperative that down stream concerns be taken into consideration when considering flow regimes. The Grand Canyon is one of America's most treasured natural resources and provides recreational and cultural opportunities for millions of people each year. These activities should, at the least, be taken into serious consideration when working on the future dam releases. Natural habitat for the many species that call Grand Canyon home is of the utmost importance as many of these species are endemic to the Canyon and will not be able to relocate. The recreational opportunities are absolutely world class and deserve a high level of attention. This attention should include, but not be limited to, minimum flow of 8000cfs, ability to ramp up quickly when tributaries are transporting large amounts of sediment to allow for beach building. In addition to beach building, transient high flows are able to renew back water areas critical to many species in the Canyon. The LTEMP process provides a unique opportunity to address the concerns of an environment that man, for good or bad, has dramatically changed for the foreseeable future, and it is incumbent upon us to recognize our responsibility, not just to the water and power interests, but to the environment we all share as human beings.

233
I have rafted the Grand Canyon many times and will again. It is a life-changing experience.

The LTEMP Draft EIS should benefit the beaches,cultural resources, and the eco-system of the Grand Canyon. It would meet the requirements of the Grand Canyon Protection Act.

234
This document supports a sustained and enhanced Recreational Trout Fishery in the coldwater environment downstream of Glen Canyon Dam. Please be advised my organization, San Pedro Flycasters, is dedicated to a principle of "Conserving, Restoring and Educating through Fly Fishing" and has generated this Statement of Interest (comment) for inclusion in the Draft Environmental Impact Statement for Adoption of a Long-Term Experimental and Management Plan for the Operation of Glen Canyon Dam. Ever since Glen Canyon Dam began compromising the flow of the Colorado River some 45 years ago, the river and floodplain, for numerous miles downstream of the Obstruction and through Grand Canyon National Park, have been drastically altered and can never be considered as a natural aquatic environment for as long as the Impediment remains in place. The Dam is now producing a typical 'tail-water' habitat fueled by cold, clear and clean water devoid of particulates, sediment and organics. Since the Dam is a managed enterprise with a fundamental and predominant manifest to produce electricity, the natural ebb and flow of the river is completely gone—terminated by a power generating schedule of water releases. Nevertheless, after the construction of Glen Canyon Dam, our Arizona Game & Fish Department recognized a fishery potential in the Dam's newly created coldwater environment and soon established a trout population for the benefit and enjoyment of the Citizens of Arizona. Certain members of San Pedro Flycasters have been utilizing the recreational fishing opportunities created by the Dam since the 1970's and, over the past years, have tabulated fond thoughts, noteworthy experiences and a sincere appreciation for this wonderful trout fishery. Fisherpersons from all over our nation have sustained business interests in the area by acquiring lodging, guide services, meals, etc. associated with their recreational pursuits. The Officers, Board Members and General Membership of San Pedro Flycasters are all united in their endorsement and support of a Glen Canyon Dam Management Plan that provides for the sustainability and enhancement of the Trout Fishery at Lee's ferry and its associated coldwater environments throughout the duration of this upcoming Management Plan.

235
I have lived in AZ Most of my life and the Grand Canyon has always been a part of it. I would love to see the Colorado flowing and see the pristine beaches be as they once were. We the people are the canyon and river stewards. It is up to each and every one of us!!! Including the LTEMP. We hope that you hear our concerns and keep them in your foresight.

1. The Grand Canyon Protection Act must be preserved.

2. I would love for my grandchildren to see big beaches that were once on the river.

3. Our cultural sites should be preserved as much as possible.

4. By integrating cultural values and including the local nations for their input.

5. The devastating effect of equalization flows, I do not claim to totally understand all this jargon. However, I know from my experience the beach detioration, the tamarisk overgrowth I have witnessed in my lifetime. Something must change.

I am writing in behalf of an area I consider home and wish for future generations to see it as I have in the past. I would hope that big money cannot be beaten by the voice of the people and the preservation of one of the worlds wonders.....

I wish to give my voice to again REINFORCE AND STRENGTHEN OUR COMMITMENT TO PROTECTING AND IMPROVING DOWNSTREAM RESOURCES within the Grand Canyon.

236
I've believed for years, and frequently stated, that the money spent on evaluating flow regimes in Grand Canyon has been and will continue to be a spectacular waste of money. The flows that remove huge amounts of sediment from Grand Canyon are the ones the cause the river to turn brown. While the operation of the dam does cause some sediment to be transported annually that is unavoidable and has been mitigated somewhat by reduction of the huge daily flow changes that used to occur. If the study/experimenter people would just terminate their flood flow studies, the river corridor might become a healthier place.

Short of removing Glen Canyon dam or finding a way to move sediment several hundred miles down lake and past it, the sediment and beach sand levels are going to be determined by annual contributions from the side streams and canyons. Efforts to move sand from bottom to bank have always had capricious and non-sustainable in terms of beach building. The can also be shown to cause huge losses of sediment downstream to Lake Mead.

Since sediment transport and dam removal are both not economically or politically viable, I believe the best course of action at this time is the termination of the provably harmful flow future studies and the following of a program of benign neglect.

237
Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

238
I am one of the thousands of people who has had the opportunity of a lifetime to travel down the Colorado below Glen Canyon Dam. This experience was truly spectacular and even though it was years ago I remember it fondly and can't wait until things work out that I can make the journey again!!!

I am pleased that there is a public input period for future management of this system. I recognized that the dams primarily exist for hydropower however I feel that the management of the dams in the 21 century should not solely be based on hydropower. Recreation is a very valuable both to the human spirit and the economy. Much of my input will be based on recreation.

Ideally, I would like to see a management system based on science that is good for the ecological integrity of the area and one that improves the Colorado river system. This includes having high water events to build and maintain beaches as well as giving the area a fresh layer of sediment where new species can grow.

I would also like to see a system where there is less of a "tidal" effect from the dam and that, though there are peaking and 'troughing' considerations, that this flooding and lowering of the river be kept to a minimum. There is nothing worse than finding your raft 100 feet from shore or worse going for a quick walk and having you kayak floating off in the distance.

Those are my primary recreational concerns - that they ecology is put ahead of hydro power and if possible to minimize the change in levels.

As per hydropower and water use... It is my understanding that the Glen Canyon reservoir was lowered as much as possible in 2011 to fill up the reservoir behind the Hoover dam. I would also like to see some more management in this area and put a higher priority on the section between the two dams rather than making the Hoover the primary concern.

239
I believe the LTEMP must take a balanced approach. We need water to live and we need nature for our overall health and grounded connection to the world that has allowed us to thrive (much to much at it's expense).

Unchecked use of water for power and development enables many problems our society faces. Add in the power of money in our unchecked capitalist society and the balance becomes one side all too often.

Please allow for high flow, sediment laden periods and steady flows to maintain the sandbars, beaches, recreation, visitor traffic, wildlife needs and a semblence of balance.

Please take a long term, balanced approach to provide the best possible balance between water/power interests and environmental/ecologicl/cultural/recreational interests!!

p.s. I've had the enviable experience of spending more than 30 days total over to trips in the Grand Canyon. I have a savings account dedicated for a family trip when my boys meet the age requirements, 12 years from now, and we are barely making ends meet. I pray that we get that chance.

240
I think the LTEMP must meet the mandates of the Grand Canyon Protection.

I ant to see big beaches brought back to the Canyon.

I want to better protect cultural sites and have the LTEMP successfully integrate cultural values.

I think that GCMRC should play a critical role.

I think that sound science & experimentation should inform management decisions.

I think the Adaptive Management Program should be more balanced and more adaptive.

I am worried about the devastating effect of equalization flows.

241
So I realize the dam and its operation will go on. Its to vital to the increased development of the west. But i do beleive that the operation of the dam could more closely mimic the seaonal flows of mother nature. I think the slower ramping has helped, and once or twice a decade a flood to help build beaches. But ramp the floods down slowly to allow the beaches to establish just as mother nature would. While this will require a little more thought and planning on the part of the coal fires plants to go off line or come on line, it can be done. Will the dam produce as much cash as it has in the past, probobly not. But once again, god was in it for the long haul when he created the grand canyon, so we must be in it for the long haul also. Gentlemen and ladies its up to you to help us protect the grand canyon. To not do so would be sacralige. Please temper profits with what is right.

242
I would like to submit comments as a Colorado resident interested in protecting the environmental, recreational, and intrinsic scenic values of rivers in my state. The future of the

Colorado River and how it is managed is important to me. I'm glad to know that the Bureau of Reclamation and the National Park Service have developed an Environmental Impact Statement, but I would like to add the following comments that should be considered in the management alternatives presented within the LTEMP EIS. Because this policy will guide decisions surrounding the Glen Canyon Dam for the next 15-20 years, I think it's important to consider all alternatives.

First and foremost, future operations of the Glen Canyon Dam should comply with the Grand Canyon Protection act of 1992. It's important to have consistency.

Beaches that exist along the Colorado River are important not just for public use and access, but also for wildlife habitat. Natural high flows build beaches with the sediment that they disperse. This builds beaches and protects delicate habitat for wildlife.

Solid science, unburdened by hydropower and water supply interests should guide the management decisions. Because I am aware of the Grand Canyon Monitoring and Research Center and the work they have done studying the river, I support the integral role they should play in developing the LTEMP EIS and continual monitoring and studying adaptive management decisions in the future.

Cultural sites in are an irreplaceable part of the canyon and need to be protected. No amount of water supply interests, hydropower interests, or recreational interests should trump the preservation of these sites. If they are destroyed or damaged, they can never be rebuilt.

The Adaptive Management Program for the Glen Canyon Dam should be more balanced in the future, representing the rights of the public to enjoy their public river, as well as cultural and ecological interests. The interests of hydropower and water supply should not be the loudest voices at the table all the time.

That being said, hydropower and water supply are obviously important, but flows should be implemented in a way that encourages the downstream values of the Colorado River and the Grand Canyon. Those values need to be protected, supported, and if possible, restored.

Thank you for taking time to read my comments. I hope they help guide discussions about what the public wants and expects out of a management plan for the Glen Canyon Dam.

243

I try to take a private rafting trip down the Colorado River through the Grand Canyon every year. It is extremely important to me that the Glen Canyon Dam is managed in such a way as to preserve recreational boating opportunities. I stand with the Grand Canyon Private Boaters Association and the Grand Canyon River Guides Association in requesting that any long term management plan addresses the needs of the recreational boating community.

244
I agree with these points:

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

245
Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992. Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events. Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future. It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values. The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

246
I am a beginning fly fisherman and have heard many positive things about the sport fishery at Lee's Ferry. Hopefully I will get to fish it this year for the first time. The decisions that your committee need to make are definitely difficult. When human progress bumps up against nature, unfortunately something has to give. Obviously the sport fishing component is vital to bringing in sport fishermen and other tourist to an area that is remote and in great need of the economic values that our fellow fishermen provide. It would be a great benefit to develop and maintain a

Blue Ribbon Trout Fishery in the Lee's Ferry area. Just look to the San Juan River example in New Mexico. This Blur Ribbon Trout River is also in a very isolated area but the influx of fly fishermen is year round. I believe a more consistent/level stream flow would be one decision that would be important to the fishery and the safety of the fishermen. Just as important as the fishes habitat and the safety of the fishermen is, there is even another just as significant and important attribute for making and maintaining Lee's Ferry a healthy fishery and that is its potential Healing Power! I work and do fundraising for multiple Wounded Warrior Foundations and one of my Wounded Warrior contacts from Troops First Foundation and also a member of Healing Waters Foundation is a very strong advocate of the healing power of fishing and fly fishing in particular. After 4 1/2 years and 27 operations to reconstruct his face Brian a TBI victim is a strong advocate on the healing powers of nature. Lee's Ferry is one of those healing places. Please keep in mind as you move forward in your decision making process that there are becoming fewer and fewer places were people can return to nature and begin to heal whether they are a Wounded Warrior or a person who just needs to regroup from the very hectic world that we live in today. Your decision is not just nature versus nurture, it goes much deeper than that and will effect many generations to come. I wish you much success.

247

I work in Grand Canyon as a commercial river guide, and also as a boatman for the National Park Service. I serve on the Board of Directors for Grand Canyon River Guides Association as well. The River corridors of Marble and Grand Canyon have been my home and office for the past 8 years, and I am very invested in protecting and preserving this amazing place. In the 8 seasons I have spent down there, I have witnessed a great deal of change, in both water levels, and beach quality. Changes caused by fluctuating and steady flows, vegetation encroachment, and direct human impact. I was involved in creation of both the Joint LTEMP comments (GCRG, GCROA, GCPBA and GCRRA) and also GCRG's individual comments that were submitted, I realize that there are a tremendous number of issues that are being addressed, by many different groups. While I agree with GRG's comments, I would like to add my own personal voice to the matter. My comments are mostly on one particular issue, after attending the public scoping meeting, November 9th, in Page AZ. I had the opportunity to learn a little about it first hand and to meet some of the people who will be working on this project (the Argonne Team and Park staff) and to ask a few questions. I found out that there is one particular issue that all of us who work on the river talk about, but none of the people I spoke to knew anything about. It is an impact aspect of the "steady flow regime" that is proposed, that I would like to address. My concern is the incredible number of green algae "pee spots" that line the riverbank at all camps and heavy day use areas, during periods of steady flows. They are the direct result of non-fluctuating flows. (and human use) The margin of the river is the most heavily impacted area at a camp. Bathing, urination, dishwater disposal, boat loading and unloading, etc. Without just a slight fluctuation of river level to "wash" the beaches, these impacts build up over the course of just a few weeks. Not only are these green spots unsightly, they are a bio-hazard, as they are created by human urine that is collecting in the sand. Now, you must understand that as guides, we instruct and stress, in accordance with the C.O.R.'s and Park rules, that our passengers urinate only in the mainstream of the Colorado, not in the wet sand at the edge of the river. But I guess people just don't like getting their feet wet. And over the course of just one summer I personally, will take between 200-250 people down the river, and no matter how hard we try, we cannot police that many individuals. Another issue that pertains to our steady flow concerns, are

the flat areas near the river where trip kitchens get set up, and mesh tarps laid down. These items both leave very obvious marks on the sand. I know that these may seem like minor things, but they greatly diminish the "Wilderness feel" of the Grand Canyon experience. When you arrive at a campsite (which, due to accelerated erosion is space limited) and you see a beach covered in green pee spots and littered with table leg holes, and tarp squares, it is very difficult to convince people we are taking good care of this place. And while these impacts are not terribly damaging to the resource, they do greatly impact the visitor experience, and their desire to minimize their own impacts. So you see, it's kind of a downward spiral. And I only say these things after years of experience with people in this kind of environment. So, if a steady flow regime is decided upon as the best way to manage our diminishing sediment resources, than I, (and many others) would like there to be a study conducted to determine the best way to mitigate this issue, such as a weekly spike flow to cleanse the lower benches and areas near the water, where human impact is the greatest. As I'm sure you are all aware, science seems to point out that daily fluctuations are one of the quickest ways to erode away what remains of our precious beaches. At the scoping meeting I became aware that none of the Argonne team working on the LTEMP has been down the River. After speaking with a man named Rick(?)who worked with Dam operations and hydroelectric production, from Salt Lake City if he had seen the Grand Canyon via the River first hand, and understood the direct impacts that Dam operations have down there, he said, and I paraphrase; "No. I have not. I need to remain un-biased, if I were to go on a river trip I may be inclined to side with the boaters." To clarify, I do not mean a "just for fun" raft trip. It is very important to see and understand what is happening down there, in a more intimate way than just reading science papers. I feel it should be of paramount importance for the team leaders who are developing the LTEMP to go down the Grand Canyon as a part of the scoping process, and to see first-hand what is happening down there, because this place is so complex, and some of the issues can only be fully understood if you see them with your own eyes. I am also in agreement with GCRG's comments. And the final decisions on the LTEMP should be in compliance with the Grand Canyon Protection Act, and should improve, protect and preserve Grand Canyon for many future generations. And it should conserve, (and if possible, increase) the invaluable sediment that we have down there. Big sandy beaches are the best places for people to stay, therefore minimizing our impacts on the more fragile parts of the Canyon. And I think GCMRC should be your chief science reference, and heavily involved in this process. The folks there have an incredible amount of knowledge on exactly what is happening in Grand Canyon. Thank you for this opertunity to comment on the LTEMP, I love the Grand Canyon and want it to be as amazing for my grandchildren as it has been for me.

248

I have been a grandcanyon river guide for about 11 years for various river companys. I am also a member of GCRG. my concerns would be that first of all this group that seems to be puting this thing together claims to be an unbiast oppinion, however has never acually seen the resource in question. Another concern of mine would be the steady flow, I have no issues with steady flows however I do feel that for the beaches sake they should do periodic house cleaning flows. By that I mean ramping up the flows in order to wash away green algea spots that form when people urinate on the beach near the river even though we tell them not to.

249

I am an avid kayaker from Tennessee and about to paddle the Colorado River of the Grand Canyon for 21 days, launching March 22, 2012. In preparing myself for this trip, I have been familiarizing myself with some of the issues surrounding the management of the flows within the canyon. This resouce is not only important for its water supply to western cities, but also for its history and recreational values.

The following points should be considered when developing a long term management plan for the operation of Glen Canyon Dam:

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

I am excited about my oportunity to paddle this amazing river and hope this resource is available for many more to enjoy in the future. Proper management is key to ensure this happens.

250

I favor operating Glen Canyon Dam in such a manner which enables, as much as possible, management of the Grand Canyon ecosystem in a natural condition. This would include periodic floods to mimic natural conditions. I also suggest researching ways to sluice down sediment from behind the dam into the river below the dam in order to rebuild beaches which have been stripped by the dam's action. I also recommend adjusting release levels to assist with recreational use of the Grand Canyon, including river running. These things will cost the operators money, but the operation of Glen Canyon Dam should include mitigating its adverse impacts upon other uses.

251
Please help preserve this awesome place for future visitors!

252
I have long hoped that the experimental releases in the 1990's that mimicked the spring run-off and helped to build beaches for river runners and habitat for the Grand Canyon's wildlife would be continued. I believe these experimental releases were a success and I hope that the BOR and NPS can find a way to bring these practices back. There is solid scientific study that supports the steps that must be taken to restore and maintain the wildlife habitat of the Grand Canyon. The BOR and NPS must also find a way to bring sediment needed for beaches and habitat downstream from behind Glen Canyon dam and balance all other interests. The environment, recreational and cultural values of the Grand Canyon must be balanced with water interests and hydropower generation. There are several important items I would like to note here: Future operation of the Glen Canyon Dam must comply with the Grand Canyon Protection Act of 1992. The restoration and maintenance of the beaches in the Grand Canyon are important to both wildlife and recreationists. Any plan for operation of the Glen Canyon Dam must have this as an important goal. The science and studies of the habitat restoration must be the guiding principles of the LTEMP. The Grand Canyon Monitoring Research Center and the Glen Canyon Institute have both done important studies and monitoring. Their work must be considered in developing the LTEMP. It is equally important to protect cultural sites within the canyon. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon. I have twice rafted the Grand Canyon and rafted Cataract Canyon above Glen Canyon numerous times. It is vitally important to me that the river above and below the Glen Canyon Dam is managed in a way to maintain the health of the river. Canyonlands down through the Grand Canyon is a national treasure and must be maintained and management in a way that supports all interest.

253
I'm a former Grand Canyon river guide. Please keep the flows consistent with beach building and recreational opportunities (river running).

254
I have floated the Colorado River through GCNP. I have seen the beaches erode over the years. I have also read about all the experiments with all the science dudes hwo have had some nice rafting trips and careers on the public dime. What I dont see is any fruits of these labors. The flow regimens still erode. As a taxpayer, and stakeholder in this country, I hope the Dam is managed:

for river corridor health first and formost

not convinced the high flow 'experiments' are worth it.

increase public input to dam flow regimens. Sometimes it might just take common sense over a supposidly scientific approach, which after all this time doesnt seem to be viable.

Thanks for the opportunity to comment. I'm a hiker and rafter and master appreciator and observer of GCNP and the river corridor.

255
I am a recreational non-motorized boater who regularly paddles the Colorado River and its tributaries, both upstream and downstream of Glen Canyon Dam. I care deeply about protecting and improving resources downstream of the Glen Canyon Dam, to meet the mandates of the Grand Canyon Protection Act. Please consider the following points in the LTEMP EIS:

1. Define & ensure a substantial role for the Grand Canyon Monitoring & Research Center (GCRMC) within the LTEMP EIS process.

2. Maintain or improve the quality of recreational experiences for users of the Colorado River.

3. Focus on protecting, preserving, and improving all of the downstream resources, such as camping beaches, cultural sites, and flora & fauna.

4. The high flow protocol should be a well defined key component of LTEMP alternatives.

5. Design intervening flows (between high flows) that maximize sediment retention on beaches and backwater areas for the benefit of campers and native biota.

6. LTEMP alternatives must be scientifically defensible and credible with well defined hypotheses, building on what we have learned from GCRMC and LTEMP implementation.

7. The LTEMP must be based on an adaptive ecosystem management approach.

8. Include an alternative to test seasonally adjusted steady flows that includes sediment triggered beach and habitat building flows based on the closest approximation of the pre-dam hydrograph.

9. Consider minimum flows no less than the long-term base flow of the Colorado River.

10..Test the "best case scenario" presented in the article, "Is There Enough Sand, Evaluating the Fate of Grand Canyon Sandbars" as proposed by USGS scientists. Particularly in regard to rebuilding and maintaining sandbars.

(http://www.usbr.gov/uc/rm/amp/twg/mt...Attach_05e.pdf)

11. Consider options that include adding sediment below the dam consistent with a pre-dam sediment profile.

12. Consider triggering flood flows based partly on distributing sediments from the LCR and Paria Rivers when those tributaries are supplying large amounts of sediment.

13. Restore historic water quality regarding temperature profiles, pH, and native fish species.

14. Limit the rate of increase/decrease of flow rates to promote boater safety and beach preservation and enhancement.

256
I would like to speak out for the preservation of the Grand Canyon. I have had the honor to raft it twice in my life and there is nothing like the solitude and peace that I experienced on these trips. The place is beautiful and pristine as well as being unique. It is a treasure for all the country and I don't believe that it should be sacrificed for the gains of a few. Whatever happens with the Glen Canyon Dam, the most care should be taken of the Grand Canyon.

257
Scoping Comments for the Development of a Long Term Experimental and Management Plan Draft EIS for Glen Canyon Dam

I have been a commercial river guide and private river runner in Grand Canyon since 1971. During those 41 years, I have witnessed first-hand, the continued detrimental affects that operations at Glen Canyon Dam have had on the Colorado River Ecosystem in Grand Canyon. The Long-Term Experimental and Management Plan now being considered for Glen Canyon Dam must, at the very least, attempt to operate the dam in a manner that does no additional harm to the ecosystem, and, in every way possible, reverses the negative effects of past dam operations. To accomplish this, I believe that:

1.) Generating electricity and profits from hydropower must be secondary to ecosystem protection and restoration. The Colorado River Storage Protection Act of 1956, which authorized the construction of Glen Canyon Dam, did not intend that generating hydropower would be the primary purpose of the dam. Other laws, ie. The National Park Service Organic Act, Endangered Species Act, National Historic Preservation Act, and Grand Canyon Protection Act, all have a very clear message that protecting the Colorado River ecosystem is of PRIME importance.

2.) All decisions about dam operations, now and in the future, must be based on past science and ongoing research, with the ultimate goal of restoring the ecosystem to its pre-dam condition. This may not be achievable, but must be our desired future condition.

3.) GCMRC is in the best position to "Experiment" and provide input on "Management" (the essence of the "E" and "M" in LTEMP) for present and future operations of the dam. They have years of background, fundamental science, and familiarity with the effects of dam operations on the river ecosystem in Grand Canyon. Although the scientists from Argonne Labs are dedicated and talented people, they simply don't have the first hand experience that the individuals from GCMRC have. It is, therefore, in all of our best interests that the lessons learned from the science GCMRC has already done, have a great impact in guiding the final plan.

4.) River flow regimes, while they obviously must meet the contracted requirements of downstream users, must at the very least, maintain beaches, wildlife habitat, and cultural resources in their present condition, and should have the ultimate goal of restoring them to their pre-dam state. This would require, among other things, properly timed beach habitat building

flows, as well as steady flows that, as near as possible, mimic natural flow patterns. Consideration must also be give to finding additional sediment inputs.

5.) Dam releases need to benefit native flora and fauna in every way possible, therefore river temperatures must be taken into account along with flow volumes and release patterns.

6.) Native tribes must have a voice in the LTEMP to protect their religious and cultural heritage.

One final comment, I do not have the scientific background and expertise to offer specific numbers on flows, ramping rates, or on how the dam should be operated, however, if the goal of the LTEMP is to follow the desires of the laws I spoke of earlier, particularly the Grand Canyon Protection Act, the science either can be, or has been generated to provide those specifics. The operations of the dam must continually be monitored and moderated to achieve a healthy Colorado River ecosystem.

258
First let me say I think the park service has done an excellent job of preserving this American jewel, this is hands down a right of passage for every American, and a luxury for those from afar. It's also a responsibility for our Us Government to preserve this right of passage @ all cost.

259
I have twice been a passenger with Moki Mac down the Colorado River in Grand Canyon and have hiked Grand Canyon several times. The experiences have been among the highlights of my life. Please note my wish that the LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

260
As an avid whitewater paddler, photographer, and student of our wild lands, it is critical that we take great care in our next steps with regards to the Glen Canyon Dam. In the creation of the next LTEMP and EIS, I believe that these facts need to be accounted for, and given adequate attention.

1. Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

2. Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

3. Solid science, not hydropower or water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

4. It is important to protect cultural and prehistoric sites in the Canyon, and the LTEMP should integrate these values.

5. The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

6. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

Thankyou for your consideration, and I sincerely hope you understand the importance of our next steps through the next two decades.

261
As an avid boater and user of public lands, I'm always concerned when reveiws and potentially changes occur in previously approved rules, regulations and acts. The biggest consideration is to assure there is no further damage to our environment, users continue to hae access and assist in preserving the areas and the current resources that are being served are eliminated based on a few discussions by those that aren't effected. Please listen to the community this area serves, users are some of the best voices of what is currently working and the limits of change that should be allowed.

I care deeply about protecting and improving all the resources ddownstream of Glen Canyon Dam, all decisions must meet the mandates of the Grand Canyon Protection Act.

262
I fully support the positions of the Grand Canyon Private Boaters and the Grand Canyon River Guides, and agree that any LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

The only process that will improve and restore the loss of sediment that has occurred will be the addition of sediment from above the dam. Contributions of the Paria, the LCR and other side streams are plainly below the threshold of effectiveness in this role as demonstrated by repeated high flow experiments.

All other biological and archaeological problems and conditions resulting from the changes initiated by dam operations hinge on the sediment problem. THE ADDITION OF SEDIMENT FROM ABOVE THE DAM is the only action I see that will enable other actions taken to "protect, mitigate adverse impacts to, and improve" the imbalance wrought by the historical operation of the dam, and I cannot envision any amount of continued experimentation will change that fact. Any LTEMP alternative that does not include the addition of sediment from above the dam will in my opinion simply continue to throw money at a set of ultimately unsolvable problems. While one of the original goals of the dam was to slow sedimentation of

Lake Mead, the operation of the dam increased the amount and rate of sediment delivered to the upper lake from the Grand Canyon river corridor, which under natural conditions would have (net) stayed on the banks and bottom. Now that the corridor has been scrubbed of substantial deposits of sediment, the volume of and carrying capacity of the dominantly clear water flows will not allow the minor amounts of sediments deposited in any high flow regime to remain in place for any significant amount of time. If enough sediment was removed from Lake Powell, it would also increase the longevity Glen Canyon Dam, and add to longterm management solutions.

263
I urge you to include the option of eliminating Powell Reservoir in your LTEMP scoping process. The option of restoring a free flowing river through Glen Canyon has so many potential significant positive effects on the health of the Colorado River ecosystem, that it'd be negligence not to study it.

264
All alternatives of the LTEMP should have as their purpose the 1992 Grand Canyon Protection Act: "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."

Include all resources, including flora and fauna, beaches, cultural sites in all LTEMP alternatives. Look at the entire ecosystem, rather than just the sand and endangered fish.

Including Beach Habitat Building Flows as well as flows subsequent to BHBF's is imperative.

Outside of the BHBF's, river flows should not be lower than 8,000 to protect resources and recreation, and should not be as high as 2011's multi-month equalization flows, which caused millions of metric tons of sediment to leave the system.

There should also be a more balanced Glen Canyon Dam Adaptive Management Program--right now it is slanted in favor of the dam and power users rather than protection or rehabilitation of resources within Grand Canyon.

265
Its snowing here and our mountain water storage project slowly begins to fill. This snow will ultimately turn to water and roll to the sea or into the heavens as vapor. This process has supported life in our region for at least 3 million years. A small chunk when considered through the lense of deep geologic/cosmic time. Yet by some ironic twist of fate we find our infant to adolescent species as the rightful managers. Our short history of river managment is comprable to a teenage boy taking daddies car for a joy ride, grinding the transmission and running the oil dry. We have not been around long enough to know how to drive this river system and ultimately the very complex ecosystem of the southwest. As we look to the future in this Long Term Experiemental Management Plan I offer this public comment and general theme: We can't put

the excrement back in the horse and if we try we will undoutably come out covered in, well, excrement. We made an awfully big pile with Glen Canyon Dam and all the dams downstream. Now it seems we're elbow deep trying to hide our mistake. Or to put it more civially. We can control our actions, but we cannot control the extent, duration or character of their impacts. We have made a ripple in the water, building dams and big cities in a historically arid land, that cannot be stopped. Every attempt to curb its impact has resulted in another ripple that creates another ripple of impact. Its time for humility as the root of our management plan. Its time to get at the source of our woes. Its time to look at some of the few remaining undammed rivers for advice. If we're going to try to restore anything lets start with water and dirt. (Heaven help us if we introduce another non-native species to fight a non-native species. Even the angels will burst out in "what the hell are they thinking!" laughter)

Water and Dirt

So how do we clean up this pile instead of trying to shove it back in the horse? To start we have to bypass the pile whilst we clean it up. Equalize dam realeases to the level coming in from upstream. Lake levels will begin to drop and sediment will begin to appear as cut banks of a new river channel. Let the river form a new channel and let the dirt calf off into the new river. As this channel begins to mature allow it to flow around and through the dams. We should begin to decomission Glen Canyon Dam and all dams in the system as a Long Term Experiemental Management Plan. If the NPS is committed to "reestablish natural functions and processes in parks unless otherwise directed by Congress." (NPS Management Policies, Section 4.1.5). If the comissioner of the Bureau of Reclamation Mike Conner is true in his saying "it is certainly my goal over the next decade that the 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." Then we must begin to truley restore. Any attempt that starts before we fix water and sediment is a fools paradise. As the river drives its own restoration process we study, observe and get out of the way. This will no doubt hurt in the short term, but the long term benifits of decomissioning dams will far outweigh the short term costs. This is the new direction of our economy, our people, our culture. Restoration and simplification. After every cultural and economic bust those that come out the other side find a way to simplify and reconnect to the things that support their existence. If the NPS and the Bureau of Reclamaton are committed to the "Long Term" we have to stop looking at the Colorado River in Grand Canyon as an amusement park or science experiement and realize that it is the life blood of our existence in this region.

Restoration Economy

So the river begins to restore its old channel as Glen Canyon Dam and others down stream and up begin to decomission. What happens to our cities and economies based on the old model of reclamation? This is a difficult idea for fear of the economic, environmental, and social impacts. Despite our fears things are changing and those who have historically thrived and survived changed their behaviour just ahead of the curve. This is nothing new nor that dramatic, but if we continue to wallow in our own crapulance we will no doubt pay the price. Like all those who have laid idlly behind the curve. If we adapt so will our culture and economy. Jobs and livelihoods will be based around rivers and river restoration. The Bureau of Reclamation could

be the driving force or an old dinosaur slowly turning into a fossil in the sands of time. The NPS could be a visionary edifice or a bureaucratic joke of history. The ball is in our court and right now its in the hands of these two agencies of the people. Will they be brave? Will they make right the mistakes of our past? Will they try to put it back in the horse or clean it up once and for all? Ah well, as they say "we can conjecture many things". But doesn't it seem like we've pretty well ruled out dams in the desert as a viable reclamation model? (That ol' evaporation and sedimentation conundrum, dang ol' losin storage from the top and the bottom). In the mean time we wait and hope for the best.

266

I am writing to submit scoping comments on the Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS). I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. I am especially concerned about loss of native fish and other wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

The LTEMP EIS should encompass the Colorado River from Cataract Canyon, through Glen Canyon and Grand Canyon, to Hoover Dam and beyond, as a single ecosystem whose components are inextricably related and must be managed in concert. Moreover, there needs to be direction for managing this Grand Canyon-Glen Canyon ecosystem in concert with the rest of the Colorado River Basin.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The LTEMP EIS process should make sure that the U.S. Geological Survey's Grand Canyon Monitoring and Research Center (GCMRC) plays an integral role in providing technical information for the scoping, determining desired future conditions, and developing alternatives. 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 science-based LTEMP EIS.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

The LTEMP EIS should consider an alternative that evaluates the use of a temperature control device at Glen Canyon Dam. 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.

The LTEMP EIS should explore the potential for a restructured Glen Canyon Dam Adaptive Management Work Group, which would ensure 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 on the other.

This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

267
Please take into account the issues important to rafters, kayakers and other paddle-floaters who use the Glen Canyon area and the Grand Canyon by complying with and considering:

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

268
They need to know that hydropower and water supply interests need to be balanced with environmental, recreational and cultural values. Consider telling the agencies that? Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events. Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future. It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values. The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon. Ideas that you have about alternatives that they should consider in the EIS.

269

I am writing to comment about the impacts myself and many other private boaters have experienced on the Colorado River in Grand Canyon.

1. Fluctuating Flows: have negatively affected the river ecosystem- from beaches, to vegetation to insects. Please mimic a typical southwest river flow and do not run the flows up and down on a daily diurnal pattern. The electric generation power interests have for too long negatively impacted the Grand Canyon.

2. Experimentation of flows: There are many studies, use the data. There is no need for additional studies to tell you to match flows to a natural river ecosystem. You have many years of historical data (pre-dam). Use it.

270

The ecology downstream of the Glen Canyon Dam needs serious consideration. The beaches need to be rebuilt and the invasive species removed. The diminishing beaches and invasive species are a direct result of the regulated flows released from the Powell reservoir. Please make sure that the Colorado River through Grand Canyon is restored and preserved.

271

It is my hope that you consider the cultural, ecological and recreational values of the river below Glen Canyon Dam during the development of the EIS for the Long Term Experimental and Management Plan. I would also like to see the Glen Canyon Dam Adaptive Management Plan be more balanced toward these considerations in the future as well. Finally, I would like to see future operation of the dam to comply with the Grand Canyon Protection Act of 1992.

When determining flows from Glen Canyon Dam please consider that the high flow events are vital to maintaining the natural ecosystem. Additionally, the beaches created are essential for the recreation community which values the section of river through the Grand Canyon as one of the most spectacular in the nation. The river is also has incredible cultural values that no other place in our country can claim. I believe that the Grand Canyon Monitoring and Research Center can

provide the most solid evidence in the form of science for this, and should therefore be an integral part of the process, not hydropower and water supply needs. Flows relating to the needs of hydropower and water supply should always consider the cultural, environmental and recreational value of a river, as well as help protect and possible restore the river.

272

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992. Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events. Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future. It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values. The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

273

I have been personally observing the impact on the river from the water flows since 1975 when I first began running the river. I have over 200 trips through the canyon since then, including participating in the adopt-a-beach program.

I understand the desire for the hydro-electric power, and the value of Lake Powell and Lake Mead. Any improvements that can be made on the operation of the dam to restore or stabilize the environment will pay off grandly in the outcome.

The peaking power flow regime has stripped the canyon of its beaches. The fact that it has required intensive study to prove the fact, is an insult to those who care, as well as to those who don’t know any better but are relying on protection acts, controlling government agencies and the belief that ‘the right thing will be done’.

So far the right thing has not been done, the fluctuating flows continue to remove what is left. I believe the extreme fluctuations must cease, due to the current use of the river for recreation, some minor fluctuations would be ideal. The large flow changes remove too much material, slower and smaller fluctuations would remove the impact of human visitation. When the flows are constant, a green slime forms on the places where people are forced to urinate at the river. I do not know how to prevent this except by cutting the user day allotment.

I think the water quality of Lake Powell could be considered in this process. Monitoring the use on the lake, including shore line activity as well as the boaters. I see extreme amounts of sewage and refuse along the shoreline. Education and attention must be paid to this area to preserve the water in the river.

Understanding that the dam is there to provide power and its connection to the grid has demands that must be met, I believe that the 'boys in charge' have been reckless and greedy with the control of the water in the river. Extreme fluctuations can no longer be tolerated. High flows to stir up the sediment to repair beaches works but how those high flows end has a big impact on where the sediment ends up, and how long it lasts. I approve of the park allowing specific areas to be "improved" to prevent further loss of camp space for the commercial groups. As a guide I know large groups on 8 day motor trips have less impact on the canyon than small groups on longer trips. Encouraging the river companies to run two boats together as opposed to allowing 2 one boat trips increases congestion by removing the flexibility of the smaller group. I encourage pruning of the tamarisk trees to provide shade in lunch areas and open up camping space. I also believe that flexibility is necessary on every ones part to meet all demands, but the canyon and the river's protection are to become the highest priority.

274

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole. I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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. Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

The LTEMP EIS should encompass the Colorado River from Cataract Canyon, through Glen Canyon and Grand Canyon, to Hoover Dam and beyond, as a single ecosystem whose components are inextricably related and must be managed in concert. Moreover, there needs to be direction for managing this Grand Canyon-Glen Canyon ecosystem in concert with the rest of the Colorado River Basin.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The LTEMP EIS process should make sure that the U.S. Geological Survey's Grand Canyon Monitoring and Research Center (GCMRC) plays an integral role in providing technical information for the scoping, determining desired future conditions, and developing alternatives. 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 science-based LTEMP EIS.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

The LTEMP EIS should consider an alternative that evaluates the use of a temperature control device at Glen Canyon Dam. 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.

The LTEMP EIS should explore the potential for a restructured Glen Canyon Dam Adaptive Management Work Group, which would ensure 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 on the other. This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

275

I have reviewed a wealth of material relevant to a fish management program at Lees Ferry, and one thing that stands out is the resilience of the trout in the face of unrelenting man made problems to the fish habitat. THis gorgeous canyon containing 15 miles of premium trout fsihing is a national treasure, and deserves the best fisheries management available. Shocking changes in water flows, massive flood releases, and heavy traffic all take their tolls. The economic impact of the loss of this tailwater fishery would be enormous. There is an ongoing movement to remove this dam and a vocal minority that is persistent in their efforts to get this done. It is unfortunate that no effort to take care of silting was made when the dam was put in place, and if measures are not implemented this will be a problem as time goes by. We encourage you to take the steps necessary to implement a proper fish management program.

276

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277

I am writing concerning the water management at Lees Ferry and the fishery associated with that area. The fishing is not good at high water flow times and hopefully such could be controlled to

better plan a more constant flow or gradual but even flow, attempting to avoid a glut of water increading the high flow. In good times the fishing area and the fishing is good. With a better quality or improved fishery, it would provide a fishing experience of excellence. Unfortunately the word, of course, would spread. But it would bring economic benefits to the area for the indigenous population, including our Native Americans. In turn the populations knowledge of the area would certainly extend to the visitors and provide for a better fishing adventure.

278

I urge you to conduct the most thorough review possible of the Glen Canyon Dam. I grew up in Utah and am old enough to have made a Colorado River trip through the Glen Canyon before the dam was finished. It was one of the great experiences of my life. What made the trip so wonderful were the spectacular natural features of the Canyon: the unique and magical Music Temple; a wonderful six mile hike to Rainbow Natural Bridge where we walked among stunning rock formations and stopped to swim in the many pools that lined the way. I was subsequently on Lake Powell after the Dam was completed. A nice place to visit and ride around in a motorboat? Of course. But that experience cannot even approach the very special experience of the beautiful Glen Canyon uncovered of water. It is one of the treasures of this world (and I have traveled to many parts of it). The Dam should come down and allow the public again enjoy the singular beauty of the Glen Canyon.

279

I've been a commercial boatman in the Grand Canyon since 1972 and have run hundreds of trips, including ten or twenty science trips, in all manner of boats. I'm a past board member and president of GCRG. I've read and agree with, for the most part, the comments submitted jointly by GCRG, GCRRA, GCROA, etc. But I want to add here two key observations of my own that I don't see represented in either those comments or the general discussion one typically hears or reads about these issues, in hopes that the LTEMP EIS will take them into account.

1. Sediment transport (and beach erosion) in Grand Canyon is directly tied to the volume of water moving through it. The higher the water, the more sand it carries out. As the water levels get higher, the increase in sediment transport is exponential. The difference between what the river carries out at 15,000 cfs and flows above that, particularly above 20,000, is staggering.

2. The vast majority of science trips I've been on, or am aware of, end at Diamond Creek, but to really understand the system as a whole you have to look at it all the way down to where the current stops: the flat water of Lake Mead. We have seen incredible changes down there the last few years and the story that is unfolding there now is a crucial part of understanding the Grand Canyon ecosystem as a whole. There lately you see both where the sand has been going all along, and how fast the big river cuts through it as the level of Lake Mead drops.

I'm a huge fan of the NPS and its mission, and also a huge supporter of this EIS. I used to be pretty skeptical about science but have seen firsthand how the beach-building events really did get better with practice and with good science. Sadly, the politics of water seem to undercut so much. The higher flows we saw immediately after the great beach-builder event in 2008 quickly undid a lot of the good there. The high flows last year were absolutely devastating.

I know how hard it is to balance all the competing interests in these things and personally don't think it should be a given at all that recreation should automatically hold sway over water and power every time. But I'd like to think that the Grand Canyon itself (and the Grand Canyon Protection Act) will.

Steady flows are really nice to boat on and the river does get scarier below 8,000. But I'm not so sure steady flows are all they're cracked up to be for overall ecosystem health, or at least the absolute key to it; and I am pretty sure we can all get through there alright on flows down to around 6,000 as long as they fluctuate somewhat higher too.

What needs to be seriously considered in this EIS, for the long term health of the river corridor overall, is the effect of the highs in general, and the notion of a cap on the high end, sensibly applied, whenever that is possible. The longer that river stays under 15,000 cfs (except for beach-building flows), the better for the beaches we live on.

The study area for this EIS should begin at the base of Glen Canyon Dam and extend to South Cove or beyond.

280

I support the concept of doing everything possible to maintain the trout fishery at Lee's Ferry. I have been fishing these waters since the mid 1970s. This fishery represents a unique recreational opportunity in the southwest that has become a favorite of fly fishermen throughout the region. This in return supports a significant economic niche for the businesses nearby, with whom we spend countless thousands of dollars. In considering dam operations, the welfare of the trout fishery, including the disruption of habitat and loss of sustenance during high flows should be considered.

Downstream, the continued effort to eradicate trout from the tributaries of the Colorado River should reflect some concern for recreational fishermen. The opportunity to catch trout in Bright Angel Creek, as I have done for 40 years, is rapidly deteriorating due to these efforts. It would be wonderful to devise a compromise, preventing spawning river fish from accessing the creek, but maintaining the creek for sportfishing of resident fish. There has to be a way.

281

I would like to show my interests and beleifs concerning a new management plan for the Colorado River corridor. I am a river guide who's primary lively hood is bases on maintaning, sustaining and if possible inproving the ecology, native and historical sites in Grand Canyon. I believe that high flows during high sediment flow periods are essential to maintaining beach size as long as those flows are within the guidelines of the 1992 inpact statement. Recreation and river corridor ecology must also be considered in these flow freqencies not just the interest of the Bureau of Reclamation. Science needs to be the voice of reason when it comes to protecting the river corridor not money or politics. I have a great love for Grand Canyon and I believe that we can only keep protecting it if we keep showing the next generation what an extroidinary precious place it is.

282
The trout fishery at Lees Ferry has been an important recreation source for me, and as a fisherman have also contributed to the livelihood of the businesses in the area, which largely depend on the health of the fishery. I would like to discourage any changes that would have a negative impact on the fishery.

283
In writing this letter, because this is an important issue and I have an ongoing interest in the quality of fishing at Lee's Ferry below Glen Canyon Dam near Page, Arizona.

I recognize that power generation is the primary goal of the dam and as such, must be a productive resource. But like all of our resources there is significant interaction between them. That is why it is so important to consider all aspects of this issue. Our goal should be to do the most good and no harm.

Over the many years, fisherman have experienced water level fluctuations ranging from mild to dangerous. These sudden changes to water level presents a safety hazzard to those who use the river. Fisherman and biologists can tell you that rapidly changing water levels and water temperature in any river will affect the quality of the fishery. A more-level stream flow will be advantageous to the fishery and the people who use the river.

I would hope that the LTEMP will include the maintenance of this fishery as well as the restoration, and maintenance of native fish..and address the threat to both from invasive non-native warm water fish, vegetation and other invasive species.

This fishery also has a major impact on the local economy. A self-sustaining, trophy trout fishery will go a long way to help the economy and the many Native Americans who make up a substantial part of the work force there.

284
I am a stakeholder in how the water that flows through Grand Canyon is used. I have been river running, hiking and trail runnign since 1969. I have slept about 1500 nights in Grand Canyon and know the area well. There are several issues that I want you to consider.

1. All strategies on river flow usage need to adhere to the Grand Canyon preservation act. This is our guiding principal and includes many facets. A. We need to continue to try to mitigate the extinction of endangered fishes. B. We need to continue to try to slow down the erosion process of the riparian zone and if possible, grow the beaches and the associated riparian zone and possible breeding grounds for the humpback chub and other affected animals. Steady flows should be considered as often as possible as this seems to be a proven method for reducing beach erosion.

2. The Grand Canyon monitoring group that has been instrumental in the scientific study of river flow (GCMRK ?) should be the main group that has input into the river flow scenarios. Their

recommendations are fluid and change with the changing scientific data that they are gathering. The final plan should be open to modification as the needs dictate.

3. There are many cultural groups besides the power generation group that need to have their needs addressed. There are something like 11 'indian' tribes that have cultural connections to the Grand Canyon. The Hopi, Zuni, Paiute and Navajo have huge connections and their perspectives need to be considered.

4. There are something like 20,000 people that use the river each year. Flows below 8,000 cfs seem to increase the injury rate. Although I think this is a secondary issue, consider keeping minimum flows at or above 8,000 cfs.

285

This letter is to address the situation concerning the Colorado River from Glen Canyon Dam at Page, Arizona to Lake Mead. First of all let me say that the dam has provided much needed power and water to an area, that without it, could not exist. The benefits far outweigh any perceived negative impacts. The dam also established a great recreational area, which feeds the local and surrounding state's economy. But what I want to focus on is the Lee's Ferry, Blue Ribbon Fishery that resulted from the dam. This Blue Ribbon Fishery became world renowned. Besides from putting the area on the map, so to speak, also added greatly to the economy. The fact that this fishery has declined in recent years, is a shame, if not a crime. Considering that our fishery people have the knowledge and know-how to restore this river to be a blue ribbon fishery again, I believe they should have a large say in how the river is managed and to when releases from the dam are managed. I believe this can be a win, win situation for everyone.

286

I am a very concerned citizen with the management of our federal lands and national treasures. From all indications water will become one of country's essential precious and irreplaceable resources. There is all ready plans to pipe water from Flaming Gorge to Denver, pipe water from Glen Canyon to St. George and water from Green River for a nuclear power plant in Green River. In establing priorities I urge you to be very careful in the EIS statement to form the LTEMP for the Colorago River and Grand Canyon NP.As olur population increases and technology increases the speed of every day life the special places like the Grand Canyon and Colorado River become more valuable. The experience of visiting these treasures keep olur society in balance. Please protect them.

287

I have been working on the river in Grand Canyon for 18 years and care about it deeply.

The LTEMP should ensure that low fluctuating flows continue to be the normal release regime from the Glen Canyon Dam. I have observed that constant flows are more erosive. Beach building flows need to occur much closer in time to the sediment input event(s). Larger sand deposits enhance the recreational experience, protect archeological resources, and the pre-dam high water zone. There should be a sensitivity to cultural values. Ongoing research through GCMRC is vital and should be adaptive to changing conditions and knowledge. Management

decisions should be based on the best available science. The LTEMP should follow the mandates of the Grand Canyon Protection Act.

288
Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

289
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It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

Ideas that you have about alternatives that they should consider in the EIS.

290

I have personally only been to the grand canyon once, but i will undoubtedly return one day, if not many days the rest of my life. I tell you that after that visit the part that stuck with me the most was the notion that the river created the massive canyon i sat and stared at for hours on end! simply unbelievable. It is a shame that such a mighty river should be dammed at all and even worse that it should no longer reach the gulf due to our increased presence of civilization along its long path. I began kayaking just two years ago, but I fully plan on kayaking the canyon at some point in my future. It would be a shame to see the regulation and flow releases change for the worse, even to the point where I might loose my chance to see the majesty of the grand canyon from the bottom up. please in whatever changes you might decide to make in the glen canyon dam management, consider the flora and fauna, the people who enjoy it's scenic views, and the way a natural river ecosystem, especially one as large as the Colorado River, should function. This primarily includes a range of differing flow levels to move sediment and create natural disturbances.

291

The Lee's Ferry trout Fishery has been and can provide a great recreational fishing attraction for the public. By providing adequate consideration for management of the flow requirements of for the Rainbow trout along with the energy needs the fishery may again become an national or international destination for fishermen. Fisherman in many cases bring their families and as visitors to the area provide additional tourism dollars to a relatively remote area. The experimental greatly increased flows to flush the Colorado River have not proved successful. Please develop a water management plan that allows for the Colorado River at Lee's Ferry to again become a world class fishery.

292

As a Grand Canyon River Guide and Backcountry Guide, I strongly urge that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

The LTEMP must be based on an adaptive ecosystem management approach and ensure that the 11 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 decision making — a distinct failure of the Adaptive Management Program to date.

Furthermore, the LTEMP should maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come. Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion. The volume and flow patterns of the Colorado River have several principal effects on river-based recreation, the recreational experience, and the resources we wish to protect. First, erosion of natural sandbars and camping beaches has progressed under all flow regimes employed to date. This erosion is a concern because as beaches recede and disappear, camping options for river-runners (as well as backpackers who reach the river and decide to camp) are reduced, which exacerbates crowding and congestion and negatively affects the recreational/wilderness experience. Campable area reduction also results in impacts to sensitive resources in the Old High Water Zone. In turn, these conditions reduce the capacity of the ecosystem to absorb visitor impacts in ways consistent with NPS and tribal river corridor management plans. Finally, the magnitude and timing of river fluctuations also have a significant impact on the riverine ecology as well as the cultural record and Traditional Cultural Properties of the eleven associated tribes who live in and around Grand Canyon. Enhanced sediment supplies are necessary to facilitate aeolian transport in order to protect the fragile and non-renewable archaeological sites along the river corridor. As river stewards, I care deeply about the protection and preservation of all the resources that make Grand Canyon so unique.

Grand Canyon river running has a significant economic impact on Page, Flagstaff, Kanab, Fredonia, and other portions of the region, through employment, direct outfitting, supplies, equipment, transportation, and lodging. Prior evaluations have dealt principally with the power generation or reservoir balancing implications of dam management. A full valuation of the socio-economic impacts to recreational resources impacted by dam operations is an essential part of the DEIS process when the economic implications of alternatives are examined. Non-use values should also be assessed and incorporated by managers into decisionmaking.

All decisions on dam operations should be based on the best available scientific findings, and application of the scientific method. The experimental aspect of the Plan should provide for further data accumulation, hypothesis testing, and modification of key Plan components over time, in order to further optimize goal attainment. Alternatives must be scientifically defensible and credible, with well defined hypotheses. The Grand Canyon Monitoring and Research Center (GCMRC) should be considered a central resource for this aspect of the Plan, together with other pertinent ongoing scientific investigations in the Grand Canyon corridor.

Current findings suggest an optimal flow regime would principally rely on steady flows (in the 8,000 - 11,000 cfs range), with appropriately timed higher volumes to facilitate rebuilding and maintaining sandbars. Accordingly, the Plan should take maximum advantage of natural sediment augmentation opportunities from the Paria and Little Colorado River watersheds. The Plan should contemplate testing the best case scenario presented in the article, “Is There Enough Sand? Evaluating the Fate of Grand Canyon Sandbars”, GSA Today, Volume 18, Issue 8, August 2008. The goal here would be to eliminate or minimize further beach erosion, facilitate re-deposition of sediment, maintain the integrity of cultural resources in situ, eliminate adverse impact on native species, and assist in re-propagation of native riparian plant communities.

The LTEMP should focus 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 protects and preserves the individual resources along the Colorado River. The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

The LTEMP should examine the role of time and climate change in the system. Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

Finally, the LTEMP should consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters. The final Plan must ensure that minimum flows meet long term average legal obligations. However, within those parameters, the Plan should generally seek to establish a year-round navigable river, with dam releases experimentally modulated in a way that emulates pre-dam patterns when the appropriate conditions prevail. To the extent practicable, the structure of the release regime should be known in advance. That is to say, recreational users (boaters and backpackers who may be camped riverside) should know that a rise in the river could occur a certain number of hours after a major sediment increase becomes evident to them as they boat. This would enable them to take precautions against rapid rise in water level.

The foundational goal of any Plan should be to do no further harm to the Grand Canyon river environment. The operation of Glen Canyon Dam has had a profound adverse impact on Grand Canyon river conditions—ecological, cultural, and recreational. A fundamental test for all future decisions should be whether any proposed action will serve to (at a minimum) preserve or (to the extent practical) restore and improve the values for which Grand Canyon National Park was created.

293

1. Define & ensure a substantial role for the Grand Canyon Monitoring & Research Center (GCRMC) within the LTEMP EIS process.

2. Maintain or improve the quality of recreational experiences for users of the Colorado River.

3. Focus on protecting, preserving, and improving all of the downstream resources, such as camping beaches, cultural sites, and flora & fauna.

4. The high flow protocol should be a well defined key component of LTEMP alternatives.

5. Design intervening flows (between high flows) that maximize sediment retention on beaches and backwater areas for the benefit of campers and native biota.

6. LTEMP alternatives must be scientifically defensible and credible with well defined hypotheses, building on what we have learned from GCRMC and LTEMP implementation.

7. The LTEMP must be based on an adaptive ecosystem management approach.

8. Include an alternative to test seasonally adjusted steady flows that includes sediment triggered beach and habitat building flows based on the closest approximation of the pre-dam hydrograph.

9. Consider minimum flows no less than the long-term base flow of the Colorado River.

10. Test the "best case scenario" presented in the article, "Is There Enough Sand, Evaluating the Fate of Grand Canyon Sandbars" as proposed by USGS scientists. Particularly in regard to rebuilding and maintaining sandbars. (http://www.usbr.gov/uc/rm/amp/twg/mt...Attach_05e.pdf)

11. Consider options that include adding sediment below the dam consistent with a pre-dam sediment profile.

12. Consider triggering flood flows based partly on distributing sediments from the LCR and Paria Rivers when those tributaries are supplying large amounts of sediment.

13. Restore historic water quality regarding temperature profiles, pH, and native fish species.

14. Limit the rate of increase/decrease of flow rates to promote boater safety and beach preservation and enhancement.

294

I'm an active whitewater kayaker for over 15 years and just returned from my first trip down the Grand Canyon last month. It was the best recreational experience of my life and Im writing to voice my concern that recreational, environmental, and cultural interests should be well considered when making decisions bout Glen Canyon Dam, including:

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing

the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

295

In November, 2011 I received the opportunity of a lifetime. To travel down the Colorado River through the Grand Canyon. Each mile we traveled from Lee's Ferry I became more grateful of this lifetime experience. I was thankful for the Grand Canyon Protection Act of 1992. It would be disappointing not to see this act honored in the upcoming years.

As one of the Seven Natural Wonders of the World, I hope the future of this river and canyon will be preserved for future generations. Each time hydropower or water supply is discussed the fact that this is such a science wonder should hold high merit. We cannot afford to lose or compromise the future of the Grand Canyon based strictly on human impact. It already saddens me that the Glen Canyon was drowned and we can no longer make the same journey Powell did in 1869.

My request is simple, respect and honor the canyon as the Natural Wonder it is. Please take into account it's cultural, ecological and recreational interests. Hydropower should be used to restore the canyon and it's beaches not destroy it.

296

I am a staunch supporter that the Long Term Experimental & Management Plan Draft EIS for Glen Canyon Dam should include the following:

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 and 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.

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

The LTEMP should reflect the societal shift to a desire for river restoration and ongoing protection.

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.

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 should consider more than just the last 15 years of science.

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.

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.

Since the Record of Decision for the initial Glen Canyon Dam EIS created the Glen Canyon Dam Adpative Managment Program, the LTEMP EIS should be able to address and improve its structure and functionality in order to meet GCDAMP mission and goals.

297

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298

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

299

Since the current ecosystem of Glen Canyon and the Grand Canyon have been disrupted by the dam I would like the NPS to follow the guidelines of the Grand Canyon Protection Act of 1992. It is important that the wildlife, fish, beaches and natural treasures of the Grand Canyon be protected from the all to many water demands placed on the Colorado River. It is very important to allow high water through the canyon on an annual basis to allow the current habitat to remain healthy.

My family and I along with the rest of the citizens of the U.S. want these waters to remain for future generations to visit, float and explore.

300

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has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole. I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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. Here are my specific comments on the scoping phase of the LTEMP EIS process:

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tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies. Thank you for the opportunity to comment on the scoping phase of the LTEMP EIS.

301

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302

The Marble Canyon Business Interests is a coalition of businesses and individuals who represent the economic interests of the region adjoining the community of Marble Canyon, Lees Ferry, and the Navajo Reservation.

The economy of this region is 100% driven by tourism and outdoor recreation and a very substantial portion of the local economy is dependent on the recreational opportunities provided by the access point to the Colorado River at Lees Ferry. This is where all Colorado River rafting trips are launched and is the only access for recreational fishing on the Colorado River above Lees Ferry to Glen Canyon Dam. The reason people come here is to raft and fish the Colorado River and the reason we are here is to provide essential services to the tourists. The livelihoods and prosperity of the regional residents are inextricably linked to the resources that support recreation on the Colorado River.

We are confident that there are many hundreds of letters being written as comments to the LTEMP in support of protecting and enhancing all of the natural resources, on and in, the Colorado River/Grand Canyon that we all cherish. So the focus of this letter is to stress the importance of including the recreational trout fishery at Lees Ferry in the LTEMP process and incorporating a detailed plan for creating and maintaining a Blue Ribbon trout fishery above the Paria River to Glen Canyon Dam. In writing this letter we are not only representing and speaking for the regional residents of the Lees Ferry/Marble Canyon and Navajo Reservation but also for the many thousands of our customers who have traveled here in past years to fish the Colorado River at Lees Ferry and hope to return in the future.

The Lees Ferry trout fishery is a section of the River no longer suitable for native fish. In the past this recreational trout fishery had a reputation as a destination Blue Ribbon trout fishery with an abundant trophy trout population. It drew visitors from across the country and around the world who over the years, have spent many millions of dollars in the local area. The economic benefits generated by the trout fishery are essential to the survival of the local population but also the

local Native American community that is largely dependent upon fishing related lodges and restaurants for employment. This is especially important considering the fact that more than 28 percent of American Indians are living in poverty, compared with 15 percent of the nation as a whole and there are no other employment opportunities in this area other than tourist services. The status of the River for fishing has been allowed to decline over time and while it remains a unique Arizona trout fishery it no longer brings the large number of fishing visitors of the past. In lieu of being managed to be what it could be it has been the recipient of unrelated management actions rather than planned beneficial actions. We are supporting the implementation of a comprehensive fishery management plan in recognition of both the recreational and economic benefits that will be enhanced through such a plan.

It is essential that a comprehensive fishery management plan be an integral part of the experimental and management plan for the future operation of Glen Canyon Dam. A plan for the Colorado River and its tributaries should be collectively developed by the relevant Federal, State, and Tribal agencies along with the participation of impacted public organizations and private parties. The plan should cover the aquatic life, principally fish, of the Colorado River between Glen Canyon Dam and Lake Mead including the River tributaries. However, as a comprehensive plan it should also include managing and enhancing the associated aquatic food base as an essential component for the success of the plan. There should be a single plan covering the River and its tributaries with the administrative geographic divisions within the area of the plan managed by the entities responsible for those divisions as determined by Federal, State, and Tribal laws, regulations, treaties, etc.

As a comprehensive plan for managing the total fishery in a coordinated manner the plan would include the restoration, recovery, and maintenance of native fish along with the recovery and maintenance of a Blue Ribbon trophy trout fishery in the Lees Ferry reach of the River while addressing the threat to both from invasive non-native warm water fish and organisms. It also should include experimental management actions based on comprehensive, measurable, and defined objectives.

303

On a trip down the Colorado River through Grand Canyon last year I saw first hand the damage to the canyon's ecosystem that has been caused by Glen Canyon Dam. Also, the reservoir has buried perhaps the best part of the Colorado River. With rules in place today the Glen Canyon dam would never be built. Do what is right. Punch a hole through the dam, drain the reservoir, and allow the Colorado River to run free. Leave the dam there to remind us of our stupidity.

304

I am a Washington, D.C. resident who is writing to you because of my love of the Grand Canyon, which I believe is the most beautiful place, not just in the United States, but on Earth.

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of

the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole. I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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. Here are my specific comments on the scoping phase of the LTEMP EIS process:

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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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

305

I first saw Grand Canyon as a teenager some 50 years ago. I knew from my first view that I wanted to go into that Canyon. Fortunately I've had that opportunity as a backpacker, day-hiker, and river trip passenger. I've backpacked since 1983 and have walked over 1400 miles in hikes off both rims. I was in the Canyon in 1996 and 1997, observing the artificial floods as well as the comets that were visible in the night sky.

It is of greatest importance to me to preserve the Canyon and to let it restore itself naturally by letting the river run free again. I urge you to fill Lake Meade first and let Glen Canyon reappear as a natural consequence of allowing the river to run free to Lake Meade.

Here are additional comments:

I am writing to submit scoping comments on the Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS). I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

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This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

306

I am a recreational user of the Grand Canyon, both rafting and backpacking along the river corridor. The NPS should be fighting to preserve the rights of users like me - who do not have big money and lobby groups to influence the process. The LTEMP must consider private, recreational uses of the river corridor. Indeed, these activities should be the primary focus of the LTEMP.

These activities include the enjoyment of a pristine environment - or at least as pristine as can be after the building of the dam. There is no justification for any action that is not scientifically justifiable. High flows, as well as the periods between high flows, should be designed to maximize sediment retention on beaches and backwater areas for the benefit of campers and native biota. Low flows should be no less than the long-term base flow of the Colorado River.

Changes in flow levels should be gradual to minimize erosion of beaches and improve boater safety. Sediment addition and distribution should be a major factor in managing flow levels. In short, the flows should be as close as possible to what they were before the dam was built.

In addition, the LTEMP should be Restore historic water quality regarding temperature profiles, pH, and native fish species.

To help make sure these goals are met, the LTEMP should define & ensure a substantial role for the Grand Canyon Monitoring & Research Center (GCRMC) within the EIS process.

307

As a Ph.D. in ecology (University of California, Davis), Grand Canyon historian, and a Grand Canyon River guide of 38 years' experience, I am in the position to state my thoughta and conclusions based on huge experience on how management of Glen Canyon Dam should be aimed in regard to the "Crownn Jewel," world's most famous National Park and World Heritage Site immediately downstream.

First of all, the releases of water from Glen Canyon Dam should be designed primarily with the "health" and well-being of Grand Canyon as the PRIMARY criterion for flows, flow levels, ramping rates, etc. NO other consideration, not hydropower revenues nor any other consideration or criterion, should take precedence over what sorts of flows best serve the riparian and riverine ecosystems in Grand Canyon National Park.

Prior to the construction Of Glen Canyon Dam the Colorado River flowing through Grand Canyon was flanked by immense beaches. These beaches existed as a Park resource when Grand Canyon was gazetted as a national park in 1919. The National Park Mandate---which precedes all laws and resolutions and operationing proceedures regarding Glen Canyon Dam---must be adherred to by the Department of Reclamation and the Federal Government in general. In short, if operations of Glen Canyon Dam negatively affect the resources within Grand Canyon National Park, then those operations are in violation of the National Park Mandatre and are illegal---exactly as if someone in DOE or any other Federal office decided to test a nuclear weapon on BLM land immediately outside the boundary of Grand Canyon National Park---thus being apparently in deferernce to the National Park Mandate but destroyed the Park from outside that boundary. The Bureau of Reclamation has been doing exactly this, destroying Grand Canyon National Park from just outside the National Park boundary in apparent compliance, but in actual defiance and violation of, the National Park Mandate.

The beaches in Grand Canyon---and the riparian elements of the shorelines in general---have been drastically modified by Glen Canyon Dam operations. Roughly 90 percent of 1960s beaches are now gone. Moreover, shorelines along the Colorado River in the Park are now "jungles" due to the regularization of flows with in the Canyon from the Lake Powell. The water temperatures released from Glen Canyon Dam are 30 degrees fahrenhite colder than normal late summer temperatures, drastically modifying the riverine habitats and causing species extinctions within the Park. All of these changes are illegal violations of the National Park Mandate.

Short of mothballing and bypassing Glan Canyon Dam, which I propose is the single best solution to the ecological problems it has created and is creating, the next best mandatory management set of criteria is do the least further damage to Grand Canyon National Park with regard to what we do know conclusively to have been its conditions in 1919. No, NEPA was not in effect then. But so what? We know enough histoy and basic ecology of the river from 1919 to 1963 to ballpark riverine and riparian conditions. Re-establishing these conditions as closely as possible should be the ONLY management goals with regard to releases from Glen Canyon Dam.

What this means is:

1. Seasonally adjusting steady flows, to be altered up or down in approximate 10-day intervals.

2. No daily fluctuations at all, execpt during that single day when the flow is adjusted up or down for the ensuing 10-day period.

3. Flows should be released at levels that are seasonally appropiate, say 48,500 cfs (or higher if possible) in June or early July, but 5,000 cfs during January or February. In short, whatever inflows Lake Powell is receiving during any 10-day period of any month should be what is released from Glen Canyon Dam into Grand Canyon National Park---as if Glen Canyon Dam did not exist as a regulatory piece of plumbing.

4.The biota of the Colorado River evolved to flourish in seasonal fluctuations for its ecology and breeding. All flow releases should be in concert with the ecological needs of the native fauna and flora of the river system.

5. This means temperatures of water released from Glen Canyon Dam also must match as much as possible those temperaturwes of the pre-dam Colorodo flowing past Lees Ferry prior to Dam construction. This means re-designing the penstocks to facilitate such warm-water---or natural-temperature water--releases, much as the penstock feeders of Hoover Dam do.

6. Restoration of the pre-dam shoreline conditions along the Colorado River in Grand Canyon National Park should be the paramount management goal of Glen Canyon Dam. This means restoring the huge beaches, and seasonally drowning the unnatural riparian shorelines of today.

7. The Bureau of Reclamation must design and install and working slurry line to funnel, pump, and deliver the sediment being stored with the reservoir of Lake Powell into Grand Canyon to rebuild those beaches. Otherwise the Bureau of Reclamation remains in violation of the National Park Mandate and otherwise those now missing beaches will remain missing.

In short, ALL management of Glen Canyon Dam would be made and desigened and executed to restore what the dam has destroyed, modified, or degraded within Grand Canyon National Park.

We ALL want the beaches back in Grand Canyon. And the river to flow naturally with regard to temperatures and sediment loads.

Thanks in advance for taking care of the hude mess you made....

308

I have rafted through the Grand Canyon and have seen the devastating effects the cold water and lack of new silt has had to the canyon created by the Glen Canyon Dam. It would seem to me that if it was anyway at all possible to somehow allow warm water from the top of the reservoir, and water containing more silt to flow into the canyon it would help bring it back to the way it was prior to the dam. It would make sense to me that with both Mead and Powell near 50% capacity that to fill Mead first before filling Powell would conserve more water in a deeper reservoir and keep the Grand Canyon healthy. An additional benefit would be exposing Glen Canyon again. Exposing Glen Canyon would allow people the ability to see a beautiful canyon that has been hidden for a generation. I would definitely go into Glen Canyon if it got exposed again. I read that it had fairly mild waters and could be paddled in a canoe.

309

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole. I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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. Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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310
Please fill Lake Mead first.

311
I would like to see the dam managed in such a way as to do no further harm to the Colorado River beaches and if at all possible, managed in a way that might rebuild some beaches.

Historical photographs of Grand Canyon beaches along the Colorado River uniformly show a reduction in beach size in the Grand Canyon. Numerous formerly camp-able beaches have disappeared completely and many others have decreased in size, and continue to do so due to the management techniques employed by the operators of upstream Glen Canyon Dam for the purpose of maximizing power output and delivering silt reduced water to downstream Lake Mead.

Currently little regard is payed dam operations to the environmental needs necessary to sustain a healthy river corridor eco-system or to the needs of recreational users. Recreational users, river runners and hiker/backpackers count on having beaches as an important part of the wilderness experience offered by the Grand Canyon. Nor does the current dam operation live up to the spirit

the Organic Act which charges the National Park Service to "protect and preserve for the future enjoyment" our national natural treasures like the Grand Canyon National park.

312

I am among the few to have had the good fortune to explore Glen Canyon prior to the dam being completed and the canyon being flooded. I was only a child then, but I will never forget the impact it had upon me. The grandeur of the canyon walls rising above the chocolate brown river, the serenity of the myriad intersecting slot canyons, the quiet pools teeming with life that lay beneath side canyon walls were all too magnificent to ever forget.

What took nature aeons to sculpt, we managed to bury under a reservoir in just a few short years. A unique and magnificent natural wonderland we sacrificed. Instead of exercising good stewardship, we sought dominion. We were wrong. No wonder that the late Senator Barry Goldwater called voting for the building of Glen Canyon Dam his biggest regret. He'd been there. He knew what was lost.

Now with this EIS there is an opportunity to try to recapture as much of what has been lost as possible. To help restoration strategies in the Grand Canyon alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam should be explored. Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead, should be seriously studied. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

Many years ago John Muir warned Americans against flooding the Hetch Hetchy Valley. Today, most Americans know he was right. Barry Goldwater recognized that flooding Glen Canyon was wrong. There will come a time when most Americans will know he was right. Now is the time to seriously study what can be done to restore as much of Glen Canyon as possible. As Edmund Burke said: "Nobody makes a greater mistake than he who does nothing because he could only do a little."

313

I am concerned that impacts of Glen Canyon Dam on the Grand Canyon, Glen Canyon and the Colorado River have not been significantly mitigated by past efforts and experiments. I urge you to ensure that the LTEMP EIS addresses the requirements of the Grand Canyon Protection Act to protect the values for which Grand Canyon National Park and the Glen Canyon National Recreation Area were created.

Alternatives considered in the EIS should fully address the impacts of ongoing and future climate change on water supply, wildlife habitats, recreation and cultural resources. This requires an assessment of the effects of water impoundment and release on the entire Colorado River system. Alternatives must include Glen Canyon Dam management options that restore natural water and sediment flows to the greatest extent possible. Conservation of water resources through minimization of evaporation and seepage must be considered. Reduction of total reservoir surface area in the system is key to reducing evaporative losses. To accomplish this, the option of

shifting primary storage to one reservoir, Lake Meade, should be assessed in one or more of the alternatives.

314

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315

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317

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992. Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and

protects the beaches that have been built through steady flows in between these events. Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future. It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values. The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon. Ideas that you have about alternatives that they should consider in the EIS. Stewart Wadsworth 20 year Kayaker and hope to go down the Grand next year on a private permit.

318

I have some concern and comment regarding future action on the Colorado River. First, economically the Colorado means millions of dollars in revenue to the area, and Arizona. We are proud to have one of the great tourist attractions in the nation. I have met people from all over the world while fishing and rafting in the area. The Marble Canyon area is a Mecca for Trout fisherman from all over the United States and the world. Once again, a significant economic benefit to the area and the state of Arizona. There were many years when the management of the water flow did not produce large trout or great numbers of trout. That situation has reversed and the area has a growing reputation once again as a premium fishery. I belong to several fishing clubs, categorically we are all concerned. I would like to see that area maintained as a premium trout fishery with significant water flow allowing the wild trout to naturally reproduce in great number and great size. My hope is that those in charge will strongly consider the request of concerned trout fisherman and maintain the Marble Canyon area below Glen Canyon Dam as a premium trout fishery.

319

Maintaining Lee's Ferry as one of the most beautiful pristine blue-ribbon rainbow trout tailwater fisheries should be kept in the forth front of any decisions being made in the Ltemp for the operation of the Glen Canyon Dam. I have fished Lee's Ferry a number of times and had just wonderful experiences. I plan on doing future trips to Lee's Ferry with friends and family and hope the experiences are just as rewarding. The economy of the area depends heavily on the return of the happy sportsmen. The one thing that would help make the experience more enjoyable for both the fishermen and and the fish is not so sudden changes in water level. A more level flow would be greatly appreciated and advantageous to the fishery.

320

I traveled the Grand Canyon with my children when they were in their mid-teens and once again in their late teens (in approximately 2000 and again in 2003). We will forever value that experience and dream of doing it again. That the Grand Canyon experience is protected is extremely important; it is important for those of us who have gone and for future generations, for them to know... I believe it important to maintain or improve the quality of recreational resource for future users of the Colorado River.

It is important to give the GC Monitoring and Research Center a substantial role within the LTEMP EIS process, they have a great body of knowledge. They have well-defined alternatives to best meet program and ecosystem goals. I also believe that LTEMP alternatives must fully meet the intent of the 1992 GC Protection Act. I believe that the Purpose and Need for Action Statement for LTEMP should be changed 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 which is an ancillary benefit of the dam. Because I have not recently gone through the river does not mean I don't care, or I am not aware, or I do not remain in contact with those who are active in protection of the Grand Canyon. I fully support goals and objectives of the Grand Canyon Monitoring and Research Center.

321

I have lived in Arizona about as long as Glen Canyon Dam has been in place. Yes it did alter much in the Colorado River below it, but it has also been good for the southwest. The dam has provided for growth and development that might not have been possible. The communities rely on the power and water available from the damn. When we are not working we have wonderful recreational opportunities at Lake Powell for boating and fishing. Below the damn we have the Glen Canyon National Recreation Area (GCNRA) with a great fishery and beautiful views to experience. Lee's Ferry is the kick off point for many rafting trips through the Grand Canyon. The Challenge that we face is to protect what we have come to rely on and enjoy while securing a place in the future for the historical past, living and cultural. The living includes all forms of creatures and plant that do and have called this area home. The cultural includes the historical sites both new and old that hold special and spiritual meanings those who directly or indirectly have experienced this national treasurer. My comments to the LTEMP scoping process will be most directly focused on the recreational fishing from Glen Canyon Dam to the entrance to Lake Meade with a heavier focus on the fishery from the Dam to Lee's Ferry. In the 1980s to the very early 1990s this fishery was known as a World Class Blue Ribbon Fishery and has been cited as such in a number of government reports. This recognition carried over into the very early 2000s, though from the early 1990s the experience was definitely deteriorating. Experimentation with flows to build sediment downstream, fluctuating flows, and other management decisions all took their tolls on the food base for fish both in the GCNRA and below.

As a long time fisherman of this river my goals is to see it return to a Blue Ribbon Fishery, a fishery where the fisher on a typical day may catch a reasonable number of trout in the range of 20–30 inches, healthy with good girth and stamina. A reasonable number would be 5–10 in this range along with a number trout of a lesser size. Such a day of fishing along the natural esthetics of the region would make fishing the GCNRA the ultimate fishing experience. Proper management of the dam and fishery can be accomplished while balancing the delivery of water, hydropower, cultural values and conservation as is provided for under the Federal Fish and Wildlife Coordination act. There also need to be a comprehensive fishery management plan for the Colorado River between Glen Canyon Dam and Lake Meade. As a part of the LTEMP a plan should be developed and implemented for the entire fishery. This plan should include components to recover and maintain a Blue Ribbon Fishery in the Glen Canyon Dam to Lee's Ferry and components to support restoration, recovery and maintenance of native fish throughout the river. Many of the components are identical such as improved food base for all species. The rainbow trout and the endangered Hump Back Chub consume basically the same diet, improving

the food base for one will improve it for the other, especially when commenced in the upstream regions of the river below Glen Canyon Dam. Fall High Flow Experiments (HFE) need to be reconsidered. These high flows are set to occur at the time of year when the sun is not reaching the bottom of the canyon. The HFE's will scourer the algae and other photosynthesis plant life from the bottom of the river. These plants are critical to the development of diatoms which is the food for scuds (gammarus) and chironomids and in turn are food for both native and on-native fish. The HFEs are set to occur when a satisfactory account of sediment is deposited in the Colorado River at and below the confluence of the Paria River, typical late August to September. It would be better for the ecosystem if HFEs were schedule in late spring to redistribute the sediment downstream. No food base studies were conducted with the only fall HFE event; however these studies were conducted after Spring HFE and found the loss of food base for native and non-native fish. For the spring HFE it required four to six months to rebuild. Here is an incident where balance needs to be considered: balance the immediate need to move sediment down river with great loss to the food base and little opportunity to rebuild for many months with a delayed HFE which has a loss of food base but a quicker opportunity to rebuild.

Lastly, the LTEMP cannot ignore the economic impact recreational activities offer to local communities along Lee's Ferry and Marble Canyon, with fishing being a large component. Coconino County of Arizona has the highest unemployment and lowest average wage in the continental United States. The lodges in this area employ a range of 55% to 80% Native American workers. Returning this fishery to a Blue Ribbon Fishery would have direct and major impact on the livelihood of the communities. These communities developed after the completion of Glen Canyon Dam. The river was stocked with rainbow trout on numerous occasions with the assistance of the United States Government and that of the State of Arizona. Business grew and prospered with the support of these government actions. A program to return the fishery to Blue Ribbon status will take a major step forward to not only preventing further decay but would foster an economic turnaround. The communities are entitled to this if only under a doctrine of laches.

I sincerely pray these comments are received and accepted in the spirit they have been made. They come from an individual who dearly loves the sport of fly fishing, an individual who treasures his time outdoors in the scenery given to us by our Father. An individual that desires the protection of all that is natural: plant life, animal life and human God given rights. Yes the terrain was altered by the construction of Glen Canyon Dam and it has continued to be altered by continued human interventions; however, no one right to existence can be superseded by the right of another not even an older life form over a new life form which has become established in the community of the ecosystem.

322

As a private boater and recreational user I would like to see policy made that maintains or improves the quality of recreational experiences for users of the Colorado River and focuses on protecting, preserving, and improving all of the downstream resources, such as camping beaches, cultural sites, and flora & fauna.

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I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

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I have enjoyed the outdoors all my life. Being almost 50 years old today, I have been a backpacker since I was 10 and a whitewater rafter since I was 20, only recently I became a whitewater kayaker too (Past President of Chico Paddleheads 2009-2011). Although on my life's bucket list, I have never yet enjoyed a trip down the Colorado River through the Grand Canyon. Whatever and however Glen Canyon Dam operates in the future, it should be in accordance with the Grand Canyon Protection Act of 1992. Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events. Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future. It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values. The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon. I want to be able to enjoy this irreplaceable and incredible natural resource in my lifetime. But more importantly, I want it to be available to my daughter and her children, and grandchildren.

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I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole. I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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. Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

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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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream. This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies. Thank you for the opportunity to comment on the scoping phase of the LTEMP EIS.

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Following this short paragraph are the comments about the Glen Canyon and Grand Canyon environmental issues. As a concerned citizen and someone who has camped and hiked in both NPS units over many years, I urge you to decide on actions that will protect and preserve the ecosystems and cultural treasures of the area. This area is a national and global treasure. Do not let the folly of man diminish the wonder and sublime features of this land. I am writing to submit scoping comments on the Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS). I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole. I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

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Western Area Power Administration (Western) is charged with marketing the electrical power produced at Glen Canyon Dam and other Federal facilities within a 15-state region in the Western United States. Western appreciates the opportunity to provide comments as to the scope of the Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS) and we look forward to assisting in the development of the LTEMP EIS as a cooperating agency.

Our comments in response to scoping for the LTEMP EIS are as follows:

Western believes that the U.S. Bureau of Reclamation (Reclamation) and the National Park Service should develop the LTEMP EIS through the auspices of the Glen Canyon Dam Adaptive Management Program (GCDAMP). The GCDAMP is a Federal Advisory Committee, with a broad group of stakeholders that has, for approximately 15 years, advised the Secretary of the Interior regarding the operation of Glen Canyon Dam and other actions in Glen and Grand Canyons. These stakeholders have developed considerable knowledge of Grand Canyon resources and are familiar with the water and power needs for which Glen Canyon Dam was constructed and with the resources within Grand Canyon National Park and Glen Canyon National Recreation Area that will be addressed within the LTEMP EIS. Moreover, GCDAMP stakeholders have demonstrated expertise working with the scientists at the Grand Canyon Monitoring and Research

Center (GCMRC) and in making recommendations with the support of a wide array of public interests represented by these stakeholders.

One way to integrate GCDAMP stakeholders is in the development of alternatives for the LTEMP EIS. We suggest using structured decision making (SDM), which was successfully employed by Reclamation in the development of the Nonnative Fish Control EA, to develop some or all of the alternatives for the LTEMP EIS. We believe SDM was helpful in bringing together management ideas and the science to support good decision making. The use of SDM would help fully integrate the Adaptive Management Work Group (AMWG)/Technical Work Group (TWG) stakeholders in the development of alternatives and the initial assessment of the performance of those alternatives. An inclusive process from the beginning will benefit everyone and lead to a well-conceived set of alternatives to consider in the LTEMP.

Scientists at GCMRC (and scientists with whom it contracts) should be fully involved in developing the LTEMP EIS. This would include assisting in the development and review of proposed alternatives; development of analyses and review of the affected environment and environmental consequences sections; and development of the necessary science plans which may be required to implement actions from the LTEMP.

All of the alternatives considered in the LTEMP EIS should be rooted and supported by the substantial body of science developed by the GCDAMP and other scientists.

The EIS should consider a baseline for economic power analysis that recognizes that there have been past federal actions (at Glen Canyon Dam, Flaming Gorge, and Aspinall Units) that have had impacts to the value of the Salt Lake City Area Integrated Projects (SLCA/IP) power resource. This is not incompatible with the need to compare the impacts of an alternative against a No Action alternative that describes the current operation. For example, in the Glen Canyon Dam EIS published by the Department of Interior (DOI) and Reclamation in 1995, significant analysis was presented that described not only the impact of an alternative on resources relative to the existing operation of Glen Canyon Dam, but also the impact of the alternative relative to pre-dam conditions.

In February 1997, new operating criteria were implemented at Glen Canyon Dam. This was the culmination of almost two decades of research and required that, then DOI Secretary Bruce Babbitt, strike a balance between the requirements of the Grand Canyon Protection Act (GCPA) and the Colorado River Storage Project Act (CRSPA). In describing his decision he referred to the need to “balance” various resources and the need to impact the generation of electrical power to the smallest degree possible to achieve the requirements of the GCPA. Western agreed then and still asserts that the improvements in environmental resources in the Grand Canyon National Park and Glen Canyon National Recreation Area should be balanced against the need for hydrological power and energy, a renewable and environmentally benign electrical resource. The alternatives for the LTEMP EIS must include only those alternatives that strike this “balance” of environmental resources, water, and electrical power.

The LTEMP EIS should consider how to improve the GCDAMP to better support an adaptive management program that includes all stakeholders. For example, the LTEMP EIS might specify the roles of the TWG and AMWG in the GCDAMP. The LTEMP EIS should consider the myriad layers of management documents related to the program and specify how to simplify and update strategic documents when they are needed to support the program.

The LTEMP EIS should consider how to better integrate tribal values into GCDAMP/DOI decision making processes.

The LTEMP EIS should clarify the role of management actions vs. experimentation and how these will be implemented and used.

The LTEMP EIS alternatives should include both Glen Canyon Dam operations and other non-flow actions, and identify relationships between them. Often, a Grand Canyon resource can be either affected by dam operations or by non-flow actions. For example, if the brown trout population in Grand Canyon is a barrier to reaching humpback chub population goals (through competition or predation) and action is necessary, then one must recognize there may be multiple ways of managing the brown trout population. One action, such as flow manipulation might have a negative impact on other desirable species such as humpback chub, while other non-flow actions like mechanical removal might not have a negative impact. Thus, accomplishing environmental goals through operations at Glen Canyon Dam as well as other non-flow actions should be fully considered in trying to meet the desired future conditions. Since the CRSPA required Glen Canyon Dam to produce the "greatest practicable amount of electrical power", a more restricted operation at Glen Canyon Dam should not be implemented if there are non-flow alternatives that have the same (or similar) end result.

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Please consider the following points: Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992. Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events. Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future. It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values. The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

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I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

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The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

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Please consider recommendations for the reservoir operation plan that will have minimum impact to recreation and that will promote beach building. Working with WAPA to allow for closer mimicry of the natural hydrograph while still providing power generation would be beneficial.

Sedimentation issues should also be considered.

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Thank you for the opportunity to provide comments regarding the scope of the EIS to develop a Long Term Experimental and Management Plan for the Glen Canyon Dam.

The EIS should be focused on the development of alternatives that meet the intent of the 1992 Grand Canyon Protection Act. These should include all of the downstream resources and their values ,such as native species and ecosystems, sediment,visitor use, tribal resources and wilderness values.

The LTEMP should be based on an adaptive ecosystem management approach.Alternatives must be scientifically defensible and credible, with well defined hypotheses. Grand Canyon monitoring and Research Center should play a crucial role in this due to their past work with the GCDAMP.

The LTEMP should include Desired Future conditions that have been developed within the GCDAMP and utilize those DFC for evaluation of the impacts of alternatives.

Tribal participation by the tribes with ties to the Grand Canyon need to be involved into this process from the beginning. Their tribal values and knowledge needs to be incorporated into the decision making

How will the LTEMP alternatives be affected by high and erosive flows instituted by Equalization flows?

How will climate change, specifically, long term significant drought be addressed by the alternatives?

Include BHBF as a well defined component of all alternatives incorporate when finalized the HFE EA into the designs of alternatives

If hydrologic events/conditions allow, test higher than 41 K experiments

Include alternative test flows regimes outside of MLFF -SASF which follow pre dam hydrograph as much as possible -Steady flows for a sufficient duration to produce a biologic signal - HFE's followed by interim flows regimes that will maximize the retention of sediment -Develop a comprehensive fishing plan from Glen Canyon Dam to Lake Mead

LTEMP should include a broad socio-economic valuation of the alternatives. These should include market,non market, and non use values

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Concerning the Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS):

The LTEMP EIS needs to fully meet the requirements of 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.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

Equalization of Lake Powell and Lake Mead water levels may have valuable effects, and in fact, I support the primary use of Lake Mead for water storage and power generation, and using lake Powell primarily for runoff control. However - 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.

The BOR and NPS 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 GCPA.

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Thank you for the opportunity to comment on the scoping phase of the LTEMP EIS. I have been a commercial and recreational user of the Colorado River through The Grand Canyon for several decades. I am still working on the river as a full-season commercial river guide. As such, I have likely noted more and different changes than all of the river corridor studies have revealed. And I'm sure I have missed many. But the changes due to the management of the river flows have been great, and a very serious look at how these flows are managed is necessary.

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Thank you for giving me the opportunity to express a few of my views on the water management of the Colorado River, especially as to the Rainbow Trout fishery.

First, let me say I have enjoyed fishing at Lees Ferry for more than twenty years, enjoying some years more than others. It appears that it can be a great fishery if it is managed properly and, of course, the devil is in the details. I put my trust in the Arizona Game and Fish Department for making recomendations on this subject even though I do have some thoughts of my own.

There have been times when I was concetrating on fishing and didn't realize the water level had risen fairly quickly and I was out in the stream farther than I should have been. This, of course, was my fault, but there were two times when I wondered if I would get back to shore safely. The rapid change in water flow also affects the quality of the fishing and if it occurs when the fish are trying to spawn, it affects the fishing for the next few years, especially if it happens in two or more consective years. When word gets out that the quality of fishing is poor, all the related

businesses in the area are affected. The Native American employees really suffer when this happens as they seem to be the first ones affected.

In closing I would like to say that if there were more consistent water flows, there would be more and larger fish to catch. Word would get out about Lees Ferry being a great fishery and economic developement would improve. If this isn't one of your goals, then I would suggest you give it some consideration.

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The Grand Canyon is a jewel, acknowledged throughout the world as one of the wonders of the natural world. People come from all over the world to see it in as unblemished condition as possible. Besides uranium mining done on the shoulders of the canyon, the Glen Canyon Dam has done needless damage to the canyon, destroying its ecosystem you haven't done a very good job in managing this wonder.

I am writing to submit scoping comments on the Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS). I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

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I've had the fortunate experience of seeing the Grand Canyon from the river several times. I've also had the unfortunate experience of seeing beach erosion from what I assume is a result of inconsistent releases from Glen Canyon Dam. I hope the planners will take into consideration the impact Glen Canyon Dam releases have on the quality of the river corridor when implementing policy on this matter.

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While working on a Masters degree in the Environmental Humanities program at the University of Utah, I have studied this issue extensively. I have interviewed the scientists who have studied the effects of dam release in Grand Canyon. I talked with Dave Wegner whose work motivated the Grand Canyon protection act of 1992. I have talked with Jack Shmidt who has seen the progress made from high-flow beach building events which have been proven to be effective-until peak power demand has destroyed the progress made.

As a river guide- for Colorado River and Trail Expeditions- I have seen how the beaches built have eroded away quickly. On my very first Grand Canyon trip I met Shmidt who was studying sediment deposition. My uncle Stuart Reeder was driving the boat. After the trip I had a chance to ask them both what they saw. This was June, 2008, and what they saw that day that I passed them in Marble Canyon, was a beach newly deposited being eroded because of peak power ramping up for the summer. In one day, this particular beach eroded away by two thirds, documented through time lapse photography.

Beyond the value of visitor's experience within the canyon, this sediment is crucial to the ecosystem that we have changed for human growth. As the ecological thread of the Grand Canyon we need to be operating the dam with consideration of the other species that depend on this special place as home. We have enough science to know how we ought to maintain this ecosystem for both people and indigenous species as well.

What I would like to see, is for the management of Glen Canyon Dam to reflect what all the science and research has told us. We need to manage the dam according to the Grand Canyon Protection Act- which I don't believe the modified low-fluctuating flows is doing. We need to have annual high flow releases- when the conditions are prime- to build beaches. And we need to maintain these beaches and habitats through regulating steady flow of the river.

I have read the report by economist David Marcus. His study shows that the cost of operating the dam with steady flow relates to-at most-a 10 cent increase to some power users a month. This is an insignificant burden that would relate to a significant increase to the health of one of the most special places on earth.

As humans we have created this situation, and now we have an opportunity to mitigate many of the negative impacts. It seems to be every stake holder against creating cheap power. Because the costs of steady flows are insignificant, we cannot afford to sacrifice this national treasure.

Thank you for listening to what the science is telling us, and making the changes that will protect the place that we love so much.

338

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study:
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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

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This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

Forwarded email:

I am writing to submit scoping comments on the Glen Canyon Dam Long-Term Experimental and Management Plan Environmental Impact Statement (L TEMP EIS). Since construction of the Glen Canyon Dam the health of the Grand Canyon has continued to decline.

I urge you to adopt the strongest possible Glen Canyon Dam L TEMP EIS. The L TEMP EIS must include a full and honest assessment that lays the groundwork for the protection and restoration of the Grand Canyon. Please include consideration of the Fill Lake Mead First proposal, shifting primary water storage from Lake Powell to Lake Mead.

As a Flagstaff resident I am privileged to visit the Grand Canyon many times in a year, to recreate and to serve as a volunteer working on projects such as the humpback chub restoration. This place is a treasure, please do all you can to protect and restore it.

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I have had the opportunity to raft the length of the Grand Canyon on 2 occasions and will be doing so again summer 2012. The Grand Canyon is a magical and wonderful place unlike anywhere else in the world. I believe that the releases from Glen Canyon Dam should more closely mimic the natural flow regime of the river. The health of the environment would be greatly improved if the environment/ecosystem is taken in account as the flow regime is being set. I recognize the need for power generation and also believe that the river should be managed for the health of the ecosystem.

Thanks for taking time to read my comments. Please help preserve this marvelous place.

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The modern history of water use in the Colorado River Basin is a tale of dismay and political monkey business. I would venture to say that it would be impossible to restore anything close to normalcy no matter how hard all users tried to get together and get the job done.

That being said, we have the Grand Canyon with what remains of the Colorado River running through it. The river should be managed as close to it's form as a wild river as can be accomplished. Even with the best effort to respect the natural ebb and flow it will pale compared to the historical norm, but it should be attempted.

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I have been to the Grand Canyon several times in my 58 years of life, but rafting thru the Canyon with my family in 2002 was one of the best expiences of my familiy's life. All Americans deserve to have that experience.

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344

Glen Canyon dam operations have had long term impacts on the Colorado River ecosystem through Grand Canyon that are in need of being corrected. I have personally observed the changes over the last 17 years, including significant river channel erosion, invasive species proliferation, diminishing native fish species, disappearing wildlife, loss of driftwood and other sediments and a heavier toll on the remaining beaches because of the varied flows required by dam operations.

It seems to me, a layman recreational boater, that the Grand Canyon, one of the wonders of the world, should be managed by what is best for this most precious and magical national park, not by what is most efficient for dam operations and generating hydroelectric power.

As a middle aged "river rat" who has done nine private, non commercial trips in Grand Canyon, I cannot emphasize how meaningful the experience of rafting the Colorado River has been to me and my family. My youngest son, 25, is now following his old man's footsteps and won his first permit in the lottery and is now a trip leader. This is the mission of our public lands in action: passing along the tradition of stewardship, and love, of the wild places from generation to generation. John Muir would be proud.

So that means more effort at keeping it wild, starting with a focus on the canyon and river first instead of the dam operations. I would like to see an outcome of this environmental analysis seriously consider operating the river with as close to pre-dam conditions as possible, that is an

annual high water flow to rebuild beaches and then a steady flow (not fluctuating) to keep sediment in place.

If there is anyway to restore historic river temperatures to closer to pre-dam conditions, that would be a worthy goal and very beneficial to native fish populations.

It is also necessary to provide objective accountability to the implementation process and I submit that the Grand Canyon Monitoring and Research Center (GCMRC) can fulfill a vital role to ensure the LTEMP achieve its goals.

Finally, throughout this LTEMP process and the others that will follow, it is important to maintain access and fair/equitable use of the river corridor through Grand Canyon for the private boater.

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I am writing to submit scoping comments on the Glen Canyon Dam Long-term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS). I was fortunate to get to visit the Grand Canyon last April. I was awestruck by its beauty and I want to return many times. However, I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

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I find it extremely important to conduct a comprehensive citizen evaluation of this project. Thank you for taking the time and also for considering public comment on this issue.

As we all know, there are major issues with the Glen Canyon Dam. My first issue is not so scientific, but rather personal. Quite simply put, I feel as though millions of people are missing the intrinsic and aesthetic value of an American Southwestern area with deep history and one of powerful lessons.

More scientifically, I feel as though it's a wasted resource. In terms of water consumption by user states as well as federal dollars in the scientific endeavors needed to sustain endemic species of flora and fauna.

I urge you to strongly consider the fact that we are currently in a transitional time in terms of possibly making highly positive impact in the areas that we love most.

One question: Is Glen Canyon Dam sustainable and needed? It has reeked havoc on the natural Grand Canyon ecosystem and now is an important time in which we can undue something that was probably a mistake in the first place.

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In writing this letter I am hoping to bring to your attention the importance of one of the most beautiful fisheries located in the state of Arizona, that being Lees Ferry. Although I am new to fly fishing I have been an avid angler all of my life. My wife and I recently joined the White Mountain Fly Fishing Club located in the White Mountains of Arizona (where we currently reside Although we have visited the Lees Ferry area over our many years in Arizona we have not yet had an opportunity to enjoy the quality fishing there. As it has always been known as a 'Blue Ribbon Fishery' it has always attracted anglers, from near and far, to its waters. We, as avid fishermen, are definitely looking forward to experiencing that thrill and hope to return there often.

We have taken an active part in helping to improve the conditions of our statewide fisheries over the years and are very aware of the importance of managing water flows in order to avoid rapidly changing water levels which affect the quality of a fishery overall. By improving the quality of fishery more recreational opportunities will open up thereby improving the overall economy of the area. In a day and time when the downturn in the economy has hit hard more and more families are choosing to vacation closer to home. Many who look to Arizona as a winter-time destination have the opportunity to enjoy its diversity and many forms of available entertainment

options, i.e., enjoying great fishing, camping in the beautiful scenic area of Glen Canyon, hiking amongst the native creatures that are so much a part of the canyons southwestern experience, etc. Whether for active participation or perhaps just a photo op Lees Ferry is a very important part of the Arizona scene and should be respected and treated as such accordingly.

Also, as a high number of Native Americans call this area home a boost in the economy would help to bring added job opportunities to the areas residents. Improvements to the fishing experience will only serve to positively impact the local economy as more anglers and tourists will be attracted to the Glen Canyon National Recreation Area. When the fishery is once again perceived as a Blue Ribbon Fishery by those of us in the fishing community many more visitors will travel in order to enjoy a great fishing experience.

As members of the WMFF club we believe that the implementation of a plan to rebuild the fishery should take into account the native aquatic species. Improving food base and habitat only serves to benefit both native and nonnative fish. Dangerous fluctuations in water levels will affect the quality of fishing in any waters. It is more advantageous to maintain a more level stream flow. There is always room for improvement.

350

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Please consider the following points regarding the LTEMP for the Grand Canyon/Colorado River:

Standing: The Colorado River as it flows through Grand Canyon National Park provides opportunities for one of the world's most sought after whitewater experiences, with close to 24,000 visitors running the river annually. The above-named five groups are intimately involved in recreational activity in the river corridor of the Grand Canyon, and have common interests with respect to Grand Canyon river management. Our groups are directly impacted by operations of the Glen Canyon Dam, as it regulates the volume of water in the Colorado River through Grand Canyon. This document represents those common interests, and thus provides a set of core considerations that we urge upon those drafting the Environmental Impact Statement (EIS) for the Long Term Experimental and Management Plan (LTEMP) for Glen Canyon Dam.

Nature of Impact: The volume and flow patterns of the Colorado River have several principal effects on river-based recreation, the recreational experience, and the resources we wish to protect. First, erosion of natural sandbars and camping beaches has progressed under all flow

regimes employed to date. This erosion is a concern because as beaches recede and disappear, camping options for river-runners (as well as backpackers who reach the river and decide to camp) are reduced, which exacerbates crowding and congestion and negatively affects the recreational/wilderness experience. Campable area reduction also results in impacts to sensitive resources in the Old High Water Zone. In turn, these conditions reduce the capacity of the ecosystem to absorb visitor impacts in ways consistent with NPS and tribal river corridor management plans. Finally, the magnitude and timing of river fluctuations also have a significant impact on the riverine ecology as well as the cultural record and Traditional Cultural Properties of the eleven associated tribes who live in and around Grand Canyon. Enhanced sediment supplies are necessary to facilitate aeolian transport in order to protect the fragile and non-renewable archaeological sites along the river corridor. As river stewards, we care deeply about the protection and preservation of all the resources that make Grand Canyon so unique.

Goal: The foundational goal of any Plan should be to do no further harm to the Grand Canyon river environment. The operation of Glen Canyon Dam has had a profound adverse impact on Grand Canyon river conditions — ecological, cultural, and recreational. A fundamental test for all future decisions should be whether any proposed action will serve to (at a minimum) preserve or (to the extent practical) restore and improve the values for which Grand Canyon National Park was created.

Decision-Making Principles: The submitting organizations respectfully offer the following recommendations for the development of the Long Term Experimental and Management Plan Draft EIS. We believe it is possible for the EIS team to develop a flow management program that effectively balances the competing interests now involved, and satisfies the following principles.

Responsible Ecosystem Management: In combination with the “do no harm” ethic stated above, this should be the prime goal, and an over-arching consideration in all decisions. A

Plan that embodies this element will result in a healthier river corridor that is in concert with the provisions of the 1992 Grand Canyon Protection Act and the Endangered Species Act.

Adaptive Management-Based Scientific Method: All decisions on dam operations should be based on the best available scientific findings, and application of the scientific method. The experimental aspect of the Plan should provide for further data accumulation, hypothesis testing, and modification of key Plan components over time, in order to further optimize goal attainment. Alternatives must be scientifically defensible and credible, with well defined hypotheses. The Grand Canyon Monitoring and Research Center (GCMRC) should be considered a central resource for this aspect of the Plan, together with other pertinent ongoing scientific investigations in the Grand Canyon corridor.

Desired Future Conditions (DFCs): The Plan should clearly articulate DFCs for all river-related factors under consideration, and utilize those DFCs for evaluation of alternatives. Future operational plans should permit adaptation of DFCs, as new scientific findings emerge and as other variables in the system change materially. The DFCs should be tied to the NPS Organic Act, NPS Management Policies, and the goals and objectives articulated in GCNP and GLCA General Management Plans.

Honor Pre-Dam Flow Patterns: The final Plan must ensure that minimum flows meet long term average legal obligations. However, within those parameters, the Plan should generally seek to establish a year-round navigable river, with dam releases experimentally modulated in a way that emulates pre-dam patterns when the appropriate conditions prevail.

Rebuilding Sandbars: Current findings suggest an optimal flow regime would principally rely on steady flows (in the 8,000 - 11,000 cfs range), with appropriately timed higher volumes to facilitate rebuilding and maintaining sandbars. Accordingly, the Plan should take maximum advantage of natural sediment augmentation opportunities from the Paria and Little Colorado River watersheds. The Plan should contemplate testing the best case scenario presented in the article, "Is There Enough Sand? Evaluating the Fate of Grand Canyon Sandbars", GSA Today, Volume 18, Issue 8, August 2008. The goal here would be to eliminate or minimize further beach erosion, facilitate re-deposition of sediment, maintain the integrity of cultural resources in situ, eliminate adverse impact on native species, and assist in re-propagation of native riparian plant communities.

Safety & Navigability: To the extent practicable, the structure of the release regime should be known in advance. That is to say, recreational users (boaters and backpackers who may be camped riverside) should know that a rise in the river could occur a certain number of hours after a major sediment increase becomes evident to them as they boat. This would enable them to take precautions against rapid rise in water level.

Additional Factors: Other components of the Plan should include consideration of:

Recreational Capacity: Proposed flows may have an effect on the recreational carrying capacity of the river corridor, which in turn directly impacts the quality of the recreational experience. Carrying capacity is the basis for launch limits incorporated into the 2006 Colorado River Management Plan (CRMP). It would be important to rely on NPS input in this regard.

Tamarisk Leaf Beetle Mitigation: In anticipation of further tamarisk defoliation by the Diorhabda Elongata beetle, the Plan should anticipate whether there are measures that can enhance restoration of native riparian shade trees along the mainstem in order to prepare for this watershed-scale change. Again, coordinating with NPS managers and Dr. Todd Chaudhry, the new Watershed Stewardship Program Manager for the park, will be important.

Economic Issues: Grand Canyon river running has a significant economic impact on Page, Flagstaff, Kanab, Fredonia, and other portions of the region, through employment, direct outfitting, supplies, equipment, transportation, and lodging. Prior evaluations have dealt principally with the power generation or reservoir balancing implications of dam management. A full valuation of the socio-economic impacts to recreational resources impacted by dam operations is an essential part of the DEIS process when the economic implications of alternatives are examined. Non-use values should also be assessed and incorporated by managers into decisionmaking.

Temperature Moderation: In furtherance of ecological restoration, the EIS should actively evaluate the efficacy of options that would provide temperature control flexibility and improved

water quality. A selective withdrawal structure or other methodology could potentially offer more flexibility in ability to respond to changing ecosystem concerns in future years, if benefits could outweigh the potential negative effects. The LTEMP team should consult with the U.S. Fish and Wildlife Service to address the costs, benefits, and risks associated with a Temperature Control Device (TCD).

Further Sediment Augmentation: The EIS should examine options for introducing additional sediment below the dam, to augment that which is periodically available from tributaries if it becomes clear that sediment resources cannot be restored and maintained through other means.

Representation in Future Decision-Making Activities: Future decision-making bodies and processes should include additional, more proportional representation by recreational and tribal parties. In addition, the final Plan must also incorporate tribal perspectives and values into the decisionmaking process in a meaningful, synergistic way, in order to achieve a balanced outcome during the life of the Plan.

Conclusion: This document should not be considered as a complete summary of concerns and recommendations from the signatory organizations. Each organization will be submitting their own detailed comments for use in formulating the Draft EIS, yet those additional materials will not be in conflict with this presentation. And it is our hope that the reviewing body will take note of the fact that five river stakeholders with such diverse goals have come together to recommend a set of commonly-held principles for river management in the Grand Canyon. We trust these joint recommendations will be regarded with additional weight because they represent the views of such major components of the Grand Canyon river community.

_____ _____

Thank you very much for your time and consideration. I work full time in summer as a river guide in Grand Canyon and depend upon the river corridor to provide sustainable camping opportunities. Watching the beaches erode, especially under fluctuating flow conditions, has been causing concern among river runners for years.

Please help us preserve the Canyon ecosystem and provide an unsurpassed recreational and spiritual experience for our citizens and visitors from around the world.

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I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water

lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

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The Grand Canyon River Runners Association represents the more than 18,000 people who use professionally guided services to visit the Grand Canyon's river corridor annually. The licensed concessionaires' guidance insures that people of all ages and abilities, as well as physically challenged individuals, have the opportunity to visit the rewarding, but challenging heart of this nation's premiere national park and World Heritage site. GCRRA's mission is to preserve public access to the Colorado River through Grand Canyon.

GCRRA welcomes this opportunity to comment on the Long Term Experimental and Management Plan. We will submit a joint comment with our colleagues at Grand Canyon Private Boaters Association, Grand Canyon River Guides, Grand Canyon River Outfitters Association and American Whitewater. In addition we wish to provide these comments that more specifically address the interests of our members and constituents.

Our principal concerns include: 1. Navigability: Three fourths of commercial boaters choose motor trips. We ask that a minimum flow threshold that ensures safe passage for these large craft be established and maintained for the duration of the motor season. 2. Protection of cultural resources: Visitors here are introduced to Grand Canyon as the ancestral home of many Native Americans. Because the Canyon harbors ancient habitations, art and artifacts, as well as sacred sites still central to traditions of some of the eleven affiliated tribes, development of the LTEMP must include consultation with tribal representatives to address their spiritual and cultural needs. 3. Restoration of lost sand at eroded beaches: It is imperative that beach habitat be protected and maintained to preserve the river ecosystem, provide a landscape that is restored to natural pre-dam conditions as closely as possible, and ensures the presence of numerous campable sandbars throughout the river corridor. USGS Circular 1282, A Report of the Grand Canyon Monitoring and Research Center 1991-2004, confirms that, "Campsite area is a readily measurable factor that has arguably changed more than any other facet of the river experience in the past 40 years." 4. Minimizing or reversing conditions facilitating encroachment of native and non-native plant species: Dam operations since 1963 have encouraged the encroachment of non-native vegetation, including such invasive species as tamarisk and camel thorn. Additionally, natives such as arrowweed and coyote willow have proliferated and dominated some beaches to the extent that they are no longer campable. At Grand Canyon River Runners Association, we believe that the ongoing scientific study and monitoring of conditions in the river corridor, both naturally occurring and pre- and post experimental high flows, has produced a wealth of good science that, if conscientiously applied, should, at the very least, result in mitigation of current conditions considered most detrimental to the Colorado River ecosystems through Grand Canyon. At best, this same science could protect and restore riparian ecosystems to the extent that they replicate pre-dam conditions as closely as possible.

We believe that the Grand Canyon Monitoring and Research Center holds the key to maximizing sediment distribution during natural floods as well as during enhanced flows from higher dam releases. The results of their research in restoring the riparian ecology and meeting the conditions of The National Environmental Policy Act (NEPA), the Grand Canyon Protection Act (GCPA),

and the Endangered Species Act (ESA) should be given priority in managing dam operations. Sandbar building would help protect archaeological sites through aeolian deposition of sand on fragile sites. Continued sandbar building could force the retreat of encroaching vegetation. The visitor experience would be significantly enhanced by a range of factors linked to larger and more numerous campsites, including fewer encounters with other groups, solitude, and opportunities for a wilderness experience (only natural ecological conditions).

354

I wish to say that I value the presence of rainbow trout in the Colorado river in the river's course through the Grand Canyon very highly. I participate in, (as an angler and naturalist, not a business owner) the fishery at Lee's Ferry. I value that fishery very highly. I need to say I do not care so much for trophy trout; I would much rather see an abundant, vibrant, and healthy population of small and medium size fish, than a paltry population of a few remnant large fish. I do not support radical actions in the Lee's Ferry reach to thin the spawning success of trout.

Besides the social and economic value of the fishery, I think you are doing a great disservice to STEWARDSHIP by closing your eyes to the ecological value of trout in the changed river. The categories of native and non-native are odious. The river is cold and clear, and perfect for trout. When you can return the river to being warm and muddy, with wildly fluctuating seasonal flows, then let's talk about fish adapted to that regime. Until then let's value what nature is proposing! I think it is a great error to fight against nature by trying to eradicate trout. Embrace the changed river, and try to appreciate the productivity and good things the river can grow; I am talking about the whole food chain and ecology, from clear river photosynthesis productivity, to invertebrates, to trout, to mergansers and eagles and otters which can feed on trout.

I think you must relocate Chub to other rivers where they can thrive. Do so like the condor. Get creative. There are other streams and rivers that might fit.

If you must fight against trout, I think you should concentrate ONLY on the area where the Little Colorado River meets the mainstem river. This is, in truth, the only place where the Chub are in good numbers. I know you say there are a few other places in the main river where chub are found, but the LCR is the only big population. And because the Tribal groups do not like your science and your native fish vs. non-native fish distinctions when it comes to killing living beings, do not take it out on the rest of the river or Lee's Ferry, because the rights of the non-Indian public like myself, who equally do not like unnecessary killing, and who find life and the whole river sacred, just as the tribes find that emergence region sacred, should be respected as well.

So, to re-cap, the alternative I wish you would look at:

1. Embrace the changed river regime and learn to appreciate and value stewardship of a changed river, and the positive role trout can play. Work with nature, not against her.

2. Get creative with saving the chub, including transplants to other suitable river systems.

3. Concentrate on the Little Colorado River, as it is the only place with conditions allowing chub growth.

4. Concentrate on Brown trout, as they like to eat other fish more than rainbows. Leave rainbow trout alone. Even consider allowing rainbow trout to spawn in tributaries.

4. Either (a). Prove you really support the sport fishing community, or (b). Stop trying to bullshit the sport fishing community, acting like you are their friend with promises of a trophy trout fishery, when what you secretly want to do is slowly eradicate the fish. Genuinely admit trout are nice to have in the river, and genuinely feel good for a vibrant fishing community which uses Lee's Ferry.

355
I have traveled through the Grand Canyon on the Colorado twice. It is a very special place where I have been able to experience true wilderness with close family and friends.

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

356
The Grand Canyon/Colorado River area is a gem of beauty and solitude. Boating on the river is the only way to truly experience this beautiful place. I have had the opportunity run with the river 3 times over the last 20 years with family on private trips. The remoteness of the area requires a multi-day journey, and riverside camping is mandatory. Reasonably spaced campsites are necessary to support the already limited public access, and safety in recovering from mishaps. Campsites require sand, and sand is displaced by the unnatural river flows from Glen Canyon Dam. Unfortunately, conflicting public interest requirements to 1) preserve the natural

environment and public access, and 2) provide energy for the public use bring us to a decision point. This you all know. I urge the development of a river management plan that fully acknowledges the protection of this unique place for the benefit of current and future generations.

This appears to have been ignored in the past. The LTEMP is the opportunity to correct this unfortunate circumstance. Please use all resources necessary to arrive at an optimum solution.

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I have been a grateful passenger on four Colorado River trips, of 12-17 days in length. The combination of living in the desert of Southern AZ, but also in Green River, WY and in Salt Lake City, UT, I believe has given me a unique insight into what water means to all of those various areas. First of all, Tucson. I moved to Tucson in 1966 after 10 years in Phoenix as a child. The difference in areas was significant. In Phoenix, flood watering of yards in neighborhoods was the norm. We lived in a rented house on the side of a hill, so no "flood" irrigation either necessary or available. Most of Phoenix, 1956 to 1966 was comprised of neighborhoods that strove to have the greenest lawns, biggest trees, prettiest flowers. You'd never think you were living in a desert in those neighborhoods, and flood irrigation for those glorious lawns was the norm. Tucson, as a college freshman in 1966 was a huge change; much smaller, no super busy streets, lots of "desert" style landscaping, but still, some neighborhoods that strove for the greenest lawns, etc. I'm not sure when it started, but sometime I think in the 70's, people started to become much more aware of water, lawns, irrigation, etc. As time went on, and we responded to the local tv station's "when will the ice melt on the Santa Cruz" contest, slowly, water conversation became much more of a current topic. I think the vote to put water back into the aquifer happened in the 90's. Then Green River, WY in 200-2002. A beautiful 6000+ ft high area, home of the start of Powell's run on the Colorado. The Flaming Gorge with all of it's nooks and crannies for fishing, waterskiing, tons of outdoor sports and entertainment which Wyomingites love. I recognized it as one of the scource rivers for the Colorado. 2002, in Salt Lake City, Utah, deployed for the winter Olympics, but a visitor there many times over the prior two years. The SLC valley is stunningly beautiful, bordered on the east side by magnificent snow capped mountains, and on the west by the saline Great Salt Lake. Just like Green River, WY, Salt Lake City is a high desert, yet, again, lots and lots of midwestern style homes, trees and lawns, just like Phoenix. Phoenix and SLC; two cities who don't really want to be deserts. Water from the Flaming Gorge project to put water from SW Wyoming and NE Utah into the front range to augment Denver's suburban growth, or water from the Lake Powell pipleline project, taken from Lake Havasu, to supplement farming in Southern Utah, steal water from all of the down river areas that come from the Colorado River. To quote The Salt Lake Tribune, opinion page, entitled Flaming Hypocrisy, Jan 18, 2012: The reason these things are overseen by federal authorities - in this case, the Federal Energy Regulatory Commission - is that a broader view is needed. Water drawn from one place affects not only human activities, both urbanization and agriculture, but also fish, animals, plants, the survival of whole ecosystems. The downstream, long-term impact of any such move, factoring in climate change models and human demographics, must be carefully considered. State lines should not matter.

358
Please keep as much of this jewel above reservoir waters as possible.

359
I can about the health of the river and recreational opportunities that lay hidden under the lake

360
I am writing in regards to the Long Term Experimental and Management Plan Draft EIS for Glen Canyon Dam. The LTEMP plan needs to meet the mandates of the Grand Canyon Protection Act and focus on statement from the Act that states: "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." To me, this statement about sums it up but there are pletora of reasons that support it as well: There needs to be protection of cultural sites and intergration of cultural values. The 11 affiliated tribes in the Grand Canyon area need to have their voices and values incorporated into the plan, something that is lacking thus far. the agencies involved in the LTEMP need to be clearly defined in their roles and eliminate redundencies. Further, other rivers that are dam managed should be studied and their negatives/positives should be evaluated to learn from them. Then, that information should be applied to the LTEMP process. Resources of the National Park/Recreation Area play an very important role and they should be both maintained and improved upon for future generations. There needs to be a focus on benefiting, protecting and preserving all of the downstream resources. This should go beyond looking at beach sedimentation and fish communities, it should include cultural heritage and more. The endangered Species Act states that habitat needs protection not just the species itself, this should not be taken lightly. No species including humans can survive without a healthy and balanced habitat. Another issue that deserves attention is flow regulation. Studies in longevity and broad scope need to be conducted to produce sufficent scientific data that can be analyzed and applied to the plan. Moreover, safe flows for boat navagation should be considered as well. Overall, the LTEMP must be based on an adaptive ecosystem approach because the area it is focusing on is itself a dynamic and ever changing place.

361
I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study:
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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

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The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

362
Please note my input that future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992. Beaches are important to wildlife and recreationists. I believe that the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future. Solid science, not hydropower and water supply interests, should drive these management decisions. It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values. The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

363
On behalf of the Farmington River Club, a group of 60 + whitewater canoers and kayakers in Connecticut I wish to encourage a thourough review of Glen Canyon Dam release schedules with full consideration of imapcts on down river ecology including sediment build up and removal. We support Grand Canyon Private Boaters Association scoping comments on the NPS Long Term Experimental Management Plan.

364
In February of 2011 I was lucky enough to spend 25 days in Grand Canyon, rafting the Colorado. Grand Canyon is an amazing place, and should be protected.

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

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365

The local community of businesses in the Lees Ferry/Marble Canyon area have historically derived a large portion of their annual income form destination fishermen. The destination fishermen and resulting revenue they generate in the shops, restaurants, lodges and bead stands provided the local businesses and therefore the local residents with a year round revenue stream. The dramatic decline in destination fishermen to the Lees Ferry/Marble Canyon area s largely due to the decline of the Blue Ribbon status along with other factors such as discouraging news releases regarding the killing of trout in the Colorado River, flow regimes which make shore fishing challenging etc.

The three hospitality businesses, guide services and roadside jewelry stands along 89A have all experienced similar declines in revenue based on the decline of the fishery attraction to destination fishermen. Year round staffing is substantially reduced with most staff now seasonal. Businesses are closed or open drastically reduced hours for much of the late fall and winter months. During the years that the Lees Ferry fishery was recognized as a Blue Ribbon trophy trout fishery the businesses were not only open all fall and winter months these were the most lucrative months of the year.

As a business owner I support the comments submitted but John Jordan, AMWG Representative for Recreational Fishing. As a business owner and fly fisherman, I have worked closely with John as he prepared his comments on behalf of the general fishing community.

I support the comprehensive plan for managing the local fishery in a coordinated manner including recovery, maintenance of native fish along with recovery and maintenance of a Blue Ribbon trophy trout fishery in the Lees Ferry reach of the Colorado River as submitted by John Jordan. Details of this proposal are available in the submittal from the recreational fishery comment submittal.

366

Glen Canyon Dam has been a disaster for the Grand Canyon. The dam traps most of the sediment that used to travel downstream and prevents natural river flows. As a result, the Grand Canyon's beaches, sand bars, and wildlife habitats are eroding away. Several native fish species, including the humpback chub, have become endangered. In 1992, the U.S. Congress responded to the growing crisis by passing the Grand Canyon Protection Act (GCPA), and in 1996, the Secretary initiated the Glen Canyon Dam Adaptive Management Program (AMP) to monitor dam operations and to recommend changes in those operations to protect the Grand Canyon. The AMP has supported important scientific study. However, it has failed to recommend any significant changes in the operation of Glen Canyon Dam. As a result, the health of the Grand Canyon has continued to decline. The LTEMP EIS must include a full and honest assessment that lays the groundwork for the protection and restoration of the Grand Canyon.

A far better solution, one that would protect both Glen Canyon and Grand Canyon, would be to fill Lake Mead first.

Save the Grand Canyon!

367
I strongly feel the primary criteria to be considered is the one that is most like the natural flows of the river. This would have the least adverse environmental impact. It would be the plan that has the most beneficial consequences to the Colorado River, the Grand Canyon, the wildlife, and the people in the area.

368
I encourage the grand canyon releases be planned in a way that will protect the natural resources within the grand canyon and the wilderness experience to recreational users including private boaters and day hikers with a particular focus on restoring sandy, campable beaches in the grand canyon.

I am lucky enough to have enjoyed the grand canyon as both a private boater and as a hiker. I feel strongly that this great natural resource is held in trust for future generation and should not be traded for short term goals of power generation or downstream water use.

369
I am a river guide in the Grand Canyon. I think the L Temp EIS Draft should benefit the beaches, cultural resources, and ecosystem to comply with the Grand Canyon Protection Act.

370
Return the Grand Canyon and other abused river systems to the people of the United States and to a wilderness state. Please ignore the economic influence commercial activity has on the preservation of wilderness. Wilderness should be preserved in its own right. Commercial activity and corporations do not belong in the wilderness. Wilderness is for the natural ecosystem and for the people of the United States and the world. I mean all people who want to visit this beautiful place, learn from it and take it on its own terms. Corporations should be outlawed in the wilderness. IF you need a guide or someone to pamper you while you are in the wilderness and take liability for your misfortunes, go to Disney World. Let the river flow freely. Let the ecosystem recover. Ban motors. Ban commercial companies. Allow private individuals to obtain a river permit to enjoy this wilderness. Do not make it a lottery. Very few people are lucky enough to get a permit. It takes a person, on average, much longer to obtain a permit through the lottery than through a wait list. Make the wait list fair and ensure that every person who wants to obtain a river permit to run the river again gets at the end of the wait list and waits until everyone ahead of him or her has had a chance to obtain a permit.

371
I believe the river operations should be managed to benefit the environment first and foremost.

372
Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

373
I fully support comments submitted by Grand Canyon River Guides including the following:

FOUNDATIONAL ELEMENTS:

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 is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which specifically states, 4The 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."

Change the Purpose and Need for Action Statement for the LTEMP 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 which is an ancillary benefit of the dam.

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. 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.

The LTEMP 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.

Clearly define agency responsibilities, improve communication, create mechanisms for productive information sharing, and eliminate project redundancies between Grand Canyon National Park and the Grand Canyon Monitoring & Research Center.

Ensure that the 11 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 decision making—a distinct failure of 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 tribes view all canyon resources as culturally significant.

Funding for monitoring and management of cultural resource should be restored. In order to comply with the Grand Canyon Protection Act, federal laws, statutes and executive orders, the importance of protecting and preserving these fragile, non-renewable resources and Traditional Cultural Properties for the benefit of future generations must not be minimized.

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.

Improve the structure and functionality of the Glen Canyon Dam Adaptive Management Program 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.

RESOURCE ISSUES:

Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come.

Consider carrying capacity and campability—design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

Focus 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 protects and preserves the individual resources along the Colorado River.

The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

Examine the role of time and climate change in the system.

Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

FLOW SUGGESTIONS:

Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives.

Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention.

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.

Include an LTEMP alternative to test steady flows.

Consider an alternative that includes a seasonally adjusted steady flow alternative that includes sediment triggered Beach Habitat Building Flows, and based on the closest approximation of the pre-dam hydrograph.

We need a scientifically credible, well-designed steady flow experiment of sufficient longevity to produce a biological signal (more than two months in the fall) that is followed by a full synthesis of impacts to biological, physical, social, economic and cultural resources.

Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

Test the "best case scenario" presented in the article, "Is there enough sand? Evaluating the fate of Grand Canyon sandbars" as proposed by USGS scientists.

Design an alternative based on the best chance of viability for rebuilding and maintaining sandbars.

I have been fortunate enough to have been on three river trips through the Grand Canyon - including one where I rowed - and on each trip I was appalled by the impacts from Glen Canyon Dam. Management, an unfortunate necessity, should guarantee protection of ecosystems natural and native to the the Grand Canyon.

374

I strongly support the Long Term Experimental and Management Plan Draft EIS for Glen Canyon Dam (LTEMP). For 38 years Tulane has run a river trip down the Colorado River as part of a regularly scheduled course (Grand Canyon Colloquium 412) which focuses on the Geology, Biology, Anthropology, and History of the immediate region. The LTEMP seems very sensible to us to help maintain the objectives of the course. Our university (Tulane) has made a commitment to this course and this type of teaching that accentuates environmental and presentational well being of the floor of the canyon. No other university has maintained a program of this type for as many years where the participants are undergraduates. To threaten in any way the goals of our teaching mission would warrant our opposition and the LTEMP to the contrary appears to support or goals over the long haul. Over the history of our Grand Canyon program we have taken over 700 students through the canyon on rafts and our feed back on the quality of the experience and educational value has been exceptional. We strongly support the LTEMP and support its passage.

375

I am very concerned about the impacts of Glen Canyon Dam on Glen Canyon, Grand Canyon, and the Colorado River. The Grand Canyon is one of our country's most prized national parks, yet its health has been deteriorating from the effects of Glen Canyon Dam. For years, the Dam has been managed in a way that neglects the ecological, cultural, and recreational resources of the Grand Canyon, including threatening or endangering several native species of fish and wildlife. The experimental flows during the past fifteen years have been inadequate to restore the beaches in Grand Canyon and its ecosystem as a whole.

I urge you to ensure that the LTEMP EIS meets the requirements of the Grand Canyon Protection Act, 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." It is critical that this study: 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.

Here are my specific comments on the scoping phase of the LTEMP EIS process:

The LTEMP EIS needs to fully meet the requirements of 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.

All alternatives in the LTEMP EIS should fully address the potential impacts of climate change on water supply and quality, wildlife habitats and communities, recreational use, and cultural sites.

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.

The BOR and NPS 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 GCPA.

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 the Fill Mead First proposal, 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.

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. As long as the dam continues to be operated in the current manner and the reservoir continues to trap sediment, beaches in the Grand Canyon will continue to be eroded, and sediment will continue to be lost downstream.

This EIS should provide alternatives that seriously assess the potential for both natural water and sediment flows by opening new tunnels to bypass Glen Canyon Dam. It should include consideration of Glen Canyon Institute's Fill Mead First proposal, which would shift primary water storage from Lake Powell to Lake Mead. This approach could reduce the amount of water lost through evaporation and seepage and allow greater flexibility for Grand Canyon restoration strategies.

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The recreational experience is tied to the environmental quality. Flow management should strive to maintain geomorphic processes that are based on channel functions; sediment transport, riparian regeneration, and floodplain connection. Maintenance of geomorphic processes will sustain robust and healthy ecological attributes; riparian, aquatic, avian, ect. Long-term management should incorporate flood flows (5yr, 10yr, 50yr, ect.), as well as base flows.

377

Utah Associated Municipal Power Systems (UAMPS) representing 30 municipal electric utilities, electric service districts and water conservancy districts that purchase and distribute power generated from the Salt Lake City Area Integrated Project commonly referred to as CRSP and whose members have a direct interest in the operations of Glen Canyon Dam. UAMPS has been a member and active participant in the Glen Canyon Dam Adaptive Management Work Group (AMWG), a federal advisory committee, since its creation. We wish to provide the following scoping comments on the Glen Canyon Long Term Experimental and Management Plan (LTEMP) Environmental Impact Statement (EIS). UAMPS is a member of the Colorado River Energy Distributors Association (CREDA) and fully supports the comments submitted by CREDA in this LTEMP EIS scoping process. UAMPS questions the relationship between this EIS, the previously announced High Flow Experiment Environmental Assessment (EA) and the ongoing Non-Native Control EA and as such is concerned whether these actions may have serious cumulative consequences for the humpback chub (HBC), as well as the range of hydropower and other economic impacts resulting from these several environmental processes.

We wish to emphasis that the purpose and need statement of this EIS required by the Council on Environmental Quality (CEQ) is not clearly defined. There is confusion as what may be management actions and what may be experimental actions and how the purpose and need of the EIS will be influenced by the two ongoing EA processes. The purpose and need statement must include and reflect all ongoing environmental processes. UAMPS urges that the purpose and need statement fully reflects the proper balance in the operations of Glen Canyon Dam such that all statutory responsibilities required by the "law of the river" as contemplated by the Grand Canyon Protections act are met.

UAMPS further urges that the LTEMP EIS consider the recommendations of the Glen Canyon Adaptive Management Program (AMP) which includes the activities of the AMWG. The AMP process involves numerous stakeholders each holding differing views of the resources relating to the downstream values below Glen Canyon Dam. Recommendations made by the AMWG are reviewed by scientific advisors to ensure the actions meet scientific scrutiny. As a whole, the AMP process is invaluable in making balanced recommendations of experimental actions which should be followed by the LTEMP EIS.

378

I think any time our 'law of the river' culture creates a new chapter to management of the Colorado River - and especially the operation of the reservoirs and river flows through the Grand Canyon- it is an auspious time. We must be reminded of the Park Service mission statement in the organic act and the legislative obligations to operate Glen Canyon dam for the least possible resource damage to the downstream resources. So let's! Please do. No doubt we will await what plans for the canyon are about to unfold. I think it is time to seriously consider the changing climate and the eventual drying of the Colorado River system. It is realistic to change paradigms of water resource managment and reservoir management. "Fill Lake Mead first" is not a silly environmental slogan. It is a potential water saving stratagy that can benefit consumptive use as much as it can potentially positivly effect natural resources in Glen Canyon. Better we do with a plan than improvise and infight amongst various water interests.

Historical photographs of Grand Canyon beaches along the Colorado River uniformly show a reduction in beach size in the Grand Canyon. Numerous formerly camp-able beaches have disappeared completely and many others have decreased in size, and continue to do so due to the management techniques employed by the operators of upstream Glen Canyon Dam for the purpose of maximizing power output and delivering silt reduced water to downstream Lake Mead.

Currently little regard is payed dam operations to the environmental needs necessary to sustain a healthy river corridor eco-system or to the needs of recreational users. Recreational users, river runners and hiker/backpackers count on having beaches as an important part of the wilderness experience offered by the Grand Canyon. Nor does the current dam operation live up to the spirit the Organic Act which charges the National Park Service to "protect and preserve for the future enjoyment" our national natural treasures like the Grand Canyon National park.

Good luck in your study process and I look forward to learning along with all the constituencies as you move forward.

379

I first visited the Grand Canyon 51 years ago, and have had the opportunity to make two trips kayaking the river through the canyon. I hope to be able to make more. I don't know all the details, but I know that there are decisions being made as to the operation of the Glen Canyon Dam, and obviously these decisions have a major impact on the canyon. I know that the Grand Canyon Protection Act, passed in 1992, states that the dam should be operated "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." Science as well as personal experience, have shown that protecting beaches is vital to the health of the canyon, from a recreational and environmental perspective. Water releases from the dam must consider beaches as well as protection of the ecological and cultural integrity of the Grand Canyon. Please do not let hydropower and/or water supply interests dictate the timing and quantity of releases. Flows relating to water supply and hydropower need to be implemented in a way that protect, and where possible, restore downstream values of the Colorado River and Grand Canyon.

380

I am a river runner and am very concerned about how the Glen Canyon damn operations is affecting the environment. I have witnessed increasing erosion of beaches and degradation of access to protected artifact viewing areas. The current management of damn releases seems to repeat the same failed theory of flooding periods to re-deposit sand to the river corridor. I wonder if the only way to reintroduce sediment to the corridor is to deposit it upstream of the damn, prior to releases? I support the following points, outlined by the GCPBA:

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

Maintain or improve the quality of recreational experiences for users of the Colorado River, for us and for generations to come.

Focus on benefitting, protecting, and preserving all of the downstream resources (such as camping beaches, cultural sites, biota, and so on) and their associated values — i.e. the LTEMP should go beyond a focus on mass sediment balance and fish.

The High Flow Protocol should be a well defined key component of LTEMP alternatives.

Design intervening flows (between high flow events) that maximize sediment retention on beaches and backwater areas for the benefit of campers and native biota.

LTEMP alternatives must be scientifically defensible and credible with well defined hypotheses, building on what we have learned from GCRMC and LTEMP implementation.

The LTEMP must be based on and adaptive ecosystem management approach.

Include an alternative to test Seasonally Adjusted Steady Flows that includes sediment triggered Beach and Habitat Building Flows (BHBF) based on the closest approximation of the pre-dam hydrograph. Consider minimum flows no less than the long-term base flow of the Colorado River.

Test the "best case scenario" presented in the article, Is There Enough Sand? Evaluating the Fate of Grand Canyon Sandbars as proposed by USGS scientists. This alternative must have viability for rebuilding and maintaining sandbars.

Consider options that include adding sediment below the dam consistent with a pre-dam sediment profile.

Consider triggering flood flows based partly on distributing sediments from the LCR or Pariah (or other major sediment sources) when those tributaries are supplying large amounts of sediment.

Restore historic water quality: temperature profiles, pH, and species abundance.

Limit the rate of increase/decrease in flow rates to promote boater safety and beach preservation and enhancement.

381
We only have one Grand Canyon. Future generations deserve to have it taken care of.

382
I'm a part-time river guide who cares about the Colorado, and the planet in general. Althought he issues are complex, I would advocate following the remarks prepared by Grand Canyon River Guides regarding the LTEMP. That seems a good balance between all stakeholders. Please weigh that heavily.

383
Thanks for allowing citizens to voice opinions about the poposed EIS. I have had the pleasure of floating the Colorado River thru the Grand Canyon five times. My thinking follows the ideas outlined by the American Whitewater Association. I add my alternative for the EIS at the end of this letter. Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992. Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events. Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future. It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values. The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests. Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon. My idea would be to include a dam removal alternative in the EIS. Yes, we are in the process of trying to remove four dams on the Klamath River. Would be nice to restore Glen Canyon to its former glory and allow the built up silt to disperse throughout the Grand Canyon to restore depleted beaches. Allow endangered fish the opportunity to once again thrive in warm water. Give future recreationists the opportunity to experience true high water conditions that are no longer available. Sometime in the future they are going to have to deal with this issue when the existing dam starts storing more silt than water. May as well look at some of the issues now. Your EIS

would be more complete and better stand up to a court challenge if it includes a Dam Removal Alternative.

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FOUNDATION: It is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

Change the Purpose and Need for Action Statement for the LTEMP 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 which is an ancillary benefit of the dam.

RESOURCE: Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come. Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

FLOW: Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives. Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

385
I have twice enjoyed the peace and spectacular beauty of the Grand Canyon on river length oar-powered raft trips. Please manage Glen Canyon Dam for the benefit of the Grand Canyon.

386
I support the comments made by the organizations I belong to: Grand Canyon River Guides, Grand Canyon Private Boaters Association, Grand Canyon Association, and the Grand Canyon Trust. Rather than repeat those comments here, I will make a few of my own which may, to some extent, overlap those made by the organizations I mentioned.

First, a bit about my background. I first visited the Grand Canyon and hiked down to the Colorado River in 1957, before the construction of Glen Canyon dam. Starting in 1974, I became a Grand Canyon river runner, and have done some 187 whitewater river trips through the Grand Canyon so far. I worked as a river guide for Arizona Raft Adventures (Flagstaff) from 1979 to 2010, and am now retired. In addition, over the years I have done numerous backpacking trips in the canyon, most of which involved spending one or more nights on a "beach" next to the Colorado River. If you were to add up all of the days I've spent below the rim - mostly on the

river, but in the back country as well - they would total more than seven years; in other words, I have spent more than 10% of my entire life in the Grand Canyon, and most of that was on the Colorado River or next to it.

So I have been observing the Colorado River in Grand Canyon for some 55 years now...and among other things I have seen are the downstream effects resulting from the operation of Glen Canyon Dam. It is extremely difficult to describe the extent of the changes that have resulted from Dam operations, not because I am personally unfamiliar with them, but rather that they are so great as to almost defy belief, even in spite of the evidence of my own experience and memory.

Most of these changes have negatively impacted the resources of the Grand Canyon. Even with the passage of the Grand Canyon Protection Act, downstream resources have been consistently neglected in terms of priority in the management of Glen Canyon Dam operations. As a result, conditions along the river have continued to get worse over the years, whether you are talking about native plants and animals (including native fish), archaeological sites, camping conditions for hikers and river runners, etc.

The operation of Glen Canyon Dam was originally supposed to be for multiple purposes, including (but not limited to) water and power resources. But hydro power and water resource considerations have come to dominate the management of the dam, and other public resources have been consistently neglected as a result. It is now time for this to change, and the originally intended balance of consideration for ALL resources needs to be restored and made a central part of the future management criteria.

But not only is it essential that the management criteria be modified to give equal consideration to things other than water and power, it is time for some serious effort to undo the extensive damage that has already been done over the past 50 odd years of Dam operations. In particular: there should be some significant emphasis on RESTORATION of things that have been lost due to past management practices that focused on power, money, and water delivery without regard to other - equally important - values, as required by law.

Some things that need RESTORATION: native fish species (like the Razorback Chub) should be part of the management plan. These are currently bred and raised at the hatchery at Willow Beach, below Hoover Dam. Why has there been no attempt at re-establishing them in the Grand Canyon, where they belong as part of the natural environment? This is inexcusable! While I realize that much has been done on behalf of the Humpback Chubs, it is not clear than any substantive progress has been made in ensuring their long term survival. I don't know what the solution is, but it is easy to get the impression that there is an attitude that "it's just a fish" and that the destruction of native fish, and adverse impacts on other plants and animals, is not taken very seriously when it comes to managing Dam operations. This needs to change!

The situation with regard to sediment depletion is also critical. It is no exaggeration to say that it sure looks like more than half the river channel sediment I saw on my first trip is now gone on downstream as a result of the way the Dam has been operated. This has an immediate impact on recreational users, be they river runners, hikers, or backpackers. But even more serious, I think,

is the impact on other resources - archaeology, native plants, and - I'm sure - other things too. Efforts to store sediment in the system - above river level, on the banks - should not be limited to "experiments" but rather part of the general management criteria. Further research on ALL resources also should be a basic component of the management plan. Although a lot has been learned over the years through research programs, much more remains unclear and needs to be carefully studied. Even more important, however, is a willingness to incorporate the results of research into Dam operational plans.

Although I have focused on downstream effects of the operation of Glen Canyon Dam, consideration to the UPSTREAM effects should be a part of the management plan as well. It used to be, you could boat down the San Juan or Colorado Rivers and continue your trip across Lake Powell. Because of the effects of Glen Canyon Dam, this is no longer possible in either case. Fixing this - and restoring access to the "Lake" from the upstream direction - will certainly not be easy. Perhaps it will even be impossible, it certainly is not a trivial problem. But it should at least be an objective of the new management plan - to study, and (if possible) find a solution for this undesirable consequence of the operation of Glen Canyon Dam. I'm sure there are other equally important impacts upstream of Glen Canyon Dam that need to be considered and researched, with the intent of eventually finding some remedy, but I don't know enough to tell you what they are. Finding out - through research looking UPSTREAM - needs to be part of the new management plan.

In summary: the new management plan must include continuing research on the negative effects of Dam operations (both upstream and downstream), a dedication to fixing what has already been destroyed to the extent possible, and it must include operational criteria that will stop - not just slow down - further negative impacts on resources that belong to everybody. No doubt this will have a cost - measured in dollars - and an impact on operations that in the past have been managed primarily for water and power. But the resources of the Colorado River belong to everybody, the water and power benefits go to just a few. It is time to take a broader view of the management of Glen Canyon Dam operations to ensure that the next 50 years will be more enlightened than the last.

387

Arizona Raft Adventures has been serving Grand Canyon National Park visitors by providing raft trips down the Colorado River since before 1974. We have guided tens of thousands of guests through this section of river and have a very vested interest in the operations of Glen Canyon dam and their impact to Grand Canyon. Not only do we have a responsibility to our clients, our employees, and ourselves to ensure that Grand Canyon remains an environmental sanctuary, we also are passionate about protecting its resources. Above all else, in the Grand Canyon we have a responsibility to preserve resources. The Canyon's resources are many and varied, including, but not limited to, the following:

cultural antiquities and sites

flora and fauna, such as the currently compromised mesquite and acacia populations; native fish and snails, also currently at risk, etc.

camping areas for recreators.

In the past, including the recent past, the operations of Glen Canyon dam have significantly prioritized power interests over this irreplaceable resource. Although the rates of up-ramping and down-ramping have been more regulated in recent years, the flow regimes continue to erode beaches at an alarming rate. These beaches provide habitat for native flora and fauna, protect cultural resources (such as archeological ruins and artifacts), and provide camping areas for Grand Canyon visitors. In addition, the Beach Habitat Building Flows, while helpful, have been insufficient. They are too infrequent, too low volume, and oftentimes too delayed (I refer to the fact that a BBHF is often months after a sediment trigger event) to make a significant change in the erosive qualities of a post-dam Colorado River and reverse annual erosion due to the flow regimens themselves. It is imperative that these flows be driven by science. "Driven by science" has several important implications:

We need a regular scientific team (perhaps Grand Canyon Monitoring and Research Center) evaluating the effects of (a) a sediment poor river with sediment trapped behind Glen Canyon dam, (b) flow regimes that exasperate the scouring effects of a sediment poor river, and (c) Beach Habitat Building Flows.

We need the baseline plan to include significantly regular Beach Habitat Building Flows, with the frequency and level to be determined by existing scientific data, and

We need an adaptive management plan that will be changeable based on ongoing research, with the specific goal in mind to protect Grand Canyon and its resources.

388

American Whitewater appreciates having the opportunity to provide comments during the scoping period for the National Park Service and U.S. Bureau of Reclamation's Glen Canyon Dam Long Term Experimental and Management Plan Environmental Impact Statement (LTEMP EIS). On January 10th, 2012, American Whitewater submitted joint comments with Grand Canyon River Guides, Grand Canyon River Runners Association, Grand Canyon River Outfitters Association, and Grand Canyon Private Boaters Association. We incorporate those comments by reference, and submit the following additional comments regarding the operation of Glen Canyon Dam.

American Whitewater is a national 501(c)(3) non-profit organization that works to conserve and restore our nation's whitewater resources and enhance opportunities to enjoy them safely. Through our combined membership and affiliate clubs, we represent the conservation interests of tens of thousands of whitewater enthusiasts nationwide. As avid whitewater recreationists, we place a high value on protecting and restoring naturally functioning river ecosystems, including their fish and wildlife, geomorphic processes, and cultural connections. Our membership highly values the Colorado River, particularly as it flows through Grand Canyon National Park. As a result, we have a direct interest in seeing the Colorado River below Glen Canyon Dam be managed in a way that complies with the Grand Canyon Protection Act of 1992, uses sounds science to restore the river and its natural hydrograph, protects and recovers endangered species, and ensures a positive recreation experience for all who visit the river.

CONSIDERING ECOLOGIC, CULTURAL, AND RECREATION VALUES IN MANAGEMENT DECISIONS

The Grand Canyon Protection Act ("GCPA") requires the Secretary to "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(a)). The LTEMP EIS should ensure that all alternatives are in alignment with the GCPA, and be written with the consideration that the primary purpose of the operation of Glen Canyon Dam should look beyond maximizing hydropower interests. The underlying purpose of Glen Canyon Dam, which was authorized by the Colorado River Storage Project Act of 1956, was to regulate the flow of the Colorado River for water storage and supply. Hydropower was listed as an "incident" of water supply purposes (see Section 1 of the Colorado River Storage Project Act — 43 U.S.C. ' 620(1)).

The Colorado River and Grand Canyon is a complex ecosystem, and our understanding of it is evolving as we continue to monitor and study the area. American Whitewater supports continuing research under all alternatives, and adaptively managing the system to respond to new information throughout the next 15 to 20 years. The USGS's Grand Canyon Monitoring and Research Center (GCMRC) has been the leading research body for the Colorado River, and as such, should play a key role in both developing the EIS and experimenting, monitoring and informing the Adaptive Management Work Group (AMWG) into the future. Additionally, because the AMWG is tasked with recommending management actions relating to dam operations to the Secretary of the Interior, American Whitewater supports a more balanced make-up of the AMWG in the future to reflect the ecological, cultural, and recreational values of the canyon.

Additionally, numerous river systems throughout the country are managed by dam operations, and much is being learned about how to operate dams in a way that strives to restore riparian ecosystem functions as much as possible. We suggest that the GCRMC and Adaptive Management Working Group look to these other examples, learn what has worked and what hasn't, and assess whether they would make sense for the operation of Glen Canyon Dam and the restoration of the Colorado River below the dam. For example, the rate at which flows are increased before a high flow event and then decreased afterwards can have a significant impact on the riparian system (See Yarnell, S, Viers, J and Mount, J. 2010. Ecology and Management of the Spring Snowmelt Recession, BioScience, Vol. 60 No. 2. Available at: http://watershed.ucdavis.edu/pdf/Yarnell_etal_Bio Science2010.pdf). Known as the "snowmelt recession," American Whitewater has either successfully used, or is currently advocating for, this model on California's McCloud, Feather, and Yuba/Bear rivers, and Colorado's Upper Colorado and Dolores rivers. We support seeing flow regimes similar in intent, which mimic the natural hydrograph, considered in the discussions of High Flow Events below Glen Canyon Dam.

SEDIMENT/FLOWS

As was mentioned in our joint letter, one our primary concerns relates to the restoration and maintenance of the Colorado River's sandbars and beaches. Glen Canyon Dam blocks

approximately 90% of the potential sediment load in the river, which has had a significant impact on numerous values, including habitat for federally listed endangered species and other wildlife, beaches for hikers and whitewater enthusiasts, and protection for cultural resources.

In our joint letter, we ask that the LTEMP take maximum advantage of natural sediment augmentation opportunities from the Paria and Little Colorado River watersheds and test the best-case scenario presented in the article, "Is There Enough Sand? Evaluating the Fate of Grand Canyon Sandbars", GSA Today, Volume 18, Issue 8, August 2008. Additionally, American Whitewater supports the finalization of the High Flow Experimental Protocol Environmental Assessment so that it can be incorporated into the alternatives considered in the LTEMP EIS. Since 1996, the GCMRC has studied three high flow events to enhance sediment build-up on beaches, which have proven to be beneficial for beach building. More beach building flows should be studied in the future, with recreational safety in mind. Additionally, adaptive management actions should consider the larger picture, examining whether the distribution of sediment is meeting the downstream values and goals rather than just focusing on the volume of sediment.

The GCPA also requires the operation of Glen Canyon Dam to be consistent with the "Law of the River", providing water resources to the Colorado River Basin States. These flows include "equalization" flows between Lake Powell and Lake Mead. The LTEMP EIS should take a proactive approach in recognizing that these flows may be necessary in the future, and develop a way to implement them while giving full consideration to downstream values.

ALTERNATIVES

Future management decisions about hydropower and water supply need to be implemented in a way that does not harm, and when possible, protects, restores and enhances the ecological, cultural and recreational values of the Colorado River below Glen Canyon Dam. American Whitewater believes that all Alternatives considered in the LTEMP EIS should:

Meet the intent of the Grand Canyon Protection Act of 1992, which requires that Glen Canyon Dam be operated in a way that "protect(s), mitigate(s) adverse impacts to, and improve(s) 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(a)).

Comply with National Park Service Management Policy 1.4.7.1 (2006), which does not allow uses that would cause unacceptable impacts to park resources and values.

Be based on solid scientific research and include experimentation and adaptive management into the future;

Include flows that restore, enhance, and protect beach habitat and sandbars;

Look beyond mass sediment balances and examine whether the sediment benefits, protects and enhances downstream values;

Improve the quality of the recreational resources of the river, and insures their protection into the future.

Thank you for considering our additional individual comments and our original joint letter. We appreciate your work on the operation of Glen Canyon Dam and look forward to the Draft LTEMP EIS.

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This past September I paddled 225 miles of the Grand Canyon between Glen Canyon Dam and Lake Mead in a kayak. There really is no other place on earth like the Grand Canyon, moment by moment I was blown away with its beauty. The whitewater, the camping, the hikes, and the scenery were all the best I have ever experienced and it is my sincere hope that the preservation of the Grand Canyon are of the highest priority. River flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon. Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon is a one of a kind natural resource and it's management is critical for those of us throughout the world that love it. I hope to paddle the Colorado many times in my life, please take the sentiments of people that enjoy the Grand Canyon for recreational purposes seriously.

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As a river guide in the Grand Canyon with over 100 trips I know the Grand Canyon and the Colorado River quite well. My first trip was in 1985 and I can tell you that the beaches and canyon have seem some drastic changes since that time. Almost all of the beaches along the Colorado River in Grand Canyon are smaller now than in 1985. I think it is very important to manage the river system in a way that is beneficial to the Grand Canyon. I have a few points I would like to make.

#1. As the west seems to be in a continual drought, and with a growing demand for what water is in the Colorado River, I would like to see a federal mandate put in place that would guarantee a minimum flow of 5000 cfs in the Colorado River, even if there are water shortages in the cities of the west.

#2. In order for the Grand Canyon to preserve its unique character I think it is a necessity to develop a plan to bring sediment from the Colorado River in the upper reaches of Lake Powell and deposit them below the Glen Canyon Dam.

#3. I think that if beach building flows are to occur they should be a minimum of 75,000 cfs. This would clear some of the beaches that have been inundated with vegetation since the building of Glen Canyon Dam and the non-flood flows.

#4. I also would like to see flow patterns be more natural when plausible in terms of flow, fluctuation, and season.

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Western Resource Advocates (WRA) appreciates the opportunity to submit these scoping comments regarding the Glen Canyon Dam LTEMP EIS. WRA is a nonprofit conservation organization dedicated to protecting the Interior West's land, air and water. We promote river restoration and water conservation, advocate for a clean and sustainable energy future, and protect public lands for future generations. We have a long-standing interest in the Colorado River basin, including years of engagement in the Upper Colorado River Endangered Fish Recovery Program and in protecting and improving flows in the mainstem Colorado River and its major tributaries. Please add WRA as an interested party to this process, and please include us in any further public correspondence.

We believe this LTEMP EIS process is a key opportunity for the Glen Canyon Dam management agencies to significantly improve the conditions of the river downstream of the dam. Accordingly, we have provided a number of recommendations regarding the alternatives we would like to see developed.

I. The alternatives considered in the LTEMP EIS must meet the natural and cultural purposes of the Grand Canyon Protection Act.

The Department of the Interior must ensure that each of the action alternatives developed for the LTEMP EIS meet the mandate of the Grand Canyon Protection Act 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" (Grand Canyon Protection Act of 1992). Under the current Modified Low Fluctuating Flow (MLFF) regime, many environmental resources and recreational assets have been degraded for the sake of hydropower production. The alternatives developed in the EIS should aim to restore those natural assets.

Specifically, sandbars downstream of the Glen Canyon Dam are essential to aquatic habitat and recreational activities, but they have not been sufficiently rebuilt under the MLFF regime. Therefore the alternatives should emphasize seasonally adjusted daily steady flows that would help prevent the erosion of sandbars and beaches. In addition, carefully timed high flows have been shown to be effective at rebuilding sandbars and should be included in the alternatives.

Each of the action alternatives should ensure adequate protection of endangered species. The humpback chub is one such species that could potentially benefit from an improved flow regime. Steady flow experiments seem to have benefited this fish, and additional experiments may yield more information regarding the restoration of this species. The attributes of stream health - biological, hydrological, geomorphological, etc. - that have been noted by the Grand Canyon Monitoring and Research Center should be criteria against which alternatives are developed and analyzed. In addition, continued monitoring of endangered species under new flow regimes should be an explicit part of the alternatives.

II. Utilize the Grand Canyon Monitoring and Research Center in the development and Assessment of Alternatives.

The experiments and monitoring activities conducted by the Grand Canyon Monitoring and Research Center (GCMRC) have added significant value to our understanding of the impacts of dam releases on the downstream reaches of the Colorado River. Only with their continued research and monitoring efforts will we have the scientific foundations upon which to develop effective management. The Department of the Interior should consider GCMRC data and analysis when evaluating the alternatives in the EIS, so as to ensure that the results of their studies are fully accounted for and integrated into the next flow management regime.

III. Integrate Climate Change into Alternatives.

The Bureau of Reclamation is in the process of developing the Colorado River Basin Water Supply & Demand Study. The Basin Study examines, among other things, the potential impacts of climate change on the Colorado River. Severe and prolonged drought is a primary concern, along with increased hydrologic variability. Any new dam management regime should have sufficient flexibility to address variable or altered conditions. Moreover, the Department of the Interior (Department) should examine ecological vulnerabilities and the ability of these ecosystems to adapt to these hydrologic changes, and adjust water release schedules as needed to reduce ecosystem impacts. The Department should also include an analysis of the potential impacts of climate change to the Colorado River in modeling all alternative water release schedules.

IV. Assess Air Quality Impacts of Management Alternatives.

The LTEMP EIS should quantify the air quality impacts from any changes in hydroelectric output. That is, if hydropower output changes as a result of a new flow regime, other energy sources likely will be used to replace the foregone hydropower. Depending on the source of this replacement energy, it could have negative impacts on air quality, such as increased nitrous oxides, sulfur oxides and greenhouse gas (GHG) emissions. A steady flow regime is paramount, but any associated environmental impacts with a new flow regime should to be assessed and mitigated.

To assess the air quality impacts of various alternatives, we recommend that the EIS: 1) estimate the potential changes in hydropower generation, 2) evaluate the alternatives to meet electricity supply/demand imbalance (including demand-side management) and 3) estimate the greenhouse gas emissions and air quality impacts associated with those alternatives. We believe an accounting of these air quality impacts and GHG emissions will provide a complete assessment of the environmental impacts of any new flow regime.

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I have spent hundreds of hours on the trails and rivers of the Grand Canyon and cannot imagine losing any part of them.

I believe that the LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

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I am concerned by the Glen Canyon Dam issue.

I have been a passenger through Glen Canyon on a commercial rafting trip. The grandeur of the scenery and diversity of the ecosystem were entrancing. The LTEMP Draft EIS should protect that one of a kind ecosystem and preserve the beauty for future generations. I believe this is required by the Grand Canyon Protection Act.

Please live up to the commitments and promises that have been made

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The GCAMP and GCMRC/USGS should be 100% re-organized so there are obtainable goals within the frame work for existing laws. So far over $500 million have been spent with no significant and sustainable changes in dam operations. Just look at any two agendas in the past 20 years and you see the topics are the same and no changes have occurred. Complexity has gone up in the agendas but the outcomes are the same - no change - continued natural resource degradation.

Management - Colorado River Watershed Board Comprised of single person designated from the following: NPS, BOR, Tribal, Basin States, and One Environmental NGO.

This panel elects a chairman and creates a useable set of by-laws. Twice annual meetings that are done via webinar - with thirty days of public input on all agenda items. Since GCD is the lynch pin of the Colorado River the geographic area should include the entire basin. Colorado River Watershed Board members are paid at the rate of a GS-12 and receives an operating budget equal to that. This will prevent the escalation of administrative costs that was so abundant with the USGS/GCMRC further reducing the value of government run science.

Science - DOI scientists are not allowed to participate in any research or monitoring of the Colorado River basin with Colorado River Watershed Board funds. The AMP/GCMRC/USGS has proven just how corruptible and ineffective “government science and management” is. Lack of honest research and review has lead to an embarrassing low level of credibility, as they evolved into a money laundering scheme for the USDOI/BOR. They kept within NEPA compliance by “showing activity toward a goal” - which was really just spending money on circular goals - sediment conservation and trout/native fish - the two biggest and least productive arm-waving debacles in the history of natural resource management.

Put all the data gathering and administrative burden within the National Science Foundation through their competitive practices. No current federal scientist or GCMRC contract scientist in the five years would be eligible to compete for grants. This would remove the AMP/GCMRC/USGS bias and ineptness that is so prevalent today. Now a fresh and highly

respected science group could proceed unencumbered by the recent poor leadership of the AMP/GCMRC/USGS.

Mission Develop a comprehensive and sustainable plan that would make the Colorado River Corridor in Grand Canyon a sanctuary for rare and endangered species. There are no data to support the long term existence of the two reservoirs as they empty of water and fill with sediment. If the Southwest USA is to survive with 10's of million of people then the management needs to address the inherent problems of climate change and the blight of trillions of tons of sediment.

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Very simply, as a recreational user of the river through Grand Canyon, I care. Please protect it. I would like to see the dam managed to benefit the Grand Canyon river environment, including the quality of the riverside beaches.

All LTEMP alternatives should fully meet the intent of the 1992 Grand Canyon Protection Act:

OOperate 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."

To elaborate on the above:

1. Define & ensure a substantial role for the Grand Canyon Monitoring & Research Center (GCRMC) within the LTEMP EIS process.

2. Maintain or improve the quality of recreational experiences for users of the Colorado River.

3. Focus on protecting, preserving, and improving all of the downstream resources, such as camping beaches, cultural sites, and flora & fauna.

4. The high flow protocol should be a well defined key component of LTEMP alternatives.

5. Design intervening flows (between high flows) that maximize sediment retention on beaches and backwater areas for the benefit of campers and native biota.

6. LTEMP alternatives must be scientifically defensible and credible with well defined hypotheses, building on what we have learned from GCRMC and LTEMP implementation.

7. The LTEMP must be based on an adaptive ecosystem management approach.

8. Include an alternative to test seasonally adjusted steady flows that includes sediment triggered beach and habitat building flows based on the closest approximation of the pre-dam hydrograph.

9. Consider minimum flows no less than the long-term base flow of the Colorado River.

10. Test the "best case scenario" presented in the article, "Is There Enough Sand, Evaluating the Fate of Grand Canyon Sandbars" as proposed by USGS scientists. Particularly in regard to rebuilding and maintaining sandbars.

11. Consider options that include adding sediment below the dam consistent with a pre-dam sediment profile.

12. Consider triggering flood flows based partly on distributing sediments from the LCR and Paria Rivers when those tributaries are supplying large amounts of sediment.

13. Restore historic water quality regarding temperature profiles, pH, and native fish species.

14. Limit the rate of increase/decrease of flow rates to promote boater safety and beach preservation and enhancement.

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A large focus in performing any assessment of the management of Glen Canyon dam needs to be focused on the environmental, recreation, and aesthetic value of the resulting river corridor. Please make these items a focal point in any impacts evaluated!

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Please remember the Grand Canyon Protection Act and keep enough water in the Colorado River in Grand Canyon National Park to sustain all life forms that depend on water. The Habitat Beach Building Flows are essential to build our post dam beaches and should always be there as a possibility to utilize. Enough water to navigate river crafts is something we need to share this most remarkable world gem. All Americans and everyone on this planet needs to have the opportunity for all generations to come to experience a healty Grand Canyon. Water is the key element and we need to listen to the trained scientists and have this always protected by law.

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I am a long time canyon river runner and I have participated in a number of NPS campsite survey trips where beach/campsite conditions are recorded and compared to previous collected data.

It's obvious to experienced Canyon travels that the beach environment as we know it is in a death spiral. Beaches and river banks continue to erode without being replenished by and and driftwood due to nearly fifty years of Glen Canyon management techniques.

The NPS charge is to "protect and preserve for future generations" - preservation and protection for the enjoyment of future generations can only be achieved by a change in management regime at the dam.

The role of Glen Canyon Dam as a tool to stop silting of Lake Mead needs to be reconsidered. As we know, sand is deposited in reservoirs such as Lake Mead at the point where river flow turbidity is insufficient to suspend sand particles, the heaviest falling out first, subsequent smaller particles falling out until the inflow to the reservoir is clear.

It was thought that stopping the flow of silted water into Lake Mead wold eliminate the potential and inevitable filling of the reservoir.

The recent severe drought in the Southwest has revealed enormous silt beds at the upper reaches of Lake Mead. This sand falling into the river via the claving process as the river cuts down into these deposits moving the sand deposits further closer to Hoover Dam.

Therefore, it's my opinion that necessary amount of sand needed to rebuild the beaches of the Grand Canyon, thereby helping to achieve the goal and mandate of protecting and preserving needs to be introduced into the flow via a new management regime.

Beach rebuilding is not an impossible task, and I offer for example the Southern California coast which damaged by the construction of numerous jetties resulting in the scouring of beach sand and ruin of many beaches, since reclaimed by sand management techniques.

If we are going to have a long term sustaining, vital, healthy canyon we need to reintroduce the flow of sands and soils to the Canyon flow.

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As both a commercial boatman and private user in the Grand Canyon going back to the late 1970s, I have seen first hand the dramatic changes that have occurred in the river corridor in such a relatively short time span. Those changes are sobering to say the least. Beaches that use to accommodate large groups are now gone. Vanished! The wildlife is changing and in some specific cases, has just disappeared. Spotting wildlife used to be an almost daily occurrence, now it's sadly the exception. For the sake of my children, their children and future generations to come, I want that canyon that I once knew and that had such a profound long lasting effect on my life. The irony is that the most "over-managed" jewel in the crown of our National Parks has come to this state. It is my most sincere hope that at this critical juncture, the "management and regulation" of the canyon can be accomplished with a broad view that covers more than just a "corridor", but the entire incredibly diverse ecosystem that the canyon is.

I fully and wholly support the positions of the Grand Canyon Private Boaters and the Grand Canyon River Guides, and agree that any LTEMP alternatives fully meet the stated intent of the 1992 Grand Canyon Protection Act. I am outlining what I feel to be the most pertinent of those points below.

FOUNDATIONAL ELEMENTS:

a) 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. It is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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".

b) Change the Purpose and Need for Action Statement for the LTEMP 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 which is an ancillary benefit of the dam.

c) 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. 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 DFC's 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.

d) The LTEMP 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.

e) Clearly define agency responsibilities, improve communication, create mechanisms for productive information sharing, and eliminate project redundancies between Grand Canyon National Park and the Grand Canyon Monitoring & Research Center.

f) Ensure that the 11 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 decision making; a distinct failure of 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 tribes view all canyon resources as culturally significant. Funding for monitoring and management of cultural resource should be restored. In order to comply with the Grand Canyon Protection Act, federal laws, statutes and executive orders, the importance of protecting and preserving these fragile, non-renewable resources and Traditional Cultural Properties for the benefit of future generations must not be minimized.

g) 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.

h) Improve the structure and functionality of the Glen Canyon Dam Adaptive Management Program 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.

RESOURCE ISSUES:

a) Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come. Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

b) Focus 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 protects and preserves the individual resources along the Colorado River. The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

c) Examine the role of time and climate change in the system. Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

FLOW SUGGESTIONS:

a) Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives. Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

b) Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention. 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.

c) Include an LTEMP alternative to test steady flows. Consider an alternative that includes a seasonally adjusted steady flow alternative that includes sediment triggered Beach Habitat Building Flows, and based on the closest approximation of the pre-dam hydrograph. We need a scientifically credible, well-designed steady flow experiment of sufficient longevity to produce a biological signal (more than two months in the fall) that is followed by a full synthesis of impacts to biological, physical, social, economic and cultural resources.

d) Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

e) Test the “Best case scenario” presented in the article, “Is There Enough Sand?” which evaluates the fate of Grand Canyon sandbars as proposed by USGS scientists. Design an alternative based on the best chance of viability for rebuilding and maintaining sandbars.

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It is very imperative that the river, fish and animal habitat, the riparian corridor, what beaches remain and cultural resources all be protected to the fullest extent possible. The huge water flows that attempt to build beaches etc are not working and are destroying the canyon even beyond just the dam being in place. Please consider the science and results that these flushing events have generated before any attempts to do any further damage. We must find a way to restore the river corridor to health. We must fill Mead first and allow Glen Canyon to drain as much as it can while working towards moving some of the sediment and silt downstream to bring the canyon corridor back to a more healthy environmnet for the fish, other fauna and flora to thrive. Please support the restoration of the river and the Park to a healthy natural state.

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Please have some common sense.

Please do not completely lose touch with reality.

Please remember a few things:

Humpback chubs are a Warm Water Fish.

The Little Colorado River in the Grand Canyon is a year round warm water river, fed by warm springs.

The Little Colorado River is heaven on earth for Humpback Chubs, both young and mature. The Colorado River however, is too cold for young chubs, but not too cold for adult chubs. Do not fall for the desire to make the perfect the enemy of the good.

Glen Canyon Dam has saved the Grand Canyon population of Humpback Chubs from the fate endured by the Upper Colorado River population of Humpback Chubs that are being consumed and outcompeted by warm water non-native catfish and bass. Catfish and bass would be present in the Grand Canyon if not for the cold water released from Glen Canyon Dam. Fish biologists in Colorado cannot control catfish and bass so the Upper Basin Humpback Chub are in very serious jeopardy. Grand Canyon Chubs, by contrast, are in heaven on earth in the warm Little Colorado River. Catfish and bass are lurking and waiting downstream in Lake Mead held at bay only by the cold water released from Glen Canyon Dam.

The Colorado River ecosystem below Glen Canyon Dam has evolved and adapted to the cold water and daily flow fluctuations released from Glen Canyon Dam. Many scientific studies from the 1980's showed that the fish and the aquatic plants benefited from the daily flow fluctuations. The dominant aquatic plants, Cladophora and diatoms actually are evolved to benefit from daily fluctuating flows and indeed do less well under steadier flows. Some modest relaxations of restrictions on daily flow fluctuations could be good for the ecosystem and should be given at least equal consideration to imposing further restrictions on dam operations as many people will certainly be suggesting.

Reclamation has already spent hundreds of thousands of dollars studying and designing devices to warm the water below Glen Canyon Dam and to add mud to the water so the Colorado River would be as muddy and warm as it was before the dam was built but the negative consequences are very obvious and they would be catastrophic.

No more money or time should be wasted studying either a temperature control device or sediment augmentation. Cladophora and diatoms cannot grow in muddy water, catfish and bass are lurking in Lake Mead, warming the water would allow catfish and bass to decimate Humpback Chubs even in their warm water home of the LCR.

Management actions or experiments to cause damage to the resident trout populations in the Grand Canyon should not be done simply on the assumption that there are too many trout downstream of Glen Canyon Dam, or even worse, simply because trout are "not native".

The current National Park Service program of capturing and killing rainbow trout and brown trout in Bright Angel Creek should be re-considered. This program has existed in several different forms and in a start and stop fashion. For a while it was a feasibility study then it became a program to kill brown trout only and then it was stopped for several years. Now it is a program to indiscriminately kill all trout. Concerned anglers have been told many stories from the NPS, including that the public would get an opportunity to comment before the killing resumed after the last time it was stopped and when the NPS was only killing brown trout. This opportunity for additional public comment did not occur. Now NPS has said that they want to kill the rainbow trout also so there will be more bugs in the creek for the native suckers to eat. Biology tells us that suckers have a competitive advantage over trout, since suckers eat bugs in the creek substrate whereas trout must wait for bugs to leave the bottom and swim up through the water column. Anglers have been fishing in Bright Angel Creek at least since the NPS first stocked brook trout fingerlings in 1920. Park visitors should not have to see trout being slaughtered in one of the park's most famous locations.

Programs to kill trout or to "disadvantage" trout are very controversial and should not be implemented for bureaucratic expedience.

Even though High Flow Experiments in the spring at least, seem to have a beneficial impact on the overall ecosystem, they are expensive from water bypassing turbines and in manpower to study the impacts. It would be nice if it could be proven that HFEs actually improve camping beaches rather than simply re-arrange the beaches and change the shape of them. Also it seems that re-shaped beaches would intuitively be less stable and more prone to erosion from rain and wind.

It seems that your time frame of 15 years of management actions and experiments is too long. It is a time frame that would inhibit future DOI Secretaries and it would inhibit the intention of the Grand Canyon Protection Act to have the Adaptive Management Work Group give the DOI Secretary advice on how best to operate Glen Canyon Dam and what experiments and monitoring should be done by the Grand Canyon Monitoring and Research Center.

I believe it was Sam Clemens, AKA Mark Twain, or maybe it was John Wesley Powell (who in 1869, named Bright Angel Creek, so happy he was to see water that was not muddy, and thought it was a "trout stream") who said the famous words that "whiskey is for drinking and water is for fighting". It seems today and for the last fifty years the National Parks have been for visiting but the Grand Canyon has been for fighting. As a Fred Harvey cafeteria employee in 1971, my memories include park rangers complaining during nature talks they gave to park visitors that Glen Canyon Dam was a terrible thing.

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INTRODUCTION OF GCROA:

Formed in 1996, the Grand Canyon River Outfitters Association (GCROA) is a non-profit trade group whose members include the sixteen professional river outfitters who hold concessionaire contracts with the National Park Service, U.S. Department of the Interior and provide public commercial whitewater rafting trips on the Colorado River in Grand Canyon National Park. Our mission is:

To protect and conserve the environment and resources of the Grand Canyon with a particular emphasis on the Colorado River corridor;

To provide a diverse range of the highest quality Grand Canyon Colorado River experiences for the professionally outfitted public;

To support the people and places of the Grand Canyon river community

The Grand Canyon's River Outfitters provide the public with safe access to one of the most unique and truly special backcountry river experiences available anywhere on Earth. Collectively we serve approximately 19,000 people per year who have a significant interest in the Grand Canyon river corridor from a recreational perspective. Our ranks include many of the original river outfitting families who, decades ago, first pioneered what today is recognized as the sport of recreational river running. This is a rich and proud heritage in America's great western tradition.

The Grand Canyon river experience is compelling and precious, yet highly individualistic. Our role is to provide a diverse means by which the American and international traveling public can interact with the canyon and the river on deep and personal terms. No one goes away untouched. Even the unsuspecting are forever changed by the canyon's sublime beauty, the river's song, and the self-discovery that comes from new experiences in powerful places.

It's the goal of each outfitter to interact responsibly with the Grand Canyon at all times. Years of work have produced numerous resource protection strategies now employed on an everyday basis. We take our partnership with the National Park Service very seriously and we're proud of our contribution. Through the professional services we provide, the National Park Service's dual mission of providing public access to the Grand Canyon river experience while protecting the resource for future generations is fully realized.

GCROA'S ENVIRONMENTAL INITIATIVES

The Grand Canyon Conservation Fund. Established in 1988 and managed voluntarily by a group of the Grand Canyon river outfitters, the Fund is a nonprofit public charity. Each year, we award grants to various conservation groups and those working to provide access to backcountry outdoor experiences for persons with disabilities. Since its inception, the Fund has awarded approximately $700,000 to groups like the Grand Canyon Trust, American Rivers, and many others. Donations come primarily from outfitted river trip passengers who contribute $1 for each day of their river trip.

Cooperative Resource Conservation Program. Each year, GCROA's members run, on a no cost basis, four extended off-season river trips through the canyon on which National Park Service field personnel and the canyon's professional river guides work together on resource protection, visitor impact mitigation, and other conservation related projects. A variety of good works is accomplished and the joint exercise serves to build an important spirit of collaboration and partnership.

Quiet, Low Emission Motors. In the summer of 1997, GCROA announced a voluntary transition from the traditional two-stroke outboard motors used in the canyon for decades to newly available four-stroke models. The transition to these low emission, low noise outboards represents a $1.5 million capital investment program. We completed the transition on April 15th, 2001. Today, one hundred percent of the motorized rafts operating in the Grand Canyon use the new motors. Four-strokes offer a dramatic reduction in motor emissions, including a ninety percent reduction in released hydrocarbons. Additionally, the new motors are substantially less noisy than the motors they replaced.

WHO TAKES OUTFITTED RIVER TRIPS?

Professionally outfitted river passengers come from all over the United States, from all over the world, and from all walks of life. Roughly eighty-five percent of our passengers are from the United States with fifteen percent coming from overseas. Ages range from young children to retirees in their sixties, seventies, and even eighties!

Each year, eighty percent—15,000 people—will experience the canyon by river for the first and only time in their lives via the services we provide. All come to see the canyon from the river's perspective and for the excitement of running North America's premier stretch of backcountry whitewater.

TRIP STYLES AND OPTIONS

In response to public desire and deeply held personal philosophies developed through years of bringing the public down the river, GCROA's members offer a diverse range of river trip styles and options. Trip lengths range from three to twenty-one days. Several different types of watercraft are employed.

These include larger more stable motorized boats that can hold an entire extended family and smaller, wetter and livelier rowed or paddled inflatable boats. There are also trips run in dories, hard-shelled boats of great beauty and grace. The average motorized trip lasts seven days. The average oar-powered trip takes fourteen days.

In addition to standard trip options (all of which feature extensive interpretation of the canyon's natural and human history) there is also a host of specialized and unique trips available. Many focus on particular aspects of the canyon or on a single scientific discipline such as geology.

There are photography trips, those that emphasize extensive off-river hiking, and even a trip accompanied by a string quartet with performances taking place in natural side canyon amphitheaters and grottos. In short, a rich mix of river trip opportunities is available, allowing anyone to find just the right trip to match personal tastes, expectations, and skill level.

ACCESS PROGRAM FOR SPECIAL POPULATIONS

GCROA's members are committed to assisting persons with disabilities experience the Grand Canyon by river. This goal is met through both mainstreaming and by special access trips on which passengers with even severe mobility impairments can be accommodated. Through the Grand Canyon Conservation Fund, scholarship assistance is also available

FACTS AND FIGURES

Year of the first professionally outfitted Grand Canyon river trip:1938

Number of outfitted passengers each year: 19,000

Number of licensed Grand Canyon river outfitters: 16

Average Grand Canyon river outfitter term of service: 34 years

Industry customer satisfaction rate: 99%

OFFICIAL COMMENTS on LEMTP DEIS:

GOAL:

Our fundamental concerns and goal of this plan, or any plan affecting the Grand Canyon River Corridor, should be to do no further harm and protect the resources. Minimizing the adverse impacts on the Grand Canyon river conditions, natural, cultural, tribal, aquatic, riparian, and recreational resources, and public access are of the most crucial importance.

ADAPTIVE ECOSYSTEM MANAGEMENT:

We strongly believe that all decisions effecting the operations of the Glen Canyon Dam should be based on the best available science and application, data collection, and practical

implementation methods. The Grand Canyon Monitoring and Research Center (GCMRC) should be considered a central source of information for this part of the Plan.

The words "Adaptive Management" generally sends concerns to stakeholders with activities that are commercial or recreational in nature because it is obviously subject to continual change, which may occasionally temporarily or permanently disrupt or affect the operational plans of commercial outfitters and recreational users of Grand Canyon. Business models, schedules, and commercial concessionaire agreements are generally fixed or static and do not allow for much flexibility to "adapt" and change easily. For example, specifics such as regulated and limited daily commercial river trip launch dates, numbers of motor or non-motor launches per day, per week, per month, or per year, numbers of "trips at one time" (TAOT) on the river, number of commercial user-days, customer demand periods and reservation timelines, passenger carrying capacity, operational time window each day for helicopter support, etc. are all generally fixed and cannot be easily changed, if at all.

Any potential changes for the management of the Glen Canyon Dam should be evaluated carefully, but should consider the affects to the commercial and recreational users of the Grand Canyon before implemented. Methods of data collection, experiments, and determined results should always be carefully questioned and scrutinized to ensure the most advanced, but adequate and practical methods are used. And we would like to see a much more balanced GCDAMP stakeholder group involved in any decision making process.

FLOW PATTERN and SAND BAR REBUILDING:

Proposed flows directly affect the commercial and recreational carrying capacity of the river corridor and the enjoyment of these users. The plan for flow patterns should always ensure a year-round navigable river. This is the single biggest variable in protecting Grand Canyon National Park as mandated by the Grand Canyon Protection Act of 1992 and the 1996 Adaptive Management Program, and the biggest factor affecting commercial and recreational users below the dam.

For the safe and navigable enjoyment of the rafting public, flows should never be lower than 8,000 cfs, and current studies suggest that steady flows ranging between 8,000–11,000 cfs, with appropriately timed higher volumes to properly rebuild and maintain the precious sandbars.

And to the extent practical, the release and flow level schedules should be well known in advance and disseminated accordingly to protect those boaters and river-side campers to enable them to take the proper precautions accordingly.

We also believe that no alternative should lock the GCDAMP into a single flow regime for the next 10–15 years. Flow experiments should be given a adequate time to be properly evaluated and tested and adjusted accordingly, but with proper due process and communication, and should also be completely determined by the needs of science in protecting the resources of the Park.

ECONOMIC IMPACTS

Prior considerations for the management of Glen Canyon Dam have mainly considered the power generation or Lake Powell and Lake Mead economic impacts. The commercial and recreational river running operations have a significant economic impact on the communities of Flagstaff, Page, Kanab, Fredonia, and other areas in the region. For decades, hundreds of individuals and families have been directly or indirectly dependent on this industry through employment, outfitting, transportation, tourism, lodging, food and beverage, retail, and providing supplies and equipment. It is imperative that these stakeholders be considered and examined as an essential part of the LTEMP Draft EIS process.

CONCLUSION

This document should not be considered a complete or exact summary of comments or recommendation from all sixteen commercial river outfitters at Grand Canyon, and each company may also be submitting direct comments on the DEIS that might vary slightly from the comments submitted here. But we strongly encourage the decisions to be made regarding the Glen Canyon Dam Long Term Experimental and Management plan always take into serious consideration all of the commercial and recreational stakeholders who provide special professional access and experiences of rafting the Colorado River in the Grand Canyon.

403
I wish to fully endorse and hereby incorporate by reference the excellent and comprehensive scoping comments submitted to you by the Grand Canyon Wildlands Council. These comments reflect my own concerns and recommendations.

404
I am a member of the Grand Canyon River Guides and have been a passenger through the Grand Canyon on several occasions. I believe the LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

405
“BUILD A DAM” Just three little words composed of just nine letters, but when implemented caused devastation to the river corridor, the heart of The Grand Canyon, this nations premier National Park.

I doubt that Teddy Roosevelt ever conceived of today’s circumstances as he viewed the Canyon in 1903 and proclaimed “The Grand Canyon fills me with awe. It is beyond comparison-beyond description; absolutely unparalleled throughout the wide world. ... Let this great wonder of nature remain as it now is. Do nothing to mar its grandeur, sublimity and loveliness. You cannot improve on it. But what you can do is to keep it for your children, your children’s children, and all who come after you, as the one great sight which every American should see.”

That is, of course, all history. The Dam is there and probably will be staying there for the foreseeable future. Science has pretty well documented damage done downstream of The Dam, and certainly upstream.

So what can be done now?

The Long Term Experimental & Management Plan offers some hope that the river corridor of Grand Canyon will not continue to be viewed by some as only a race-way for spent turbine turning water. The path of focusing on maximum power generation leads only to more desecration in this National Park, a place that many consider to be Holy Ground.

The LTEMP should study and implement every conceivable way to change Dam operating protocols to emphasize restoration of natural river patterns and processes that held sway during the eons before the dam, and which were responsible for the creation of one of the most sublime locals in the entire earth.

406

I have visited the Grand Canyon on numerous occasions, as a rim-camper, day-hiker, backpacker, and rafter. I can honestly say that the best six weeks of my life have been my three trips through the canyon on a raft with Moki Mac outfitters. I have been following the development of the draft EIS through contacts in the guide and advocate community, as well as news stories, and wish to provide my input as a citizen who hopes to return often to this beautiful place for the rest of my life.

I believe that the Grand Canyon Protection Act is vital to preserve this unique American treasure so that future generations can enjoy the Canyon as I have been able to. I also believe that the Act requires the health of the river ecology within the Canyon to be considered in formulation of the draft EIS, and in any decision affecting the river.

While I understand that water needs, power needs, and the desires of those who use Lake Powell for recreation or business must be considered, any planning for operation of the Glen Canyon Dam, for me, boils down to this: This nation has many resevoirs, many lakes, and many power plants, but only one Grand Canyon. I have spent time on the upper Colorado and Green Rivers, as well as many other Western rivers, but nothing, anywhere, compares to the experience in the Canyon. A huge number of Americans visit the Canyon each year, and every one walks away with a lifetime memory of the place.

It is important that the whole Canyon experience be available for future generations. That experience includes the unique ecology of the river and side canyons, the cultural marvels inside the Canyon, the people who help visitors enjoy, learn about, and learn from the Canyon, and the river itself. There is no river like the Colorado that runs through the Grand Canyon.

The plants and creatures that manage to live in the Canyon--some of which are found nowhere else--and the methods they have developed to survive are amazing. The Canyon is the best geology textbook that will ever be written. The layers of rocks formed over billions of years show a timeline of the development of our continent, and of life on earth. The Canyon protects

many areas sacred to the Native Americans, and many sites where we can marvel at the toughnes, resourcefulness, and remaining art of the waves of early Americans who managed to live within and near the Canyon. Starting with Major Powell's expedition and continuing to this day, the Canyon has attracted a particular breed of American adventurer. Today's generation--the boatmen, rangers, trail guides and colorful locals--tell the stories of the earlier generations of adventurers. Those stories, the people that tell them, and the river that inhabits the stories are all part of American lore and must be preserved.

Then, as now, explorers are drawn to the river. The Colorado carved the Canyon, and the Colorado remains the heart of the Canyon. The river must be preserved as near it's natural state as can be achieved given the presence of the dam. The impact of any action or policy on the beaches, aquatic life, and riverside plant and animal communities should weigh heavily in any decision affecting the timing and volume of river flows. The geologic sites at and near river level must be maintained and protected. The cultural marvels must be preserved.

Please allow future generations of Americans the opportunity to experience the Grand Canyon as it should be. Please place the health of the river and its beaches, flora and fauna, along with protection of the historical and scientific marvels within the park as the highest priority in creating the draft EIS.

407

1. I have been a river passenger. 2. The LTEMP Draft EIS should benefit the beaches, cultural resources, and the ecosystem of Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

408

As our social security coffers continue to empty and our national debt approaches sixteen trillion dollars, it becomes readily apparent that past generations put their own interests ahead of their children and grandchildren's future. I was born in 1987 and belong to the generation of millions of Americans who will have to pay for the financial ineptitude of our predecessors. Unfortunately, the shortcomings of past generations are not restricted only to dollars and cents. During the first seven decades of the twentieth century, the Colorado River was transformed from a free flowing, irregular, and natural river into a system of artificial lakes and canals. In the process, the ecosystem suffered severe and in some cases irreparable damage. Populations of endemic fish such as the humpback chub and the pikeminnow declined rapidly as well as birds such as the willow flycatcher. The main culprit for this decline was dams. Specifically, dams like Glen Canyon drastically reduced the average annual temperature of the river, blocked fish migration, trapped sediment, and eliminated annual flooding necessary for sustaining native fish populations. Moreover, dams flooded riparian areas that once boasted animal friendly cottonwood and willow stands. The American populace finally began to become more farsighted in the 1970s. The Endangered Species Act of 1972 provided a framework for protecting endangered populations of fish and birds in the Colorado River basin. Despite the restoration efforts of several federal agencies, many native species remain endangered. The reason for the limited success of restoration efforts is linked to the continued presence of gigantic dams that alter the flow and health of the river. The time has come for my generation and those generations

in power to demand a different and more effective strategy for ecological restoration. I urge you to adopt a management plan that will seek to divert water around Glen Canyon Dam and ultimately drain Lake Powell. With both Lake Powell and Lake Mead well below full capacity, the existence of two massive reservoirs on the Colorado wastes too much water to evaporation and is simply imprudent. Furthermore, restoring the river to a more natural flow will improve the ecological health of the area and those farther downriver. Although the draining of Lake Powell will eliminate much of the existing recreation scene, the area will benefit recreationally from new tourism associated with the reopening of "the place no one knew." The time for a bold new step in the history of the Colorado River and Glen Canyon has come. We now have the knowledge and the ability to take a major step in restoring the Colorado River ecosystem and fixing a grave mistake made by our parents and grandparents. As Americans, we pride ourselves on our resiliency and hard work. I am confident that current generations will not only revamp social security and pay back our national debt, but also to restore the Colorado River ecosystem to a wild, natural, and healthy existence for the sake of our children and grandchildren.

409

I fully support that the operation of Glen Canyon Dam should ". . . 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."

410

1. Define & ensure a substantial role for the Grand Canyon Monitoring & Research Center (GCRMC) within the LTEMP EIS process.

2. Maintain or improve the quality of recreational experiences for users of the Colorado River.

3. Focus on protecting, preserving, and improving all of the downstream resources, such as camping beaches, cultural sites, and flora & fauna.

4. The high flow protocol should be a well defined key component of LTEMP alternatives.

5. Design intervening flows (between high flows) that maximize sediment retention on beaches and backwater areas for the benefit of campers and native biota.

6. LTEMP alternatives must be scientifically defensible and credible with well defined hypotheses, building on what we have learned from GCRMC and LTEMP implementation.

7. The LTEMP must be based on an adaptive ecosystem management approach.

8. Include an alternative to test seasonally adjusted steady flows that includes sediment triggered beach and habitat building flows based on the closest approximation of the pre-dam hydrograph.

9. Consider minimum flows no less than the long-term base flow of the Colorado River.

10. Test the "best case scenario" presented in the article, "Is There Enough Sand, Evaluating the Fate of Grand Canyon Sandbars" as proposed by USGS scientists. Particularly in regard to rebuilding and maintaining sandbars. (http://www.usbr.gov/uc/rm/amp/twg/mt...Attach_05e.pdf)

11. Consider options that include adding sediment below the dam consistent with a pre-dam sediment profile.

12. Consider triggering flood flows based partly on distributing sediments from the LCR and Paria Rivers when those tributaries are supplying large amounts of sediment.

13. Restore historic water quality regarding temperature profiles, pH, and native fish species.

14. Limit the rate of increase/decrease of flow rates to promote boater safety and beach preservation and enhancement.

411
I live in Idaho and I work and recreate on the Colorado in Grand Canyon below Glen Canyon Dam.

I feel that it is imperative that the Long Term Experimental and Management Plan and future Glen Canyon Dam operations comply with the Grand Canyon Protection Act of 1992. In addition, Glen Canyon Dam operations should be managed to maximize the benefit to Grand Canyon beaches (sand resources), riparian ecology, and cultural resources.

While I understand the importance of hydropower and the water needs for the desert Southwest, a water flow release regime needs to be implemented that is based on current science and the monitoring by the Grand Canyon Monitoring and Research Center.

In summation, the Long Term Experimental and Management Plan for Glen Canyon Dam and the Grand Canyon must be based on an adaptive ecosystem management program that is consistent with the 1992 Grand Canyon Protection Act, which 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."

412
I have been fortunate enough to raft through the Grand Canyon twice. Please ensure that the LTEMP Draft EIS will benefit the beaches, cultural resources, and the ecosystem of the Grand Canyon, in order to fully meet the requirements of the Grand Canyon Protection Act.

413
I am a resident of Pennsylvania but have had the great pleasure to paddle the Grand Canyon on a private permit. In summary, please ensure that all discussions include recreational interests, such as non-profits like American Whitewater.

I also support American Whitewater principles for this discussion:

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

Thank you. I look forward to enjoying resources provided by the dam in the future.

414

I have only visited and fished the Colorado River below Glen Canyon Dam on one occasion, April of 2011. It was a fantastic experience and I will come back again for sure. I have also shared my positive experience with friends in this area and feel confident that some of them will visit the Lees Ferry area for quality fishing as well.

As an avid fly fishermen, I sincerely advocate and support maintaining quality water and riparian condition for fish and other aquatic dependent species. I fully support the need for a Long Term Experimental and Management Plan to maintain the blue ribbon rainbow trout fisheries that is a vital economic and recreation use of this scenic and unique area.

It is easily recognized even after one visit that there are important and highly political competing interests for water flows and hydroelectric demands. These are very real and needed interests and weighty economic values. This letter is to stress the importance and also very viable economic values of the recreational resources of this sensitive stretch of water to those who clamor for the rainbow trout or ride the white water on down for 100 miles or more. The size and healthy quantities of these rainbows are prized and so very special that they need to be seriously included in all decisions as part of any future Management Plan.

I urge the decisions makers to include as equally as possible the recreation and economic values of the fisheries and white water sports when developing alternatives and final plans for the Lees Ferry/Marble Canyon areas.

415

I only minutes ago became aware of commenting, hence my less than erudite comments. Simply stated, living in Colorado I am well aware of the Colorado River's plight. And, I have hiked the Grand Canyon numerous times and will continue to do so. But, to the point, the Glen Canyon Dam. In the best of worlds, I would like to see it dismantled and the river returned to its natural flow, with water actually reaching its mouth other than merely a trickle. The reality, though, dictates that will not happen. Consequently, I would like to see water released annually, if not more often, from the dam to at least mimic, to some degree, the original state of the river, its banks, its wildlife. The recent rules denying mining for the next 20 years in the many acres surrounding the GC is a "grand" start. Now, please, please start allowing some sort of regular flow to the river, reestablishing to some degree what the early Native Americans, Spainards, and other explorers experienced and thus providing our future generations a semblance of the great river and its immediate environs.

416

In order to fully meet the requirements of the Grand Canyon Protection Act, I believe that the LTEMP Draft EIS should benefit the ecosystem of the Grand Canyon including but not limited to benefiting beaches and the canyon's cultural resources.

417

As someone who frequently vacations in the Grand Canyon/Colorado Plateau region and who has hiked and boated in the Grand Canyon, stewardship of this area is important to me. I especially urge you to expand the scope of your consideration to include all of Lake Powell and its important tributaries as well as Lake Mead. It is important to consider the entire Colorado River system as the integrated ecoregion that it is, and to include impacts throughout the system in planning for the future of Glen Canyon Dam. I also ask that you be open to the possibility of significant changes in the operation of Glen Canyon Dam if they are indicated by a full scientific study. Finally, I urge you to carefully consider the comments submitted by the Grand Canyon Wildlands Council, an organization which I support.

418

I grew up in Flagstaff, AZ and have explored Grand Canyon since I learned how to walk. As an adult, I have worked in Grand Canyon as a river guide for 13 years, have served as president of Grand Canyon River Guides and seen this incredible place change. Grand Canyon is my place of solace, my church, my home. My comments for the LTEMP are in agreement with Grand Canyon River Guides:

FOUNDATIONAL ELEMENTS:

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 is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

Change the Purpose and Need for Action Statement for the LTEMP 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 which is an ancillary benefit of the dam.

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. 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.

The LTEMP 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.

Clearly define agency responsibilities, improve communication, create mechanisms for productive information sharing, and eliminate project redundancies between Grand Canyon National Park and the Grand Canyon Monitoring & Research Center.

Ensure that the 11 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 decision making — a distinct failure of 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 tribes view all canyon resources as culturally significant.

Funding for monitoring and management of cultural resource should be restored. In order to comply with the Grand Canyon Protection Act, federal laws, statutes and executive orders, the importance of protecting and preserving these fragile, non-renewable resources and Traditional Cultural Properties for the benefit of future generations must not be minimized.

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.

Improve the structure and functionality of the Glen Canyon Dam Adaptive Management Program 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.

RESOURCE ISSUES:

Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come.

Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

Focus 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 protects and preserves the individual resources along the Colorado River.

The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

Examine the role of time and climate change in the system.

Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

FLOW SUGGESTIONS:

Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives.

Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention.

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.

Include an LTEMP alternative to test steady flows.

Consider an alternative that includes a seasonally adjusted steady flow alternative that includes sediment triggered Beach Habitat Building Flows, and based on the closest approximation of the pre-dam hydrograph.

We need a scientifically credible, well-designed steady flow experiment of sufficient longevity to produce a biological signal (more than two months in the fall) that is followed by a full synthesis of impacts to biological, physical, social, economic and cultural resources.

Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

Test the “best case scenario” presented in the article, “Is there enough sand? Evaluating the fate of Grand Canyon sandbars” as proposed by USGS scientists

Design an alternative based on the best chance of viability for rebuilding and maintaining sandbars.

419

My experience with this particular area of the Colorado consists of being along on three separate raft trips through the Grand Canyon and a couple of days fishing below Glen Canyon Dam. My first trip on the Grand Canyon Section of the river was in 1986 or 1987. It was a late fall trip and I remember that the fishing was fantastic in the upper reaches above the Little Colorado. Below

that we did well at the mouth of the side streams. I suspect that we had arrived during the spawning season and the fish were interested in moving into the streams to spawn.

Last Spring I had the good fortune of fishing below Glen Canyon Dam. We did well and the fish seemed to be plentiful but maybe a bit smaller than I remember during the 80s.

As for numbers and size, I don't have any particular hangups other that I think the goal should be to keep the fishery in the "Blue Ribbon" category. As we already know the river is plenty capable of providing both reasonable size and numbers. I just want to know that this fishery is there and that it will always be a trip that any fisher person would be happy to experience.

I realize that there are many other concerns besides providing some fisherman an opportunity to bag a limit. I am sure that Native Americans have very legitimate concerns and needs as well. I am of the opinion that the primary need is to maintain and restore as much of the native wildlife and fisheries as possible in this area. Having said that, I also know that the dams have forever changed this section of the Grand Canyon and the Colorado River. I do not think that trout would have fared well in this section before Glen Canyon Dam and the resulting cold water.

I think that now we need to take what we have and work with it, in concert with the natural ecosystem of that section of the Colorado River. The trout fishery there has most likely already replaced some of the species that swam there when John Wesley Powell first explored it. We may as well make the most of it and provide another economic, sporting and cultural incentive for folks like myself to visit that beautiful part of Arizona.

420

I have worked in Grand Canyon as a River Guide since 1998. I have may concerns about the future of Grand Canyon and my comments for the LTEMP are in agreement with Grand Canyon River Guides:

FOUNDATIONAL ELEMENTS:

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This is a dynamic and complex system. Our learning and adapting/building on what we know must continue indefinitely.

Clearly define agency responsibilities, improve communication, create mechanisms for productive information sharing, and eliminate project redundancies between Grand Canyon National Park and the Grand Canyon Monitoring & Research Center.

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Reaching a certain metric for mass sediment balance is not sufficient — The LTEMP needs to focus on whether the sediment adequately protects and preserves the individual resources along the Colorado River.

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Examine the role of time and climate change in the system.

Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

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Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention.

> 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.

Include an LTEMP alternative to test steady flows.

> Consider an alternative that includes a seasonally adjusted steady flow alternative that includes sediment triggered Beach Habitat Building Flows, and based on the closest approximation of the pre-dam hydrograph.

> We need a scientifically credible, well-designed steady flow experiment of sufficient longevity to produce a biological signal (more than two months in the fall) that is followed by a full synthesis of impacts to biological, physical, social, economic and cultural resources.

Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

Test the "best case scenario" presented in the article, "Is there enough sand? Evaluating the fate of Grand Canyon sandbars" as proposed by USGS scientists

> Design an alternative based on the best chance of viability for rebuilding and maintaining sandbars.

421

I am a Grand Canyon (GC) river runner since 1973, who has done over 170 Colorado River (CR) trips, as a passenger, boatman, trip leader, and historian, including commercial, private, research, and educational trips. I am a life-time member of Grand Canyon River Guides (GCRG), also having been a Board Director, Vice President, and President. I was the first research librarian at the Glen Canyon Environmental Studies (USBOR) and Grand Canyon and Monitoring Research Center (USGS), 1993-1997, conducting many of their research trips as boatman and researcher, including the 1996 BHBF, and handled much of the research data for them during those years.

As such, I followed the current GCRG Board of Directors process for comments on the LTEMP and concur with their discussions and conclusions. Glen Canyon Dam (GCD) operations should adhere to the Grand Canyon Protection Act criteria. GCD has for too long been beholden to the Power and Water "Dogs": we all know, that in the criteria for the building and operation of GCD had power generation as an afterthought, listed about 8th and definitely not a priority. It's way past time for BOR, DOE, etc. to come into compliance and protect the resources of Glen and Grand Canyons, not those with the power and money. Let's stop water from flowing uphill to money

422
Please make sure that the new rules protect the environment and the recreational resources to the utmost following the protocols decided upon in 1992: "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."

423
I would like to see the dam managed in such a way as to do no further harm to the beaches, and if at all possible in a way that could actually rebuild some beaches.

As a recreational user of the river, I care. Please protect it.

424
[The following is an abridged version of Glen Canyon Institute's scoping comments on the Glen Canyon Dam LTEMP EIS. A full version will be submitted separately by mail.]

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 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 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.

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. 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 of 1922 and the Mexican Water Treaty of 1944, and the sale of hydropower generated at Glen Canyon Dam have continued.

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.

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.

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. 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. 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.

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

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). 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.

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 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.

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). (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.)

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 he generators without generating power. This approach seems primarily designed for minimum inconvenience to the power industry, not maximum benefit to the Grand Canyon ecosystem.

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.

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. It

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. 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 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.

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Brief resume of [Commenter]. Relevant background to LTEMP comments on this Environmental Impact Statement:

1973-2012: Conducted professional river trips in Grand Canyon as river guide and trip leader for OARS/Grand Canyon Dories, 50-100 days/year.

1991: Lobbied Congress for successful passage of Grand Canyon Protection Act of 1992.

1992-1995: Actively participated in Glen Canyon Dam EIS public input process.

1996-2012: Initiated and conducted the Adopt-a-Beach program of "citizen science" for monitoring camping beaches under the supervision of Grand Canyon River Guides, Inc.

1996-1997: Worked on Transition Work Group to guide initial development of the Adaptive Management Program.

1997-2010: Served on the Adaptive Management Work Group representing whitewater recreation concerns for Grand Canyon River Guides, Inc.

1997-2010: Committed AMWG subcommittee work includes; Technical Work Group, Strategic Plan, Public Outreach Program, Core Monitoring Plan, Long Term Experimental Plan.

2001: Ph.D (Geology), Arizona State University.

1993-2012: Instructor, Grand Canyon Field Institute.

1998-2000: Completed geomorphic model for Cultural Program of Grand Canyon Monitoring and Research Center.

2002-2007: Invited to participate in Colorado River Project annual symposium for the Water Education Foundation, The Bishop's Lodge, Santa Fe, NM.

2007-2011: Instructor (geosciences), Prescott College.

2012: Sabbatical, research and writing.

Comments on the Long Term Experimental and Management Plan (LTEMP)

1) The Purpose and Need for Action Statement must parallel and reflect the essential language of the Grand Canyon Protection Act , of 1992: 4The 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."

Hydropower generation due to dam re-operations and balancing of water between Powell and Mead are secondary to achieving the principle intent and essential language of the GCPA.

2) All monitoring and research activities must be guided by the best available scientific information. This includes the incorporation of previous and ongoing work generated under the auspice of the U.S. Geological Survey (GCMRC), and may also include information from sister agencies such as the National Park Service and the Bureau of Reclamation. Native American nations and other public interest groups should provide relevant guidance to desired future conditions and management actions but perceptions and beliefs must not presuppose the data provided by rigorous science.

3) Grand Canyon must not continue to be treated in isolation of the larger river system. The quantity, quality, distribution and longevity of fine sediment is of fundamental concern for most ecosystem resources. Also, the physical and chemical qualities of the water are essential determinants of ecosystem response and health. For these reasons, more ecosystem information should be incorporated from upstream and tributary processes (e.g. San Juan River, Cataract Canyon, Little Colorado River). Processes and conditions in tributaries entering Lake Powell and

Grand Canyon as well as reservoir conditions within the Lake should be incorporated into long-term management and experiment plans.

4) Restoration of natural conditions should be the basis for habitat restoration (as possible given presence of dams and non-native species). The next long term experiment must incorporate this principle at its foundation.

Restore periodic floods to the canyon via the High Flow Experiment protocols (HFE). This should be a common element for all alternatives.

Restore a natural hydrograph that emulates the seasonal fluctuations prior to Glen Canyon Dam. Use upstream river conditions as a model for doing this (e.g. Colorado, Green, San Juan Rivers that are closer to 'natural'). Alternative experiments may include (with HFE protocols): 1) Year-round steady releases. 2) Seasonally-adjusted steady releases. 3) Run-of-the-river releases that emulate reservoir inflows. 4) Moderated low fluctuating flows (status quo).

Investigate and make plans for sediment transfer through Glen Canyon Dam via the bypass tubes as that becomes imminently necessary in the time frame of this LTEMP.

5) A new funding cap should be set for the successful completion of the LTEMP. The present funding cap that was arbitrarily forced on the Adaptive Management Program must be reset to accommodate the necessary work needed to ensure the success of the LTEMP. After twelve years of monitoring and research under MLFF, we have a much better understanding of the program needs that will dictate the funding cap for the LTEMP over the next decade.

the dam has nearly repaid the federal treasury for construction.

the basin states do not need further subsidizing of already developed water systems.

beyond maintenance costs, future hydropower revenues should be utilized for optimal operation of the dam (LTEMP) with additional moneys used to pay down the federal debt.

Concluding comments:

Glen Canyon Dam is owned and operated by the Federal Government (which represents all American citizens). Hydropower revenues and distribution of water is under the purview of the secretaries of Interior and Energy. The basin states are only in this for their take on dam revenues. Here, water distribution is not their issue. The dam profoundly and directly affects at least two major National Parks and several Native American tribes. Priorities need to be clarified and acknowledged.

It must be that this LTEMP be thoughtfully crafted and understood for its impacts, both local and national on all peoples of this country, not to mention the countless millions of future visitors

that will continue to revel in this great landmark. It remains the precious treasure that all Americans must see. Please consider your actions and responsibilities in this light.

426

Future operations of Glen Canyon Dam should comply with the Grand Canyon Protection Act of 1992.

Beaches are important to wildlife and recreationists alike, and the dam should be operated in a way that builds beaches through high flow events when new sediment enters the system, and protects the beaches that have been built through steady flows in between these events.

Solid science, not hydropower and water supply interests, should drive these management decisions. The Grand Canyon Monitoring and Research Center (GCMRC) is the leading entity studying the River, and should be an integral part of both developing the LTEMP EIS and monitoring and informing adaptive management decisions in the future.

It is important to protect cultural sites in the Canyon, and the LTEMP should integrate these values.

The Glen Canyon Dam Adaptive Management Program should be more balanced in the future, with greater representation of cultural, ecological and recreational interests.

Flows relating to water supply and hydropower need to be implemented in a way that support, protect, and when possible, restore downstream values of the Colorado River and Grand Canyon.

427

I have been a river guide in the Grand Canyon for 40 years, and I am also a PhD-level ecologist. I believe that the Grand Canyon Monitoring and Research Center should have a significant role in the LTEMP EIS process, to help inform the process with scientific research. The purpose for the LTEMP should be to meet the intent of the 1992 Grand Canyon Protection Act, and all alternatives should reflect this. I support an adaptive ecosystem management approach for the LTEMP, so that Desired Future Conditions can continue to be refined.

The LTEMP should focus on benefiting all downstream resources, including camping beaches, cultural resources, and endangered species habitat. The quality of the Colorado River recreational resource is an important issue. I support Beach Habitat Building Flows as an important component of all LTEMP alternatives. Flows at other times should be planned to optimize sediment retention. For navigation and safety, it would be best to have minimum flows of 8000 cfs.

428

I would like to see the dam managed in such a way as to do no further harm to the beaches. If at all possible, manage the dam in a way that could actually rebuild some beaches. Water release

should be optimized such that beach building is enhanced,beach erosion is reduced, recreational experiences (and safety) are enhanced and power production is not the highest priority.

429
All LTEMP alternatives must fully meet the intent of the 1992 Grand Canyon Protection Act. Hydropower is ancillary to that. The LTEMP must define a clear role for the Grand Canyon Monitoring and Research Center utilizing the scientific knowledge they have accumulated in order to adequately evaluate actions in the future.

The LTEMP must be based on a collaborative management system with involved stakeholders whose primary charge is meeting the intent of the Grand Canyon Protection Act.

430
I am writing to support the continued operation of Glen Canyon Dam to support the recovery of endangered species and beach building. I have been down the river in 1987, 2007, 2009, 2010 and 2011 as a kayaker and later as a baggage boatman for Moki Mac. I have been able to observe the effects of the beach building efforts.

While I cannot know the impacts on endangered species, I have observed improvements in camping on the beaches.

431
I would very much like to see efforts made to minimize any additional loss of beaches along the Colorado below Glen Canyon dam. I would also like to see policy in place that would attempt to restore as much as possible of the beaches lost over the last 40+ years.

432
Thank you for continue to develop a long-term monitoring program for the Grand Canyon. The most critical aspect of the plan is that it incorporates a major role for continued research on how to best protect and preserve the Grand Canyon. Specifically all of the LTEMP alternatives should meet the intent of the 1992 Grand Canyon Protection Act.

433
I have been running the Colorado River through Grand Canyon for the last 15 years and been a part of many restoration, research, monitoring and mitigation efforts, most of them centered around understanding the decline of the ecosystems and cultural sites downstream of Glen Canyon Dam.

There are volumes of science that has aggregated over the last 25 years largely from efforts of the Grand Canyon Monitoring and Research Center (GCMRC) that points to lack of sediment and the poor management of what little we have left. You must use science as the lens to develop alternatives for operating Glen Canyon Dam that protect not just the Humpback chub, but its habitat, that supports a host of other native species. It must be adaptive, and collaborative, involving tribes and the public, not just lipservice.

Develop an alternative that includes low, steady flows with regular flooding beach building events.

Alternatives need to follow the 1992 Grand Canyon Protection Act, which 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."

REMEMBER, DON'T IGNORE THE SCIENCE.

I look forward to seeing a Grand Canyon First alternative that once and for all puts one of the 7 wonders of the world before our insatiable need for hydropower.

434

LTEMP should propose experiments and management to protect, restore and enhance the beaches, ecosystems, cultural resources, recreational resources and ecosystems as required by the Grand Canyon Protection Act (GCPA)

There is a need to conduct a true steady flow experiment to monitor the benefits to native fish over at least a 6 month period in the summer, when day length and sunlight angle can stimulate productivity.

There is a need to experiment with minimizing erosion FOLLOWING Beach Habitat Building Floods (BHBF) flows.

There is a need to experiment for sediment retention, along the lines of the technical article by Wright, et al "Is There Enough Sand?"

There is a need to evaluate the non-use values of the recreation, the cultural resources, and the replacement costs of the sediment that is removed by dam operations not required by water delivery treaty (fluctuating flows).

There is a need to evaluate alternate sources of peaking power, including natural gas turbines, and electrical rate structures that reduce the need for peaking power.

There is a need for experiments to determine the optimum time after a sediment input to run a BHBF.

There is a need for experiments to determine the optimum flow rate after a sediment input before BHBF is run.

There is a need for experiments to determine the optimum amount of sediment input to successfully run a BHBF.

There is a need for experiments to determine the optimum duration of a BHBF.

435
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 is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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."

Change the Purpose and Need for Action Statement for the LTEMP 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 which is an ancillary benefit of the dam.

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. 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.

The LTEMP 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.

Clearly define agency responsibilities, improve communication, create mechanisms for productive information sharing, and eliminate project redundancies between Grand Canyon National Park and the Grand Canyon Monitoring & Research Center.

Ensure that the 11 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 decision making—a distinct failure of 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 tribes view all canyon resources as culturally significant.

Funding for monitoring and management of cultural resource should be restored. In order to comply with the Grand Canyon Protection Act, federal laws, statutes and executive orders, the importance of protecting and preserving these fragile, non-renewable resources and Traditional Cultural Properties for the benefit of future generations must not be minimized.

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.

Improve the structure and functionality of the Glen Canyon Dam Adaptive Management Program 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.

RESOURCE ISSUES:

Maintain or improve the quality of recreational resource for users of the Colorado River, for generations to come.

Consider carrying capacity and campability -- design flows and flow experiments that will ensure sufficient number, size and distribution of camping beaches to accommodate the level of use delineated by the Colorado River Management Plan and minimize crowding and congestion.

Focus 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 protects and preserves the individual resources along the Colorado River.

The Endangered Species Act specifies that it is not just the fish that require protection, but also their habitat.

Examine the role of time and climate change in the system.

Can we build up a Humpback chub population (above survival levels) during drought low flow warm water years sufficient to mitigate impacts from years with high snow levels in the Rockies and high release/cold water flows from Glen Canyon Dam?

FLOW SUGGESTIONS:

Beach Habitat Building Flows should be a well-defined, key component of LTEMP alternatives.

Finalize the High Flow Experimental Protocol Environmental Assessment and incorporate it into the design of all LTEMP alternatives.

Design intervening flows (flows immediately after, and between high flow experiments) that maximize sediment retention.

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.

Include an LTEMP alternative to test steady flows.

Consider an alternative that includes a seasonally adjusted steady flow alternative that includes sediment triggered Beach Habitat Building Flows, and based on the closest approximation of the pre-dam hydrograph.

We need a scientifically credible, well-designed steady flow experiment of sufficient longevity to produce a biological signal (more than two months in the fall) that is followed by a full synthesis of impacts to biological, physical, social, economic and cultural resources.

Consider a minimum flow of no less than 8,000 cfs to ensure navigability and safety for all boaters.

Test the “best case scenario” presented in the article, “Is there enough sand? Evaluating the fate of Grand Canyon sandbars” as proposed by USGS scientists

Design an alternative based on the best chance of viability for rebuilding and maintaining sandbars.

436

Please include a steady flow alternative (SASF) in place of the ineffective (MLFF) approach that is being used which does not fulfill the mandate of the Grand Canyon Protection Act or

incorporate new scientific data necessary to understand the contextual condition of Humpback Chub.

Please fully address the requirements of the Grand Canyon Protection Act, and the multiple values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established.

Please include a natural river restoration alternative, and assess the potential for restoring both natural water and sediment flows by opening new bypass tunnels.

Please include a temperature control alternative, that could minimize temperature shock downstream.

Please consider reform of the Glen Canyon Dam Adaptive management Program Work Group because science strongly argues for a change in dam operations and the (AMWG) has continued to favor water development and power generating interests.

Specify the desired future condition of the river, dam operations, and management in order to get a sense of identity, what is at stake and move toward effective restoration quickly.

437

I am writing you concerning the LTEMP EIS, and am recommending that you strongly consider supporting a thriving wild trout fishery in the Colorado River below Glen Canyon Dam, both at Lees Ferry and downstream through the Grand Canyon in National Park Service Lands, as part of your greater fisheries management plans.

The existing trout fishery provides significant economic benefits to tourist-based communities near the Colorado River, particularly near Lees Ferry. If Glen Canyon is managed in such a way to limit this fishery, it is likely that these communities will face economic hardship. Furthermore, I know from direct personal experience that many visitors that make the trip down to the Colorado River in Grand Canyon National Park, particularly in the Bright Angel area, do so to fish, specifically for trout. They value the Colorado and its tributaries as some of the finest trout fisheries in the state, and if these fisheries were removed, these visitors would discontinue their trips to these locations, potentially resulting in reduced visitation fees to the Park.

The ecological perspective also needs to be considered in regards to the existing trout fishery. The Colorado River ecosystem has been transformed from the construction of Glen Canyon Dam--where once a free-flowing, turbid, warm water system once existed, favoring the native fish species that evolved to take advantage of such conditions, the river now is a cold water, managed system, that has caused the local extirpation of at least three of these native species, with others (most notably the humpback chub) now critically endangered. At the same time, trout have flourished in these conditions, and are perfectly suited to the conditions created by the presence of Glen Canyon Dam. Moreover, as the ecosystem has been altered, some native species have adapted to these conditions, including (threatened) bald eagles that now rely on spawning trout in Grand Canyon as a seasonal food source. Removing or eradicating trout within

the Grand Canyon could have negative consequences for the new ecosystem, and the species that have adapted to these new conditions.

I believe that the presence of a wild trout fishery in the Colorado River at Lees Ferry and through the Grand Canyon contributes to the overall value of the watershed; given the current non-negotiable management priority of maintaining Glen Canyon Dam to benefit people, it makes the most sense to allow the fishery to continue to thrive in its own right. While agencies such as the Park Service may have a mandate to preserve and restore native fish species such as the humpback chub, it is unrealistic (and scientifically unsound) to expect that such species can survive long-term in habitats that no longer meet their life history needs. Furthermore, such short-term remedies as trout removal in localized areas is a misguided use of time and resources that could better be spent finding locations for translocating native fish species into aquatic systems that still meet their life history needs.

Trout serve important economic, recreational, and biological functions in the Colorado River system below Glen Canyon Dam--I would urge those agencies involved in creating the LTEMP EIS to consider and incorporate them in any planned management activities.

438
I strongly support the detailed comments submitted by the Grand Canyon Private Boaters Association and the Grand Canyon River Guides Association.

It is paramount that all LTEMP alternatives fully meet the intent of the 1992 Grand Canyon Protection Act, which 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.'

The Grand Canyon is a national treasure, an international treasure. First and foremost, the selected LTEMP alternative must do the utmost to preserve and improve the natural character of the Grand Canyon.

439
i have just learned about this opportunity to chime in + offer feedback.. i also see that i have but just moments remaining to submit comments.

the beauty of the canyon is the sum of too many components to identify but certainly those camps with the large + pristine beaches are high on the list. i understand that those large beaches have many environmental benefits but not being a scientist i recognize that i may well be over my head in attempting to speak on that subject.

rather i would like to focus on the rare opportunity to sit on a beach or to gaze at a beach so deep into the earth's surface. in sept. of last year i had the privilege of being on a private trip down the canyon. it was a time when the flows were constant. many of our participants were from germany. their amazement at what they experienced, their joy in walking along the river,

camping along the river gave me a renewed sense of pride + appreciation in what the park service has worked so diligently to preserve.

those beaches which do not suffer from erosion need to be preserved. please respect that feature our this great resource.

440
Living Rivers, Colorado Riverkeeper, Center for BIological Diversity and River Runners for Wilderness submit the following comments for the Long-Term Management and Experimental Plan (LTEMP) Environmental Impact Statement (EIS) to be prepared under the guidelines of the National Environmental Policy Act (NEPA).

The purpose and need for this proposed action as described in the Federal Register of July 6, 2011 is: to reverse the impairment of downstream resources caused by operations of Glen Canyon Dam to Glen Canyon National Recreation Area (GCNRA) and Grand Canyon National Park (GCNP), as mandated by the Grand Canyon Protection Act (GCPA), Endangered Species Act (ESA), and other federal laws.

The notice also lists the lead agencies for this EIS as Argonne National Laboratory, and two agencies of Department of Interior (DOI), the Bureau of Reclamation (Reclamation), and the National Park Service (NPS). The cooperating agencies include in part: US Fish and Wildlife Service (FWS), US Geological Survey (USGS), Western Area Power Administration (WAPA), and the First Nations.

I. EXECUTIVE SUMMARY

A. Visioning the LTEMP EIS Interior's approach of creating management plans in incremental, piece-meal fashion with narrow time-frames has persisted for too long. The proposed 10- to 15-year management plan continues this short-sighted approach. The current drought could last another two decades or, contrarily, a probable maximum flood could arrive. These variables would have a significant impact on the ecosystem in Glen and Grand canyons below GCD.

Diminished reservoir levels at Lake Powell may require strategies to cool the river and to increase the level of dissolved oxygen. Conversely, maximum reservoir levels may require strategies to warm the river and decrease the export of sand from the river ecosystem in Grand Canyon and into Lake Mead.

Interior should not assume that the circumstances of the next two decades will be predictable and Interior should be properly prepared to take action under any future reservoir management scenario. The EIS team should therefore heed the two Secretarial Orders that address climate change in federal planning and to also utilize rigorous science (SO #3289(1) & SO # 3305).(2)

Interior must look further into the future when undertaking this EIS. Interior should strongly embrace foresight scenario planning in the time-frame of a 100-years or greater, and allow for a broader, more realistic range of scenarios to be explored including: climate change, enduring aridity and catastrophic flood events.

Additionally, it must be recognized that Glen Canyon Dam has a lifespan, thus it's appropriate to consider what a plan would look like when GCD can no longer perform its primary function of storing water, storing sediment, and providing safe and reliable flood control. Especially as it relates to preparing a funding mechanism for such a plan, since it will be quite expensive to mitigate infrastructure that is compromised, and also a challenge to keep water deliveries uninterrupted and of good quality.

Furthermore, flow regimes and infrastructure necessary to provide more flexibility and diversity in the experimental programs of the Adaptive Management Program (AMP) have yet to be implemented or tried. For example, a temperature control device, mechanical sediment augmentation (which would also disadvantage hunt-by-sight nonnative fish), floods timed with the spawning season, floods of higher magnitude to increase sand and carbon storage in the old high water zone, and low and steady flows immediately following the spring spawn, which would provide nursery habitat and increase the yield of the food base for the hatchlings.

The scope of this EIS must also include a much broader and aggressive range of experimentation other than the three high flow experiments of the recent past, mechanical fish removal, and two months of steady flows in September and October.

B. The Adaptive Management Program In monitoring the progress of the GCD AMP for nearly 15 years, it is evident that were the program functioning properly, most specifically employing the practice of "learn by doing," then this EIS would be wholly unnecessary.

For example, since the signing of the Record of Decision (ROD) there is less sand, less archeology, the razorback sucker (RBS) is now extirpated, and the river is still deprived of the basic habitat elements to repatriate RBS and the other extirpated species.

"Doing" means AMP should be willful about solving management issues as they arrive (or change) through rigorous planning, research, experimentation, and monitoring programs, which includes finishing compliance documents in a timely manner without periodic suspension. From the beginning of the first Adaptive Management Working Group meeting of 1997, the program has proven not to have that kind of leadership. In fact, its dysfunction is precisely why this EIS is necessary.

The public can't help but notice that AMP has lowered the bar of achievement over the last 15 years. Instead of applying themselves to perform beneficial accomplishments, the AMP focuses on avoiding litigation. It is not uncommon to have major components of AMP meetings devoted to addressing possible, pending or existing litigation brought on by the public as result of the program's unwillingness to act in the public's interest and within the resource protection spirit that lead to its creation. As such, the AMP in its present form is counterproductive and its continued existence will only ensure further degradation of the ecosystem and contention from the public.

Therefore, the reformation of AMP, its mandate, structure and decision-making must become a high priority of this EIS.

C. Documents of Departure and a Contradictory Management Objective The Biological Opinion (BiOp) of 2008 stated the Modified Low Fluctuating Flow (MLFF) regime is not harmful to humpback chub (HBC), which is a departure from the BiOp of 1994 and its recommendation for the Seasonally Adjusted Steady Flow (SASF) regime. The decision by FWS was based on status and trend reports published by the USGS. The documents explain that the populations of HBC began to increase slightly in the 1990s, which is when the MLFF regime was initiated.

This result does not necessarily mean that MLFF is the appropriate flow regime from GCD. It is quite possible that had the SASF flow regime been in place since 1996, the HBC may have been delisted by now and the RBS would not be extirpated. Until SASF is fully tested, this flow regime should not be eliminated from any alternative.

Additionally, SASF is most likely required to repatriate RBS and restore its critical habitat below the mouth of the Paria River'a mandate of the GCD AMP, but one which has been ignored since its inception. SASF is also likely required to increase the yield of the food base of the Colorado River. This flow regime is also more likely to retain more sediment than MLFF. The 2005 State of the Colorado River Report (SCORE(3)) by USGS does specifically state that MLFF is not a successful flow regime for the retention of sand.

Moreover, the GCD AMP's whole approach to non-natives, especially trout, is baffling. Removing non-native trout in one reach, while concurrently maintaining a healthy nonnative population of in another reach, is an objective that must be reevaluated, especially given that such a management objective is contrary to resource protection within the national park system.

D. Looking Back into the Administrative History Fifty-years of progressive degradation of the nation's premiere national park is unacceptable. Upon reviewing the administrative record of dam operations since the development of the National Environmental Policy Act of 1970 (NEPA) it's clear how Reclamation has been overtly reluctant to adapt to new environmental policies as major federal actions occur.

This willful delay has only served to increase the degradation of park values over time and making its long-term recovery all the more difficult to achieve. Consequently, the park is in a situation where the urgency is far greater than it was 15 years ago when AMP was first chartered. This EIS must demonstrate that this lost time will be recovered and aggressive programming will rebound from this point onward.

E. Annual and Five-year Operating Plans On March 3, 1997(4) the Federal Register published guidelines for developing an annual operating plan and the 5-year review as it relates to fulfilling the provisions of the Grand Canyon Protection Act (GCPA). It is not clear that the intent of the GCPA is fully captured in these two operating plans. For example, the balancing flows of Interim Criteria (2007) could have been performed in a manner that would have provided benefits to critical habitat, instead of disturbing the mass balance of sand and other basic elements of critical habitat such as the food base and near-shore warming.

This EIS must provide a better integration with these 1- and 5-year operating plans. For example, mailing the draft annual operating plan each spring to all the interested parties and then

scheduling a brief consultation meeting at McCarren Airport in Las Vegas is wholly inappropriate given the importance of these guidelines.

F. Interim Opportunities for Immediate Change Interior must immediately initiate SASF until the Record of Decision (ROD) for the LEMP EIS is formally initiated. This is a situation that would be similar to the Interim Flow criteria that was instituted while the EIS process was underway in the early 1990s. Such action will allow sediment retention to once again become balanced in the ecosystem, and for the elements of critical habitat to be improved. Especially since Reclamation announced on January 6 (link),(5) that high volume balancing flows would be prematurely suspended due to dry conditions; the snowpack is currently 30% of the April 15 total average.

Additionally, it is not unreasonable to assume that the LTEMP EIS will likely be delayed, as was the case for the first EIS that began in 1989, or even suspended, as was the case for the LTEP EIS that began in 2007. This includes the two suspensions of the Environmental Assessments (EAs) to implement a temperature control device.

Initiating SASF immediately provides the ecosystem in the national park the best baseline to work with in the near future should delays or suspensions again occur.

G. A Brief Presentation of Proposed Alternatives The table below summarizes the two alternatives that must be addressed by the EIS, both of which are discussed further in Section III. [See attachment for actual Table.]

Table No. 1: Two alternatives in brief for consideration of the LTEMP EIS Alternative Basic components and benefits in brief

A: Mimic the natural hydrograph and other natural processes.

Implement mechanical sediment augmentation.

Time spring freshets with the native fish spawn.

Implement selective temperature control.

Implement low steady flows in summer and fall.

Non-native fish removal.

Repatriate extirpated species.

Remove tamarisk and restore the native riparian plant community for sensitive bird species.

Implement replacement power without increasing carbon emissions, and without constructing dams and pump back hydropower facilities. Alternative Basic components and benefits in brief

B: Dam removal and a precautionary principle management plan

Prepare for sediment reservoir filling the reservoir and aging infrastructure.

Manage for climate change including the need for land management practices to control dust on snowpack.

Revise flood control management in the historic floodplain below Davis Dam; reform planning and zoning laws to protect people and infrastructure.

Create strident programs to protect the watershed from pollution and permanently withdraw all fossil and nuclear fuel leases in the basin.

Replenish depleted aquifers to create a groundwater storage buffer for shortages and emergencies (drought and natural disasters).

Reform planning and zoning to reflect reality with available water resources without vulnerable and energy intensive augmentation technology.

Reform agricultural practices.

Restore the natural hydrograph and the sediment balance without the intensive capital outlay of additional infrastructure to mimic natural processes during the lifespan of GCD.

Avoid the inherent dangers of GCD failure, which include the vulnerability of a cost-saving, arch-cantilever dam design that utilizes closed spillways of inadequate capacity, and built in water soluble Navajo sandstone.

Increase water yield by reducing bank storage and evaporation.

Increase the range of riparian habitat and restore the connectivity of the major tributaries for native fish species.

The breakdown of leaf litter and woody debris would naturally augment the food web with much-needed carbon.

Create immediate jobs that include landscape restoration, nonnative fish removal, and sediment stability projects.

Initiate sediment removal program at Lake Mead.

II. ADMINISTRATIVE HISTORY

A. The Adaptive Management Program Since 1973, the public has demonstrated a desire for a functioning, natural ecosystem in Grand Canyon National Park (GCNP). Despite decades of interventions and litigation, there have been no deliverables. Forty years has been more than

enough time to return the river corridor in Grand Canyon to mimic its pre-dam natural state, but so far this has not occurred, nor as evidenced by the limited information surrounding the scope and need for this EIS is there any indication that much change can be anticipated from the foregoing.

Nonetheless, we do commend Interior's decision to start this new EIS because it is indeed urgently required. Interior must start over and essentially return back to accepting the recommendations of the leading aquatic ecologists of 1993 (Clarkson, 1994),(6) the Biological Opinion (7) of 1994, and the visionary period of the 1995 - 1997 Transition Working Group (TWG Final Objectives, 1996).(8)

As we have suggested since our scoping letter of April 2, 2004,(9) the AMP as presently structured should be abandoned and something new put in its place. Basically the responsible agencies of DOI and sovereign nations (tribes) should comprise AMP and let the others participate on the same tier as the public citizen.

Typically, other AMP "stakeholders," especially WAPA, exert undue influence on the AMP's direction and decisions, as their aims (maximize power generation) run 180- degrees contrary to the habitat needs of the river corridor through Grand Canyon National Park. The Colorado River's natural hydrograph through Grand Canyon remains subservient to electricity generation. The same is true of non-native trout advocates. Since the Redwood Amendment of 1978, its amazing that a federal advisory committee is compelled to manage for a viable non-native trout population in the national park system. Moreover, it's equally inappropriate to limit beneficial habitat flows because river runners (who welcome and praise natural flows in other national parks) would be inconvenienced by high or low flows. If the natural hydrograph is accepted elsewhere, why not also in the Grand Canyon?

The following table of comments from academic reviewers of GCD AMP illustrates further how the AMP program as a body is derelict in its charge to stop the impairment of the river ecosystem in GCNP due to GCD operations.

Table No.2: Academic reviews of GCD AMP [See Attachment for actual Table] Reviewer Analysis Remedy Feller, 2008

The GCD AMP has substituted collaborative decision-making among stakeholders for the hierarchy of priorities created by law.

The AMP has facilitated non-compliance with ESA and has given hydroelectric power production a higher priority.

AMP has actually stifled adaptive management by making agreements among stakeholders a prerequisite to changes in dam operations.

Proposes a program for adaptive, but not collaborative, management of Glen Canyon Dam that would better conform to the law and would be more amenable to adaptation and experimentation than would the current, stakeholdercentered program.

Camacho, 2008 — At the beginning (1997) AMP adopted and implemented an approach that provides little chance for addressing and resolving complex natural resource problems.

AMWG expends most of its social capital on the details and technical questions of the AMP, instead of focusing on the resource issues.

The process is being utilized only to delay any action or to create the illusion that something is being done.

There must be measurable clarity (transparent and measurable regulatory targets) for a multilateral process to be effective.

Effective leadership within DOI and AMP should provide that clarity.

Susskind, 2010 — AMP should not be considered a success because it has failed to address effectively the concerns that led to its creation in the first place.

DOI failed to follow commonly identified best practices in collaborative and adaptive resource management in structuring the AMP.

AMP missed multiple opportunities both to foster agency and stakeholder learning and to cultivate constructive engagement of the stakeholders who care the most about the Colorado River.

Hydropower advocates seem incapable of fashioning creative solutions that meet multiple interests.

Identify appropriate stakeholder representatives.

Set clear goals and involve stakeholders in developing a collaborative process.

Use professional neutrals when appropriate and commit to building common ground. Incorporate joint fact-finding to deal with scientific uncertainty.

Produce collectively supported written agreements.

Build long-term adaptive management capabilities. References: Feller;(10) Camacho;(11) Susskind.(12)

Another table is presented here, which highlights public intervention through litigation to address grievances in regards to impairment issues from operations of Glen Canyon Dam, the Colorado River Storage Project (CRSP), and others.

Table No. 3: Key public interventions on management of Glen Canyon Dam, Glen Canyon National Recreation Area and Grand Canyon National Park. [See Attachment for actual Table] Date Summary of Citizen Litigation April 21, 1973 Friends of the Earth (FOE) v. Armstrong

(360 F Supp, 165, 1973) — Joining FOE in this suit for relief and injunction are Wasatch Mountain Club and river outfitter Kenneth Sleight. The defendants are DOI and Reclamation. The purpose is to prevent the rising waters of Lake Powell from creeping into Rainbow Bridge National Monument (RBNM) as a violation of the Colorado River Storage Project Act (CRSP) of 1956, which states the intent to keep impounded waters out of RBNM. The case was upheld by the federal District Court in Utah, but was lost in the appeal process.

July 31, 1973 Grand Canyon Dories v. Walker — Plaintiffs forward to federal court a temporary injunction after two river trip concessioners respond to Reclamation's announcement (July 27, 1973) about extreme low water releases from GCD following extreme peaking power releases in the morning. The defendants are NPS, Reclamation and DOI; Walker is Director of NPS.

August 1, 1973 Dories v. Walker — A court order of dismissal was entered.

August 2, 1973 FOE v. Armstrong — The defendants appeal and the court decides that CRSP does not prohibit Lake Powell from entering RBNM because Congress denied funding to construct a proposed concrete dike to keep Lake Powell reservoir water from entering the monument. An appeal to US Supreme Court was presented, but the high court refused to hear the case.

Sept. 5, 1973 Dories v. Walker — Plaintiffs file an appeal stating that Reclamation cannot arbitrarily set operations of GCD without first initiating NEPA compliance procedures.

August 20, 1974 Dories v. Walker (500 F. 2d. 588) — Plaintiffs bring forward a complaint to federal court on the issue of Reclamation's non-compliance with NEPA regarding operations at GCD and seek injunctive relief. The appellants allege that operations at GCD interfered with the safe operation of float trips, and continuing operations are a major federal action, and therefore NEPA requires the preparation of an EIS. The court denied judicial relief on the grounds that no evidence was produced to show DOI had considered how NEPA applies. The court thus held, in those adolescent days of NEPA litigation, that a determination must be undertaken by the agency prior to any judicial review. With this action DOI was effectively put on notice for future NEPA compliance and, in the following year, Reclamation did undertake a formal study to prepare an EA on operations at GCD, but it was not finalized for another 8 years.

Sept. 3, 1974 — The Navajo Legal Aid Society files suit in federal court A suit to keep Lake Powell reservoir water from inundating RBNM. The case will evolve into Badoni v. Higginson. Badoni is a Navajo medicineman and Higginson is Commissioner of Reclamation. Click here for history of Navajo legal claims.

Spring, 1977 Badoni v. Higginson (455 Fed. Supp. 641) — Navajo medicinemen allege that Reclamation had not complied with NEPA regarding not only operations at GCD and Lake Powell, but the entire CRSP. Plaintiffs sought to prevent destruction to a natural area and desecration of sacred areas at RBNM resulting from threatened inundation by Lake Powell. The district court ruled consistent with Dories v. Walker that the NEPA issue was not yet ripe for review. This decision was subsequently appealed by the plaintiffs.

Nov. 3, 1980 Badoni v. Higginson (638 F. 2d. 172) — The Court of Appeals affirms the decision of District Court that NEPA compliance was not yet ripe for judicial review and acknowledged that Reclamation had formally decided to draft a comprehensive EIS (CEIS) for the entire Colorado River Basin "The information gathered in the preparation of the DEA on the operation of Glen Canyon Dam and Reservoir is intended to be used in the preparation of a comprehensive basin-wide EIS, which will evaluate the operation of all the Bureau of Reclamation projects on the Colorado River and its tributaries. The determination to prepare a comprehensive basin-wide EIS on the Colorado River dams is a reasonable one within the administrative discretion of the Department of Interior" (Brief of Federal Appellees, Badoni v. Higginson, 1978, pp. 26-27). The Court agreed that the government's decision to draft the CEIS, as opposed to a site specific EIS, was reasonable since GCD and Lake Powell were important links in the Colorado River development scheme and cannot be considered alone (Badoni v. Higginson, p. 181). However, the initial work in 1977 by Reclamation for NEPA compliance was abandoned, even though Congress had never specifically denied funds for such a project.

March 27, 1981 Badoni v Higginson — The plaintiffs appealed and the court maintained, as in EDF v. Higginson (655 F. 2d 1244), that the agency would seek funding for the CEIS. Reclamation decided instead to meet its NEPA obligations by continuing "its past practice of addressing cumulative and synergistic impacts in site specific impact statements for individual projects and their components in the Colorado River Basin." (Appellee' s Memorandum to Court, p. 1.) The Court of Appeals thus affirmed the District Court's decision based upon the government's original promise to complete the CEIS, but remanded the case to the District Court for determination of the legality of the government's shift from a CEIS to a site specific project EIS, emphasizing that NEPA compliance was required one way or another, and that EIS's must be prepared addressing cumulative impacts.

April 3, 1981 EDF v Higginson (655 FR 2d, 1981) — Environmental Defense Fund files a complaint against DOI and Reclamation in federal district court (District of Columbia) on the issue of a CEIS for the entire Colorado River basin. Joining EDF is Wilderness Society and Trout Unlimited.

April 20, 1982 EDF v. Broadbent EDF, Wilderness Society, Trout Unlimited offer a settlement agreement in federal court (District of Columbia), wherein Reclamation and DOI agreed to prepare EIS's on Colorado River hydropower facilities, specifically addressing cumulative and synergistic environmental impacts within each document. The cases pending were thus dismissed pursuant to the stipulation filed and accepted by the court. Broadbent replaced Higginson as Reclamation Commissioner.

Dec. 21, 1988 NWF v WAPA National Wildlife Federation, Grand Canyon Trust, American Rivers, & Western River Guides Association petition federal court to consolidate their complaint with a similar complaint by Salt Lake City (SLC v WAPA), for reasons of saving resources. This action, in both complaints, is based on WAPA failing to conduct a proper EIS in compliance with NEPA.

Sept. 29, 1989 NWF v. WAPA injunction — A court injunction orders WAPA to stop its Call for Applications for Power. The reason is lack of preparing an EIS. Joining as plaintiffs are Trout

Unlimited, Stonefly Society of the Wasatch, Utah Wildlife Leadership Coalition, Salt Lake County Fish and Game Association and Utah Wildlife Federation. Joining the defendant is Colorado River Energy Distributors Association (CREDA). The Plaintiffs will prevail in District Court (Utah) and WAPA is ordered to prepare an EIS. WAPA is permitted to market power on a court approved interim plan, which still provides for the generation and sale of peaking power pursuant to their previous marketing criteria.

Feb. 15, 2006 CBD v Reclamation Center for Biological Diversity, Living Rivers, Arizona Wildlife Federation, Glen Canyon Institute and Sierra Club allege violations of the GCPA, NEPA, and ESA. A settlement initiates the Long-Term Environmental Plan (LTEP) EIS, which is eventually suspended and then substituted with a 5- year experimental plan of high flow experiment and fish removal. The subsequent Biological Opinion (2008) became an embarrassing departure from the 1994 BiOp.

March 28, 2006 RRFW v NPS River Runners for Wilderness, Living Rivers, Rock the Earth and Wilderness Watch challenge NPS and their 2005 Colorado River Management Plan, and their departure from the plan of 1979 to manage the river corridor as a wilderness area, addressing impacts from motorized recreation, and addressing inequitable river access that is presently dominated in the prime season by commercial outfitters.

Dec. 7, 2007 GCT v Reclamation GCT allege violations by Reclamation of ESA in regards to harmful flow regimes from operations at Glen Canyon Dam that degrade critical habitat in Glen and Grand canyons. GCT will challenge the departure of the 2008 BiOp and prevail. The case is currently under appeal.

Table No. 4: References of Table No. 3 [See Attachment for actual Table and hyperlinks] Citizen Group Legal Documents Hyperlinked Center for Biological Diversity

CBD v Reclamation
Dories v Walker
1973 injunction
1973 dismissal
1973 appeal
1974 complaint
500 F. 2d. 588
Environmental Defense Fund
1982 settlement
Friends of the Earth
360 F Supp, 165, 1973
Grand Canyon Trust
GCT v Reclamation
National Wildlife Federation
Consolidation of suits
1989 injunction
Navajo Legal Aid Society
NPS history of Navajo legal claims

455 Fed. Supp. 641
638 F. 2d. 172
1980 affirmation
Congress had not denied funds for CEIS
655 FR 2d, 1981
River Runners for Wilderness
RRFW v NPS

B. Administrative History of Operations at Glen Canyon Dam

The tone within the environmental review documents produced by Reclamation in the 1970s (13) & 1980s (14) indicate a strong preference for compliance with legislation that authorizes water and power projects, over legislation that authorizes environmental protection. For example, while the FWS submitted a jeopardy opinion (15) for endangered fish facing extinction due to operations of GCD, Reclamation stated their dam operations would have a negligible effect on the downstream environment.

However, this preference is surprising given that natural resource protection legislation has existed for more than a century starting with the Antiquities Act of 1906 (authorizing National Monuments) and the Organic Act of 1916 (authorizing National Parks). These are both older than the Boulder Canyon Project Act of 1928 (BCP), and the Colorado River Storage Project Act of 1956 (CRSP).

While it is true the Reclamation Act of 1902 is the oldest of congressional authorization for water projects, that document does not preclude the rights that belong to federal reserve lands, as affirmed by the Winters Doctrine, Arizona v California, and The Redwood Amendment.

In 1977, when the Department of Energy was created, another federal agency joined the fold of Colorado River management: Western Area Power Administration (WAPA), which manages the distribution of federal hydropower resources produced at power plants operated by Reclamation. As noted early, this agency asserts itself inappropriately, and largely facilitates the degradation of park values in Grand Canyon.

Another challenge so far ignored by the AMP are the deficiencies of the BCP and CRSP that ensure that Glen Canyon Dam's design is adequate to handle severe and sustained drought or probable maximum floods. At best, present-day dam operations can only handle droughts and floods of small magnitude. Unfortunately, 30 million people now depend on a water delivery system that is vulnerable to extremes of climate. In another generation of time some 50 million people will to dependent on this infrastructure with even more vulnerability as climate continues to shift toward greater extremes; and as this infrastructure simultaneously ages, and as the reservoirs lose water storage space and flood control capacity to sediment filling.

The relentless development of the nation's water resources created situations whereby it became necessary for Congress to intervene with environmental protection laws to restore the balance. The most significant to date has been the National Environmental Policy Act (NEPA), 1970.

NEPA allows for a broad range of approaches to correct environmental problems. For example, an agency can take the high road, or the low road. In the case of Reclamation, it has tested the ground all too often to ensure that the lowest tier of environmental protection is provided. We acknowledge that improvements have been made in the agency over time, but these gradual changes occurred at the cost of losing an ecosystem in GCNP. Had the opposite approach been embraced by Reclamation immediately, or AMP for that matter, there would be absolutely no need to initiate this EIS.

Among other things, the intent of these environmental laws is to help preserve our natural heritage for future generations. It is not clear or understandable why Reclamation or WAPA would downplay these beneficial features for as so long as they have.

The table below illustrates how various branches of government have adapted, or not adapted, since the inauguration of environmental protection laws in the 1960s, and as it pertains to operations at Glen Canyon Dam and the management of natural resources in GCNP.

Table No. 5: Administrative History of NEPA (1970) compliance below the forebay of Glen Canyon Dam. [See Attachment for actual Table]

Event Recommendations or Criteria Action, Delay, Inaction, Comment 1967 - Humpback chub and Colorado pikeminnow are listed as species threatened with extinction. None Ongoing research by independent and concerned scientists.

1970 - Long-range Operating Criteria Coordinate dam operations of the Colorado RIver basin on 1- and 5-year basis. Reclamation arbitrarily coordinates dam operations without environmental or public review until 1997. It is not clear that this mandate at present is compliant.

1973 - Endangered Species Act (ESA) Secretary to work with state agencies to monitor the status of sensitive species Federal and state wildlife agencies initiate research & monitoring programs.

1974 - NPS begins studies to determine human impacts to natural and cultural resources.

Funds from the National Science Foundation provide baseline data for Lake Powell region.

Improve management policies to mitigate impacts from increased visitation & dam operations.

Wilderness values are assessed.

Assess air quality and long-term climate.

NPS initiates management plans under NEPA guidance and prepares a wilderness proposal.

Reclamation initiates studies to increase peaking power at GC Dam, install generators on river outlet works, and construct a regulation dam just above Lee's Ferry to capture the spikes and release a steady flow through generators.

Reclamation does not reference any NEPA compliance issues in their study.

1976 - Stockton and Jacoby present treering climate data. Address the overallocation problems of the Compact and prepare for sustained drought. Reclamation will not study climate induced water shortages until the SECURE Water Act is authorized in 2009. Reclamation is preparing a narrow study, but not a firm long-term action plan.

1978 - Jeopardy Opinion issued by FWS Endorses the recommendations of the NPS studies Cold water and constant daily fluctuating flows are the cause of the impairment.

1979 - Recovery plans for endangered fish are issued, and revised in 1984, 1990 & 2002, and partially in 2011.

Continue research and monitoring;

Maintain or enhance refugia;

Remove threats from development;

Remove impacts of non-native fish;

Acquire water rights for habitat;

Develop and maintain genetically viable brood stock.

Recovery planning arrives 6 years after ESA.

Cooperative agreements with Reclamation and the states arrive in 15 years (1988) after ESA for the Upper Colorado.

Cooperative agreements for the San Juan River arrive 19 years after ESA (1992).

Cooperative agreements for the Grand Canyon arrive 23 years after ESA (1996).

1979 - Reclamation prepares EA for rewinding degraded generators at GCD, which will also increase the hydroelectric yield.

The EA undergoes revision in 1981 and 1982. The EA and its revisions concluded that environmental and recreational impacts were insignificant or nonexistent.

The rewinding project was underway as the EA was prepared and before the Finding of No Significant Impact (FONSI), which arrived in December 1982.

The impact is not really the small increase of generator efficiency. The impact is the normal everyday operations of peaking hydropower generation at GCD.

1980 - Hatch Amendment NPS wilderness proposal for the Colorado River corridor in GCNP does not advance to Congress. Prevented the use of appropriated funds to implement a management plan for the Colorado River which "reduces the number of user days or passenger launches for commercial motorized watercraft excursions, for the preferred use period."

1982 - Phase I of Glen Canyon Environmental Studies (GCES) begins.

Phase II begins in 1989 and ends with the Record of Decision in 1996. The studies are to focus on a broad range of ecological and recreation issues related to the operations at GCD, but were not to address any economic or societal issues. After considerable investment for research and monitoring, the public demanded an EIS, which was initiated in 1989.

1982 - Reclamation and Army Corps modify flood control criteria of 1968.

A minimum of 5.35 maf must be available in the basin's storage system by January 1st of each year.

1.5 maf of storage space must always be available at Lake Mead.

1983 - April to July volumes (13.6 maf) caused emergency spills at GCD and Hoover Dam; damage to all spillway tunnels occurred; massive flooding below Davis Dam.

1984 - April to July volume (13.6 maf) was safely discharged through power plants and river outlets.

It is uncertain that GCD or Hoover Dam could safely manage, for example, the April to July volume of 1884 which is estimated to be 30 maf; it is quite certain that property damage below Davis Dam would be quite severe at this discharge volume.

1984 - spillways at Hoover and GC dams are repaired.

Air slots are constructed to reduce cavitation in spillways.

Studies are conducted to assess probable maximum floods.

Subsequent studies have revealed that floods even greater than the event of 1884 have occurred in the Colorado River basin in the last 1,000 years.

Flood studies by USGS and U of AZ prompt removal of uranium waste pile along the Colorado River near Moab, UT.

1988 - Many public service groups present briefs for a legal intervention to address hydropower impacts from GCD and prevail. Conduct an EIS on operations of GC Dam and the impacts on GCNP.

Secretary Lujan announces the preparation of an EIS on operations of GCD in 1989.

Note: Dam operations are managed by Dept. of Interior and hydropower distribution is managed by Dept. of Energy through the Western Area Power Administration.

1992 - Congress intervenes because the EIS is not produced in a timely manner by authorizing Grand Canyon Protection Act (GCPA). GCPA mandates a final EIS in 2 years, an audit by GAO, and development of a longterm research/monitor plan through AMP. The intent of GCPA is helpful, but it does not go into any great detail about how to mitigate operations of GCD, which essentially means that agency programs could range from marginal to effective. The degree of compliance is dependent on the leadership of AMP and the Secretary.

1993 - Lead scientists of aquatic ecology present their recommendations to restore native fish populations. Warm the river, control non-native species, seasonally adjusted steady flows and sediment augmentation. EIS writers endorse MLFF as the preferred alternative and WAPA asks that the proposed alternative be adjusted to accommodate for more hydropower flexibility by increasing maximum allowable flow and the ramping rate.

1994 - Critical habitat designation for the Colorado River Basin Razorback sucker (RBS): Colorado River from mouth of Paria River to Hoover Dam.

HBC: Colorado River from Nautiloid Canyon to Granite Park & the lowest 8 miles of Little Colorado River.

RBS became extirpated under MLFF.

HBC population in LCR has stabilized under Interim Flows and MLFF, but it remains premature to remove jeopardy status.

The main stem elements still do not favor reproduction in the main stem under MLFF, nor to repatriate RBS and other extirpated species.

1995 & 1996 - Completion of Biological Opinion, EIS, and GAO audit.

Record of Decision signed.

Transition Work Group replaces GCES and begins the long-term planning process (Strategic Plan).

First High Flow Experiment in March of 1996.

Transition team drafts AMP Charter, guidelines for GCMRC, goals and objectives of strategic plan, workshops for RBS recovery and temperature control device.

High flow experiment built beaches and backwater habitat, but the length of the experiment sacrificed the mass balance of sand on the negative side.

The activities of the Transition Work Group reveal a higher degree of efficacy than the current AMP.

1997 - Technical Work Group (TWG) and Adaptive Management Work Group (AMWG) are formally established. Procedural affairs become the dominate activity of the AMP.

Activities initiated by the Transition Working Group languish in debate.

The administrative record of AMP on the official webpage does not begin until 1999.

TCD EA is suspended.

2000 LSSF experiment is poorly executed.

2000 - Low Steady Summer Flow (LSSF) experiment Initiate components of the Reasonable and Prudent Alternatives of the Biological Opinion.

The planning for this experiment was fasttracked and flawed, and long-term monitoring procedures were inadequate.

A comprehensive report of the LSSF experiment did not emerge until 2011 and knowledge gaps remain.

2001 - Revision of Recovery Goals GCMRC comment letter resonates a decline in HBC in GCNP and recommends a more universal methodology of synthesizing the population data.

Considerable programming is initiated to understand the status and trends of HBC in GCNP, which essentially breaks down into bean counting.

AMP becomes unbalanced as it focuses almost exclusively on HBC to avoid a legal intervention, which arrived anyway in 2006 and continues to this day.

2002 - Recovery plans revised

Recommends warming the river.

Provide flows that advantage native fish.

Reduce non-native fish population.

Provide management plan for Little Colorado River.

AMP will initiate non-native fish removal. AMP will provide steady flows in the fall but not the in the summer.

AMP will initiate high flow experiments, but not in the beneficial months of May or June.

LCR management plan continues to languish.

TCD continues to languish.

RBS recovery continues to languish.

2004 - High Flow Experiment Occurs in November to take advantage of inputs from summer and fall monsoon events. A simulated flood of shorter duration with less export of sand from the system.

2006 - LTEP EIS announced and eventually suspended Generate a long-term planning document. Generates a departure from the previous Biological Opinions and Recovery Goals. Essentially manifests that AMP will lower the bar of performance.

2007 - Little Colorado River Watershed Coordinating Council formed. LCR planning was first recommended in the recovery goals of 1979. Overdue by 3 decades.

2007 - Interim Guidelines Record of Decision Manage Lakes Mead and Powell as one reservoir; balance water storage in the two reservoirs equally. Essentially changes the Compact Point from Lee's Ferry to Hoover Dam. Recent high volume balancing flows reduce mass balance of sediment resources in GCNP and renders near shore habitat during fall steady flows as moot.

2008 - High Flow Experiment Occurred in March with considerably more sand to work with than previous experiments.

Significant positive beach and habitat building followed by normal erosion of fluctuating flows.

Sediment in the old high water zone continues to degrade forcing the excavation of archeology sites.

2010 - Desired Future Conditions Revisit the fundamental goals and objectives of AMP.

Some ambitious goals are presented.

Some departure from the goals and objectives of the 1996 Transition Work Group.

2010 - Development of protocol for High Flow Experiments and non-native fish removal 10-year planning document Zuni uncomfortable with non-native fish genocide near sacred places at or near the mouth of Little Colorado RIver.

2011 - 5-year review of humpback chub.

Recommends warming the river.

Provide flows that advantage native fish.

Reduce non-native fish population.

Re-consultation if population drops.

High volume releases in 2011 due to criteria of Interim Criteria reduces river temperature;

Disadvantaged young-of-the-year native fish and near-shore ecology.

Reduced the mass balance of sand for sandbar habitat.

Table No. 6: References for Table No. 5. [See Attachment for actual Table and Hyperlinks.]
References Hyperlinks to References of Table No. 5

Adaptive Management Program

1996 - TWG final objectives of long-term planning.

1999 - Science Advisors review Temperature Control Device.

2001 - Strategic Plan with Appendices.

2003 - Science Advisors review Temperature Control Device.

2010 - Desired Future Conditions

Biological Opinions

1978 - Jeopardy Opinion of GCD

1994 - BiOP of GCD

2008 - BiOp of GCD

2009 - Supplemental BiOp of GCD

Congress

Grand Canyon Protection Act

NEPA regulations

Endangered Species Act

National Historic Preservation Act

Redwood Amendment

SECURE Water Act

Federal Notices

1967 - listing of Colorado pikeminnow as endangered

1967 - listing of humpback chub as endangered

1980 - listing of bonytail chub as endangered

1990 - listing of razorback sucker as endangered

1994 - Designation of critical habitat in Colorado River Basin

1997 - Operating Criteria for GCD

Litigation

1908 - Winter's Doctrine

1964 - AZ v CA

1989 - NWF v WAPA

2006 - CBD v BOR

2008 - GCT v BOR

National Park

1977 - Synthesis and Management Implications of the Colorado River Research Program

1979 - Colorado River Management Plan

Agency & Public Comments

1981 - Environmental assessment of Glen Canyon Dam operations

1990 - Agency recalcitrance and evasion regarding compliance with NEPA relating to GC Dam operations: A documented need for Congressional intervention

2001 - GCMRC comments on the recovery goals for endangered fish

Reclamation

1976 -Draft EA

1977 - Report of Western Energy Expansion Study

1982 - Draft Environmental Assessment

1996 - Record of Decision, Glen Canyon Dam

2007 - Mechanical Sediment Augmentation

2008 - Evolution of Hoover Dam Inflow Design and Flood Study

Recovery Plans

1990 - Recovery goals of humpback chub

2002 - Recovery goals of Colorado pikeminnow

2002 - Recovery goals of humpback chub

2002 - Recovery goals of bonytail chub

2002 - Recovery goals of razorback sucker

2011 - HBC 5-year review

Science

1970s - Lake Powell Research Project

1976 - Long-term surface water supply and streamflow trends

1994 - Paleofloods in Grand Canyon

1994 - Management of discharge, temperature, and sediment in Grand Canyon for native fish

1999 - Driftwood and aquatic food web

2002 - Aquatic food base monitoring and research

2002 - Recent sediment studies refute Glen Canyon Dam hypothesis

2004 - Statistical analysis of flood occurrence near Moab, UT

2005 - Paleofloods near Moab, Utah

2005 - State of the Colorado River in Grand Canyon (SCORE Report)

2008 - Abundance trends & status of LCR population of HBC with data from 1989 to 2006

2008 - Is there enough sand?

2009 - Abundance trends & status of LCR population of HBC with data from 1989 to 2008

2011 - Effects of Three High-Flow Experiments (USGS Circular 1366)

2011 - Analysis of the 2000 low steady summer flow (LSSF)

Sufficient Progress Reports

1990s - Sufficient progress reports, GCD (combined)

1990s - Sufficient progress responses from Reclamation, GCD (combined)

WAPA

1993 - WAPA requests modifying the range of MLFF

III. ALTERNATIVES THAT MUST BE ADDRESSED BY THE EIS

A. Restore natural process in the river corridor in Grand Canyon The paramount objective for the EIS must be the establishment of a process, or a dam operating regime, that assures the basic elements of habitat that existed prior to Glen Canyon Dam's construction to thrive, and as such the protection all native species present at that time. These basic elements must include:

1) Flows: a natural hydrograph includes a gradual increasing flood flow beginning in the late spring, followed by a gradual decrease in this flood flow in the early summer (April to July).

2) Temperature: The temperature of the river below the dam in the spring spawn must be at least 15 degrees Celsius to stimulate the full maturation of a hatchling. The temperature of the river in the late summer and fall must at least be 15 degrees Celsius at the mouth of the Paria RIver and 17 degrees Celsius at the mouth of the Little Colorado River.

3) Sediment and nutrient transport: must be sufficiently abundant and stable to sustain summer and fall nursery habitat for the hatchlings to mature.

4) Non-native fish eradication: to ensure there is ample food for the native species, and to also ensure young-of-the-year native fish do not fall victim to predation, the nonnatives must be removed from the ecosystem from the base of the dam to the mouth of Lake Mead.

It is abundantly clear that adjusting flow operations at Glen Canyon, in and of themselves, cannot modify the elements of critical habitat in a consistent manner over long periods of time to bring about the necessary habitat conditions for Grand Canyon's restoration consistent with the Grand Canyon Protection Act. Tuning a dial here or switching a lever there, so-to-speak, is not how an agency should go about improving a debilitated ecosystem. More dramatic steps must be taken to increase the range of diversity and application of mimicry applications, such as a selective temperature control device, mechanical sediment augmentation, and mechanical non-native fish removal. There is no other way to test these applications until they are actually built and implemented. The GCD AMP has consistently ignored these issues and the resources has continued to suffer as a result. It's critical that all alternatives explored by the EIS address these issues and how the specific alternative will address them.

B. Integrating Dam Removal with a management plan based on the Precautionary Principle
Hoover Dam on its own has always satisfied the mandates of the Colorado River Compact and division of the two basins at Lee's Ferry is an arbitrary point on a map. The coordinated management of the two reservoirs (Interim Guidelines, 2007) demonstrates that Hoover Dam is now the new Compact Point. As former commissioner Floyd Dominy expressed aptly, Glen Canyon Dam is a "cash register dam." The revenue stream pays for upper basin irrigation projects on saline soils at high elevation. The trans-basin diversions above the Colorado Plateau render the salinity problem more grave and increasingly problematic. It is possible that the development scheme prepared for the upper basin is too ambitious and should be reevaluated with a programatic basin-wide assessment to improve water efficiency and best management practices overall.

Moreover, Glen Canyon Dam represents a safety liability to the entire Colorado River system downstream. Interior should not drain the reservoir to begin repairs and modifications. Instead, Interior should remove the dam and let the river flow free through Grand Canyon and liberate Glen, Cataract and San Juan canyons.

As has been highlighted by The One-Dam Solution (16) and elsewhere, water users within the basin would not be unduly burdened once Lake Powell reservoir is removed from the system. Moreover, diminishing inflows and increasing consumption may in fact cause the draining of the reservoir naturally, something Interior has yet to contend with in its scenario planning. An abundance of energy alternatives exist for those reductions in flow that may result in the decommissioning of power stations: alternatives which insufficient to maintain the power pool.

Where alternatives do not exist, is for the unique river ecosystem that bisects the nation's premier national park and core component of the region's natural heritage. Glen Canyon Dam's

decommissioning must be addressed as a viable alternative to achieve the objectives of the EIS generally, and more specifically the components addressed in Alternative A above.

Table No. 7: Administrative history of Glen Canyon Dam and its features. [See Attachment for actual Table.]

Event Comments 1953 & 1954 - Northcutt Ely testifies before the Subcommittee of Interior and Insular Affairs representing the California Colorado River Board. Ely was the executive secretary of Interior in the Hoover administration and lead author of the Hoover Dam Documents. Ely did not object to the CRSP and felt the upper basin had the right to develop its water resources. However, he recommended a wait-and-see attitude toward the construction of Glen Canyon Dam. Ely stated decades would pass before the upper basin would use its full allocation of 7.5 million acre-feet (maf). When the upper basin does finally utilize its full allocation, it would likely be impossible to keep the two reservoirs full and hydropower would be curtailed at both dams. In the meantime, Glen Canyon reservoir (Lake Powell) would needlessly evaporate water that otherwise could be utilized by the lower basin to spin generators and be put to beneficial use. Note: Ely used these arguments in the 1960s for the proposed dams on the Colorado River in Grand Canyon, which were not built.

1959 - USGS hydrologists Walter Langbein and Luna Leopold study water storage efficiency. Concluded the Colorado River basin will have excessive storage capacity and will experience diminishing returns in the water-yield. Did not really discuss the effect on water quality, but it is now selfevident that salinity has increased problems for the end-users of Colorado River water.

1961 & 1970 - Specifications of GCD are published. Schultz GCD Technical Report — The dam site in Glen Canyon is wide and U-shaped with bedrock that has a porosity ratio of 25%. A dam design similar to Hoover Dam (HD) would have intensive concrete construction costs and a cantilever arch design was chosen instead. The GCD design still used more concrete than HD, but the longitudinal thickness of GCD at the base is half that of HD. Unlike HD, the outlets at GCD are fixed horizontally. This design reduces the life span of Lake Powell considerably because sediment filling in the dead pool space at the forebay will compromise the safe performance of the river outlet works. The outlet works are now also utilized to provide environmental services to benefit the ecosystem in GCNP and eventually that option will be unavailable. Diminished reservoir levels in the future also mean that water quality for Glen and Grand canyons will be poor. Without the river outlets, cooling the river will also not be an option.

1983 to 1984 - Spillway use is required and the integrity of the tunnels fail at only ~17% of total design capacity. GCD Spillway Test Rhodes — In anticipation of Central Arizona Project becoming operational, Reclamation keeps Lake Powell full in the early 1980s. Consequently there is not enough space in the reservoir to handle the April to July, 1983 snowmelt volume. It becomes necessary to use the spillways and the public and Reclamation now understand that the spillway design is flawed, as are the protocols of flood control management. Spillway release procedures also demonstrate a preference to use the left spillway over the right spillway, and questions arise about the integrity of the right spillway. Reclamation repairs the damage and installs air slots to reduce cavitation pressures. Spillway capacity is reduced from the original

specification of 276,000 cfs to 208,000 cfs. Left spillway is tested for one hour at ~50% capacity. Right spillway is not tested. It is unknown if the spillway problem has actually been resolved.

2003 - Lake Powell drops dramatically. Impacts recreation and reduces hydroelectric yield. WAPA. Exposed sediment in the upper reaches of Lake Powell force closure of the boat ramp at Hite Marina and the floating marina is removed. Park Service extend the concrete ramps at the other marinas. Hydroelectric yield at GCD drops 30% in 2004 and by March 2005 to 40%.

Table No. 7 References: Ely;(17) Langbein;(18) Leopold;(19) Schultz;(20) GCD Technical Report;(21) GCD Spillway Test;(22) Rhodes;(23) WAPA;(24)

IV. CONCLUSION After four decades of Interior's attempts to address the declining habitat conditions in Grand Canyon National Park's river corridor resulting from Glen Canyon Dam operations, it's critical now to treat this EIS opportunity as the major step forward in what must be a remedy to the ongoing failure of Interior's past ambivalence.

The management process is faulty from both the bottom-up and the top-down. From the bottom lies an AMP process that is guided by the whims of special interest, while the resource itself continues to suffer. From the top there is no clear mandate of what the real objectives are or should be, especially over the medium- and long-term. The ecosystem in Grand Canyon National Park is not WAPA's, trout fishermen's or river runner's playground to do with as they please. Nor is it Glen Canyon Monitoring and Research Center's scientific playground to tinker with trivial actions from a body dominated by these special interests. This is a world renowned riverine resource for which Interior, guided by the most rigorous interpretation of the sprit of those acts governing the National Park System, must step forward and act in the public's interest. If these special interest groups become frustrated with Interior's actions, they can challenge them in the courts and the court of public opinion. There is no substitute for Grand Canyon, and it should be managed in accordance with that principle, now and in the future.

As such, there must be new leadership, and new avenues for administering the will and mandate of this leadership. The GCD AMP has and will continue to be a failure, so the EIS must address how this will be remedied.

Unfortunately, the complexity of water issues in the basin have effectively taken the common citizen out of the process. The issues, policy, laws and science have become too burdensome, too one-sided, and has created a situation of bewilderment or malaise. It has been suggested by many authors and oversight agencies that an independent commission for the Colorado River basin should be established. These issues have arrived to a point in history where it is quite possible that Interior is not the best choice in providing a long-term management proposal for the Colorado River basin, as evidenced by decades of time under its watch having failed to provide the leadership necessary to provide effective change toward greater sustainability on several fronts.

The EIS should therefore evaluate the constraints impairing Interior's ability to address the complex challenges facing the Grand Canyon River ecosystem and Colorado River management as a whole. A key component of any alternative must therefore be mechanisms to give all the

funding and authority to an independent commission that can provide basin-wide and comprehensive analysis of what must be accomplished and in a reasonable time-frame for the benefit of Grand Canyon and the basin as a whole.

The EIS must also address Glen Canyon Dam's operations and impacts, in the full spectrum of its lifespan. All reasonably supported hydrologic and catastrophic scenarios over a century time-window must be explored in conjunction with evaluating alternatives. If climate change has taught us anything, it's that such long-range planning is critical now, something that Reclamation has been slow to recognize. If Glen Canyon Dam fails in a flood, or fails to provide water during a severe and sustained drought, then everybody will lose and this EIS will have been nothing more than stepping stone in that process.

Alternatives must also address specific strategies for habitat restoration in Grand Canyon's river corridor including: natural flow regime with associated temperature changes and sediment transport along with non-native species eradication. Most of these issues and the recommendations surrounding them have been on the table for decades, but it's time they are fully explored consistent with the present and long-term needs of a healthy, natural, Grand Canyon river ecosystem. And in exploring alternatives that can deliver these alternatives, a decommissioned Glen Canyon Dam must be included. As the past decade of inflows has illustrated, the likelihood of a naturally drained reservoir is no longer something water and energy planners can ignore, especially in light of the long-term environmental damage Glen Canyon Dam continues to impose.

Most importantly, it's time for Interior to have some real vision for what can be and should be done when it comes to water management through Grand Canyon. Interior must once and for all abandon its policy of tinkering with knobs and switches and then defend these actions in court explaining how the public should not expect them to achieve a better result.

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Attached, please find the Seven Colorado River Basin States' Joint Comment Letter on the Scope of the Long-Term Experimental Management Plan EIS. Should you have questions or concerns regarding this transmission, please contact me at your earliest convenience.

[Attachment follows]

Colorado River Basin State Representatives of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming January 31, 2012 Via E-Mail and U.S. Mail Glen Canyon Dam LTEMP EIS Scoping Argonne National Laboratory 9700 S. Cass Ave.

EVS/240 Argonne IL 60439 http://ltempeis.anl.gov.

Re: Scoping Comments on the Adoption of a Long-Term Experimental and Management Plan for the Operation of Glen Canyon Dam.

Dear LTEMP Scoping Team,

The Department of the Interior ("Department"), through the Bureau of Reclamation ("Reclamation") and the National Park Service ("Park Service"), has announced plans to prepare an Environmental Impact Statement ("EIS") and adopt a Long-Term Experimental Management Plan for Operation of Glen Canyon Dam ("LTEMP"). See 76 Fed. Reg. 39435 (July 6, 2011) and 76 Fed. Reg. 64104 (Oct. 17, 2011). The Department conducted a number of informational meetings to initiate the process and provided opportunity for the public to comment on environmental and operational issues and concerns that should be considered when developing the EIS and implementing the LTEMP. The comment period ends January 31, 2012. The following comments are submitted on behalf of the seven Colorado River Basin states and the Upper Colorado River Commission (collectively referred to herein as the "Basin States") as part of this LTEMP scoping process.

Basin States' Interests The Basin States have an undeniable interest in the wise administration of the Colorado River system reservoirs, including Glen Canyon Dam. The Basin States hold federally recognized entitlements to the Colorado River resource that serves as the primary water supply source for over 30 million people in the United States and provides for irrigation on nearly 4 million acres. The Colorado River system also produces more than 4,200 megawatts of hydroelectric energy and provides a source of environmental protection and enhancement from the headwaters of the Colorado Rockies to Mexico. Access to these and other resources make the Colorado River system the lifeline of the southwest.

Over the past 80+ years, the Basin States have been closely involved in negotiation of interstate compacts, litigation over the management and allocation of Colorado River water, and development of federal laws and regulations concerning the Colorado River system. The Upper Basin States have also established an interstate commission through federal compact to address management and allocation of Colorado River water in the Upper Basin. The Basin States have also implemented salinity control measures in the Colorado River Basin ("Basin"), and developed and carried out environmental programs to improve natural resources and recover endangered fish species in the Basin, including the Grand Canyon. Simply put, there is no aspect of Colorado River water management, allocation or operation in the Basin that does not affect the broad public interests represented by the Basin States.

Comments:

A. Legal Framework: The LTEMP should be developed according to the framework adopted by Congress in the Grand Canyon Protection Act (GCPA) for operating Glen Canyon Dam and using the Colorado River. This framework includes specific priorities, constraints and requirements as outlined below for the Secretary of the Interior to navigate in developing and implementing the LTEMP.

1. Priorities — Water allocation, appropriation, development and exportation.

a. 1802(b) - Operations to protect, mitigate and improve resources in Grand Canyon National Park and Glen Canyon National Recreation Area downstream of Glen Canyon Dam must remain

consistent with and subject to the existing laws governing allocation, appropriation, development and exportation of the Colorado River resource. See 1802(b), Grand Canyon Protection Act (1992).

b. Senate Energy Committee Report - The Senate Energy Committee's Report on the GCPA makes clear that "the intent of '1802(b) is not merely to provide a savings clause but to establish that the Secretary's responsibilities for water storage, allocation and delivery under the Law of the River are primary and control the Secretary's actions under [the GCPA.]" S. Rep. No. 102-267 at p. 135 (1992).

c. 1806(1) — Nothing in the LTEMP shall affect in any way the allocations of water secured to the Colorado River Basin States by any compact, law or decree. See 1806, GCPA.

2. Constraints — The priority given to water storage, allocation and delivery under the GCPA substantially limits the Secretary's ability to change other elements of Glen Canyon Dam operations as part of the LTEMP. S. Rep. No. 102-267 at p. 136.

a. 2007 Interim Guidelines — The 2007 Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operation of Lake Powell and Lake Mead (Interim Guidelines) implement the Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs (LROC) to address water storage, allocation and distribution at varying reservoir elevations between now and 2026. The guidelines link release determinations at Glen Canyon Dam to specific trigger elevations at both Lake Powell and Lake Mead to better balance the system under varying water supplies. Depending on the reservoir levels in both, the Interim Guidelines provide a range of possible release volumes from Glen Canyon Dam in any given water year. Because these guidelines directly implicate water storage, allocation and delivery of the Colorado River resource in a manner intended to comply with and implement the Law of the River, the LTEMP must be "consistent with and subject to" the Guidelines.

b. Annual/Monthly Releases — The LTEMP must recognize the significant constraints placed on annual and monthly releases from Glen Canyon Dam as a result of water supply considerations, water delivery requirements, and the avoidance of anticipated spills. ("Spills" in this context are recognized as "releases in excess of powerplant capacity, which . . . are referred to as 'flood releases')." S. Rep. No. 102-267 at p. 133.

Pursuant to the LROC, as implemented by the Interim Guidelines, annual release volumes from Lake Powell are projected for the next Water Year based on the results of the August 24-Month Study. This projected annual release volume is then updated each month of the Water Year to incorporate actual hydrologic conditions as evaluated in the monthly 24-Month Study model runs. Through these updates, the annual release volume for Glen Canyon Dam moves from projected to actual as contemplated under the Interim Guidelines.

The annual release volume as projected (in accordance with the Interim Guidelines and based on the August 24-Month Study) serves as a basis for projecting the monthly release volumes from Glen Canyon Dam for the upcoming Water Year. These monthly release projections must likewise be updated as necessary throughout the Water Year to track with the updates for annual

release volumes from Glen Canyon Dam. The flexibility to modify monthly release volumes based on actual hydrology is essential to assuring that Reclamation can achieve the required annual release volume from Glen Canyon Dam consistent with the Interim Guidelines.

c. Balancing - The Secretary must also balance competing interests on the River when developing the LTEMP pursuant to the GCPA. - The Senate Committee Report on the GCPA explains that in fulfilling the basic requirements of the [GCPA], the Secretary is faced with the fundamental challenge of identifying and implementing a set of remedial measures that recreate and preserve the natural processes and value of the Colorado River below Glen Canyon Dam, while operating within the constraints of the most intensely regulated river in the world. S. Rep. No. 102-267 at p. 135.

> The U.S. District Court for the District of Arizona further clarified that the broadly worded provisions of the Colorado River Storage Project Act (CRSPA) and GCPA impose on the Secretary an obligation to balance many different interests in operating Glen Canyon Dam. Grand Canyon Trust v. Bureau of Reclamation, 623 F.Supp.2d 1015, 1036 (D. Ariz., 2009).
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> The Federal Government's brief in the Grand Canyon Trust litigation acknowledges and recognizes the Secretary's obligation to fulfill multiple and sometimes competing statutory requirements applicable to the operation of Glen Canyon Dam. See, Federal Defendants' Memorandum In Opposition to Plaintiff's Motion for Summary Judgment on Claims 6-8 at p. 38 (Dec. 19, 2008). It further clarifies that the Secretary must continue to recognize that power production is still a primary purpose of the Dam that must be balanced against other purposes, statutory requirements, and water delivery obligations as he considers actions to implement the GCPA. Id. at 38.

3. Requirements

Consistent with the GCPA and the Senate Committee Report, the LTEMP should also consider and include the following requirements:

a. Exercise other authorities — In addition to dam operations, efforts to protect, improve and/or mitigate resource values in the Grand Canyon National Park and Glen Canyon National Recreation Area should "exercise other authorities under existing law." See '1802(a), GCPA. According to the Senate Committee Report, this phrase means the Secretary should consider and may implement non-operational measures to address downstream effects of Glen Canyon Dam. S. Rep. No. 102-267 at pp. 135. Specifically, the Committee intended that the Secretary consider all alternatives to improve park values and not focus exclusively on dam operations. Id. at 137.

b. EIS and Monitoring — The LTEMP EIS should consider and incorporate the following key elements regarding preparation of the EIS and the long-term operation of Glen Canyon Dam to remain consistent with the statutory requirements of the GCPA. See ''1802, 1804, 1805, GCPA.

Audit - Auditing of the costs and benefits to water and power users and to natural, recreational and cultural resources resulting from management policies and dam operations. ‘1804(b), GCPA.

Criteria - Adopting criteria and plans based on the findings conclusions and recommendations in the EIS and the Audit. ‘ 1804(c)(1)(A), GCPA.

Reporting - Reporting on LTEMP activities in a manner that does not interfere with the Secretary’s preparation of the Annual Operating Plan as prescribed under the Colorado River Basin Project Act of 1968. ‘1804(c)(2), GCPA. Any reporting on the LTEMP pursuant to the GCPA should be separate from and subject to the 1968 Act Annual Operating Plan report. ‘1804(c)(2), GCPA; S. Rep. No. 102-267 at p. 137.

Costs - Reallocating the costs of construction, operation, maintenance, replacement and emergency expenditures for Glen Canyon Dam among the purposes for protecting, mitigating and improving the values downstream of Glen Canyon Dam and the purposes for which Glen Canyon Dam was authorized under the CRSPA. ‘1802(e), GCPA. Any operational changes that reduce the generation of peaking power in favor of baseload operations will greatly reduce power generation benefits. As benefits of operations shift, the costs allocable to the beneficiaries should shift as well. S. Rep. No. 102-267 at p. 138.

Monitoring - Establishing and implementing long-term monitoring programs and activities, including any necessary research and studies to determine the effect of actions on the natural, recreational and cultural resources and ensure the dam is operated in a manner consistent with ‘1802. ‘1805(a) and (b), GCPA.

Consultation - Consulting with the Basin States and others in preparing criteria and operating plans as well as monitoring programs and activities for the LTEMP. ‘1804(c)(3) and ‘1805(c), GCPA. B. Geographic Scope of Proposed Actions: As currently described, the project area for the LTEMP EIS includes the Glen Canyon National Recreation Area, Grand Canyon National Park, Lake Mead National Recreation Area, and resources of importance to American Indian Tribes. However, the stated purpose of the LTEMP does not mention Lake Mead or the Lake Mead National Recreation Area. See Fed. Reg. 76 Fed. Reg. 64104 (explaining that the purpose is to “inform Departmental decisions and operate Glen Canyon Dam in such a manner as to improve and protect downstream resources in Glen Canyon National Recreation Area and Grand Canyon National Park.”) Furthermore, the GCPA makes no mention of Lake Mead or the Lake Mead National Recreation Area, and the current EIS for Glen Canyon Dam operations focuses on “the Colorado River corridor from Lake Powell, formed by Glen Canyon Dam in northwestern Arizona, southward through Glen and Marble Canyons and westward through Grand Canyon to Lake Mead.” Operation of Glen Canyon Dam EIS at pp. 5-6. Recognizing the LTEMP EIS must evaluate and disclose all significant impacts of the alternatives wherever they may occur, the geographic scope of proposed actions considered in the LTEMP EIS should be limited to Glen Canyon Dam through the Grand Canyon National Park to Lake Mead.

C. Species Conservation and Recovery Implementation Programs: The LTEMP EIS process is also intended to determine whether to establish an ESA recovery implementation program for endangered fish below Glen Canyon Dam. This process should be coordinated with (and not allowed to disturb) the existing programs currently operating in the Colorado River Basin — i.e., the Upper Colorado River Endangered Fish Recovery Program; San Juan River Basin Recovery Implementation Program; and the Lower Colorado River Multi-Species Conservation Program, which have been and remain critical to the sustainable development of the river system. Additionally, to the extent the LTEMP EIS considers funding for any recovery implementation program downstream of Glen Canyon Dam, it should be done consistent with the costs framework highlighted in Section A(3)(b), supra.

D. Distinguishing Between Experimental and Management Actions: Drawing from experience gained in developing the Beach Habitat Building Flow management action as part of the 1996 Record of Decision for Glen Canyon Dam Operations and subsequent High-Flow Experimental actions, the LTEMP EIS should clearly distinguish between proposed experimental and management actions to operate Glen Canyon Dam. In doing so, stakeholders will be better situated to determine whether and to what extent they can accept a proposed action as necessary to gain experience and knowledge in reservoir operations and environmental resources without waiving rights established under the Law of the River. Management actions involve additional requirements under the Law of the River compared to experimental actions. It remains the Basin States' position that high flow releases can only be legally done by experiment and cannot be considered as a long term operational management decision.

E. Alternatives: Generally, the LTEMP EIS should include only those alternatives that can and will remain consistent with and subject to the priorities, constraints, and requirements recognized in the GCPA. See Section A, supra. However, with the understanding that the modified low fluctuating flow (MLFF) will serve as the "No Action" alternative, the LTEMP EIS should include a post-dam, pre-1996 ROD alternative that can isolate and demonstrate the benefits and impacts of MLFF operations. Finally, the Basin States would like to participate in developing the LTEMP alternatives and anticipate proposing an alternative for consideration.

F. Process Comments: The following process comments are specific to standards and processes for developing the LTEMP EIS.

1. Timeline and Timing - The LTEMP involves adjusting dam operations that impact a large number of interests and resources. The process for developing management and experimental programs under the LTEMP EIS should be thoughtfully considered and sufficiently flexible to avoid being rushed to completion.

Given the scope, duration and importance of the LTEMP EIS, documents relevant to its development and implementation should allow sufficient time for stakeholder review and comment. The proposed schedule is very aggressive and may not allow a full and robust consideration of all reasonable alternatives and their implications. See Public Involvement Section, infra.

2. Public Involvement - Given the potential impact of LTEMP operations throughout the Basin, its development should involve collaboration in addition to consultation with the following stakeholders:

i. Basin States. As parties to and beneficiaries of the interstate compacts, laws and a Supreme Court decree that allocate the Colorado River resource, the Basin States have a sovereign interest in the flow of the Colorado River that rises above a mere question of local private rights. Deciding how to develop and implement the LTEMP will directly implicate these interests. Over the past 20 years, the Basin States have fostered a working relationship with the Department to develop innovative and flexible agreements and programs that provide important tools for adapting to challenges and avoid interstate disputes both now and in the future. The Secretary should continue to consult and collaborate with the Basin States on the LTEMP EIS in furtherance of this relationship and mutual goals.

ii. GCDAMP Representatives. The Adaptive Management Workgroup (AMWG), Technical Workgroup, Science Advisors, and the Grand Canyon Monitoring and Research Center have developed a knowledge base and expertise in the Colorado River's scientific and policy issues that goes above and beyond an individual stakeholder interest in the River. Their valuable perspectives are, in part, why the Secretary established the AMWG as a Federal Advisory Committee to provide advice and recommendations on Colorado River and Glen Canyon Dam operations. As such, it will be important to directly consult and collaborate with and learn from these representatives in developing the LTEMP EIS.

3. Role of Federal Agencies - There are a number of federal agencies with authorities and obligations concerning the Colorado River — i.e., Fish and Wildlife Service, Bureau of Indian Affairs, Western Area Power Administration, and Bureau of Land Management, in addition to Reclamation and the Park Service. The LTEMP EIS should clarify the role and involvement of each agency in preparing, commenting on and finalizing the LTEMP EIS as well as the decision-making and implementation processes.

4. Role of Desired Future Conditions - The Department of the Interior, in conjunction with AMWG, is currently developing Desired Future Conditions (DFCs) for key resource elements at and below Glen Canyon Dam. Because these DFCs involve variable resources with differing goals, they also identify potentially competing interests for operating Glen Canyon Dam. Satisfying goals for one resource DFC may ultimately be at the expense of another. If the DFCs are used to inform the LTEMP process, it will be important to recognize the need to balance the competing DFC goals and interests consistent with the purpose and intent of the GCPA. See Section A(2)(c), supra.

5. Role of Science - The Basin States advocate for the LTEMP EIS to be developed and implemented based on credible and objective science concerning the Colorado River Basin.

Conclusion The Basin States thank you for the opportunity to provide these comments on the scope of the LTEMP EIS. We have a particular interest in avoiding potential impacts from the LTEMP while ensuring its success. In this effort, we ask that the Department please consider and incorporate the above comments in determining the final scope for the LTEMP process. We

further ask that the Department allow the Basin States to propose an alternative for consideration and evaluation under the LTEMP EIS. Should there be any questions or concerns regarding this letter or any other aspect of the Basin States' interest regarding the LTEMP process, please contact us at your earliest convenience.

Sincerely, Sandra A. Fabritz-Whitney Director, Arizona Department of Water Resources

Dana B. Fisher Colorado River Commissioner, Colorado River Board of California

Jennifer Gimbel Director, Colorado Water Conservation Board

Patricia Mulroy General Manager, Southern Nevada Water Authority

Estevan Lopez Executive Director, New Mexico Interstate Stream Commission

Jayne Harkins Director, Colorado River Commission of Nevada

Dennis J. Strong Director, Utah Department of Water Resources Utah Interstate Stream Commission

Don A. Ostler Executive Director, Upper Colorado River Basin

Patrick Tyrrell State Engineer, Wyoming State Engineer

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On July 6, 2011, the Department of the Interior through the Bureau of Reclamation ("Reclamation") and the National Park Service ("NPS") published in the Federal Register (76 Fed.Reg. 39435), notice that it would prepare an environmental impact statement ("EIS") and conduct public scoping for the adoption of a Long-Term Experimental and Management Plan ("LTEMP") for the operation of Glen Canyon Dam. (1) The Irrigation & Electrical Districts Association of Arizona ("IEDA") appreciates the opportunity to provide comments during scoping of the LTEMP EIS.

IEDA BACKGROUND

The Irrigation & Electrical Districts Association of Arizona ("IEDA") is an Arizona non-profit association formed in 1962 to represent the interests of its members with regard to power and water issues and other related issues and to provide an interface for dealing with federal agencies that manage and distribute these resources.

Fourteen of our 25 members and associate members contract with the Western Area Power Administration ("Western") for power from the Colorado River Storage Project ("CRSP"). Such members have, under contract, in excess of 75% of the CRSP power allocated to the Southern Division. IEDA interfaces with Western and with Reclamation on issues involving CRSP, including operation of Glen Canyon Dam, on a regular basis. Additionally, many of our other members take power from other federal resources on the river whose capabilities for delivering

that power are affected by the operation of Glen Canyon Dam. Thus, our membership has an abiding interest in any actions taken concerning power operations at Glen Canyon Dam, including the formulation of the LTEMP and the scoping and development of the associated EIS.

With this perspective in mind, we offer the following comments on the LTEMP scoping process. (2) In doing so, we endorse and incorporate, and will not repeat, the comments of the Colorado River Energy Distributors' Association ("CREDA") of which we are a member.

LTEMP EIS SCOPING

The stated purpose of the proposed LTEMP is to inform departmental decisions and operate Glen Canyon Dam in such a manner as to improve and protect downstream resources in Glen Canyon National Recreation Area, while maintaining compliance with the relevant laws, including the with the Grand Canyon Protection Act of 1992 ("GCPA") (3) , the Law of the River, and the Endangered Species Act ("ESA")(4). The LTEMP process is intended to develop and implement a structured long-term experimental and management plan to determine the need for potential future modifications to Glen Canyon Dam operations and to determine whether to establish an ESA Recovery Implementation Program for endangered fish species below Glen Canyon Dam.

This task is undoubtedly a delicate balancing act, complicated further by the fierce competition for resources along the Colorado River. The overall goal should be to design a downstream mitigation plan that addresses the interests that Congress directed the Secretary to address downstream of Glen Canyon Dam (5) while maintaining the Dam's status as a load following hydropower facility. In doing so, we can have both hydropower and endangered fish recovery. We can have both hydropower and river rafting recreation. We can have both hydropower and a blue ribbon trout fishery at Lee Ferry. This can all be accomplished in one fell swoop, but only if studies are conducted with the goal of maximizing all resources.

THE NATIONAL ENVIRONMENTAL POLICY ACT

In order to avoid unnecessary delay and litigation, Reclamation should strive to comply with the strict guidelines as set forth by the National Environmental Policy Act ("NEPA")(6) , the Council on Environmental Quality regulations ("CEQ regulations") (7), and the Department of the Interior Manual ("DOI Manual")(8) . Reclamation should also examine the LTEMP scope in light of its own internal guidelines. (9)

The CEQ regulations establish minimum requirements that an agency must follow for developing and analyzing alternatives to a proposed action. An EIS shall: (a) rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reason for their having been eliminated; (b) devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits; (c) include reasonable alternatives not within the jurisdiction of the lead agency; (d) include the alternative of no action; (e) identify the agency preferred alternative or alternatives; and (f) include appropriate mitigation measures not already included in the proposed action or alternatives. (10)

The range of alternatives considered is generally at the agency's discretion and is reviewed under a rule of reason that requires an agency to set forth only those alternatives necessary to permit a reasoned choice. (11) The existence of reasonable but unexamined alternatives renders an EIS inadequate. (12) The agency's discretion, however, can be limited, or perhaps defined, by statute.(13) Here, the Colorado River Storage Project Act of 1956 mandates the maximization of power generation revenues, provided that operations do not impinge on the "Law of the River". (14) As a result, Reclamation may diverge from the directive to generate the most power possible only to the extent that peer-reviewed science demonstrates that downstream resources will be improved.

The CEQ regulations are supplemented, and used in conjunction with, the DOI Manual, which establishes procedures for the DOI, and its constituent bureaus, to use for compliance with NEPA.(15) The DOI Manual requires that Reclamation proposed actions analyze the effects of any appropriate mitigation measures or best management practices that are considered.(16) Moreover, the EIS shall disclose "[t]he relationship between local short-term uses of the human environment and the maintenance and enhancement of long-term productivity." (17)

With these NEPA guidelines in mind, careful consideration should be given to recognized technologies, application of proven management strategies, and the development of reasonable alternatives.

STUDY THE FULL USE OF POWER RESOURCES AT GLEN CANYON DAM

The hydrologic experience of the last year (18) at Glen Canyon Dam demonstrates unequivocally that any future study must include studying the effects of releasing water at full power plant capacity on a constant basis as well as using maximum power plant capacity in a fluctuating release regimen beyond that of the Modified Low Fluctuating Flow ("MLFF") regimen.

A future management plan cannot ignore any of the hydrologic mandates that could require Reclamation to full use of the power plant like those that were experienced this past summer. As a management construct, any future management plan must take into account all of the situations with which Reclamation can be faced in the future with regard to operating the Dam. Any EIS which fails to study the full power resource will likely be rendered inadequate.

HIGH-FLOW EXPERIMENTAL RELEASES

As early as 1996 (and later in 2004 and 2008), Reclamation conducted a series of artificial floods known as a High-Flow Experiment ("HFE") in order to find a way to stabilize beaches and to stabilize and possibly create backwaters with sandbars primarily in the upper half of the Colorado River from Lee Ferry to Lake Mead. The purpose of these floods was to see whether, under relatively low water conditions, sand could be deposited in some places that people could camp on and in other places where, presumably, juvenile fish could hide behind. (19) The extent to which these HFEs are necessary, or even effective, has been the center of much debate.

Beaches and Other Sandbars From its inception, the HFE floods have failed to produce any long-term discernible benefit to the beaches and sandbars. The HFEs conducted at different times and under different sediment conditions, have one thing in common. The sand deposition created by these artificial floods largely disappears within six months. (20)

These floods are attempting to recreate, in part, the behavior of the river before Glen Canyon Dam was built. One of the reasons dams were built along the Colorado River is that it was widely considered to be the most erratic major river in the United States. The environment through Glen Canyon Dam, Marble Canyon and Grand Canyon prior to the construction of Glen Canyon Dam was generally and universally considered to be unstable, erratic and barren. The river corridor was barren because massive floods crashed through these canyons every year taking everything with them except sand, boulders and rocks.(21) Because water flows and the wind blows, sand deposited on Marble Canyon beaches erodes. This occurred before Glen Canyon Dam was constructed, and is occurring now. The artificial floods merely recreate that instability.

In short, the artificial floods have been widely ineffective beyond that of creating short-term beaches. The beaches and sandbars created by HFEs are merely bandaids to a much greater wound. Much like a real bandaid, when it is mixes with water, it tends to erode and wash away. Mechanical Augmentation Alternative Reclamation should consider, as an alternative to HFEs, mechanical augmentation (a/k/a "dredging") of sediment and sand to enhance beaches and sandbars. Mechanical augmentation is a proven management strategy that is also economically feasible.

Reclamation routinely dredges sand below Parker Dam to enhance the river's effects on the Havasu National Wildlife Refuge, a program that benefits both water delivery and the environment. (22) The same program should be utilized at select locations and elevations in Marble Canyon to place beach deposits and protect the shores from nature's erosive effects. Assuming juvenile humpback chub thrive on backwaters, the same dredging program could also be implemented to provide backwaters of appropriate sizes and locations for the chub.

Mechanical augmentation is also economically feasible. IEDA has researched the costs associated with obtaining and operating dredges and urges Reclamation to solicit bids. The costs associated with dredging pale in comparison to those of these artificial floods. A dredge can be broken down and transported to a dredge-site at minimal expense. Once on location, the dredge can be reassembled and used, taken apart again and floated down the river. The portability and maneuverability of the dredge provide a relatively permanent and infrequent mitigation measure far surpassing artificial floods.

Additionally, mechanical augmentation does not involve certain economic and environmental costs associated with artificial floods. With each artificial flood, Glen Canyon Dam power purchasers are forced to purchase alternative sources of power at much higher cost, usually ranging in the millions of dollars. More often than not, the source of alternative power requires the use of other less environmentally desirable resources. Beaches are cut and rendered less accessible to persons of less than athletic ability and non-native trout are benefited at the expense of the endangered humpback chub.

Humpback Chub The population of humpback chub in the Little Colorado River near its confluence with the main stem and in the main stem is one of six populations of this endangered fish within the Colorado River system. Once thought to be in serious decline, the Grand Canyon population of the humpback chub is growing steadily. Scientists have reported a recent survey of adult humpback chub in this population to be on the order of 7,650, more than twice the current draft recovery goal for this population of the species.

Much has been said about how the humpback chub need a backwater to hide in when they come out of the Little Colorado River, flushed out by high late summer flows in the Little Colorado River. Unfortunately, this oft repeated supposition cannot be sustained. Recently, scientist netted over 16,000 fish in backwaters and less than 100 were humpback chub. (23) The humpback chub is a canyon fish whose natural habitat is located in deeply incised canyons. These are mother-nature's equivalent of canal systems, which don't have backwaters and don't have beaches. Water flows through them and takes the sediment with it. Therefore, if the humpback chub doesn't rely on backwaters, we don't need artificial floods to create backwaters or maintain backwaters that it isn't going to utilize.

Quixotically, the High Flow Experiments ("HFE") enhance the trout population, and consequently increase competition and predation of the humpback chub. These "[d]irect short-term reductions in habitat and food supply, as well as increases in rainbow trout abundance, have potential to indirectly affect the humpback chub, as well as directly affect elements of critical habitat." (24) A related Biological Assessment reached the same conclusion, finding that "[t]he proposed action is likely to adversely affect the humpback chub and is likely to adversely affect its designated critical habitat." (25)

The HFE's are clearly harmful to the endangered humpback chub. Reclamation cannot implement two (2) programs whose impacts on the humpback chub so directly conflict.

Electrofishing Alternative The threat to the humpback chub is not the lack of backwaters along the river, it is rainbow trout. The trout from Lee Ferry find their way downriver and prey upon the humpback chub. In response, scientists have developed a system known as mechanical harvesting (a/k/a "electrofishing"). Mechanical harvesting is a proven technique that has been successful at controlling non-native fish below Glen Canyon Dam. (26)

In response to early Tribal objections to the taking of life near Colorado and Little Colorado River ("LCR"), scientists put forth a solution that allowed for electrofishing to be conducted just below Lee Ferry and down about 17 miles to an area near Soap Creek. Doing this maintains a management barrier to trout going down river and attacking the chub and allows the captured trout to be brought up river to Lee Ferry on motorized boats because there is only one, fortunately navigable, rapid between Lee Ferry and Soap Creek.

Trout removal strategies aimed at the Paria to Badger Rapid reach ("PBR"), with a variety of permutations in deference to cultural values, and with backup removal at the Little Colorado River reach ("LCR"), "were identified as top-ranking portfolios for all agencies and Tribes" and also "outperformed portfolios based on flow manipulations." (27) Other endangered species,

such as the kanab ambersnail and the razorback sucker, will also be jeopardized by artificial floods, an impact that can be totally avoided by the non-native fish control proposal. (28)

This is a tried and true control method that adapts to sensitivities. The result is that we have, in effect, zoned the river, leaving the Lee Ferry trout fishery to the ribbon trout fishery it is. This is a common sense solution. The goal is to zone the river so that the trout fishery down to lee ferry.

CONCLUSION

For far too long, Glen Canyon Dam has been managed under the preconceived notion that the Dam should be operated in a manner that would mimic pre-dam conditions. This strategy, while novel in theory, has proven costly and ineffective. For "you can build the Eiffel Tower, Pyramids and the Las Vegas casinos, but you can't recreate the mighty Colorado River." (29)

For better or worse, construction of Glen Canyon Dam forever changed the landscape of the Colorado River. Rather than operating the Dam in a way that attempts to mimic pre-dam conditions, Dam management should instead seek to utilize the Dam's defining characteristic: stability. Stability of the river can make dealing with river impacts easier, but only if people are willing to consider proven management strategies and common sense solutions, such as those described above.

The Dam should be utilized in the way it was intended; as a load following hydropower facility that adjusts its power output as demand for electricity fluctuates. Management should adopt mitigating measures such as those described above and implement them in a way that complements hydropower production. The LTEMP EIS must examine more common sense ways to mitigate downstream impacts and stabilize downstream resources. The taxpayers and ratepayers funding this exercise deserve it. The Grand Canyon deserves it.

(1) 76 Fed.Reg. 64104 (October 17, 2011). (2) These written comments are intended to supplement the electronic comments previously submitted by IEDA at the public scoping meeting held in Phoenix, AZ on November 7, 2011. IEDA reserves the right to further supplement its comments in the event that the January 31, 2011 comment deadline is extended or the comment period reopened. (3) Grand Canyon Protection Act, P.L. 102-575. (4) 16 U.S.C. '1531 et seq. (1973). (5) GCPA, P.L. 102-575. (6) 42 U.S.C. 4321, et seq. (7) 40 CFR ' 1502.13. (8) 43 CFR ' 46. (9) Reclamation has withdrawn its instructions on NEPA from its website. As of the date of these comments, Reclamation's NEPA guidelines have not yet reappeared on its website. It is therefore impossible to say whether those instructions, which Reclamation will be obligated to follow in the future, complement or possibly conflict with certain aspects of scoping this EIS. In short, Reclamation should publish its instructions and examine the scoping of this EIS in light of those revised instructions and the Department Manual before developing a scoping report to be presented to the public. Otherwise, Reclamation may be placed in the embarrassing position of having to recreate scoping on this project. (10) 40 CFR 1502.14. (11) Navajo Nation v. U.S. Forest Service, 408 F.Supp.2d 866, 874 (D.Ariz. 2006), rev'd in part and remanded on other grounds, 479 F.3d 1024 (9th Cir. 2007), opinion adopted en banc, 535 F.3d 1058 (9th Cir. 2008); citing Headwaters, Inc. v. Bureau of Land Management, 914 F.2d 1174, 1180 (9th Cir. 1990); see also NEPA LAW AND LITIGATION ' 10:30 (range of

alternatives that must be discussed). (12) Navajo Nation, 408 F.Supp.2d at 874; quoting Friends of Southeast's Future v. Morrison, 153 F.3d 1059, 65 (9th Cir. 1998); Muckleshoot v. United States Forest Service, 177 F.3d 800, 14 (9th Cir. 1999). (13) See generally County of Trinity v. Andrus, 438 F.Supp. 1368 (E.D. Cal. 1977). The court considered whether the Bureau's decision to terminate an increased flow release experiment during a drought year violated the Trinity Act, and found that it had not. (14) Compare: The Colorado River Storage Project Act of 1956, ch. 203 ' 7, 43 U.S.C. ' 620f with Section 2 of the Grand Canyon Protection Act, 106 Stat. 4669. (15) 43 CFR ' 46.20. (16) Id. at 46.130. (17) Id. at 46.415(a)(7). (18) The 2011 water year release volume from Glen Canyon Dam was 12.52 maf and this was the largest water year release volume made since water year 1998. http://www.usbr.gov/uc/water/crsp/cs/gcd.html. (19) Environmental Assessment: Development and Implementation of a Protocol for High Flow Experimental Releases from Glen Canyon Dam, Arizona, 2011 through 2020, U.S. Department of Interior, p. 1, available at http://www.usbr.gov/uc/envdocs/ea/gc/HFEProtocol/HFE-EA.pdf (hereafter "HFE EA"). (20) 2008 High-Flow Experiment at Glen Canyon Dam — Morphologic Response of Eddy-Deposited Sandbars and Associated Aquatic Backwater Habitats along the Colorado River in Grand Canyon National Park, U.S. Geological Survey, Open-File Report 2010-1032, pp. 42-3, found at http://pubs.usgs.gov/of/2010/1032 (hereafter "2008 HFE Report"). (21) Carothers and Brown, The Colorado River Through the Grand Canyon, Natural History and Human Change, University of Arizona Press, Tucson (1991), pp. 117-19. (22) Parker Dam and Powerplant, Bureau of Reclamation, available at http://www.usbr.gov/lc/hooverdam/parkerdam.html. (23) 2008 HFE Report, pp. 41-42. (24) Draft Environmental Assessment — Development and Implementation of a Protocol for High-Flow Experimental Releases from Glen Canyon Dam, Arizona, 2011 through 2020, p. 43 (January 2011) ('EA"). (25) Biological Assessment: Development and Implementation of a Protocol for High-Flow Experimental Releases from Glen Canyon Dam, Arizona, 2011 through 2020, p. 33 (January 2011) ("BA"). (26) Non-Native Fish Control below Glen Canyon Dam, USGS Open-File Report 2011-1012, available at http://pubs.usgs.gov/of/2011/1012/pdf/ofr20111012.pdf. (27) Id. at 1-2. (28) The EA provides, "[t]he proposed action is likely to adversely affect the Kanab ambersnail because of the potential for high flows to inundate and scour habitat and snails at Vasey's Paradise." BA, p. 53 (also finding that the razorback sucker will be adversely affected). (29) Quote from an unknown author.

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I am writing to express my concern over the fishery at Lees Ferry. Over the many past years I have witnessed all the studies around this fishery and the Grand Canyon and I want to tell all that this is an important aspect of my life and am asking all those that can to do something to protect this outdoor form of recreation from being eroded by environmental elitists like the Grand Canyon Trust.

The studies have concluded the trout are NOT the problem restricting humpback chub populations yet the Trust continues to advertise to its listeners for more revenues to fight a Crime that they have invented for the purpose of raising revenues.

They're actions of lawsuits against other cooperative members of the AMWG clearly demonstrates a destructive action to the hope of getting anything accomplished. They should be removed from the AMWG.

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At this time the Salt River Project Agricultural Improvement & Power District (SRP) has the following comments about the L TEMP EIS Scoping Process.

1. How will the proposed L TEMP EIS process fit with other associated federal activities? SRP's understanding is that two Environmental Assessment (EA) activities are ongoing at the present time, a High Flow Experiment EA and a Non Native Fish Control EA. It seems that one or both of these activities could result in determinations by DOl regarding the management of Glen Canyon Dam.

Further, DOl has led and actively promotes the Glen Canyon Adaptive Management program, from which determinations by DOl regarding the management of Glen Canyon Dam could be made.

The LTEMP EIS activity appears to be another effort that could result in determinations by DOl regarding the management of Glen Canyon Dam.

These four separate efforts appear to deal with Colorado River resource management topics that are not mutually exclusive. Will one of these processes result in decisions that take precedence over one or more others? Can you help us understand how DOl expects that the results of all of these processes will work with one another?

2. What constitutes a "reasonable alternative"? At the 11/7/2011 LTEMP EIS Scoping meeting in Phoenix, DOl representatives indicated that "all reasonable alternatives would be considered". SRP would like to contribute to the process in meaningful, constructive ways. Can you provide some guidance regarding how "reasonableness" will be determined?

3. How will "economic feasibility" be determined? Also at the 11/7/2011 L TEMP EIS Scoping meeting in Phoenix, DOl representatives indicated that "all alternatives must be economically feasible".

It seems to us that various Colorado River resource stakeholders would likely be impacted in different ways and to different degrees by various Glen Canyon Dam management decisions. Non federal entities (e.g. recreation companies, fishing interests, power customers) might be impacted in ways that are completely distinct from federal (presumably taxpayer) impacts. For example, when looking at the economic feasibility of something like a temperature control device aimed at helping to meet one or more Colorado River resource objectives, the evaluation would likely revolve around a cost I benefit analysis to support an associated appropriation of federal funds. In this instance, economic feasibility would be an entirely federal matter.

However, when a proposed management action would impact principally or only non-federal entities, how would economic feasibility be determined, and by whom? Will DOI look to the affected stakeholders to measure or determine feasibility? If not, how will ~he federal government determine economic feasibility on behalf of non federal stakeholders? Will the costs of federal impact mitigation or non-federal impact mitigation be considered within determinations of economic feasibility?

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"The glories and the beauties of form, color, and sound unite in the Grand Canyon-forms unrivaled even by the mountains, Colors that vie with sunsets, and sounds that span the diapason from tempest To tinkling raindrop, from cataract to bubbling fountain. ... A year scarcely suffices to see it all. It has infinite variety, And no part is ever duplicated Its colors, though many and complex at any instant, Change with the ascending and declining sun; Lights and shadows appear and vanish with the passing clouds, and the Changing seasons mark their passage in changing colors." --John Wesley Powell

About Grand Canyon Trust

The mission of Grand Canyon Trust (GCT) is to protect and restore the Colorado Plateau-its spectacular landscapes, flowing rivers, clean air, diversity of plants and animals, and areas of beauty and solitude. Pursuant to this mission, GCT's work is guided by its strategic plan to address a wide array of public land and Native American issues across the Colorado Plateau with priority given to projects that are important to public lands management; that have broad public lands policy implications; and that have practical and demonstrable outcomes. GCT currently employs a professional staff of thirty, encompassing a wide range of skills from biology and forestry to economics and law. We have twenty-five committed board members, a national membership of more than 4,000 people, and an active seasonal volunteer network of 450+ people who assist with our local fieldwork. GCT is based in Flagstaff, Arizona with satellite offices in Moab, Utah, Durango and Denver, Colorado, and a lobbyist in Washington, D.C.

About National Parks Conservation Association

The mission of National Parks Conservation Association (NPCA) is to "protect and enhance America's National Park System for present and future generations." Founded in 1919, NPCA has become the leading private voice for the parks. It is a national non-profit with a headquarters in Washington, DC, and 23 regional and field offices. NPCA represents 600,000 members and supporters who care deeply about America's shared natural and cultural heritage preserved by the National Park System.

Purpose and Need of the Long-Term Experimental and Management Plan (LTEMP) EIS

These scoping comments are made in response to Federal Register Notice #76 FR 64104, published October 17, 2011. The stated Purpose and Need for the L TEMP, 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 GCP A and other provisions of applicable Federal law. The proposed action will help determine specific alternatives that could be implemented to meet the GCP A'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)

The reference to hydropower at the end of the Need Statement should be dropped. Water storage and water delivery obligations are the primary purposes of Glen Canyon Darn, whereas hydropower is a benefit incident to these purposes. The Grand Canyon Protection Act in 1992 prioritizes improving and protecting Grand Canyon resources above hydropower revenue.

Grand Canyon Protection Act Rules Several federal laws have been passed to protect Grand Canyon, but prominent among them is the Grand Canyon Protection Act (GCPA), signed into law on October 30, 1992. The GCPA states: 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.

The intent of the GCPA is unambiguous: to operate the dam in a manner that protects park resources, notwithstanding impacts to hydropower generation. Senator John McCain, cosponsor of the bill stated: 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 the future generations for whom we hold it in trust.

The destructive “erratic releases” Senator McCain refers to are the ceaselessly fluctuating flows from Glen Canyon Dam that generate cheap peaking power but, in the bargain, unravel the health of Grand Canyon. Fluctuating flows erode sediment faster than steady flows, diminishing beaches, harming native fish habitat, eroding centuries-old cultural sites, and jeopardizing the existence of the 4-million-year-old humpback chub, an endangered fish found only in the Colorado River.

New Flows Needed from Glen Canyon Dam Before Glen Canyon Dam’s existence, Grand Canyon was characterized by huge sweeping beaches built up with raging snowmelt floods in the spring. The wind picked up the beach sediment and carried it inland, burying a multitude of archaeological sites. Water temperature varied from freezing in the winter to a balmy 85 degrees in the summer. Eight native fish, supremely adapted to these harsh conditions, thrived in the mainstem and tributaries. River runners during the twentieth century began taking advantage of these huge beaches for camping.

Glen Canyon Dam blocked the Colorado River in 1963 and initiated a cascade of ecosystem changes. The dam traps about 85 percent of the annual sediment supply for Grand Canyon -the other 15 percent coming from tributaries within the canyon. In addition, water releases from the dam were altered to generate the maximum amount of peaking hydropower. The loss of sediment

supply and the greatly increased rate of erosion from flows designed to maximize hydropower set in motion the continual Joss of sediment from Grand Canyon. Research on annual sediment balance has shown only one year when Grand Canyon has not lost sediment, and this one positive year resulted from a unique sequence of late season flood events.

The loss of sediment from Grand Canyon has resulted in fewer and smaller beaches. It has also eliminated significant critical habitat for native fish. Sediment deposits create complex shorelines and underwater features that are used by native fish for spawning and rearing. Four of the eight species of native fish that once plied the waters of Grand Canyon have already been lost. A fifth species, the endangered humpback chub, is vulnerable to being lost from Grand Canyon because virtually all spawning and rearing habitat has disappeared from the mainstem.

The continual loss of sediment from Grand Canyon has also resulted in archaeological sites being exposed to erosion and impacts from visitors. Historically, these sites were protected with a regularly renewed layer of sediment derived from the beaches and transported by the wind. Without the influx of new sediment, we constantly lose these irreplaceable features of our cultural heritage.

The way in which water is released from Glen Canyon Dam has profound effects on the river corridor, the species living there, and the abundant cultural sites. Simply stated, water can be released as either steady flows or fluctuating flows. Neither flow regime impacts water supplies or water deliveries by the Colorado River; however, over the last 15 years, science has shown that fluctuating flows damage all the key resources in Grand Canyon--the beaches, the backwater habitats for native fish spawning and rearing, the native shoreline plants and animals, and cultural and archaeological sites. At the same time, scientists have concluded that steady flows are very likely to be optimal for all sediment related resources. A recent report from Grand Canyon Monitoring and Research Center concluded that fluctuating flows following the last high-flow experiment quickly eviscerated the benefits created by the high flow.

Two types of flows are needed: 1) regular high flows under sediment-enriched conditions to deposit sediment from tributaries and to scour sediment from the bottom of the river to rebuild beaches and near shore habitat for native fish, and 2) seasonally-adjusted steady flows, based on the natural rhythms of the pre-dam river, which would preserve beaches, protect native fish habitat, and stabilize centuries-old cultural sites.

General Issues Park resources continue to decline under current dam operations and a change is needed now. It is critical that the LTEMP alternatives consist of alternative dam operating criteria (in concert with other management actions) designed to meet the requirements of the Grand Canyon Protection Act.

In addition to the GCPA, alternatives must be consistent with the many laws and policies that govern water releases, park resources and values, and hydropower production. Because of the trade-offs inherent in managing these resources, Congress has established priorities by enacting the GCPA. The GCPA makes it clear that dam operations must be guided first by meeting the legal requirements for water delivery to the lower basin, and then by the need for protecting park

resources and values. All other considerations, including hydropower production, are a lower priority.

The Colorado River Ecosystem (CRE) has been drastically altered by the presence and operation of Glen Canyon Dam and other changes, and achieving the resource objectives for the CRE will require bold action. Thankfully, there is a tremendous pool of scientific information from the CRE and other river systems that is available for developing and testing alternative dam operations and other management actions to meet the requirements of the GCPA.

The EIS should clearly identify the park resources and values" downstream of Glen Can on Dam that will be affected b the alternatives-includin cultural resources.

The National Park Service is required to manage for park resources and values. The Grand Canyon Protection Act requires the Secretary of Interior to operate Glen Canyon Dam to "protect, mitigate adverse impacts to, and improve" park resources and values. To meet the intent of the LTEMP, and provide the information needed for the Secretary oflnterior to select the most appropriate alternative, park resources and values need to be clearly defmed and the impacts of the different alternatives need to be assessed against park resources and values. Park resources and values arise from the National Park Service (NPS) Organic Act of 1916 and subsequent statutes (e.g., General Authorities Act of 1970, "Redwoods Act" of 1978). Park resources and values are defined in the 2006 Management Policies and Director's Order #55. The 2006 Management Policies states:

The "park resources and values" that are subject to the no-impairment standard include: the park's scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects,7 museum collections; and native plants and animals,7 appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them; the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and any additional attributes encompassed by the specific values and purposes for which the park was established.

Park resources and values identified in the Management Policies are used as the foundation for the various management plans for Grand Canyon National Park (e.g., General Management Plan, Resource Management Plan, Draft Wilderness Management Plan, Colorado River Management Plan), and Glen Canyon National Recreation Area (e.g., 2005 Glen Canyon five-year strategic plan). Using these documents, it is clear that park resources and values for both Grand Canyon National Park and Glen Canyon National Recreation Area that may be affected by the alternatives include: 1. The natural distribution and abundance of natural communities and species (e.g., terrace and sand beach riparian communities, spring communities, humpback chub and other native fish). 2. Natural biological processes (e.g., genetic structure and diversity;

incidence of predation, competition, diseases, parasites). 3. Natural physical processes (e.g., hydrology, water quality, sediment storage), that act upon the natural communities and species. 4. In situ maintenance of archeological resources. 5. Appropriate opportunities to experience enjoyment of the above resources to the extent that can be done without impairing them.

Alternatives should be targeted at conserving park resources and values. The primary purpose of the EIS must be on developing and assessing alternatives to "protect, mitigate adverse impact to, and improve" park resources and values. It would not be appropriate to develop alternatives that might impair park resources and values.

Actions intended to favor resources that are not park resources and values may be included in an alternative only to the extent they are compatible with conserving park resources and values. For example, generating hydropower at Glen Canyon Dam is not a park value, and cannot be favored at the expense of park resources and values, or "balanced" with park resources and values. The relative priority for generating hydropower revenues is provided by the GCP A and its legislative history. Consistent with the legislation, the intent of the 1996 Record of Decision on operation of Glen Canyon Dam is to, " ... 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."

Alternatives should be consistent with an ecosystem management approach. The 2006 Management Policies, NPS management plans, U.S. Fish and Wildlife Service (USFWS) policy, and the AMP Strategic Plan all mandate an ecosystem management approach to managing park resources and values. For example, the 2006 Management Policies state:

Natural resources will be managed to preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities. The Service will not attempt to solely preserve individual species (except threatened or endangered species) or individual natural processes; rather, it will try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and genetic and ecological integrity of the plant and animal species native to those ecosystems.

It is the policy of the USFWS to develop and implement recovery plans for threatened and endangered species in a manner that restores, reconstructs, or rehabilitates the structure, distribution, connectivity and function upon which those listed species depend In particular, these recovery plans shall be developed and implemented in a manner that conserves the biotic diversity (including the conservation of candidate species, other rare species that may not be listed, unique biotic communities, etc.) of the ecosystems upon which the listed species depend.

In the AMP Strategic Plan, Principle #4 states: "An ecosystem management approach, in lieu of an issues, species, or resources approach, will guide our efforts." Similarly, Principle #6 of the AMP Strategic Plan states, "Dam operations and management actions will be tried that attempt to return ecosystem patterns [e.g., the abundance and distribution of species and communities] and processes [e.g., hydrology, sediment flux, water quality] to their range of natural variability."

An ecosystem management approach is also appropriate for protecting archaeological resources because the priority is to protect them in situ. The 2006 Management Policies state, "Archeological resources will be managed in situ, unless the removal of artifacts or physical disturbance is justified by research, consultation, preservation, protection, or interpretive requirements."

Alternatives should to be consistent with the Clean Water Act The alternatives must comply with all relevant provisions ofthe Clean Water Act (CWA), and be consistent with the Supreme Court's holding in S.D. Warren Co. v. Maine Board ofEnvironmental Protection, 126 S. Ct. 1843 (2006). In the Warren case, the Court held that hydroelectric dam operation does raise a potential for a "discharge" into navigable waters ofthe United States, and that "[any] federal license under' 401 of the Clean Water Act requires state certification that water protection laws will not be violated." ld. at 1846.

Alternatives should represent the large-scale changes that are needed to protect park resources and values. There have been major changes in the riparian and riverine ecosystems since the construction of Glen Canyon Dam, and there will need to be major changes in dam operations, in concert with other management activities, to restore park resources and values.

The alternatives must be bold to detect a response in the ecosystem for several reasons including: 1) data on the response of large, complex ecosystems is inherently "messy;" and 2) ecosystem processes typically need to surpass critical thresholds to elicit a change in ecosystem patterns.

Alternatives should explicitly state the predicted outcomes for park resources and values and other resources. Providing the predicted outcomes for each alternative allows comparison with NPS targets for ecosystem patterns and processes and facilitates the selection of the most appropriate alternative. In addition, the 2006 Management Policies and NPS management plans direct movement of ecosystem patterns and processes towards the generic target of" ... the closest approximation of the natural condition when a truly natural system is no longer attainable."

It is also essential to provide the predicted outcome for other resources including non-native species (e.g., tamarisk (Tamarix spp.), rainbow trout (Oncorhynchus mykiss), brown trout (Salmo trutta), catfish (Ictalurus punctatus), New Zealand mudsnails (Potamopyrgus antipodarum), quagga mussels (Dreissena bugensis), etc.), hydropower (e.g., capacity, generation, and revenue), and non-use values. The inclusion of a thorough non-use values analysis is especially critical.

Alternatives should consider alterati0ns of the current annual and monthly release volumes. Alternatives should utilize the inherent flexibility in the Colorado River Compact for designing water releases. The Compact does not require a particular annual release volume, but rather, it requires that the " ... states of the upper division will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of 10 consecutive years reckoned in continuing progressive series beginning with the 1st day of October next succeeding the ratification of this compact." In addition, there are no legal requirements mandating particular monthly release patterns over a given year.

Monthly and annual release volumes could be designed to help manage sediment, near-shore habitat stability, temperature, spawning cues, etc. In addition, mimicking the natural variability in annual and monthly releases may be a useful tool in managing against non-native species that are adapted to the flow and temperature regime in the post-dam environment.

Alternatives should consider implications of reduced inflows to Lake Powell. Climate change is upon us and is having consequences. Alternatives should anticipate the predicted reduction in Lake Powell inflows. The reduced inflows are likely to have a significant impact not only on release volumes, but also on the water quality of the releases. Water quality parameters that could be affected include temperature, nutrients, heavy metals, salinity, and dissolved oxygen. Although water quality has not been a major concern in the past, these forthcoming changes could have profound impacts on both human and ecosystem health in the CRE.

Protecting Cultural Resources There should be developed a renewed commitment to incorporate values and traditional cultural knowledge from the eleven affiliated tribes of the Grand Canyon. These spiritual and cultural connections, concerns, and objectives must be integrated into the LTEMP and incorporated more substantially into the Glen Canyon Dam Adaptive Management Program.

More attention should be given to compliance issues that address 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.

Specific Alternatives and Issues Steady Flows Conserve Sediment and Warm Water Most of the resources of concern in Grand Canyon are reliant upon sediment in one way or another. Sediment conservation should thus be a key component of all alternatives considered in the LTEMP EIS. The best flows for conserving sediment are steady flows. A USGS Fact Sheet (Publication #2009-3033) summed up the science position on steady flows in Grand Canyon this way:

For a given volume of water to be released .from Glen Canyon Dam, the optimal dam operation for accumulating tributary-supplied sand is a constant, steady flow over the entire year.

Steady flows also warm river water, especially near the shoreline. This is important as native fish need warmer temperatures to successfully reproduce. Two specific types of steady flows should be considered as alternatives in the EIS:

Seasonally-Adjusted Steady Flows. The steady flow regime that most closely resembles pre-dam flows is called Seasonally-Adjusted Steady Flows (SASF). SASF can take many forms, but its most basic outline contains high steady flows in the spring, perhaps accompanied by a HighFlow Event, followed by low steady flows in the summer and fall. In addition to conserving sediment, this flow regime can also significantly warm shoreline waters. Because of low summer steady flows, water temperatures can rise to a level that supports spawning and rearing of the endangered humpback chub. GCMRC should be asked to develop an SASF alternative, consistent with sediment conservation and improved native fish habitat.

Year-Round Steady Flows. This is the "best case scenario" for conserving sediment 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)

As stated previously, neither steady flow regime will change water allocations among the states.

Four-Year Experimental Blocks Because of the uncertainties attending any new flow regime, one possible alternative would be a 12-year series of three four-year experimental blocks that test the pros and cons of both kinds of steady flows described above. The 12-year experiment might begin with four years of Seasonally-Adjusted Steady Flows, followed by four years of Modified Low Fluctuating Flows for comparison's sake, and finish with four years of Year-Round Steady Flows. At the end of the 12 years, all three flow regimes would be analyzed to see which produces the best results for the resources in Grand Canyon, consistent with the Grand Canyon Protection Act.

High-Flow Events High-Flow Events (HFEs) should be a part of all alternatives. High flows done on a regular basis when sufficient sediment is in the river system can help build beaches and improve other sediment-related resources.

The current limit ofHFEs to 45,000 cfs should be changed. Sediment science suggests that flows of 60,000 cfs and more would be extremely beneficial for the sediment-based resources in Grand Canyon. Before Glen Canyon Dam was completed, the annual spring snowmelt floods ranged between 35,000 and 120,000 cfs. Beaches, native fish habitat, cultural sites, and other resources would benefit by regular HFEs that mirror these pre-dam floods.

2007 Shortage Criteria Modified Low Fluctuating Flows plus equalization flows equals massive destruction of Grand Canyon. Because of the guidelines adopted in the "Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations of Lake Powell and Lake Mead" (Interim Guidelines), huge equalization flows were released in 2011, transporting a record amount of sediment from Grand Canyon, dramatically eroding beaches and damaging Grand Canyon resources.

The Interim Guidelines as adopted has set back sediment conservation in Grand Canyon several years. Higher flow volumes have a direct effect on sand transport, a fact 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).

To remedy this situation, the Interim Guidelines should be amended to include consideration of the requirements of the GCP A. It should also explicitly be acknowledged that when equalization is required, larger flows can and should be released over a two- or three-year period. This longer

term of releases would still satisfy the criteria for moving water from Powell to Mead, but would do it in a manner that better protects the resources in Grand Canyon.

GCMRC Involvement The Grand Canyon Monitoring and Research Center (GCMRC) was created to fulfill the mandate in the Grand Canyon Protection Act for the "establishment and implementation of a long-term monitoring and research program to ensure that Glen Canyon Dam is operated in a manner that protects the values for which the Grand Canyon National Park and the Glen Canyon National Recreation Area were created."

Over $100 million has been spent during the last 15 years on Grand Canyon science. The Grand Canyon Monitoring and Research Center has been the science body at the forefront of this substantial multi-year effort. It is important that GCMRC's expertise be drawn on to develop and evaluate LTEMP alternatives that best meet the purpose and need of the EIS. GCMRC should be significantly involved in all aspects ofthe LTEMP EIS.

Extirpated Species A plan to reintroduce extirpated species in Grand Canyon should be a part of all alternatives considered in the L TEMP EIS. These might include: the river otter (*Lutra canadensis*), razorback sucker (*Xyrauchen texanus*), Colorado pikeminnow (*Ptychocheilus lucius*), and bonytail (*Gila elegans*).

Reintroducing extirpated species is one of the 12 goals highlighted in the Stategic Plan of the Glen Canyon Dam Adaptive Management Program. It is also a park value supported by the Grand Canyon Protection Act.

Sediment Augmentation

The EIS should examine options for mechanically introducing additional sediment below the dam, to augment that which is periodically available from tributaries.

Temperature Control Device

The natural flow cycle of the Colorado River before Glen Canyon Dam was constructed included a seasonal warming trend in the late summer as the water temperature increased to approximately 85 degrees. After the dam was constructed, the temperature of released water became relatively steady at between 45-50 degrees as water was drawn from the deep penstock intakes. Even though the released water warms as it moves downstream, it still does not normally the temperature that allows endangered, warm water fish, such as the humpback chub to reproduce in the mainstem of the Colorado River.

The EIS should actively evaluate the efficacy of implementing a Temperature Control Device that would provide temperature control flexibility and improved water quality. A selective withdrawal structure or other methodology could improve the ability to create productive habitat for endangered fish and also offer more flexibility to respond to changing ecosystem concerns in future years.

As stated in the 1995 Glen CanyonDam FEIS: Increasing mainstem water temperatures by means of selective withdrawal structures installed at Glen Canyon Dam offers the greatest potential for creating new spawning populations of humpback chub and other native fish in Grand Canyon.

Stay the Course

It is important that the L TEMP EIS run all the way to a Record of Decision. Several years ago, a surprised public saw the start and stop of a similar EIS process, called the Long-Term Experimental Plan (L TEP) EIS, which never reached a final decision. Politics got in the way of its completion.

Please do not LTEP the LTEMP!

Summary

It is critical that the L TEMP alternatives consist of alternative dam operating criteria in concert with other management actions designed to meet the requirements of the Grand Canyon Protection Act while being consistent with other laws including those regarding water delivery, endangered species, cultural resources, and water quality. The alternative selected as best meeting these criteria should then be tested for the appropriate number of years to achieve the desired level of confidence in the results.

The LTEMP provides a public opportunity for Interior and the responsible agencies to accomplish something big -- to meet in full the requirements of the Grand Canyon Protection Act. To do this, the L TEMP must be intellectually honest, legally defensible, scientifically credible, and reflect the high value the public places on the integrity of the natural, cultural, and recreational resources in this most iconic of national parks.

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The Colorado River Energy Distributors Association (CREDA) appreciates the opportunity to provide comments during scoping of the Long-Term Experimental and Management Plan (LTEMP) Draft Environmental Impact Statement (EIS) process (7/6/2011 and 10/17/2011 Federal Register notices). In the event there is an extension of the comment period, CREDA may supplement these comments at an appropriate later date.

CREDA Background CREDA's mission is "To preserve and enhance the availability, affordability, and value of Colorado River Storage Project facilities while promoting responsible stewardship of the Colorado River System." CREDA is a non-profit, Colorado corporation, also authorized to do business in Arizona, which was formed in 1978 as an association of non-profit entities who are longterm contractors for resources of the Colorado River Storage Project (CRSP). CREDA represents its members by working with the Bureau of Reclamation (Reclamation) and the Western Area Power Administration (WAPA) regarding issues related to the CRSP. CREDA members serve over four million consumers in six states: Arizona, New Mexico, Nevada, Colorado, Utah and Wyoming. CREDA members include joint action agencies, state agencies, political subdivisions, tribal utility authorities, municipalities, rural electric

cooperatives and irrigation and electrical districts. CRSP contractors pay all the power costs of the CRSP, which includes construction (with interest), operation, maintenance and replacements, transmission, environmental and approximately 95% ofthe irrigation costs. CREDA has also been a representative of contractors who purchase federal power on the Glen Canyon Dam Adaptive Management Work Group (AMWG) since its inception. CREDA and its members have a direct and specific interest in this process.

CRSP Background In 1956, the CRSP was initiated to provide storage facilities for the Upper Basin states so that they could meet their obligations under the Colorado River Compact. The CRSP was authorized in the Colorado River Storage Project Act of 1956 (P.L. 485, 84th Cong., 70 Stat. 50), as a multi-purpose federal project. The Act defmed project purposes as flood control, water storage for irrigation, municipal and industrial purposes and generation of electricity. The CRSP includes hydropower generation facilities at the Aspinall Unit (three dams with hydropower facilities), Flaming Gorge Dam and Glen Canyon Dam. Glen Canyon Dam is the largest hydropower generating feature of the CRSP, comprising approximately 70% of the generation resource of the Salt Lake City Area Integrated Projects (SLCAIIP). A significant use of power revenues generated by CRSP facilities is used to pay for irrigation projects (beyond the ability of the irrigators to pay), which provides important economic benefits to the Upper Colorado River basin states. Without this funding stream, the U.S. Treasury would be obligated for this repayment.

Glen Canyon Dam and Humpback Chub Glen Canyon Dam located near Page, Arizona, includes eight generators, with nameplate generating capacity of 1,320,000 kW (1) and reservoir storage capacity of 27,000,000 acre feet (to elevation 3,700) (2). Lake Powell and Glen Canyon Dam are critical to the workings of the Law of the River, the Colorado River Compact and the Upper Colorado River Basin Compact, particularly in times of drought.

Reclamation currently operates Glen Canyon Dam to allow for hydrologic conditions, water rights, minimum stream flows, powerplant capacities, and reservoir elevation goals. “In addition to the primary purpose of water delivery, another function of Glen Canyon Dam is to generate hydroelectric power”. (3) However, that function has been significantly constrained since the early 1990’s, with the initiation of interim operating criteria, and continuing with the October 1996 Record of Decision (ROD) (4) which called for a Modified Low Fluctuating Flow (MLFF) operating regime, which ultimately resulted in the constraint of hydropower generation levels (maximum and minimum generation/flow and limits on up and down ramps) in favor of downstream concerns. In a 2005 USGS publication, based on research by the Grand Canyon Monitoring and Research Center (GCMRC), it was hypothesized that a downward trend in the humpback chub population may have coincided with initiation of interim operating criteria and ROD flows. (5) However, since publication of that report, significant new science and information has been developed and indicate that the humpback chub population is “a persistent and increasing reproducing population .. .in the Grand Canyon.” (6) This continuing upward trend (adult fish increased approximately 50 percent between 2001 and 2008) (7) should be a major factor in assessing any experimental or management action which could negatively impact this endangered species.

Proposed Purpose and Need for Action The Council on Environmental Quality (CEQ) Regulations require that the purpose and need statement of an EIS state the proposed action, the purpose of the proposed action, and specify the underlying need to which the agency is responding in proposing the alternatives, including the proposed action. (8) In addition, the purpose and need "section may introduce a number of factors, including economic and technical considerations." (9)

The purpose and need statement for this EIS needs to be clearly identified and stated at the outset of this process. A clear delineation between what is considered management versus experimentation must be determined prior to beginning the L TEMP; clear hypotheses must be developed and incorporated into the alternatives. It is currently unclear how the decisions and actions emanating from the draft Environmental Assessments (HFE and Non-Native Fish Control) will impact the scope of this EIS. Those decisions, impacts and the interrelationships with this EIS must be addressed.

Further, CREDA is concerned about the proposed purpose and need and objectives as described in the public scoping meetings held in November 2011.There is no reference to hydropower in the stated Objectives (November 2011 scoping meeting information). Any EIS which addresses Glen Canyon Dam must address the hydropower purpose. As required by the 1956 CRSP Act, the production of hydropower is an authorized purpose of this federal project. This EIS is tiering off of previous environmental compliance, including the 1996 Record of Decision as well as the 2007 Shortage Criteria EIS and the 2008 five-year experimental plan. The decision in the 1996 ROD included the selection of the existing operational alternative which would achieve an appropriate "balance", so that the operation of Glen Canyon Dam would conform to the direction given in the Grand Canyon Protection Act of 1992 while remaining in compliance with other legal mandates;" ... to balance competing interests and to meet statutory responsibilities for protecting downstream resources and producing hydropower ??? " (10) The concept of"balance" was integral to the selection of this alternative and is repeated in several related documents: "The goal of selecting a preferred alternative was not to maximize benefits for the most resources, but rather to find 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." (Emphasis added). (11) More recently, this concept was reaffirmed by Judge David Campbell: "The Bureau of Reclamation, as the operator of the Dam, has a complex set of interests it must balance in operating the Dam. Those interests include not only the endangered species below the Dam, but also tribes in the region, the seven Colorado River basin states, large municipalities that depend on water and power from Glen Canyon Dam, agricultural, Grand Canyon National Park and national energy needs at a time when clean energy production is becoming increasingly important". (12)

In accordance with the CRSP Act and the Law of the River, the Secretary has a legal mandate to improve and protect important downstream resources which requires the generation of hydropower to the maximum extent practicable. Section 2 ofthe Grand Canyon Protection Act allows the Secretary to vary from the legal requirements of Section 5 of the CRSP Act only if there is substantial evidence that doing so meets the objectives of the Grand Canyon Protection Act. The best available science does not provide that substantial evidence. Wherever there is

specific reference to section 1802(a) of the Grand Canyon Protection Act of 1992, there must also be included reference to section 1802(b) of that Act which states “It is imperative that the proposed action clearly be one that preserves the purposes for which Glen Canyon Dam was constructed, while meeting environmental and science objectives to the extent practicable.”

The LTEMP and Glen Canyon Adaptive Management Program The Glen Canyon Dam Adaptive Management Program (AMP) and Adaptive Management Work Group (AMWG) federal advisory committee consist of stakeholders who devote significant time and effort each year to understand the current scientific research, operating criteria, environmental, cultural, economic and recreational resource needs that must be considered when developing dam operational and experimental proposals to the Secretary. These recommendations and these processes balance complex, and most often competing resource needs. The July 6, 2011 Federal Register notice underscores the inclusion of stakeholders, including members of the AMP and AMWG; CREDA encourages the Department of the Interior to examine recommendations from the AMWG stakeholders, given their in-depth knowledge ofthe complex issues that must be considered in development of this EIS.

The science being produced for the AMP by or through the USGS since its inception should form the basis for the resource and impacts assessments undertaken in the LTEMP. Specifically, information provided to the AMWG stakeholders during the summer and fall of 2011 on the aquatic and physical resources sciences should play a prominent role as the best available science in this EIS. In addition, the Science Advisors should play a key role in any evaluation of alternatives. Building on the best available science provided through the AMP, the EIS must consider the full range of management options that can be within the discretion of Reclamation, or is “forced” on Reclamation hydrologically, such as the hydrologic conditions that occurred this past water year. In other words, full use of Glen Canyon generating units must be studied and considered.

The Data Quality Act requires agencies “to ensure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements” and to “identify any methodologies used” and “make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement.”(13) While analyzing and developing potential alternatives, scientific analysis that indicates ‘‘uncertainty” should be treated as just that, and additional “value judgments” attached to uncertainty such as “possibly positive” or “possibly negative” should be discounted. “Such value-laden words should not be used to convey scientific information because they imply a preferred ecological state, a desired condition, a benchmark, or a preferred class of policy options. Doing so is not science, it is policy advocacy.” (14) If there is clear scientific data supporting a statement, it should be considered, but non-supported statements should be considered inappropriately biased. (15)

Energy and Hydropower Considerations “Increased American energy production is one of the best ways to help jumpstart our economy. It will create over a million energy jobs and thousands of indirect jobs in a variety of sectors in every state throughout the country. Given the tremendous economic benefits - not to mention the national security implications - there is no reason why we should not provide access to our own energy resources located here at home.”(16)”Hydropower provides a wide range of benefits to the country. It is a clean, low-cost

source of energy that can be relied upon for long-term, stable production of domestic energy."(17) In addition, "there is also the ability to increase hydropower capacity through efficiencies and upgrades of existing facilities."(18) Over the past 25 years, electrical demand in the West rose at nearly twice the rate of the population growth (140% vs. 71%), with the population expected to increase another 54% by the year 2030.(19) Despite improved efficiency of electric devices the Energy Information Administration projects residential electric use to grow at .7% per year through 2035.(20) Now is not the time to further reduce or continue to unnecessarily restrict generating capacity at Glen Canyon Dam. Hydropower has been labeled the "most successful form of renewable energy."(21) Hydropower has many advantages over other power sources, including the ability to start quickly and adjust to rapid changes, and including black start capability during times of high energy demand and regional system disturbances. Since the power system in the West operates in an integrated manner, any time the load increases or decreases, a regulating generator must sense that change and immediately respond. Glen Canyon generation provides that capability. Glen Canyon generation is constrained by maximum and minimum flow and ramp rate releases, and thus flexibility and resource diversity is reduced. Reduced generation capability also requires the use of other less environmentally desirable resources, which can also raise the cost to consumers due to the need to replace the hydropower resource that is no longer available.

Since implementation oflnterirn Flows in 1991, hydropower production has been severely constrained, at a loss of approximately $50 million per year. (22) Since 2004, 57 tribal entities began receiving the benefit of the CRSP resource through long-term finn contracts with the Western Area Power Administration. Many of these tribal communities are in some ofthe most economically-stressed areas ofthe country. Impacts to these communities, as well as other CRSP firm electric service customers, from operational changes or alternatives which seek to further restrict Glen Canyon hydropower generation must be evaluated and mitigation measures evaluated and recommended. "Mitigation measures are not necessarily independent of the proposed action and its alternatives and should be incorporated into and analyzed as a part of the proposal and appropriate alternatives. Where appropriate, major mitigation measures may be identified and analyzed as separate alternatives in and ofthemselves where the environmental consequences are distinct and significant enough to warrant separate evaluation."(23) Alternatives that continue to constrain or further limit the hydropower resource with no specific measurable or commensurate resource benefit or equivalent "trade off" should be rejected. Under NEPA, Reclamation must recognize the benefits of hydroelectric power and assess the adverse impacts to this project purpose from any proposal or alternative. (24)

Development of Alternatives and Geographic Scope During the November 2011 scoping public meetings, information was presented that indicates consideration is being given to potentially including Lake Mead National Recreation Area in the geographic scope of the L TEMP. In fact, tourism figures were displayed for that NRA. CREDA recommends the scope be limited to the Glen and Grand Canyon areas. Including Lake Mead in the geographic scope raises significant additional issues that may not be directly associated with the operation of Glen Canyon Dam and may impact the operation of Hoover Dam. Glen Canyon Dam and Hoover Dam were authorized and operate under distinctly different legislative constructs. What is the legal authority to expand the geographic scope of Glen Canyon Dam operations to Lake Mead NRA?

We understand that Reclamation has withdrawn its Instructions on NEPA, and that document has not yet reappeared on the Reclamation website. It is therefore impossible to determine whether those Instructions, which Reclamation is obligated to follow, complement or possibly conflict with certain aspects of scoping this EIS. Reclamation should publish its Instruction and examine the scoping ofthis EIS in light of those revised Instructions and the Department Manual before developing a scoping report, which we understand will be provided to the public. The cooperating agencies should have the opportunity to review the scoping report in advance of its publication. As indicated in the scoping meeting presentations, all reasonable alternatives will be considered. In addition, the cumulative effects analysis must take into consideration impacts to the hydropower resource since changed operations due to Interim Flows in 1991.

The November scoping information includes a preliminary list of considerations (resources, impacts, or issues). The scoping materials state "MLFF is the starting point". Given the hydrologic experience of the past water year, any future study must include studying the effects of releasing water at full powerplant capacity on a constant basis, as well as using maximum powerplant capacity in a fluctuating release regimen such as MLFF. Hydrologic "mandates" requires that any new management plan must consider all ofthe hydrologic situations facing Reclamation in future operations of Glen Canyon Dam. In addition, specific consideration should be given to air quality impacts associated with adjustments to hydropower operations, including impacts from replacement power resources. Based on the most recent "best available science" provided by USGS to AMWG stakeholders during the summer and fall of 2011, additional elements which could be considered in alternative(s) include (but are not limited to):

evaluation of faster downramps

monthly volumes of water delivery

evaluation of specific beach conditions in all reaches, not just Glen, Marble and Grand Canyons

consideration given to the current state of knowledge regarding humpback chub habitat preferences Creek

greater relocation of humpback chub to tributaries, including Bright Angel

greater fluctuations to dry trout redds in the spring

mechanical removal of brown trout up and downstream of Bright Angel Creek

modification of recreational use of beaches by testing impacts to users by prohibiting use of select beaches and monitoring sand losses; utilization of areas with shelving as campsites in lieu of sand beaches in these areas

Paria River sediment check dams (to enhance turbidity condition downstream for reduction of trout predation)

bubblers in the forebay to break down reservoir thermocline (an inexpensive, temporary method to increase water temperatures downstream that could test theories on benefits and detriments to temperature increases)

mechanical augmentation of sediment/sand to enhance camping beaches.

As indicated at the November scoping sessions, selected alternatives must be "economically feasible." How will this feasibility be determined? If feasibility means a direct cost to the US taxpayer by virtue of appropriated dollars being used for capital improvements or management actions, there is a direct means test for that feasibility. If, however, there is a direct economic impact to a particular group of resource beneficiaries by virtue of operational changes, that too must be measured and considered. Non-use as measured by contingent valuation analysis, if considered at all, must have the lowest priority afforded to those assessments by the decision-maker. "We believe that contingent valuation is a deeply flawed methodology for measuring nonuse values, one that does not estimate what its proponents claim to be estimating. Thus, we conclude that current contingent valuation methods should not be used for damage assessment or benefit cost analysis." (25)

Recovery Implementation Program The July Federal Register notice includes reference to consideration being given to a recovery implementation program (RIP), but other than a paragraph at the end of the November scoping material FAQs, there is little continued reference to this activity. Several years ago, the USFWS was charged by the AMWG with leading an effort to consider a RIP, which was intended to incorporate science from the AMP, management actions (current and future) being undertaken (such as humpback chub translocation and trout removal), refugia, population augmentation planning, a plan for Cameron Bridge mitigation, and incorporation of recovery goals for the endangered fish species. At the outset of any discussion, the Department needs to clarify what is meant by recovery. The elements contained in the AMP's HBC Comprehensive Plan should be the starting point for discussions with potential participants in conjunction with the AMP, and there should be collaboration with the Upper Colorado and San Juan Endangered Fish Recovery Implementation Programs as well as the Lower Colorado River Multi-Species Conservation Program to avoid duplication and overlap. CREDA has been a participant in the Upper Colorado and San Juan River Programs since their inception.

Given the current humpback chub population status, consideration should be given to development of a recovery maintenance program as an independent action which would parallel the development of this EIS. Since the adult HBC population substantially exceeds the recovery goal, this program could be developed now, as opposed to waiting for completion ofthis EIS, and the results of the program could be used to inform this EIS.

(1) http://www.usbr.gov/power/datalsites/glencany/glencany.html (2) http:/ /www.usbr.gov/ projects/Facility.jsp?fac _Name=Glen+Canyon+Dam&groupName=Hydraulics+%26 +Hydrology (3) 71 Fed.Reg. 74558, December 12, 2006 (4) http://www.usbr.gov/uc/rmlamp/pdfs/sp _ appndxG ROD.pdf (5) SCORE Report, USGS Circular 1282 (Oct. 2005), page 45, Figure 12 (6) LTEMP Public Scoping document "Aquatic Ecology", November 2011 (7) USGS Fact Sheet: bttp://pubs.usgs/gov/fs/2009/3035/ (8) 40 CFR

‘ 1502.13. (9) 516 DM 1-7, 1052.13 (4.9) (10) Record of Decision, Operation of Glen Canyon Dam Final Environmental Impact Statement, page 1. (11) Ibid, Section VII. Basis for Decision. (12) Order, CV-07-8164-DGC, June 29,2010. (13) 40 C.F.R. ‘ 1502.24. (14) Lackey, Robert T., “Science, Scientists, and Policy Advocacy”, Conservation Biology Volume 21, no. 1, page 14. (15) Table 4.2, GCMRC’s Assessment oftbe Estimated Effects of Four Experimental Options on Resources Below Glen Canyon Dam, October 27, 2006. (16) http://naturalresources.house.gov/News/DocumentSingle.aspx?DocumentiD=269694 (17) Memorandum of Understanding for Hydropower Among the Department of Energy, the Department of the Interior and the Department ofthe Army, March 24,2010. (18) http:/ I democrats.naturalresources.house.gov/issues@id=0025 .html (19) Energy Information Administration, Annual Energy Outlook 2006 with Projections to 2030, http://www.eia.doe.gov/oiaf/aeo/electricity.html (Feb. 2006) (20) Energy Information Administration, Annual Energy Outlook 2011, http ://www.eia.gov/forecasts/aeo/ (April2011) (21) Report ofthe Energy Policy Development Council, May, 2001 at 5-19. (22) Ex Post Power Economic Analysis of Record of Decision Operational Restrictions at Glen Canyon Dam, T.D. Veselka, L.A. Poch, S.C. Palmer, S. Loftin and B. Osiek, 2010 (23) Index to 516 DM 1-7, 1502.14 (4.10.B) (NEED CORRECT CITE) (24) 42 U.S.C. ‘ 4321. (25) Contingent Valuation: Is Some Number Better than No Number? Diamond, Peter A. and Hausman, Jerry A., The Journal of Economic Perspectives, Vol. 8, Issue 4, (Autumn 1995), 45-64.

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INTRODUCTION

Thank you for the opportunity to comment on scoping issues for the L TEMP EIS, involving the potential socio-environmental impacts of alternative Glen Canyon Dam operating protocols, experimental opportunities, and other management actions. The EIS will be designed to meet the obligations of the Grand Canyon Protection Act (1992) to protect Colorado River resources affected by Glen Canyon Dam for future generations, conserve species listed under the Endangered Species Act, and protect American Indian Tribal interests, while meeting water delivery obligations and generating hydroelectric power. Grand Canyon Wildlands Council, Inc. (GCWC) is a 501(c)(3) not-for-profit conservation organization dedicated to the conservation and restoration of native species and natural ecosystems throughout the Grand Canyon ecoregion (GCE), which includes Glen Canyon National Recreation Area and the drainage basin of Grand Canyon on and near the southern Colorado Plateau. The community of members we serve includes citizens who treasure this ecoregion for its native biological diversity as well as its cultural and geographic complexity. Many actively hike and raft in Grand Canyon for recreation, creative pursuits, or scientific research and ecological restoration purposes. For more information about our organization, please see our website at www.grandcanyonwildlands.org. GCWC staff serve on the Adaptive Management Work Group (AMWG) FACA committee representing conservation interests, and we strongly emphasize the need to base dam and the Colorado River stewardship on clearly defined desired future conditions, high quality scientific understanding, well-reasoned planning, and conscientiously conducted management experiments. With more than 40 years of experience in the region and more than 50 peer reviewed scientific publications on the ecology and management of the Grand Canyon ecoregion by our staff, we offer these scoping comments from both the standpoints of science and management. We present policy and science scoping issues that appear to us to be important considerations for the Bureau of

Reclamation and the National Park Service as those organizations undertake the development of this EIS. We also generally support the recommendations presented by our colleagues among the Grand Canyon River Guides, the Grand Canyon Trust, the National Parks and Conservation Association, participating Native American Tribes, and other organizations whose intent is to incorporate the best scientific knowledge to improve sustainable natural resource stewardship of Grand Canyon and the Colorado River. We encourage Reclamation and the National Park Service (NPS) to reconsider the scope of this effort and include not only the 1996 Record of Decision study area from the fore bay of Lake Powell to Lake Mead, but all of Lake Powell and the tributaries that are useful to scientific research and monitoring, or that are affected by the river running public. It is this that we regard as the Colorado River ecosystem throughout these comments.

LTEMP EIS SCOPING Issues

The L TEMP is being developed to address the array of socio-environmental issues facing Reclamation and the NPS in their efforts to improve stewardship of the Colorado River and associated ecosystems, including but not limited to: hydrology /water delivery, sediment transport, deposition, and erosion; riparian and terrestrial ecology, including native, nonnative, and endangered species; aquatic ecology, including native, non-native, and endangered species; historic properties; Tribal resources and cultural concerns; wilderness issues; recreation (fishing, rafting, camping); and hydropower production. Below we group our comments into the over-arching categories of policy and science. Policy 1. Ensure that CRE stewardship is in full and active accord with the Grand Canyon Protection Act (GCPAi 1992). Make sure that the L TEMP EIS fulfills the directives of the GCPA and is an active, responsive, “living document” that continues to integrate new information to improve stewardship of Glen Canyon Dam and affected Colorado River, both upstream and downstream from the dam. 2. Expand the scope of the project area to include all of Lake Powell, Cataract Canyon, the lower San juan River, as well as the downstream river to Lake Mead. Failing to include Lake Powell and its major tributaries, particularly Cataract Canyon, means that less attention has been paid to the sources of water and nutrients, as well as important scientific controls for understanding and predicting changes in Grand Canyon, such as anoxic hypolimnial waters, system-wide nutrient flux, zooplankton delivery, invasive species (e.g., quagga mussel) threats, and recreation (boating, fishing, etc.) use and economics. It is this larger spatial scope that we subsequently refer to below as the Colorado River ecosystem (CRE). Eventually we hope that stewardship of the entire Colorado River will be integrated, rather than bisecting it into upper and lower basins and having numerous federal entities managing different parts (e.g., MSCP, AMWG, Upper Basin Fisheries Program, etc.). 3. Ensure, continue, and refine adaptive ecosystem management of the CRE through a reinvigorated Adaptive Management Program (AMP), with increased integration with the Annual Operating Plan process, and through refinement of adaptive management processes generated from in-depth review of the AMP, as well as increased transparency and emphasis on improved public and Tribal trust. 4. Complete and present to the public the desired future conditions for the CRE that qualitatively and quantitatively frame desired resource conditions for the future of species, ecosystems, ecological and societal processes, including timelines for restoration of missing and declining species and natural ecosystems, and clearly embrace Native American concerns. 5. Clarify and resolve policy conflicts and prioritize management responsibilities between the “Law of the River” and the GCPA. This policy review is long

overdue, and its absence perpetuates long-standing agency management conflicts associated with efforts to balance economic and environmental stewardship of Glen Canyon Dam. Such a policy review should be undertaken by highly qualified individuals and should be reviewed by the Solicitors of the Department of the Interior and the Department of Energy, and perhaps other federal departments. One of many long-standing debates is where hydroelectric power generation falls in relation to environmental and societal objectives for the operations of Glen Canyon Dam. Another policy issue is whether the AMP should fund restoration of rare or missing taxa in the river corridor. 6. Develop an independent scientific advisory committee to coordinate CRE science activities and ensure integration of information into improved stewardship. An independent scientific advisory committee is needed to oversee and advise science efforts and help integrate the findings into appropriate management activities. Such a panel would help ensure that the scientific activities being conducted are of high quality, are reported to the public and the scientific community, and are applied to improvement of CRE stewardship. The Adaptive Management Program Science Advisors (AMP-SA) could be tasked with review of science planning and science credibility of the combined GCMRC and NPS programs, but that panel has not played a substantial role in advising NPS or other agency-level managers about how to integrate scientific findings into improved CRE stewardship. Thus, if the AMP-SA is employed for this purpose, its scope and funding would have to be expanded and the membership reconfigured to undertake a stewardship advisory role for the LTEMP. However, leaving these tasks in the hands of the agencies will contribute to programmatic inefficiency, lack of attention to important issues, and failure to meet public and Native American trust obligations. 7. Develop an annotated administrative history ofCRE management This is a practical suggestion presently under consideration by the AMWG to help new participants in the CRE AMWG and related management programs more readily understand the history of core issues (e.g., temperature control devices, program scope, native fish population health, administration structure, etc. In addition, such an administrative history will help clarify decisions about key program issues, such as the development of desired future conditions, steady vs. non-steady flow issues, and resource monitoring efforts. This administrative history would best be developed by an independent team of historians to avoid agency bias from dominating the document(s). 8. Native American concerns about the CRE deserve more rigorous attention. As a participant in the AMWG process, we have observed that Native American concerns about the CRE are presently pigeon-holed into archeological site protection, monitoring, and excavation, missing the central importance of the health and wellbeing of the Canyon to their cultures. These are complex issues that the White world little understands. A more respectful, more rigorous commitment to communication about such issues with the participating Native American cultures is warranted. 9. Improve federal communications with non-federal constituents, partners, and stakeholders. Fishing guides are interested in collaborating on fisheries management; however, this constituency has not received sufficient attention from the AMP. Such offers to participate should be respected, fostered, and supported by the federal government. 10. The AMP, NPS, and GCMRC should be more collaborative. Information sources external to the AMP can be engaged to help improve understanding of the CRE, yet inhouse agency processes largely eliminate such collaboration. In its original formulation, GCMRC was to be a small, highly collaborative set of program managers and limited staff; however, the program has increased greatly above that original intent Nonetheless, much basic inventory and monitoring has not been undertaken, and external collaborators can provide service to the AMP at no cost to the program. Assistance from such collaborators should be

considered and engaged where advantageous to AMP objectives. 11. Improved outreach to the public is needed, as the AMP has made little direct attempt to outreach to the public, which supposedly is receiving the benefits of CRE stewardship actions. However, the low participation of the public in this L TEMP process is evidence that public outreach has been insufficient. A goal of this EIS should be to have the visiting public educated as to the extent of the high quality scientific understanding of the ecosystem, and a public that is confident that such scientific information is being used to inform and direct stewardship appropriate to a World Heritage Site like Grand Canyon. Engagement of a professional, non-federal public relations advisor might help bring this important program to the attention of the public. 12. Continue to engage a professional facilitator in adaptive management meetings. The success of the present program is due not only to the recent, excellent coordination by the Department of the Interior to this program, but also to the engagement of a highly skilled, dedicated, and knowledgeable facilitator. Such assistance is essential for the federal government to communicate with often fractious stakeholders.

Science 1. The LTEMP should adopt an ecosystem approach to the stewardship of the Colorado River affected by Glen Canyon Dam. Ecosystems include the interacting biotic and abiotic domains, species, and ecological processes within a defined area, including human uses, goods, and the services provided by the ecosystem. The CRE, including the Colorado River and its tributaries, including Cataract Canyon, Lake Powell, lower Glen Canyon, Grand Canyon, are human-dominated river systems, ones that have been highly altered by flow regulation and other human activities (e.g., the introduction of non-native species and visitor impacts), activities that have simplified ecosystem structure and composition. We suggest that adoption of an ecosystem approach would help improve CRE stewardship. Such an approach would include linking several models together, including: a) flow-sediment model (largely completed) b) a nutrient dynamics model for carbon, nitrogen, and phosphate c) water quality, including temperature, inorganic constituents, and microbes d) an aquatic foodbase model (under construction) e) a coupled river continuum and landscape-based river corridor habitat model f) a wetland and riparian vegetation development model g) population models of trophically significant biota h) a trophic relations model i) a human goods and services model, including cultural concerns, hydroelectric and recreational economics, and non-use values j) an administrative model that tracks stewardship goals, objectives, projects, and costs in relation to the overall CRE model. Such a linked ecosystem model would identify information gaps and allow testing of management scenarios without having to commit the entire CRE to potentially harmful experiments, such as occurred in Year 2000. 2. Integrate scientific activities between GCMRC and the NPS. The USGS Grand Canyon Monitoring and Research Center presently organizes and conducts scientific adaptive management activities in the CRE, including non-native fish removal, and the National Park Service conducts resource monitoring and native fish translocations in the river corridor in Grand Canyon in relation to its most recent Colorado River Management Plan. However, there appears to be little discussion between these two agencies about monitoring. overlapping efforts, or how to integrate scientific planning and information incorporation into improved stewardship. 3. Improve the inventory, monitoring, and restoration of rare taxa. By our estimate, at least 85 taxa (including some large groups of species) have been extirpated from the CRE since 1963 (Stevens 2011). Of these, the loss of four of eight native mainstream fish is well known, but many terrestrial and some other aquatic taxa also have been lost, including Sonoran river otter, badger, endangered southwestern willow flycatcher, and other riparian vertebrates. Population status

information is lacking for a large number of rare plant, invertebrate, and vertebrate taxa, and more species are likely to be lost from the river corridor in the near future. a. Continue to inventory, particularly for rare and declining species. Detailed inventory of the population status and causes of decline of missing and declining CRE aquatic, wetland, and riparian plant, invertebrate and vertebrate species is needed immediately and over the course of this EIS to understand existing biodiversity, ecosystem structure, population status and responses to dam operations, and to prevent future biodiversity losses. b. Reintroduce and restore missing and declining species. Decades of fruitless discussion and agency inertia have failed to reintroduce razorback sucker, a species that could easily be reintroduced into the river. Initiate reintroduction of razorback sucker immediately, and move forward on prioritizing and restoring the other missing or declining CRE species. Our report to the NPS on the location of pre-dam Goodding's willow and Fremont cottonwood (GCWC 2009) was written to assist the NPS plan vegetation restoration prior to the arrival of the non-native tamarisk leaf beetle. Those are sites in which the NPS can quickly move to revegetate and provide native habitat and seed sources for replacement of non-native tamarisk. c. Restore missing and altered habitats in the CRE. Such habitats include healthy native stands of wetland and riparian vegetation, limiting population growth of keystone (strongly interacting) native and non-native species that restrict population growth of native assemblages (e.g., beaver, Molothrus cowbirds, non-native minnows, brown trout, etc.). d. Restore the range of native fish species to the entire flowing portion of the CRE. Predam springtime floods created large pools of quiet, clear, warm, and highly productive water at tributary mouths. Minckley (1973 and pers. comunication) reported that humpback chub were abundant at the mouth of the Paria River; however, cessation of large, long-duration floods and the loss of tributary mouth habitat led to the loss of HBC, pike minnow, and razorback sucker from that area. We suggest the managing agencies work together to consider construction of Paria River mouth rearing ponds to experimentally attempt to restore the range of HBC and other native fish to lower Glen Canyon and upper Grand Canyon. 4. The LTEMP should be firmly based on a high quality scientific approach. Scientific adaptive ecosystem management relies on several components to be effective: a credible conceptual scientific approach to research, inventory, assessments, implementation, and monitoring (Science Point 1 - above); high quality, independent scientific review of research (including monitoring) methods, and implementation of stewardship activities (Policy Point 6 - above); use of scientific controls for understanding differences among treatments and changes over time; a rigorous information management system that is well designed for archival, accessibility, and inquiry; a rigorous peer-reviewed publication program, so that studies conducted are submitted to independent review and are communicated to the scientific community; monitoring that is directed towards model testing and validation within a larger ecosystem conceptual model; and integration of new knowledge into improved stewardship. a. Include Cataract Canyon as a scientific control study area. One of the most glaring inadequacies of the existing AMP science program is the failure to understand the ecosystem ecology of Cataract Canyon in southern Utah as a scientific control, against which to evaluate expectations for improved management of the CRE downstream from Glen Canyon Dam. Cataract Canyon is the only large, relatively free-flowing section of the Colorado River, and has most of the attributes of the pre-dam Colorado River downstream from Glen Canyon Dam, including relatively natural geomorphology, high sediment flux, and seasonal water temperature variation. A thorough ecological inventory of Cataract Canyon, and testing of Grand Canyon type models against end points in Cataract Canyon are needed to ground understanding of whether desired future conditions in Grand Canyon will achieve basic resource management

needs. Among the many comparative tests to be made are those related to native fish stewardship, river running recreation, and water quality safety, and other ecosystem attributes. b. Develop an In situ experimental study site at Lees Ferry. Small-scale, in situ experiments are needed to resolve a host of ecological questions about dam impacts on river ecosystem processes, such as competitive and predatory impacts of small non-native fish, water temperature impacts on food base, water clarity impacts on foodbase and fish predation, and many other experiments. We suggest that an open-air experimental arena be developed in the gravel pits near the mouth of the Paria River to conduct such experiments. The experimental arena should use water piped or channeled to study ponds from both the mainstream Colorado River and the Paria River. Ponds and channels could be experimentally manipulated as outdoor flumes and used to test numerous important concepts that limit our present understanding of ecosystem management. Such an experimental arena would be easy to access, construct, and monitor, would create jobs, and would provide evidence to the public that scientific understanding is critical to federal management of the CRE. Such a site should be jointly managed by the NPS, the U.S. Fish and Wildlife Service, the Arizona Game and Fish Department, and Reclamation. c. Improve understanding of the range of variability of flow. We recognize the exponential relationship between flow and sediment transport, and we support efforts to understand and manage the sediment budget to support sandbars. However, we also are concerned that restoration of this ecosystem involves better understanding of flow variability over time and impacts on biological resources. The unregulated Colorado River was renown for its extreme variability in flow, with 2-3 orders of magnitude difference in flow annually. Historical flow records show that although pre-dam within-day flow variability was low, between-day, within-week, and within-month variability expanded progressively. We believe it is important to recognize this inter-day variability and consider how flow steadiness affects the remaining native species, habitats, and the many non-native taxa that have been introduced. We recommend consideration of experimental testing of the effects of flow variations at 2-day, 4-day, week-long, and month-long intervals. A great deal is now known about flow and sediment relationships, but nutrient spiraling is poorly understood and little is known about biological responses to inter-day variability. 5. Increase the magnitude of high flows for experimental sediment, geomorphology, and vegetation management, when the Lake Powell water supply permits. Present high flow experiments are not sufficiently large. Experimental high flows are needed to better understand flows ~60,000 cfs for development and refinement of sediment, geomorphological, and vegetation models, and for ecosystem stewardship. Such flows are still far lower than those that occurred nearly every year in pre-dam times. Our direct observations of high flows of those magnitudes in the early 1980's suggested thresholds in riparian vegetation scouring, sandbar rejuvenation, ponding of tributary mouths, mobilization of debris fan boulders, and many other factors, thresholds that yet to be recognized by the existing AMP high flow experiment program. An experimental ~60,000 cfs release could have been conducted during 2011, rather than squandering several years of stored sediment under poorly planned reservoir equalization flows. We recognize that such flow experiments will only be possible in years with sufficient inflow to bring the pool elevation high enough to use one or both of the spillways; however, the EIS should recognize and take advantage of the importance of such rare opportunities. 6. Improve information on river corridor visitation, visitor safety, and accident frequency. Too few data are readily available on many aspects of visitation and visitor safety in Grand and Glen Canyons, and adequate data for understanding visitor safety and the types and severity of CRE visitor accidents are not readily available (Myers et al. 1999). Accident types and frequency are not

adequately reported, and tripthreatening water quality and disease issues are poorly understood and underreported. The adequacy of existing data on visitation and visitor safety data quality should be independently reviewed and the lead agencies should develop, or collaboratively develop, an easy-to-access database on river running visitation and safety.

SUMMARY AND CONCLUSIONS We hope these comments contribute to improving the scoping process for the Glen Canyon Dam LTEMP, and we are most interested to see this important process succeed. Please feel free to contact us if you have questions about these comments or wish copies of our scientific publications or reports on the CRE.

REFERENCES CITED Grand Canyon Wildlands Council, Inc. 2009. Recommendations on riparian habitat restoration in Grand Canyon National Park, Arizona. Grand Canyon Wildlands Council, Inc., Flagstaff. Minckley, W.L. 1973. Fishes of Arizona. Arizona Game and Fish Department, Phoenix. Myers, T.M., C. C. Becker, and L.E. Stevens. 1999. Fateful Journey: Injury and Death on Colorado River Trips in Grand Canyon. Red Lake Books, Flagstaff. Stevens, L.E. 2011. Assessment of taxa of management concern in the Colorado River ecosystem, Glen and Grand Canyons, Arizona, USA: Habitat Needs, Availability, and Ecosystem Roles. Grand Canyon Wildlands Council, Inc. Flagstaff. Available on-line at: http: /fwww.grandcanyonwildlands.org/publicfGoal 3 white paper AMWG final 110708.p.

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The Sierra Club appreciates the opportunity to comment on the scope of the Environmental Impact Statement for the Long-Term Experimental and Management Plan (LTEMP) for future operation of Glen Canyon Dam. The Sierra Club is America's oldest, largest and most influential grassroots environmental organization. Inspired by nature, the Sierra Club's more than 750,000 members— including 12,000 plus in Arizona as part of the Grand Canyon Chapter—work together to protect our communities and the planet. Our members recreate – hike, backpack, raft, fish, and more – in the areas downstream from the dam and have a significant interest in retaining and protecting the beaches, the archaeological sites, and the native ecosystems. The Grand Canyon Chapter has a long history of protecting the Colorado River corridor in Grand Canyon from the impacts of dams.

1. INTRODUCTION

The Sierra Club fought to protect Grand Canyon from inundation by other proposed dams, and today Grand Canyon National Park's river ecosystem is in serious decline, largely due to the operation of Glen Canyon Dam upstream. The lack of natural flows, the loss of 95% of the corridor's sediment and nutrient base, decrease in dissolved oxygen, and the dramatically reduced steady water temperature have had a devastating impact on Grand Canyon's riverine ecosystem (Shannon 2002, Valdez et al. 1999). Changes in all aspects of the natural flood regime threaten the survival of riparian and aquatic species: flow magnitude, frequency, duration, timing, and rate of change across hourly to century scales (Poff et al. 1997, Schmidt and Grams 2011).

We are concerned about the way the Department has managed the resource for the past 40 years. As a result, the ecological integrity of the Colorado River system continues to decline. At least 12, and up to 21, animal species have been extirpated from the Colorado River ecosystem since Glen Canyon Dam closed in 1963 (GCWC 2011), and riparian habitats are now dominated by non-native plant species.

2. SELECTED LEGAL AUTHORITIES
According to the Grand Canyon Protection Act (GCPA; Reclamation Projects Authorization and Adjustment Act of 1992, Title XVIII – Grand Canyon Protection, Sec. 1801-1809),

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. (GPCA Sec. 1802(a), emphasis added)

Nothing in this title alters the purposes for which the Grand Canyon National Park or the Glen Canyon National Recreation Area were established or affects the authority and responsibility of the Secretary with respect to the management and administration of the Grand Canyon National Park and Glen Canyon National Recreation Area, including natural and cultural resources and visitor use, under laws applicable to those areas, including, but not limited to, the Act of August 25, 1916 (39 Stat. 535) as amended and supplemented. (Sec. 1802(c))

During the Colorado River Management Planning (CRMP) process, the National Park Service (NPS) put much of the burden of responsibility for adverse downstream ecological impacts on the Bureau of Reclamation (BOR) and their operation of Glen Canyon Dam. For instance, in the areas of impact to soils, aquatic resources, wildlife habitat, threatened and endangered species, the NPS asserted that these problems are beyond their management responsibility and beyond the scope of the CRMP as a result of the large scale impact of dam operations. The NPS has the responsibility to manage Grand Canyon National Park and the BOR has a responsibility to manage the dam in a manner which will meet the language and intent of the Grand Canyon Protection Act (GPCA) of 1992.

The Secretary of the Interior and the National Park Service (NPS) have the responsibility to "conserve the scenery and the natural and historic objects and the wild life therein" (National Park Service Organic Act of 1916 (16 U.S.C. Sec. 1-18f, 39 Stat 535). Further, the Endangered Species Act (Endangered Species Act of 1973 [Public Law 93-205, 87 Stat. 884]) requires that:

Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an ''agency action'') is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been

granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available. (Sec. 7(2) [16 U.S.C. 1536], emphasis added)

The Redwoods Act of 1978 clarified the NPS mandate to emphasize that recreation should not be allowed to impair park resources.

Congress further reaffirms, declares, and directs that the promotion and regulation of the various areas of the National Park system… shall be consistent with and founded in the purpose established by the first section of the Act of August 25, 1916, to the common benefit of all the people of the United States. The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directed and specifically provided by Congress. (16 U.S.C. 1a-1, 6(b), Public Law No. 95-250, emphasis added)

Colorado River Storage Project Act of 1956 (Public Law 84-485), the act which authorized Glen Canyon Dam. Therefore, hydropower generation should be removed from the need statement.

The Secretary of the Interior was authorized to "construct, operate, and maintain" Glen Canyon Dam under the Colorado River Storage Project Act of 1956 (Public Law 84-485),:

". . . 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…" Section 1 of the Act (43 United States Code [U.S.C.] ' 620)

3. SCIENTIFIC FRAMEWORK

In developing this new draft Environmental Impact Statement (EIS), it is imperative that the BOR include an analysis of all of the downstream resources that are affected by the current operations of Glen Canyon Dam. The special nature of these resources in Grand Canyon National Park requires that the agency look at the full range of alternatives and the ongoing and cumulative impacts as well as alternatives to mitigate those negative impacts. The American public wants and deserves intact ecosystems in Grand Canyon.

This will be a Long Term Experimental and Management Plan. Experimentation must be a component of all alternatives. That is, clearly defined hypotheses, ample monitoring and data analyses, and timely reporting need to be included in every alternative. Specific trigger points to guide management decisions must be outlined in the plan. The LTEMP must identify detectable thresholds that, if reached, will cause a change in operations.

NPS and BOR must create experiments with intent to manage Glen Canyon Dam to "protect, mitigate adverse impacts to, and improve" the river ecosystem. The scientific arm of the Glen Canyon Dam Adaptive Management Program, the Grand Canyon Monitoring and Research Center, should provide significant input to create testable hypotheses and management strategies for the Dam, in order to create a plan with the highest likelihood of achieving the goals set forth in GPCA.

The new EIS must have a clear purpose and commitment to implement recovery of native species, and analyze alternatives that experiment with sediment augmentation, temperature modification and restoration of the natural hydrograph.

In order to meet the requirements of the Grand Canyon Protection Act, Endangered Species Act and National Environmental Protection Act, as well as comply with the settlement agreement of September 2006, we recommend the following be addressed in the EIS.

4. MODIFICATION OF 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 offers the following Purpose and Need for Action:

"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) The LTEMP should not simply "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." In order to "meet the GCPA's requirements", the purpose of the LTEMP should be to reverse past damage and prevent future damage to the species and cultural resources of Glen and Grand Canyons, and create a better ecosystem and recreational experience than the one that's persisted since the closure of Glen Canyon Dam:

"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)
B) Hydropower generation is intended to be "incident" to other purposes set forth in the Colorado River Storage Project Act of 1956 (Public Law 84-485), the act which authorized Glen Canyon Dam. Therefore, hydropower generation should be removed from the need statement.

The Secretary of the Interior was authorized 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…" Section 1 of the Act (43 United States Code [U.S.C.] ' 620)

Since "regulating flow" and "control of floods" are primary purposes of the dam, they should be used as tools to further the intent of the GPCA. For example, the dam can be operated to buffer changes to earlier snowmelt timing (Clow 2010), but only if high flows and floods are allowed to occur during the historic high flow period, which occurred during late spring and early summer. On other rivers where dams have been operated to mimic the historic hydrograph, benefits extended to a multitude of aquatic and riparian resources (Richter et al. 2003, Rood et al. 2003, etc). Therefore, the reference to hydropower should be dropped from the need statement and replaced with a goal of improving habitat with planned floods.

5. IMPACTS ON NATURAL RESOURCES – SEDIMENTS AND SOILS
The 2004 Colorado River Management Plan (CRMP) EIS states that a large portion of the impact to soils results from the operation of Glen Canyon Dam. The assumptions common to all EIS alternatives notes that "[t]he diminished sediment load in the river below Glen Canyon Dam has resulted in, and will continue to result in, an overall reduction in the total number of beaches and individual beach sizes" (CRMP EIS, p. 225). The 2005 USGS report on the state of the Colorado River concurs:

The dam…continues to erode the limited fine sediment deposits that exist downstream…. Sandbar erosion [has] continued despite changes in the operation of the dam that resulted from the implementation of the interim operating criteria in 1991 and the modified low fluctuating flow (MLFF) alternative in 1996.
The 2005 USGS study found that from 1990–2004 the Paria River was the "single largest sand supplier to the reaches below Glen Canyon Dam." The texture of Paria-derived sediment differs from pre-dam sediments and may be less suitable for stable beaches (see Figure 1, below). Management of dam operations must deal with the continued effects of eroding beaches. Reclamation has an obligation to protect the Colorado River corridor and its natural resources by making management decisions that result in a reduction of impacts.

Fig. 1 Cable marks approximate year of Glen Canyon Dam closure. Sediment above the cable is primarily sourced from the Paria River and differs in texture from sediment below. Photo credit Tom Martin.

The reduction in size and distribution of beaches, a result of dam operations, has had significant negative impacts on downstream ecology and on associated recreational use. As beaches disappear, human impacts grow and the intensity of use on smaller areas increases. The CRMP EIS states that "[t]he Colorado human impact monitoring program…has documented significant changes to soil and vegetation resources caused by recreationists, as well as a strong relationship between beach size and vegetation and soil impacts." The size, number, and distribution of beaches used as campsites limit the river's recreational carrying capacity. Pages 233 and 419 of the DEIS establish and discuss the relationship between beach size and vegetation loss due to human impacts. "As beach size is diminished, impacts to soil and vegetation increase in the old high-water zone." <u>If beach size continues to shrink, recreation capacity should be reconsidered, and adjusted down if necessary to protect sediment resources.</u>

Moreover, the experimental floods of 1996 and 2004 did not provide the sediment gain required to save Grand Canyon's cultural sites along the river from deterioration. The 2005 USGS study found that the impacts from Glen Canyon Dam operations are resulting in a diminishing supply of sediment and are the primary contributor to the degradation of many archaeological sites in the river corridor (USGS 2005, p. 187). The report calls for the creation of sandbars above the level of normal dam operations. To be effective over the long-term, periodic high flows would need to be carried out at relatively frequent intervals. The EIS should analyze alternatives for "best-case scenario" sediment retention, such as the methods outlined in Wright et al. 2008, and/or other alternatives to best preserve sediment that have been identified by the Grand Canyon Research and Monitoring Center. Seasonally adjusted steady flows, interspersed with beach habitat building flows, and low flows between those beach habitat building flows, might conserve sediments and mimic natural processes, and allow native species to thrive.

High flows, of a magnitude equal to the pre-dam annual or bi-annual average peak flow, and/or a flow that exceeds the current annual average flow by the same proportion as a pre-dam peak exceeded average annual flow, should be planned when water is available. Ecological goals may be impossible without occasional larger flows to truly scour banks, move sediment higher, and redistribute organisms and organic matter within the channel. However, these types of very high flows will have to be done using the bypass gates on a full to capacity lake, and there would have to be sediment augmentation, or more scouring will occur. And, without removing non-native species from the river channel, floods may not benefit the native ecological communities. What is important is that flows be planned to favor natural processes and healthy thriving populations of native species.

6. IMPACTS ON NATURAL RESOURCES-THREATENED, ENDANGERED, AND SENSITIVE (TES) SPECIES

The issues identified during the scoping process for the CRMP and the effects analysis in the CRMP DEIS revealed that Threatened, Endangered, and Sensitive (TES) species are being affected at a level that is resulting in significant impacts to individual species as well as causing permanent disruption to natural ecosystem processes.

The Endangered Species Act (ESA) (16 U.S.C. 1531 et. seq.), the Grand Canyon Protection Act (Public Law 102-575), and the National Environmental Policy (42 USC 4321 et seq.) require Reclamation to assess the impacts of current and modified operations of Glen Canyon Dam on TES species. Since the Grand Canyon Protection Act was passed in 1992, Reclamation has been obliged to modify the operations of the dam on the Colorado River to reverse the dam's downstream impacts on the Canyon's river ecosystem. To this date, these efforts have failed to produce positive results. At least 12, and up to 21, animal species have been extirpated from the Colorado River ecosystem since Glen Canyon Dam closed in 1963 (GCWC 2011)

The analysis of impacts to sensitive species is directly linked to the health of soil, flow, and vegetation resources. Sensitive species which require these resources for habitat production may be dramatically affected due to small populations and specialized habitat requirements. Impacts to sensitive species are likely to be long term and adverse unless strong management actions are taken during this planning process.

7. UNSUCCESSFUL NATIVE FISH RECOVERY

The 1989 CRMP stated that the first goal of that plan was, "To preserve the natural resources and environmental processes of the Colorado River corridor and the associated riparian and river environments" (USDI 1989:9). Despite this commitment, the river corridor's resources are still in serious jeopardy.

Four of eight native main stem fish (Colorado Pikeminnow, Bonytail Chub, Roundtail Chub, and Razorback Sucker) have been extirpated and three more (Humpback Chub, Flannelmouth and Bluehead Sucker) are in serious decline. The 2002 Recovery Goals defined a population as recovered at only 2,100 adults, a conclusion not supported by the best available science, and, incredibly, a lower value than when they were first listed as endangered.

Moreover, one of the major impacts of the Glen Canyon Dam on the Colorado River was the change in water temperature to a cold, steady water temperature that favors coldwater species like trout over native fishes. The native warm water species cannot reproduce and do not grow well in these cold waters (USGS 2005, p36). A more natural temperature regime might increase reproduction and survival of native fish (Clarkson and Childs 2000).

We know that a flow regime that mimics the natural hydrograph benefits native fish, especially when the timing of flood peaks is replicated, and that higher flows are more beneficial to native fish than lower flows (Propst and Gido 2004, Brouder 2001). Native fish responded positively to properly timed flood peaks in two geographically close rivers with similar historical hydrographs, the San Juan and the Verde (ibid). A similar experiment replicating the historic hydrograph on another southwestern desert river, the Truckee River, benefitted native fish and riparian vegetation there (Rood et al. 2003). The LTEMP should experiment with a historically-timed flood peak, even if it occurs during the popular boating season. Previous high flows during boating season actually improved the experience for those who were on the water (USGS 2011, p. 11).

8. UNSUCCESSFUL ADAPTIVE MANAGEMENT PROGRAM

The unsuccessful "Modified Low Fluctuating Flow Alternative" (MLFF) enacted in the Adaptive Management Program has not achieved the desired results of protecting the Canyon's resources including the beaches, the native fishes, and the cultural sites. New alternatives should be developed by the Grand Canyon Monitoring and Research Center to address scientific hypotheses regarding the best possible alternative for sediment retention (i.e., Wright et al. 2008) and mimicking the natural, historic hydrograph, as has been shown to benefit native aquatic and riparian resources on other rivers (i.e., Richter et al. 2003, Rood et al. 2003). Even a "best-case scenario" for sediment retention might fail to protect Grand Canyon from further decline (Wright et al. 2008).

On the Colorado River through Glen and Grand Canyons, a compromise to achieve maximum sediment retention while benefitting native species might be a seasonally adjusted steady flow and beach habitat building flows that are timed to mimic historic flood peaks, with periods of low flow to minimize sediment loss. The Grand Canyon Monitoring and Research Center should provide significant input in developing flow regimes, hypotheses, and monitoring plans.

9. CUMULATIVE IMPACTS

The cumulative impacts analysis in the 2004 DEIS for TES species identifies the operation of Glen Canyon Dam as the major factor cumulatively affecting TES species. According to page 515 of the 2004 DEIS:

The [Glen Canyon] dam has created a new vegetative structure that should remain relatively stable under current operations. The ongoing erosion of beaches under the current operating parameter, however, could result in additional impacts to fish and wildlife resources. As beaches erode, river recreationists tend to move into vegetated areas to accommodate camping needs, resulting in additional wildlife habitat degradation. The impacts to threatened, endangered and sensitive species would be increased as the loss or degradation of habitat accelerated. Impacts on each listed threatened and endangered species must be set forth explicitly and addressed in the Long Term Plan. In addition, the Bureau of Reclamation must consult with the U.S. Fish and Wildlife Service with respect to this Plan, as required by the Endangered Species Act. The final plan should remedy deficiencies and provide for the recovery of at-risk species.

It is still unclear to us why the High-Flow Experimental Protocol and Non-Native Fish Removal Protocol are not being incorporated into the LTEMP, since the effects on all of these actions are interrelated and dependent on one another.

10. IMPACTS ON NATURAL RESOURCES -WATER QUALITY

Water quality is an important concern in the Colorado River corridor and even small changes to water quality can result in substantial changes in dependent aquatic flora and fauna. Operation of the dam affects the water quality of Lake Powell and downstream releases. Restoration of water quality must be addressed in the EIS taking into account the effects of different release structures and their affects on downstream ecology. The EIS should also consider salinity levels, water temperature, turbidity and suspended sediment, nutrients and dissolved oxygen concentrations. An additional critical factor that must be considered is the impact of drought on the quality of dam releases. For example, when Lake Powell is lower, water releases are warmer than, and oxygen levels differ from, water released from a fuller lake.

11. IMPACTS OF REDUCED FLOWS ASSOCIATED WITH CLIMATE CHANGE

The LTEMP must plan for uncertainty in future water supply in the Colorado River system. Long-term climatic trends can influence inflows into Lake Powell and affect the quality of dam releases (USGS 2005, p83). Reservoir levels, yearly operations, and local precipitation affect riparian vegetation growth and development within all vegetation zones along the river corridor (Ibid, p111). During the prolonged drought, Lake Powell water storage was reduced by approximately 60%. Although it has risen, we now understand that climate can cause reservoir levels to fluctuate beyond the levels anticipated at the time of dam construction.

Significantly, a recent report by the National Research Council that studied the Colorado River's flow over the last several hundred years with tree ring data has found that previous droughts were longer and more severe than anything in the historical record (National Academies of Science 2007). Future droughts may be longer and more severe because of a regional warming trend, and more challenging for native species to survive. The report also states that "the

preponderance of scientific evidence suggests that warmer future temperatures will reduce future Colorado River streamflow and water supplies. Reduced streamflow would also contribute to increasing severity, frequency, and duration of future droughts." (Ibid) The U.S. Bureau of Reclamation was one of the sponsors of this study.

The ongoing Colorado River Basin Supply Study is supposed to be addressing water supply issues, and is seeking suggestions from the public to better plan for shortages. The LTEMP must specifically create a plan for providing water to the Colorado River in Grand Canyon during extended drought periods. The water must be of sufficient quality and delivered in such a manner as to protect Grand Canyon's natural resources.

12. IMPACTS ON NATURAL RESOURCES - TERRESTRIAL WILDLIFE
Terrestrial wildlife, including TES species, must be protected. Glen Canyon Dam should be operated to protect these species, not just fish. About half of all species in Arizona depend on riparian habitats for some portion of their life cycle. The health of the river is intertwined with the health of riparian habitats. The river should not be operated solely to protect fish, but must also consider the other riparian-dependent species that reside (or have resided) along the Colorado River. Habitat loss is directly linked to the issues of beach erosion, exotic plants, and the resulting determination of carrying capacity.

As beaches disappear, human impacts grow and the intensity of use on smaller areas increases. The CRMP EIS states that "[t]he Colorado human impact monitoring program…has documented significant changes to soil and vegetation resources caused by recreationists, as well as a strong relationship between beach size and vegetation and soil impacts."

13. IMPACTS ON NATURAL RESOURCES - VEGETATION
Glen Canyon Dam should be managed for a healthy native vegetation community. It is hypothesized that vegetation has become more abundant in the Colorado River corridor below Glen Canyon Dam since scouring flood flows were reduced (Webb et al. 2002), but native vegetation can help to anchor beaches, build habitat, and counter some of the negative effects of the dam. Riparian vegetation habitats are the most biologically productive terrestrial habitats in Grand Canyon National Park. They provide essential cover to native fish during high flows; they are the only fish habitat that increases in size during floods. Vegetation decreases water velocity and may decrease downstream fish export during high flows. Both juvenile and adult humpback chub show an affinity for vegetated habitats, and endangered southwestern willow flycatchers nest in streamside riparian vegetation with foliage 0–13 ft from the ground. Vegetative debris released into the water provides allochthonous inputs of coarse and fine particulate organic matter that are nutrient sources for the base of the aquatic food chain. Roots anchor soils and prevent erosion from water, wind, and recreational activities. According to the 2005 USGS report, "measures of plant abundance, species richness, diversity, and distribution all showed a decline since 2001 (Kearsley 2004)." The report also states that these changes were due to changes in dam operations and persistent drought.

Vegetation also increases surface roughness, helping to trap sediment during high flows, building beaches and sandbars. The services provided by streamside vegetation can help to compensate

for the environmental damage created by Glen Canyon Dam, but only the removal of the dam could guarantee that beaches will remain intact and that the aquatic community will thrive.

With the impending invasion of tamarisk leaf-eating beetles (Diorabdha elongata), recruiting native vegetation, particularly willows that will hang over the water's edge, must be a priority when devising flow protocols. In order to accomplish this, the following should be considered:

- Floods should occur during native plant seed dispersal. Floods should not limit flowering plant reproduction by inundating plants during flowering. The floods should be timed to promote reproduction by wetting banks during seed release. Timing flows to accommodate one or more native species often benefits a suite of natives, as was seen on the Truckee River, where flows promoting native fish restored native vegetation (Rood et al. 2003). A similar phenomenon can be observed along the San Juan River, where flows to promote native fish (Propst and Gido 2004) have encouraged dense willow recruitment along banks.
- The receding limb of the hydrograph should be tailored to allow elongating roots to maintain contact with the phreatic zone (see Mahoney and Rood 1998). When designing flow regimes, sediment texture should be accounted for, since coarser sediments drain more quickly than finer sediments (Mahoney and Rood 1991).
- Flows should be kept low and steady following floods to prevent scouring or desiccating seedlings. Steady water availability will encourage rapid plant growth to protect native species that will lose tamarisk habitats following the spread of tamarisk leaf-eating beetles.
- Fall floods that occur after spring floods should never be of greater magnitude than the preceding spring floods. Fall floods should only be used to scour banks (especially after tamarisk begin to lose foliage) and to prepare the beaches for springtime or summer floods that encourage native plant recruitment. November floods are not part of the natural hydrograph of the Colorado River. Unless preparing banks for spring recruitment, fall floods should not be used. Fall floods also create greater risk to juvenile humpback chub.

14. RECOMMENDATIONS:

The restoration components of a long-term management plan must result in improving Grand Canyon National Park resources (which is the mandate of the Grand Canyon Protection Act). In addition, the restoration components should include the reasonable and prudent alternatives of the 1994 Biological Opinion (USDOI 1995).

The LTEMP must address mechanisms to:

- Restore essential sediment and nutrients into the main stem of the Colorado River in the Grand Canyon.

- Restore flow regimes to properly transport the sediment and nutrients within Grand Canyon, when and where it belongs. The 1994 Biological Opinion and the EIS referred to these as Seasonally Adjusted Steady Flows (USDOI 1995).
- Restore the seasonally variable water temperature in the main stem of the Colorado River through Grand Canyon. The 1994 Biological Opinion and the EIS referred to this as Selective Withdrawal by means of a Temperature Control Device (USDOI 1995). Look to the Temperature Control Device at Flaming Gorge Dam as a source of information and experimentation to guide planning at Glen Canyon Dam. Answer the question of "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." (USDOI USBOR 2007) It is entirely possible – even probable –that native fish will perform better in the temperature environment in which they adapted (i.e., Clarkson and Childs 2000).
- Implement a restoration and recovery program for the Colorado River corridor in Grand Canyon that includes the recovery of all species known to be native to Grand Canyon prior to the operation of Glen Canyon Dam.
- Implement a non-native eradication program to minimize alien species in the Grand Canyon river corridor with a priority on those that prey on, compete with, or otherwise impair the health of native plants and animals. Non-native fish retention should not be a priority in designing new flow regimes.
- Complete the Little Colorado River Management Plan as recommended by the 1994 Biological Opinion (USDOI 1995).
- Address the dysfunction of the Adaptive Management Program. The AMP should be replaced by an open source and independent body of research and advisory scientists, where the monitoring and research data are consistently and thoroughly peer-reviewed prior to providing any recommendation to the Secretary of Interior. The Grand Canyon Research and Monitoring Center should have a significant role in creating the LTEMP, including choosing testable hypotheses, designing best-case flow scenarios to retain sediments and native species in Glen and Grand Canyons, and crafting monitoring regimes.
- Assess how the river could be managed with shrinking reservoirs and emphasize water conservation in long-term dam and reservoir management plans. A study by the National Research Council has indicated that long-term drought is the likely outcome of climate change in the Southwest (NRC 2007). The Bureau should consider at what point river management – specifically, water and power needs – would be better served by maximizing water storage in Lake Mead rather than dividing it between Mead and Powell reservoirs. In fact, an article released just this week raises tensions about keeping Lake Mead full (see http://www.climatecentral.org/blogs/dry□weather□is□drawing□down□lake□mead/, accessed 1/31/12). The Bureau should assess the

comparative loss of water from bank storage and evaporation between these two maintaining both reservoirs, maintaining only Lake Mead, and an alternative where Lake Powell is kept low to reduce "losses" to infiltration and evaporation.

- An alternative that examines what would be required to generate a flow magnitude equal to the pre-dam annual or bi-annual average peak flow, and/or a flow that exceeds the current annual average flow by the same proportion as a pre-dam peak exceeded pre-dam average annual flow, should be included, so that such a flow could be planned when water is available.
- If beach sizes continue to shrink, recreational capacity should be adjusted downward to prevent exacerbating beach erosion, damaging cultural sites, and damaging vegetation.
- Specific trigger points to guide management decisions must be outlined in the plan. If the dam is truly to be adaptively managed, then the LTEMP must identify detectable thresholds that, if reached, will cause a change in operations to be executed.
- A healthy Colorado River in Glen and Grand Canyons must be the top priority of all alternatives proposed in the LTEMP, in order to meet the requirements of the GCPA. There is no evidence that Glen Canyon Dam can be operated to restore species and beaches to their pre-dam condition. This plan should be devised as a last, best effort to restore the National Park Service lands downstream of Glen Canyon Dam. Planners should think holistically about what is required to achieve restoration goals, and create alternatives that aim for success. The cost of these alternatives may be high, but will represent the full cost of Glen Canyon Dam to the American public. We are subsidizing the services provided by Glen Canyon Dam by giving away parts of the Colorado River ecosystem for free, and we deserve to know what it will cost to replace all of it.
- Consider the non-use economic value of the Colorado River to the power and water market area when conducting economic analyses.
- This is an Experimental and Management Plan. Experimentation must be a component of all alternatives. That is, clearly defined hypotheses, ample monitoring and data analyses, and timely reporting need to be included in every alternative.
- The Grand Canyon Monitoring and Research Center should be involved in the development of dam operations alternatives and analyzing the pros and cons of different flow regimes. They should provide significant input into developing testable hypotheses, monitoring regimes, and determining thresholds that will trigger operational changes.
- Glen Canyon Dam is now approximately 50 years old, and its right spillways have never been tested. We have now experienced climate fluctuations that have come very close to testing both the highest capacity and the lowest capacity of the dam for controlling water flow into the Lower Colorado River. There needs to be a plan for dam failure, either by overtopping or by extremely low lake levels. The safety of the dam, spillways, and adjacent sandstone walls should be examined in this analysis.

Thank you for considering our comments. Please keep us informed of any issues or developments in this process.

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