GRAND CANYON TRUST

National Parks Conservation Association®
Protecting Our National Parks for Future Generations®

Scoping Comments on the Long-Term Experimental and Management Plan Environmental Impact Statement

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

January 31, 2012

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 LTEMP, 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)*

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 Dam, 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, co-sponsor 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 loss 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 Canyon Dam that will be affected by the alternatives—including 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 of Interior to select the most appropriate alternative, park resources and values need to be clearly defined 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; museum collections; and native plants and animals; 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.

<u>Alternatives should be targeted at conserving park resources and values.</u>

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 GCPA 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 of the Clean Water Act (CWA), and be consistent with the Supreme Court's holding in S.D. Warren Co. v. Maine Board of Environmental 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 of the 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." Id. 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 alterations 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 High-Flow 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 of HFEs 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 GCPA. 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 of the LTEMP EIS.

Extirpated Species

A plan to reintroduce extirpated species in Grand Canyon should be a part of all alternatives considered in the LTEMP 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 Canyon Dam 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 LTEMP 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 (LTEP) 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 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 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 LTEMP 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.

Thank you for this opportunity to provide scoping comments on the Long-Term Experimental and Management Plan EIS,

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