

Glen Canyon Dam Adaptive Management Work Group
Agenda Item Information
March 7-8, 2006

Agenda Item

Public Outreach Ad Hoc Group (POAHG) Report

Action Requested

- √ Information item only; we will answer questions but no action is requested.

- √ Feedback requested from AMWG members.
Feedback is requested on several outreach fact sheets. See “Background Information,” below, for more information.

- √ Motions requested: Motion language as follows. See “Background Information,” below, for more information.

Proposed Motion #1: “AMWG approves the design, content, and installation of the Adaptive Management Program stationary display for the Carl Hayden Visitor Center at Glen Canyon Dam, as presented at the AMWG meeting.”

Proposed Motion #2: “AMWG approves the layout and functionality of the AMP website as presented at the AMWG meeting.”

Proposed Motion #3: “AMWG approves the following public outreach fact sheets as presented at the AMWG meeting: Cultural Resources, Recreational River Rafting, and Hydropower and the Adaptive Management Program (graphic only).”

Presenters

Amy Heuslein and André Potochnik, Co-Chairs, Public Outreach Ad Hoc Group
Lisa Iams, Webmaster, Bureau of Reclamation
Ginger Reeve, Graphic Artist, Bureau of Reclamation

Previous Action Taken

- √ By AMWG:
At the March 2005 AMWG meeting, the following motions were passed:
MOTION: AMWG approves the logo, catch phrase, outline of stationary display at Glen Canyon Dam, and the AMP website anonymously hosted by Reclamation, www.gcdamp.gov, all as presented to AMWG.

MOTION: AMWG delegates to POAHG these specific authorities:
 - 1) Posting to and updating of AMP website (AMWG retains review opportunities on new materials via email prior to posting),
 - 2) Identify new topics for Fact Sheets and start creating them,
 - 3) Finalize strategy for Glen Canyon Dam Display with Reclamation review and involvement,
 - 4) Speak to media on rapid response items via Secretary’s Designee and/or Interior public relations, including the five-day AMWG review for the rapid response process, and
 - 5) Develop, finalize, and distribute guide resources.
MOTION: AMWG authorizes:

- 1) A continuing budget line item of \$50,000/year with carryover from year to year, not to exceed \$25,00 (for a total of \$75,000),
- 2) POAHG to recommend service contracts to the Bureau of Reclamation to complete necessary duties and products, and
- 3) POAHG to report public outreach budget details annually to the TWG Budget Ad Hoc Group for review in a timely manner.

At the August 2005 AMWG meeting, the following motions were passed:

MOTION: Approve the four “final” fact sheets (AMP Purpose and Goals, AMP Origins, Hydropower and the AMP, and Who We Are) with the insertion of “consistent with the Law of the River” in AMP Origins, second paragraph, first line, after the 13th word.

MOTION: To add \$19,000 to the Outreach Program, from project F.7 (Experimental Carry Forward) p. 1, Line 23D, not to be spent until after the POAHG meeting where it is determined how the funds are to be spent. The POAHG must concur on a workplan that requires the funding at its November 2005 meeting for this to occur.

Relevant Science

√ There has been no relevant research or monitoring on this subject.

Background Information

√ I have attached background information for this agenda item. The following is a synopsis of my presentation.

ITEM #1: GLEN CANYON DAM STATIONARY DISPLAY (ACTION ITEM)

Presenter: Ginger Reeve, Bureau of Reclamation

Background: In March 2005, the AMWG approved an outline of the stationary display. Also at that meeting, AMWG directed the POAHG to “finalize [the] strategy for [the] Glen Canyon Dam Display with Reclamation review and involvement.”

This four-panel display will be installed before Memorial Day, 2006 in the Carl Hayden Visitor Center at Glen Canyon Dam. Additional permanent installations are possible and the POAHG will take suggestions on other locations. This same display will be produced as a traveling display that AMWG members may use in other public meetings.

A final version will be printed out on paper at actual size and displayed on the wall at the AMWG meeting, March 7-8, 2006. Final suggestions and edits will be taken from AMWG members at the meeting. The presentation will be by Bureau of Reclamation graphic design specialist, Ginger Reeve.

Proposed Motion #1: “AMWG approves the design, content, and installation of the Adaptive Management Program stationary display for the Carl Hayden Visitor Center at Glen Canyon Dam, as presented at the AMWG meeting.”

ITEM #2: ADAPTIVE MANAGEMENT PROGRAM WEBSITE (ACTION ITEM)

Attachment: Website home page and navigation outline (3 pages) for approval

Presenter: Lisa Iams, Bureau of Reclamation

Background: In March 2005, the AMWG approved the concept of an AMP website

anonymously hosted by the Bureau of Reclamation. At that same meeting, AMWG delegated to the POAHG the responsibility for “posting to and updating of AMP website (AMWG retains review opportunities on new materials via email prior to posting).”

At the AMWG meeting, the POAHG will provide an on-screen walkthrough of the navigation of the website. POAHG requests AMWG approval of the layout and functionality of the website.

POAHG also request additional stakeholder content for the AMP website by April 15, 2006 in anticipation of the website “going live to the public” following approval at the summer AMWG meeting.

Proposed Motion #2: “AMWG approves the layout and functionality of the AMP website as presented at the AMWG meeting.”

ITEM #3: FACT SHEET APPROVALS (ACTION AND FEEDBACK)

Attachment: Three fact sheets for review and feedback:

- Lees Ferry Trout Fishery
- Native Fishes of Glen and Grand Canyons
- Endangered Species

Attachment: Two fact sheets and a graphic for final approval:

- Cultural Resources
- Recreational River Rafting (formerly Whitewater Recreation)
- Hydropower and the Adaptive Management Program (graphic only; text has been approved)

Background: In March 2005, the AMWG directed the POAHG to “identify new topics for Fact Sheets and start creating them” for approval by AMWG. AMWG has since approved four fact sheets developed by the Ad Hoc Group: AMP Purpose and Goals, AMP Origins, Hydropower and the AMP, and Who We Are.

Proposed Motion #3: “AMWG approves the following public outreach fact sheets as presented at the AMWG meeting: Cultural Resources, Recreational River Rafting, and Hydropower and the Adaptive Management Program (graphic only).”

ITEM #4: BUDGET UPDATE (INFORMATION ITEM)

Attachment: FY06 Budget as amended, per motion in August 2005.

Attachment: Adopt-a-Beach Program Executive Summary.

Background: In August 2005, the AMWG approved the following motion: “To add \$19,000 to the Outreach Program, from project F.7 (Experimental Carry Forward) p. 1, Line 23D, not to be spent until after the POAHG meeting where it is determined how the funds are to be spent. The POAHG must concur on a workplan that requires the funding at its November 2005 meeting for this to occur.”

Update: The 2006 POAHG workplan/budget was revised in POAHG meetings in November 2005. The Ad Hoc Group agreed to request \$16,000 instead of \$19,000 from the Experimental Carry Forward line item, due to a revision of projected expenditures. In addition, POAHG voted to fund the Adopt-a-Beach Program for one year, contingent on minor revisions of the proposal. An Executive Summary of the revised AAB proposal is attached.

The POAHG 2006-2008 work plan and budget were submitted on time to the Budget Ad Hoc Group for inclusion in overall budget plans, as stipulated by the March 2005 AMWG motion.

Announcement Insert

Adaptive Management Program Stationary Display

March 7-8, 2006 AMWG meeting

Public Outreach ad hoc committee

This four-panel display will be installed before Memorial Day, 2006 in the Carl Hayden Visitor Center at Glen Canyon Dam. Additional permanent installations are possible and the POAHG will take suggestions on other locations. This same display will be produced as a traveling display that AMWG members may use in other public meetings.

A final version will be printed out on paper at actual size and displayed on the wall at the AMWG meeting, March 7-8, 2006. Final suggestions and edits will be taken from AMWG members at the meeting. The presentation will be by Bureau of Reclamation graphic design specialist, Ginger Reeve.

Proposed Adaptive Management Program Website: Homepage

GLEN CANYON DAM ADAPTIVE MANAGEMENT PROGRAM

Using Science to Manage River Resources
in the Grand Canyon

- [AMP Home](#)
- [About AMP](#)
- [Key Resources](#)
- [Temp Control Device](#)
- [Photo Gallery](#)
- [FAQs](#)
- [Contact Us](#)
- [Links](#)

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Proposed Adaptive Management Program Website: Sub-Menu Link-- What is Adaptive Management

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Using Science to Manage River Resources in the Grand Canyon	
	
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Proposed Adaptive Management Program Website: Sub-Menu Link-- AMP Background

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Using Science to Manage River Resources in the Grand Canyon	
	
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Cultural Resources

The Grand Canyon Protection Act identifies cultural resources as a focus for the Adaptive Management Program. But what are cultural resources? In an abstract sense, a cultural resource is anything that people place a cultural value on. For the Adaptive Management Program, however, this definition needs to be more focused in order to be an effective guide for developing management goals and for directing management activities. Therefore, only specific categories of cultural resources have been identified for consideration within the Adaptive Management Program.

National Register of Historic Places

The National Historic Preservation Act (NHPA) serves as the foundation for how the United States formally defines, preserves, and manages its cultural resources. In short, this legislation identifies the federal government's responsibility regarding preservation of the history of the nation. To be considered a significant cultural resource, or "**historic property**", under the NHPA, the place must fall into one or more of the of the following categories:

- It is related to events or people that are significant in our history.
- It is representative of a period or type of construction (including the work of a master).
- It can provide information about the past.

If one or more of these requirements are met, then a property can be listed on the **National Register of Historic Places** and becomes eligible for special treatment by the federal government. The identification plaques seen on some of the older buildings in many towns indicate that the buildings have achieved this status.

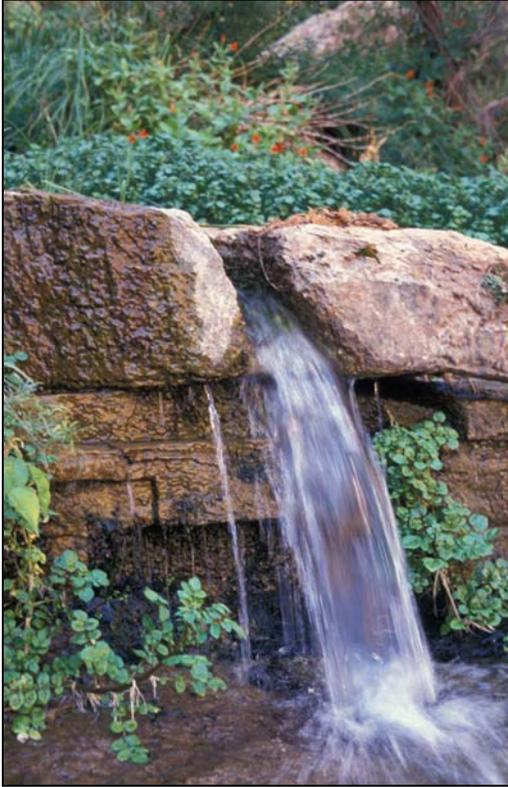
Within Glen and Grand Canyon, most of the historic properties are not actually listed on the National Register of Historic Places, but are nonetheless recognized as eligible for listing. This recognition conveys the same degree of protection as if they were formally listed and requires the federal agencies to evaluate how their management and other activities may affect the properties.

Historic Properties and the Adaptive Management Program

Archaeological sites comprise the largest number of historic properties under consideration by the Adaptive Management Program. They include past living places, agricultural fields, trails, ceremonial locations, inscriptions, and other evidence from the people who lived their lives in Grand Canyon. These places are generally related to the ancestors of the Native Americans that still occupy the area around the Grand Canyon, including the Havasupai, Hopi, Hualapai, Navajo, several Paiute Bands, and the Zuni.



Prehistoric petroglyph adjacent to the Colorado River in Grand Canyon.



A spring considered to be a TCP by several tribal groups.

Other types of historic properties are related to the use of the region by miners, scientists, activities by the federal government, and recreationists. These include such things as mines, houses, inscriptions, and boats.

A special class of historic property is termed **Traditional Cultural Property (TCP)**. These are places of importance to traditional cultures and serve a role in maintaining cultural continuity – they link the past to the present, and the present to the future. While commonly associated with Native American cultures, TCPs can exist for any traditional group. These historic properties are often difficult for a person outside the culture to identify because they may lack any constructed evidence. TCPs in Grand Canyon include, landforms and geologic features, ceremonial sites, tribal origin locations, springs, and resource collection areas.

Culture and Our Environment

The narrowly defined “historic property” of the National Historic Preservation Act fails to consider the full sweep of cultural resource concerns that are addressed in the Adaptive Management Program. The tribal participants as

well as other stakeholders hold strong cultural or societal values for most of the resources in Grand Canyon, including the Grand Canyon itself. It is precisely because there are cultural values for the resources of Grand Canyon that the Adaptive Management Program exists. The plants, animals, water, geography, sounds, smells, and space all have traditional cultural values to Native Americans. These resources also have cultural values for the other participants in the Adaptive Management Program.

If there were no value placed on having sand beaches as places to camp, or to provide habitat for plants and animals, then there would be no reason to care about their status and to manage them. If keeping species from going extinct had no value in our cultural, then the Endangered Species Act would not exist. The Adaptive Management Program seeks to recognize the values for the resources along the Colorado River and develop appropriate management actions to achieve these values.



Sand beach along the Colorado River with multiple cultural values

Recreational River Rafting

The Colorado River downstream of Glen Canyon Dam flows through a majestic desert canyon for almost 300 miles in one of the most stunning landscapes on earth... the Glen and Grand Canyons. This magnificent gorge and river, explored by John Wesley Powell in 1869, remains a widely revered and sought-after destination for whitewater and smooth water recreation.

Why is River Recreation Included in the Glen Canyon Adaptive Management Program (AMP)?

Glen Canyon Dam has changed the downstream river ecosystem and therefore the visitor experience in the Canyon. Upon construction of the dam, the regulation of river flows that generally benefited river running also decreased the sediment flow into the canyon. Preservation of the remaining sediment is not only crucial to the restoration of native river habitat, it is necessary to maintain dozens of camping beaches used by the river running community.

- The Grand Canyon Protection Act of 1992 requires that operation of Glen Canyon Dam will, among other directives, benefit visitor use of the river below the dam.
- The Adaptive Management Program incorporates goals for river recreation needs, including conservation of many popular beaches throughout Grand Canyon.
- The magnitude of daily flow fluctuations can make river running difficult at times and affects the number, size and location of camping beaches.
- Large periodic “flood” releases from the dam improve navigability of rapids by clearing the channel of accumulated rock debris and rebuilding sandbars necessary for camping.

History and Growth of River Recreation in Grand Canyon

Following Powell's pioneering exploration, people began to run the 280 mile whitewater stretch of the Colorado River from Lees Ferry through Grand Canyon for adventure and enjoyment. Only a few hundred adventurers ran the river during the first half of the 20th century. In the 1950s, commercially guided river trips in Grand Canyon, lasting from one to three weeks in length, became available to the public. The rapid growth of river rafting as a national pastime in the 1980s caused an increase in private (self-outfitted) trips. In addition, the popular one-day, smooth water float trip through Glen Canyon from the dam to Lees Ferry continues to grow in popularity.

- With completion of Glen Canyon Dam in 1963, water flows became more consistent throughout the year creating conditions more favorable for river running in Grand Canyon. Demand for river trips grew rapidly in the following decade.
- By 1972, surging popularity of river running caused the National Park Service to begin regulating visitor use to protect the river environment and the quality of the river experience.

Explosive growth in the number of recreational river runners in Grand Canyon indicates that there are more people who desire to run the Colorado River than the environment can potentially sustain. In 2006, the National Park Service completed an Environmental Impact Statement for

revision of the Colorado River Management Plan (CRMP). The CRMP is a visitor use plan that allocates recreational use of the river, which has grown significantly over the past 50 years.

1955	150 people/year
1963	1,100 people/year
1972	16,500 people/year
2004	22,460 people/year
2007 (projected)	26,317 people/year

Socioeconomic Benefits of River Recreation:

Whitewater and smooth water river rafting generate about \$83 million* annually in the regional economy. Rafting also:

- Generates about 600 jobs in river guiding and support services in local communities.
- Returns about 12 percent of the gross revenues earned by river outfitters to the National Park Service and Grand Canyon National Park.
- Generates significant revenue for the Hualapai Tribe river runners. This tribe manages most of the land south of the Colorado River in lower Grand Canyon.

In addition to dollars spent for recreation in the local economy, there is an incalculable value to millions of people worldwide, simply knowing that the Grand Canyon river environment is still there, preserved and accessible for future generations.

* Loomis, J., Douglas, A.J., and Harpman, D.A., Recreation use and nonuse values of Glen and Grand Canyons in Gloss, S.P., Lovich, J.E., and Melis, T.S., eds., 2005, The state of the Colorado River ecosystem in Grand Canyon (SCORE), U.S. Geological Survey Circular 1282, pp. 153-164.

ADAPTIVE MANAGEMENT PROGRAM

Using Science to Manage River Resources in Grand Canyon



Hydropower and the Adaptive Management Program

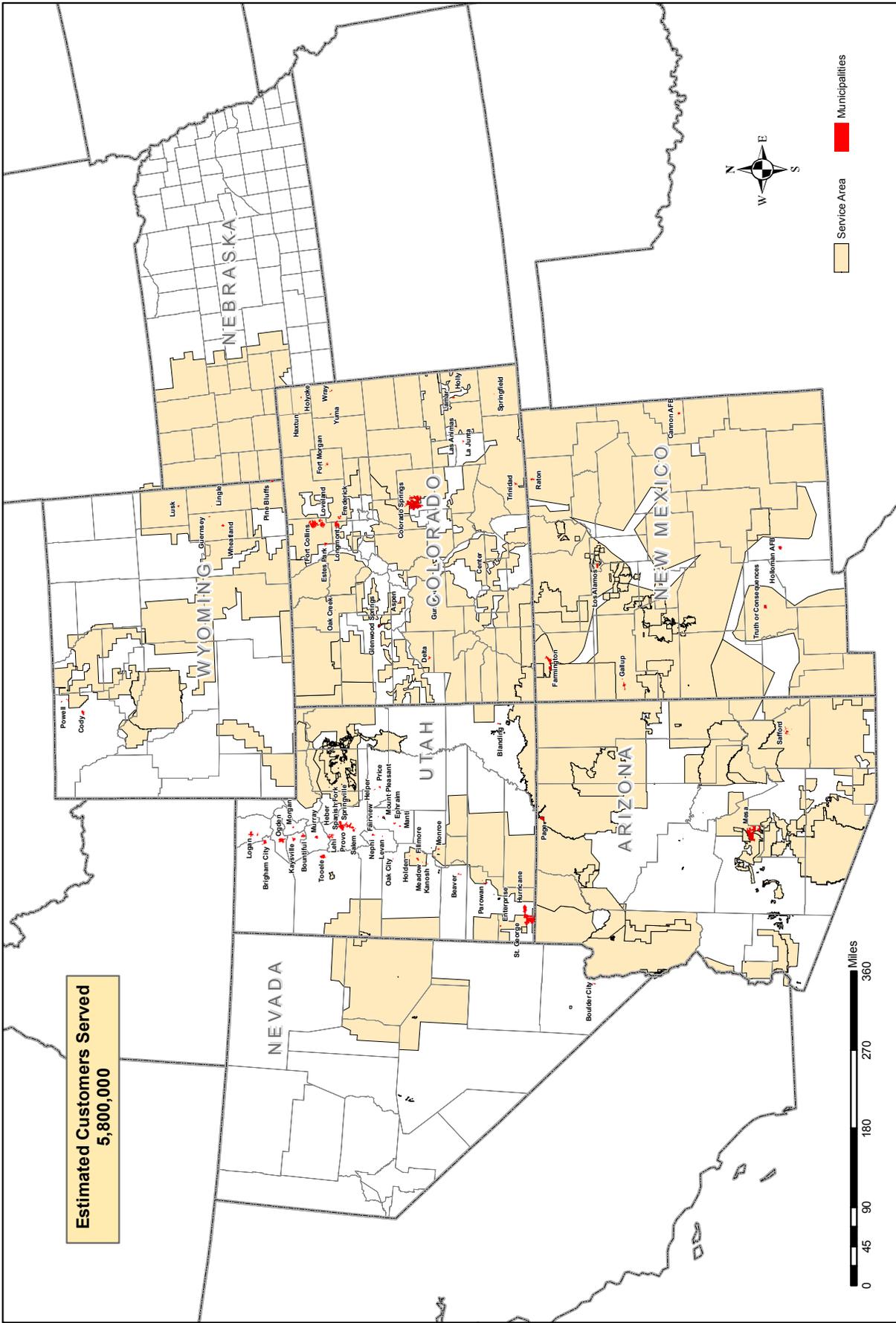
Hydropower Overview

Dams convert energy from falling water into electricity. Hydropower is a clean, renewable and reliable energy source that contributes between eight and 12 percent of United States' electrical generation and serves nearly 35 million residential customers. It is used to follow fluctuating electrical demand, or peaking power, while the larger, less-flexible coal and nuclear resources provide baseload power. Hydropower facilities are ideal for following rapid changes in electrical demand because they can be quickly adjusted to meet these changes.

Glen Canyon Dam is the largest generating facility of the federal Colorado River Storage Project (CRSP). The dam's eight generators can produce up to 1,300 megawatts, enough electricity to serve 1.3 million residential customers. The integration of hydropower and other resources provides an efficient and flexible operation of this region's electrical resources. Releases of water from Glen Canyon Dam are adjusted in part to accommodate daily and seasonal peak power demands.

CRSP Customers, Revenues and the Adaptive Management Program

- Power generated at Glen Canyon Dam is sold under 20-year contracts within the states of Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming. CRSP power is sold to non-profit entities who serve over five million customers.
- Revenues from the sale of CRSP power are deposited in the U.S. Treasury and are used to fund Glen Canyon Dam's construction costs (including interest), irrigation assistance, operation and maintenance costs, salinity control, and environmental programs.
- The Glen Canyon Dam Adaptive Management Program (AMP) can affect hydropower production at Glen Canyon Dam. The intent of the AMP is to improve the resources downstream of Glen Canyon Dam, recognizing that hydropower is an integral component of the region's economy.
- Since 1991, operations have been changed at Glen Canyon Dam to address environmental concerns, reducing electricity generation by about one-third. This reduction in electricity must be purchased from other generating resources (such as coal, thermal, gas, nuclear) and paid for by CRSP customers.
- Since 1983, CRSP power revenues have funded over \$225 million of costs associated with environmental programs in the Grand Canyon. Since 2000, environmental experiments at Glen Canyon Dam recommended through the AMP cost an additional \$33.5 million.
- Service area profiling distribution of CRSP power provided on the back of this fact sheet.



**Estimated Customers Served
5,800,000**

Western Area Power Administration
An agency of the U.S. Department of Energy
**The Colorado River Storage Project
Management Center**
Revised January 30, 2006

DISCLAIMER:
The data represented on this map has been developed from the best available sources. Although efforts have been made to ensure that the data is accurate and reliable, errors may exist. The data on this map is for reference use only. Population figure generated from U.S. Census year 2000 data.

**The Colorado River Storage Project
Management Center Service Territory**



Colorado River Storage Project Power Customers

Endangered Species and the Glen Canyon Dam Adaptive Management Program

The Endangered Species Act (ESA) calls upon all Federal agencies to conserve endangered and threatened species and to take any action necessary to ensure that their actions don't jeopardize the continued existence of those species or destroy or modify their habitat without proper consultation.

Responsibilities under the Endangered Species Act of 1973

A goal of the AMP is to be consistent with the ESA. Full restoration of the pre-dam ecosystem and annual and seasonal river flows and temperatures are not realistic objectives for the AMP. However, efforts to regain the function of the river and its ecological attributes so that the most disadvantaged species along the river are not jeopardized with extinction are laudable goals and are required under the ESA. All activities recommended by the AMP that may affect threatened and endangered species are consulted upon with the U.S. Fish and Wildlife Service.

Endangered Species Affected by River Operations

Glen, Marble and Grand canyons are treasure troves of threatened, endangered and recovered species (see inset box). River operations do not affect all of these species. However, flow releases that may affect the southwestern willow flycatcher, humpback chub, razorback sucker and Kanab ambersnail are routinely considered by the AMWG.

Southwestern willow flycatcher: This small, endangered, migratory bird returns to the Southwest to breed each spring and summer. Small populations of southwestern willow flycatchers breed in dense riparian vegetation along the Colorado River in Grand Canyon. Breeding populations are constrained by the narrow riparian corridor through the canyon; however, broader expanses of flycatcher habitat are found downstream at upper Lake Mead. Flycatchers tend to breed in dense, young willow and saltcedar stands over water or moist soils. This breeding habitat is dynamic, growing out of suitability and then being rejuvenated or replaced by flood events, or contracting and expanding by scouring and sediment deposition.

AMP efforts to restore sediment deposition through flow experiments create new beaches upon which riparian habitat can become established. While experimental floods immediately reduce ground cover and low lying branches in flycatcher habitat, they open new patch areas for establishing dense new plants and can improve habitat in the long term.

Humpback chub¹: This large (20 in) endangered minnow occurred throughout the Colorado River and its tributaries in Grand Canyon. However, greatly reduced water temperatures, changes in daily and seasonal river flows from dam operations, and increased competition and predation by non-native fishes aided by dam operations, have detrimentally impacted this and other species. Spawning and young survival are now limited to the Little Colorado River and the confluence of this tributary with the mainstem river.

Threatened and Endangered Species of Glen, Marble and Grand Canyons

Southwestern willow flycatcher (endangered)*
Bald eagle (threatened)
Mexican spotted owl (threatened)
California condor (endangered)
Peregrine falcon (recovered)
Humpback chub (endangered)*
Razorback sucker (endangered)*
Kanab ambersnail (endangered)*
Colorado pikeminnow (endangered)*
Bonytail chub (endangered)*
Sentry milk-vetch (endangered)
Siler pincushion cactus (threatened)

*Riverine/riparian species affected by
Glen Canyon Dam operations

¹ See Native Fish Fact Sheet for description of this species and its natural history.

The AMP is trying to improve humpback chub populations. The magnitude of daily river fluctuations has been reduced and flow experiments are being conducted to attempt to improve habitat for humpback chub. Trout, carp and other non-native fishes are being mechanically removed from the mainstem river in the vicinity of the Little Colorado River confluence (an area approximately 60 miles downstream of Lees Ferry). Ongoing flow and sediment deposition experiments are designed to improve native fish rearing habitat. Bureau of Reclamation is investigating the feasibility of installing a selective withdraw structure² at Glen Canyon Dam that will allow for the flexible release of warmer water more suitable to chub spawning and survival of their young.

Razorback sucker: This long-lived sucker can reach three feet in length and has a prominent “keel” behind its head. It is magnificently adapted to living in the wild rivers of the Southwest – swift and turbulent spring runoffs, low fall and winter flows and prolonged droughts. Yet, razorbacks do not spawn in reservoir-chilled waters. Their young are eaten by non-native species and succumb to competitive pressures of non-native fishes. Razorbacks have become very rare in Grand Canyon, and may be absent, although a reproducing population still occurs in Lake Mead, just downstream.

Many of the AMP programs designed to benefit the humpback chub are also designed to restore conditions essential to a healthy razorback population. Conservation of all native fish in Grand Canyon is a recognized AMP goal.

Kanab ambersnail: This small (3/4 in) terrestrial snail is known to historically occur at only three locations. One is along the Colorado River in Grand Canyon. Vaseys Paradise is a monkey flower- and water cress-dominated area created by a perennial stream flowing from the base of a limestone cliff. The ambersnail is dependant on this unique habitat. Lower portion of the snail’s habitat and snails can be swept way when the Colorado River floods.

In advance of experimental high flows, the AMP established a refugium population of Kanab ambersnails at Upper Elves Chasm in Grand Canyon. Additionally, low-lying sod-like patches of snail habitat have been removed prior to experimental floods and successfully replanted once water levels subside.

² See Glen Canyon Dam Selective Withdrawal Structure Fact Sheet.

Historical Native Fishes of Glen and Grand Canyons

The native fishes of the Colorado River make up one of the most bizarre and unusual faunas found anywhere in the world. This assemblage of fish is specifically adapted to the historic environment of the Colorado River, and the species that make up this assemblage are often found nowhere other than the Colorado River Basin.

Construction of Glen Canyon Dam resulted in changes in the river from a turbid, flood-prone, warmwater river to a perennially cold, clear river. This may present several challenges to native fishes in the main stem of the Colorado River. They may encounter a physiological challenge related to temperature constraints associated with being a warmwater adapted fish living in a cold environment. They may encounter interaction with introduced species. Prior to construction of Glen Canyon dam, the Colorado River in Grand Canyon was dominated by introduced species, mostly warm water species. Following closure of the dam and transition to cold water releases, introduced trout expanded their use of the river. Introduced fishes residing in the Grand Canyon may interact with, compete with, or prey upon these native fishes.

Common Native Fish in Grand Canyon – Conservation Through Adaptive Management
Speckled Dace (*Rhinichthys osculus*) - This small minnow is widely distributed across the western United States. They inhabit tributaries of the Colorado River through Glen and Grand Canyons, and are not uncommon in backwaters in western Grand Canyon.

Bluehead Sucker (*Catostomus discobolus*) – Blueheads occur throughout the upper Colorado River Basin and extend into the Lower Basin through the Little Colorado River Drainage and through Grand Canyon to Lake Mead. They are common in tributaries in Grand Canyon. An adult bluehead may approach 20 inches in length, and can live up to 20 years.

Flannelmouth Sucker (*Catostomus latipinis*) – Flannelmouth Sucker are widely distributed in the Upper Colorado River Basin, and extend into the Little Colorado River Watershed of Arizona and through Grand Canyon. An adult flannelmouth sucker may approach about 20 inches in length, and like other large suckers of the Colorado River may live up to 20 years.

Endangered Fishes of Grand Canyon – A Major Focus of Adaptive Management
Humpback Chub (*Gila cypha*) – This endangered fish is only known from the Colorado River System, and is restricted to a few remaining populations. One of those populations resides in the Grand Canyon. It was historically widely distributed in the Upper Colorado River Basin and extended down the main stem of the Colorado River into the Lower Basin to at least current Lake Havasu. In Grand Canyon, most humpback chub are found in the vicinity of the Little Colorado River and its confluence with the Colorado River. This is a warm water species, and its' spawning and recruitment appears limited in the now cold waters of the Colorado River in Grand Canyon. Spawning and recruitment of young chub appears to be principally restricted to the lower portions of the Little Colorado River in Grand Canyon. An adult chub might reach 20 inches in length, and

may live 20 years or more. Population levels have declined over the last decade, though recent information suggests some recent increases in recruitment. Modification of the river's temperature, expansion of tributary populations, and nonnative fish control are all strategies being evaluated through Adaptive Management.

Endangered Fish Absent from Grand Canyon – Possible Restoration Species

Razorback Sucker (*Xyrauchen texanus*) – The endangered razorback sucker may be extirpated from Grand Canyon. This fish was historically widely distributed throughout both the Upper and Lower Colorado River Basins. No razorbacks have been captured from the River in recent years. Adult razorback suckers are found in the Colorado River and the lower San Juan River above Lake Powell; in Lake Mead; and Lake Mohave. A large razorback sucker can reach a length of 3 feet, and may live upward of 40 years.

Bonytail Chub (*Gila elegans*) –A cousin of the humpback chub, they share many features in common.. Its size and lifespan are similar to a humpback chub. This species is very rare and is listed as endangered. Bonytail chub have not been reported from Glen or Grand Canyon in recent history (more than 30 years?).

Colorado Pikeminnow (*Ptycocheilus lucius*) – This fish is the giant of the minnow family, reported achieving a maximum length of 6 feet. This fish was historically widely distributed throughout the Colorado River Basin. It is now extirpated from the Lower Basin, including Grand Canyon, and is listed as an endangered species throughout its range.

Lees Ferry Trout Fishery Fact Sheet

The 15.5-mile stretch of clear flowing Colorado River winding through the Marble Canyon Gorge between the Glen Canyon Dam and the beginning of the Grand Canyon is commonly referred to as Lees Ferry. Since 1964 this area has hosted a recreational trout fishery that has grown in importance and reputation. For anglers, this picturesque stretch of river is a unique tail-water trout fishery of international renown. Anglers from around the world have come to Lees Ferry to fish for rainbow trout in this large, swift flowing river winding its way through the lower most segment of Glen Canyon.

Because of the reliable flows of cold water ranging from 46 to 60 degrees and the supply of aquatic foodstuffs (aquatic insects and amphipods [freshwater shrimp]), the Lees Ferry reach of the Colorado River has the capacity to maintain a remarkable trout fishery in the desert. The fishery itself has gone through an evolution since it was first created following the completion of the Glen Canyon Dam. During its infancy, this productive fishery produced huge rainbow trout ranging from 10 to 20 pounds. The fishery has gone through peaks and valleys, but throughout its history, it has provided some of the most sought after trout fishing opportunities in the Southwest.

The trout population at Lees Ferry is principally composed of rainbow trout. While small tributaries of the Colorado River in Grand Canyon National Park were stocked with brown trout and rainbow trout beginning in the 1920s and continuing until the 1960s, the main stem of the Colorado River was not amenable to supporting trout populations. The main stem of the river became more conducive for trout with the completion of Glen Canyon Dam and the establishment of reliable cold, clear water flows. By agreement with the land and water managers, the Arizona Game and Fish Department began establishment of the Lees Ferry trout fishery in 1964, initiating stocking of trout in the accessible portion of Glen Canyon between the Paria River and Glen Canyon Dam.

The Lees Ferry trout fishery has evolved into a self sustaining, naturally reproducing rainbow trout population. The fishery was maintained through stocking catchable, and later fingerling trout, from 1964 through the mid-1990s. Natural reproduction of trout became more reliable with the establishment of more reliable flows resulting from the re-operation of Glen Canyon dam, and stocking support was ceased. Reproduction of trout in the Lees Ferry reach peaks in winter and spring months.

The fishery is managed for a “blue ribbon” fishing experience by the Arizona Game and Fish Department, the wildlife management agency for the State of Arizona. The intention of “blue ribbon management” is to provide a quality fishing opportunity where anglers can catch larger than average trout, at a relatively high catch rate, in a unique recreational setting. To accomplish this, special fishing regulations are imposed between Glen Canyon Dam and the Paria River that require the use of artificial flies or lures (bait items are not allowed) and that limits the harvest of fish. Current regulations require that fish over 12 inches in length must be immediately released alive. Anglers may retain 4 smaller trout per day, and may possess 8 Lees Ferry trout at any one time. Regulations differ below the Paria Riffle, allowing the use of bait items and a larger daily

bag limit. Below 21-mile rapid (in Grand Canyon National Park), there anglers may harvest and retain as many caught trout as they wish.

Anglers use a diversity of fishing methods at Lees Ferry. Fly fishing is practiced by many anglers visiting Lees Ferry. Fly fishers will travel by boat to gravel bars and beaches upriver from the principal access point at the boat ramp within the Glen Canyon National Recreation Area, and fish while wading along those gravel bar area. Spin fishing is not uncommon, with spin anglers fishing frequently from shoreline areas or while drifting their boats through riffles or runs in the river.

River flows can have direct and indirect effects on the trout population at Lees Ferry, and on recreation associated with the trout fishery. Several factors can influence the abundance of trout and the food supplies available to fuel their growth. River flows can directly influence the amount of food available for trout, and how it is delivered. The abundance of the organisms that make up the base of the aquatic food chain [aquatic algae and plants; chironomid midge larvae; and *Gammarus*] is related to the reliable minimum volume of water in the river. Fluctuations in flows can increase the numbers of food organisms that are available to trout in the “drift” by lifting them from the river bottom and delivering them in the flow. Because trout lay their eggs in “redds” or nests in the river gravels, changing flows can regulate the success of spawning and in-turn determine the numbers of trout in the river. Anglers too can be influenced by changing flows. Fly anglers often wade along gravel bars to cast to fish in deeper water. Wading anglers have to be alert to changing water levels, both for their angling tactics and to ensure their safety.

The trout fishery at Lees Ferry is one of the values associated the Glen Canyon National Recreation Area, and its maintenance is among the goals of the Adaptive Management Program. The explicit goal 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.”



**ADOPT-A-BEACH PROGRAM:
Public Outreach through River Guides
Executive Summary for FY 2006**

Proposal to: The Adaptive Management Program Public Outreach Committee
Applicant: Grand Canyon River Guides, Inc., a 501(c)(3) non-profit organization
Date: 10/5/05
Request: \$13,000 (partial funding) from the FY 2006 budget of the Adaptive Management Program's Public Outreach Committee

Challenge: The Adaptive Management Program of Glen Canyon Dam requires a powerful mechanism for translating the concept of dam management into terms that are both understandable and memorable to the general public while also providing relevant data to the scientific community and program stakeholders.

Solution: River guides are the key to surmounting this challenge through an innovative "citizen science" program called Adopt-a-Beach – a long-term comparative photographic program to monitor Grand Canyon camping beaches that creates a remarkable range of unique and compelling public outreach strategies, thereby supporting both Goal 9 and Goal 12 of the Adaptive Management Program Strategic Plan. Grand Canyon River Guides is the only organization poised to perform this important function, reaching and educating thousands of river users each year through our Adopt-a-Beach program.

Background: Prior to the Beach Habitat Building Flow (BHBF) of 1996, Grand Canyon River Guides realized the research potential of this historic experiment and seized the opportunity to send volunteer guides down the river with cameras to objectively document a dataset of 40+ camping beaches distributed throughout five critical reaches, both pre-and post-flow. The Adopt-a-Beach program, now in its ninth year, continues to document and analyze changes in the recreational resource over time, while theorizing about potential causalities and offering a series of recommendations to strategic river managers. Since 1996, over 100 volunteers have cooperated in the program, including guides from all fifteen of the commercial river outfitters, freelance guides, private boaters, National Park Service and Arizona Game and Fish personnel, and various science trips. This collaborative, diverse base exemplifies the human spirit of the program that creates invaluable "teaching moments" for the river running public about the benefits of Glen Canyon Dam, the effects of dam flows, the importance of monitoring, and the crucial role of the Adaptive Management Program.

Deliverables: The deliverables for the program stem from the need to facilitate effective public education and build greater awareness of the challenges engendered by a dam-altered environment in Grand Canyon. This is achieved through a clear articulation of Adopt-a-Beach program results and direct public access to its extensive photographic record. Program deliverables include: public dissemination of a "state of the beaches" report for the 2005 river season (with a comparison to previous years' data), an Adopt-a-Beach website and photo gallery of the complete AAB photo record (since 1996) linked to the new Adaptive Management Program public outreach website, articles in the *Boatman's Quarterly Review* reaching approximately 1,900 individuals, submissions to other agency public outreach venues, a National Public Radio interview, public presentations, photo CD's for research purposes, and a reassessment river trip that couples program oversight with interpretive learning opportunities for participants.