



THE SECRETARY OF THE INTERIOR
WASHINGTON

JAN 26 2010

The Honorable Jeff Bingaman
Chairman, Committee on Energy
and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

This enclosed report on the operation of Glen Canyon Dam by the Department of the Interior is submitted pursuant to section 1804 of the Grand Canyon Protection Act of 1992, which provides - -

Each year after the date of the adoption of criteria and operating plans pursuant to paragraph (1), the Secretary shall transmit to the Congress and to the Governors of the Colorado River Basin States a report, separate from and in addition to the report specified in section 602(b) of the Colorado River Basin Project Act of 1968 on the preceding year and the projected year operations undertaken pursuant to this Act.

This report provides an update from the last report submitted by the Department on February 21, 2003. This report covers activities for years 2008 and 2009. Operations for years 2010 and 2011 will be submitted shortly.

The Department continues to closely monitor conditions in the Colorado River Basin and looks forward to continuing to work with your representatives and other interested stakeholders regarding the management of this vital component of the Colorado River system.

Sincerely,

Ken Salazar

Enclosures

REPORT TO CONGRESS

I. EXECUTIVE SUMMARY

This report by the Department of the Interior (Department or Interior) is submitted pursuant to section 1804 of the Grand Canyon Protection Act of 1992, which provides

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II. INTRODUCTION

Glen Canyon Dam was authorized for construction by the Colorado River Storage Project Act of 1956. 43 U.S.C. § 620. The Dam was completed in 1963 and is operated by the Bureau of Reclamation (Reclamation). In 1992, Congress enacted the Grand Canyon Protection Act, which requires the Secretary of Interior to operate Glen Canyon Dam

[i]n 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.

In 1997, the Secretary established the Glen Canyon Dam Adaptive Management Program (GCDAMP) to carry out the requirements of the Grand Canyon Protection Act. As part of the GCDAMP, the Secretary also established a federal advisory committee, the Adaptive Management Work Group (AMWG), a 25-member committee that operates pursuant to the provisions of the Federal Advisory Committee Act, 5 U.S.C. § App. 2. The Secretary's Designee, currently Assistant Secretary for Water and Science Anne Castle, serves as the Chair of the AMWG.

III. STATUS REPORT

Five agencies within Interior have responsibilities under the Grand Canyon Protection Act, and undertake operations pursuant to the Act: (1) the Bureau of Indian Affairs (BIA); (2) the Bureau of Reclamation; (3) the National Park Service (NPS); (4) the United States Geological Survey (USGS); and (5) the United States Fish and Wildlife Service (FWS). The role of each responsible agency under the Act is briefly addressed below.

Bureau of Indian Affairs:

The BIA's mission, among other objectives, includes enhancing quality of life, promoting economic opportunity, and protecting and improving trust assets of Indian Tribes and individual American Indians. This is accomplished within the framework of a government-to-government relationship in which the spirit of Indian self-determination is paramount. As part of the AMWG, BIA's Western Regional Office is committed to working hand-in-hand with interested tribes and other participating agencies to ensure that this fragile, unique, and traditionally important landscape is preserved and protected.

Bureau of Reclamation:

Reclamation operates Glen Canyon Dam in accordance with the additional criteria and operating plans specified in section 1804 of the Grand Canyon Protection Act as well as in accordance with approved experimental plans. Glen Canyon Dam is also operated consistent with and subject to numerous compacts, federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as the "Law of the River."

National Park Service:

The NPS carries out its responsibilities in parks and programs under the authority of federal laws, regulations, and Executive Orders, and in accordance with policies and Director's Orders established by the Director of the National Park Service and the Secretary of the Interior. The NPS manages Grand Canyon National Park and Glen Canyon National Recreation Area under the authority of the Organic Act, which provides that the Park Service "shall promote and regulate the use of . . . national parks . . . in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The Park Service provides support to the Secretary to assist in achieving the overall goals outlined in the Grand Canyon Protection Act.

United States Geological Survey:

The Grand Canyon Monitoring and Research Center (GCMRC) of the USGS 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 for natural, cultural, and recreation resources of Grand Canyon National Park and Glen Canyon National Recreation Area. GCMRC provides independent, policy neutral scientific information to the GCDAMP on (a) the effects of the operation of Glen Canyon Dam and other related factors on resources of the Colorado River Ecosystem using an ecosystem approach, and (b) flow and non-flow measures to mitigate adverse effects. GCMRC activities are

focused on (a) monitoring the status and trends in natural, cultural and recreation resources that are affected by dam operations, and (b) working with land and resource management agencies in an adaptive management framework to carry out and evaluate the effectiveness of alternative dam operations and other resource conservation actions described in this report.

Fish and Wildlife Service:

The FWS provides Endangered Species Act (ESA) conservation and associated consultation and recovery leadership with various stakeholders primarily to benefit four listed species: the humpback chub (*Gila cypha*) but also razorback sucker (*Xyrauchen texanus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and Kanab ambersnail (*Oxyloma haydeni kanabensi*). The FWS provides Fish and Wildlife Coordination Act (FWCA) planning assistance for important fish and wildlife resources whenever waters of the Colorado River or its tributaries are controlled or modified.

A. 2008 Operations

On March 5, 2008, former Secretary of the Interior Dirk Kempthorne initiated a high flow experiment (HFE) at Glen Canyon Dam. The HFE released 41,500 cubic feet per second (cfs) through Glen Canyon Dam's powerplant and bypass tubes for about 60 hours. The experiment was designed to enhance habitat in the canyon, and its wildlife, and to conduct research focusing on a range of questions, including whether high-flow releases can rebuild and maintain sandbars, whether such releases have benefits for native fish, and whether high-flow releases help protect cultural sites. Each of the five agencies played a role in the 2008 HFE as described further below.

1. Bureau of Indian Affairs

Currently, six Tribes are members of the AMWG and the GCDAMP established by the 1996 Record of Decision for Operation of Glen Canyon Dam pursuant to the authority of the GCPA. They are the Hualapai Tribe, Southern Paiute Consortium (representing two separate Tribes, the Kaibab Band of Paiute Indians and the Paiute Tribe of Utah), Hopi Tribe, Navajo Nation and Pueblo of Zuni. There are also several other Tribes, such as the Havasupai, with ties to the Grand Canyon that currently are not members of the AMWG. Each of the Tribes has a voice on the committee; BIA's role is to support them and to ensure that tribal issues and concerns are addressed appropriately. Because the BIA has jurisdictional responsibility for those tribal lands directly impacted by dam operations, BIA has continuing involvement with the process.

The BIA supported the Tribes in their funding requests for the budget for developing protocols for tribal monitoring, various annual work plans, integrating tribal perspectives with other disciplines, and training. The BIA was involved and participated in various consultation meetings with the Tribes regarding the Tribal Consultation Plan, pre-meetings with tribal representatives conducted prior to AMWG meetings, Ad Hoc Groups and other meetings regarding cultural or natural resources issues and concerns. BIA also reviewed reports by GCMRC and various compliance documents (*i.e.*,

Experimental Flow Environmental Assessment (EA), Biological Assessment (BA) and Draft Biological Opinion (BO)) and provided comments as they related to impacts or issues with regard to tribal trust resources. In addition, the five DOI agencies provided \$95,000 each year to each of the Tribal entities involved in the GCDAMP.

2. Bureau of Reclamation

As in previous years, Glen Canyon Dam operations in 2008 included experimental operations designed to provide additional information as part of the ongoing GCDAMP. The GCDAMP, through the AMWG, provides recommendations to the Secretary of the Interior for achieving the requirements of the 1992 Grand Canyon Protection Act. Reclamation administers funding for the GCDAMP, including the portion transferred to GCMRC for research and monitoring, and provides staff support for the meetings of AMWG and for the Secretary of the Interior's Designee to the AMWG.

The following section provides a short summary describing the operation (including experimental operations) of Glen Canyon Dam by Reclamation in 2008.

Reclamation operated Glen Canyon Dam during the 2008 water year (October 1, 2007 – September 30, 2008) consistent with the 1996 Record of Decision on the Operation of Glen Canyon Dam, the Operating Criteria for Glen Canyon Dam, the Record of Decision¹ for Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead (Interim Guidelines), the Final Environmental Assessment: Experimental Releases from Glen Canyon Dam, Arizona, 2008 through 2012² (Experimental Releases EA), and the 2008 Annual Operating Plan for Colorado River reservoirs.

The annual release volume during water year 2008 from Glen Canyon Dam was 8.978 million acre-feet (maf). Monthly releases from Glen Canyon Dam during 2008 are shown in Table 1.³

¹ A ROD adopting the Interim Guidelines was signed by the Secretary of Interior on December 13, 2007.

² <http://www.usbr.gov/uc/env/docs/ea/gc/2008hfe/index.html>.

³ Projected monthly releases reflect compliance conducted in the 1995 EIS on the Operation of Glen Canyon Dam, the Operating Criteria for Glen Canyon Dam, and approved experimental releases, such that the projected annual release volumes meet the annual requirements of the Interim Guidelines. Projected monthly releases are frequently adjusted during the water year, consistent with the Interim Guidelines, as snowpack and projected runoff conditions in the Colorado River Basin change.

Table 1
Monthly Releases from Glen Canyon Dam in Water Year 2008

Month	Release (maf)
October 2007	0.601
November 2007	0.603
December 2007	0.803
January 2008	0.801
February 2008	0.602
March 2008	0.830
April 2008	0.678
May 2008	0.790
June 2008	0.791
July 2008	0.865
August 2008	0.890
September 2008	0.723
Water Year 2008	8.978

As explained above, in December 2007, Reclamation, in coordination with other agencies within the Department of the Interior, proposed a spring 2008 HFE as part of experimental releases from Glen Canyon Dam. Previous high flow experiments were conducted at Glen Canyon Dam in 1996 and 2004.

The proposal for a 2008 high flow experiment was the result of information gathered through scientific monitoring and research activities and discussions within the GCDAMP. The proposal also included steady flows in September and October to be implemented each year during 2008-2012, with releases consistent with the 1996 Record of Decision and Operating Criteria for Glen Canyon Dam in the other months (November through August). The purpose of the proposed five-year fall steady flows is to determine the effect that steady and fluctuating releases have on native fish habitat, survival, and recruitment.

Appropriate compliance for the proposed high flow experiment and five-year period of steady flows was completed. A non-jeopardy Final Biological Opinion on the Operation of Glen Canyon Dam was issued on February 27, 2008, containing conservation measures agreed to by Reclamation. The Experimental Releases EA and Finding of No Significant Impact were issued on February 29, 2008.

The HFE was initiated on March 5, 2008, and completed on March 9, 2008. During the high flow experiment, water was released through Glen Canyon Dam's powerplant and bypass tubes to a maximum discharge of 41,500 cfs for 60 hours. The release hydrograph for the 2008 HFE was a repetition of the hydrograph of the 2004 HFE. However, the 2008 HFE was conducted under much more favorable sediment conditions,

with at least two-and-a-half times more sand retained in the river channel (from tributary inputs that occurred in fall 2006 and 2007 below Glen Canyon Dam) than existed at the time of the 2004 HFE. Compared to the results of the 2004 experiment, preliminary reports from GCMRC indicate increases in beaches over a longer portion of the river corridor in lower Marble Canyon and eastern Grand Canyon.

In April 2008, consistent with Section 6.B.3 of the Interim Guidelines, the September 30, 2008 Lake Powell elevation was projected to be above 3,636 feet (the equalization level in the Interim Guidelines for water year 2008). This triggered Section 6.A (Equalization Tier) of the Interim Guidelines to govern the operation of Glen Canyon Dam for the remainder of water year 2008.

A steady flow regime (steady daily releases), as described in the Experimental Releases EA, was conducted during September 2008 (as well as during the first month of the 2009 water year, October 2008). These steady releases were approximately 12,100 cfs during these two months.

Progress on conservation measures during 2008 included: (1) initiation of a nearshore ecology study by the GCMRC to carry out the assessment of steady and fluctuating releases; (2) removal of juvenile endangered humpback chub from the Little Colorado River in preparation for translocation of the fish to Shinumo Creek, a tributary of the Colorado River in Grand Canyon National Park, in 2009; and (3) holding the humpback chub at the FWS' Dexter National Fish Hatchery and Technology Center in Dexter, NM, which satisfies a conservation measure to establish a refuge for this endangered species. Other conservation measures that will be addressed in 2009 include a comprehensive plan for the management and conservation of humpback chub in Grand Canyon, mechanical removal of some nonnative fish that are predatory to native fish, and development of a nonnative fish control plan.

3. National Park Service

In 2008, Grand Canyon National Park provided significant support to the overall goals outlined in the Grand Canyon Protection Act. Program areas included activities related to natural and cultural resources and visitor use as further described herein.

High Flow Experiment: The NPS, along with GCMRC, provided operational and logistical support for the March 2008 high flow experiment. The NPS took the lead in providing information to park visitors with affected river trips by providing information concerning the effects of the high flow event, including specific information on when the flow would reach specific locations in the canyon and where appropriate camping areas were located. The NPS worked with the other DOI agencies on all public outreach materials for the flow event, providing logistical support for the Department on the river below Glen Canyon Dam, staffing information tables at the dam during the event, and hosting a down-river trip with Departmental participants and stakeholders during the high flow event. Leading up to the HFE, the NPS worked with GCMRC in developing

research permit proposals, river trip proposals and minimum requirement analyses to ensure that all applicable policy was adhered to.

The NPS continues to support research and related activities in support of the Grand Canyon Protection Act. In 2008, the NPS evaluated research activities for compliance with applicable federal laws and issued permits. NPS also conducted government-to-government consultation requirements for proposed activities that could affect affiliated American Indian tribes.

In 2008, an overall research permit was issued to GCMRC for 11 specific research studies, and 25 river permits were issued for a total of 7138 user days. In addition to the GCMRC permits and related river trips, three tribal monitoring river trips were permitted for the Hopi, Hualapai and Paiute tribes.

Resource Monitoring: The NPS regulates the Colorado River Corridor through a periodically-revised Colorado River Management Plan (CRMP). The 2006 CRMP required the implementation of a comprehensive Integrated Resource Monitoring Program. The monitoring program includes monitoring and assessment of impacts from visitor use at campsites and other attractions or destination areas and overlaps with program areas identified in the GCPA. The Integrated Resource Monitoring Program also includes vegetation transects, avifauna habitat monitoring, archeological site monitoring and campsite assessments.

In 2007, the NPS began a collaborative project with the GCMRC to map all camps in the Colorado River corridor. The purpose of this collaborative project is to compile historical data about campsites along the Colorado River, to determine changes in campable areas on existing sandbars and campsites, and to create a “Campsite Atlas” for research purposes and public use. The development of the campsite atlas required mapping over 350 camps/sandbars using aerial maps. This total number includes camps that are currently used, and “legacy” camps that have become unusable due to loss of sediment and vegetation overgrowth.

The baseline maps produced for the atlas project are now an integral part of the NPS’ monitoring program and will be used to track changes in campable area and campsite attributes related to dam operations. Following the 2008 HFE, the NPS mapped 75 campsites; 30 of these sites were mapped immediately following the HFE, and others mapped in the fall 2008. The park will continue to use these maps, along with Geographic Information Systems (GIS) technology, to track changes in campsite size and condition as part of the NPS’ CRMP long-term monitoring program.

The campsite monitoring program is integral to the NPS’ long-term mitigation program. The mitigation program involves onsite management actions to address resource impacts including rehabilitation of camps and trails as well as restoration of old highwater zone areas impacted by visitation. These trips are conducted 1-2 times each year, and are conducted in cooperation with river guides.

Archaeological/Cultural Resources: In 2008, the NPS, in cooperation with the Museum of Northern Arizona, continued excavation of the most threatened archaeological sites along the Colorado River. As described in the approved Reclamation treatment plan for archaeological sites along the river corridor, NPS is working with the Museum of Northern Arizona to assess and mitigate the impact from erosion to ten of 161 sites that NPS has identified as having the greatest threat of impact through ongoing erosion. NPS and Reclamation agreed upon an additional 151 sites that would be assessed for erosional threats and information potential. In addition to the excavation of three puebloan sites, education and outreach efforts provided opportunities for over 500 visitors to view the excavations in process; on-line publications about the excavations were prepared; and an exhibit on the excavations was shown at the Museum of Northern Arizona.

The NPS continues to support Reclamation's implementation of the 2007 treatment plan through on-going collaboration on the archaeological excavations, monitoring, and stabilization programs. NPS actively participated in 2008 with Reclamation's contractor, Utah State University, on field work associated with site excavations at four archaeological sites. NPS, in consultation with Reclamation, also continued work with the affiliated Native American tribes concerning impacts to traditional cultural areas affected by dam operations. This is an on-going consultation.

The NPS also manages an ongoing monitoring and mitigation program of archeological resources to address based upon potential impacts from recreational use along the Colorado River. The NPS maintains the Archaeological Sites Management and Information System (ASMIS) and pursuant to NPS' policy monitors all known properties within park boundaries and updates the information in ASMIS on a regular schedule. This aspect of the program contributes to the overall goal articulated in GCPA relative to the condition of cultural resources potentially affected by Glen Canyon Dam operations.

Humpback Chub Translocation to Shinumo Creek: In 2008, the NPS, in cooperation with FWS and others, continued to work on the translocation of humpback chub into small Grand Canyon tributaries in order to increase resiliency. The first effort has focused on Shinumo Creek, a tributary off the north rim of Grand Canyon. The information gathered from this effort will contribute to potential establishment of a second population of humpback chub in Grand Canyon and provide an opportunity for rearing humpback chub in a natural environment outside of the Little Colorado River.

Three hundred juvenile humpback chub were captured in July and October 2008 near the mouth of the Little Colorado River. The 2 – 4 inch (50 – 130 mm) fish were transported out of the canyon by helicopter and were then treated to remove parasites at the Arizona Game and Fish Department's Bubbling Ponds Fish Hatchery. The fish will overwinter at the Dexter National Fish Hatchery and Technology Center to grow to a size that will allow identification tags to be implanted. Passive integrated transponder tags, which are small electronic tags that will aid in monitoring after translocation, will be implanted within the fish a month before the translocation.

4. U.S. Geological Survey

In 2008, the GCMRC continued its effort to develop and implement comprehensive system-wide monitoring programs for resources in the Colorado River below Glen Canyon Dam. Monitoring efforts focused on priority resources identified by the AMWG, including the endangered humpback chub, rainbow trout, riparian vegetation and springs, water quality, flow, sediment, sandbars, camping beaches, and archaeological sites. Information from these monitoring programs is critical to assessing the status of resources below the dam and the effects of dam operations, other management actions, and other factors on those resources. Results of those monitoring efforts are summarized in the USGS report entitled “The State of the Colorado River Ecosystem in Grand Canyon,” which documented the condition and trends of resources downstream of the Glen Canyon Dam from 1991 to 2004 (Gloss 2005) (Attached).

One of the most visible changes resulting from the presence of Glen Canyon dam is the erosion and shrinking of Grand Canyon sandbars. Sandbars provide camping beaches for river runners and hikers, supply sand needed to protect archaeological resources from weathering and erosion, sustain riparian shoreline habitats, and may also provide rearing habitat for native fish, including the endangered humpback chub. Fewer and smaller sandbars mean fewer and smaller camping beaches for visitors to use, continued erosion of cultural sites, reduced carrying capacity for plants and animals within shoreline riparian habitats, and possibly less habitat for endangered fish to recover.

In an effort to restore sandbars and related habitat and to comply with its responsibilities under the Grand Canyon Protection Act, as described above, Interior authorized the 2008 HFE. At the initiation of the 2008 experiment, sand supplies in the Colorado River were at a 10-year high. A comprehensive science plan (USGS 2008) was developed to assess the feasibility of using high flows to improve a range of Grand Canyon resources. Specifically, the focus of the high flow experiment was to assess the effects of the high flow on sandbars and camping beaches, the endangered humpback chub, and other downstream resources, including rainbow trout, the aquatic food base, riparian vegetation, and archaeological sites.

In 2008, GCMRC finalized the Monitoring and Research Plan (MRP) in support of the Glen Canyon Dam Adaptive Management Program. The MRP describes the scope of a 5-year monitoring and research program to address priority goals, questions, and information needs specified by the GCDAMP. The MRP emphasizes four key components:

1. Incorporating interdisciplinary, integrated river science
2. Building bridges between science and management
3. Addressing priority AMWG goals/questions and associated Strategic Science Questions
4. Addressing critical monitoring and research needs outside the scope of the GCDAMP

GCMRC also completed numerous peer-reviewed USGS reports and journal articles during 2008, including a GSA Today article (Wright 2008) that evaluated one of several

possible scenarios for operating Glen Canyon Dam using existing sediment transport models.

5. Fish and Wildlife Service

The FWS provided a Biological Opinion for the 2008 HFE. The 2008 biological opinion included the following Conservation Measures: Humpback Chub Consultation Trigger to be used if the population declines significantly; Comprehensive Plan for the Management and Conservation of Humpback Chub in Grand Canyon (Comprehensive Plan); Humpback Chub Translocation into tributaries; Nonnative Fish Control to protect humpback chub from predation by trout, catfish, and other species; Humpback Chub Nearshore Ecology Study; Monthly Flow Transition Study to assess potential to achieve improved conditions for young-of-year, juvenile, and adults; Humpback Chub Refuge to assist in case of a catastrophic loss by providing a permanent source of sufficient numbers of genetically representative humpback for restoration purposes; and Little Colorado River Watershed Planning with consideration for watershed effects to humpback chub.

The 2008 biological opinion provided a Conservation Recommendation that Reclamation continue working with FWS to implement activities that will achieve the recovery goals (in revision) for humpback chub, that Reclamation utilize the Comprehensive Plan and work with FWS to determine what actions remain to be accomplished, and find additional funding sources provided by other willing partners to help achieve recovery. Also, a Conservation Measure was provided for the Kanab ambersnail for Habitat Protection to temporarily remove and safeguard all Kanab ambersnails within the zone that would be inundated, along with about 15% of the ambersnails' habitat, which would be flooded by the HFE. A Conservation Recommendation recommended that Reclamation continue to work with FWS to implement the "Interim Conservation Plan for the *Oxyloma (haydeni) kanabensis* Complex and Related Ambersnails in Arizona and Utah" developed by the Arizona Game and Fish Department.

FWS also provided planning assistance within the GCDAMP and the AMWG for endangered species conservation; this included revising the Recovery Implementation Program for the Humpback Chub (*Gila cypha*) in the Grand Canyon: Report on analysis and recommendations to support stakeholder driven outreach program and identification of information needs (Recovery Implementation Program Strategy Report).

FWS conducted six monitoring trips in the lower portion of the Little Colorado River, the primary spawning and rearing area for humpback chub. Data from these trips generate population estimates in cooperation with the USGS for humpback chub, other native fish, and provide trend data for nonnative fish including channel catfish (*Ictalurus punctatus*) and black bullheads (*Ameiurus melas*). Two humpback chub capture trips were conducted in cooperation with the NPS and Wildlands Council in support of three projects, including the Chute Falls translocation on Navajo Nation lands, Dexter National Fish Hatchery and Technology Center, and the Shinumo Creek translocation in the Grand Canyon National Park. Fish were maintained for periods of time by the Bubbling Ponds

Facility of the Arizona Game and Fish Department. As a result of these capture efforts in 2008, 199 fish were translocated above Chute Falls and 300 fish began the genetic refuge at Dexter National Fish Hatchery and Technology Center. Also, a meeting was conducted to review the Hualapai Tribe's Native Fish Rearing Facility on the Hualapai Reservation by FWS, Arizona Game and Fish Department, and the Hualapai Tribe.

In addition, FWS and Arizona Game and Fish Department, in cooperation with GCMRC, NPS, and Western Area Power Administration (Western), met with Lees Ferry Trout fishermen and associated business representatives (November 28, 2007) to discuss the proposed HFE (September 01-October 31, 2008-2012). A report was provided with planning information regarding biological and related economic impacts to the Lees Ferry Trout fishery and included recommendations to avoid and/or minimize detrimental impacts to the fishery (December 17, 2007).

Work was initiated with Arizona Game and Fish Department to utilize their procedures to develop meetings with recreational fishing interests to address Reclamation mitigation measures identified above in cooperation with the Glen Canyon National Recreation Area.

B. 2009 Operations

1. Bureau of Indian Affairs

BIA continued to support the Tribes in their funding requests for various projects, participated in consultation meetings with the Tribes regarding the Tribal Consultation Plan, pre-meetings with tribal representatives conducted prior to AMWG meetings, Ad Hoc Groups and other meetings regarding cultural or natural resources issues and concerns.

2. Bureau of Reclamation

Glen Canyon Dam was operated in 2009 consistent with the 1996 Record of Decision, Operating Criteria for Glen Canyon Dam, the Interim Guidelines, the Experimental Releases EA, and the 2009 Annual Operating Plan for Colorado Rivers. The operation of Glen Canyon Dam was also consistent with a September 9, 2008, recommendation by the AMWG "that the Secretary of the Interior adopt the GCDAMP FY09 annual budget and workplan dated August 8, 2008; and that the Water Year 2009 hydrograph will consist of Modified Low Fluctuating Flow operations from November 2008 through August 2009, include experimental steady flows in October 2008 and September 2009, and include up to 5 days of steady flows at 8,000 cfs in late May 2009 to accommodate the planned remote sensing overflight of the Colorado River." Remote sensing is an important monitoring technique to determine the level of success for experimental flows, as is identified by GCMRC in their high flow experiment science plan. The Deputy Secretary of the Interior concurred with this AMWG recommendation on December 4, 2008.

Reclamation operated Glen Canyon Dam during the 2009 water year (October 1, 2008 – September 30, 2009) consistent with the 1996 Record of Decision on the Operation of Glen Canyon Dam, the Operating Criteria for Glen Canyon Dam, the Record of Decision^[1] for Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead (Interim Guidelines), the Final Environmental Assessment: Experimental Releases from Glen Canyon Dam, Arizona, 2008 through 2012^[2] (Experimental Releases EA), and the 2009 Annual Operating Plan for Colorado River reservoirs.

The annual release volume during water year 2009 from Glen Canyon Dam was 8.23 million acre-feet (maf). Monthly releases from Glen Canyon Dam during 2009 are shown in Table 1.^[3]

Table 1
Monthly Releases from Glen Canyon Dam in Water Year 2009

Month	Release (maf)
October 2008	0.749
November 2008	0.603
December 2008	0.801
January 2009	0.802
February 2009	0.602
March 2009	0.626
April 2009	0.604
May 2009	0.582
June 2009	0.662
July 2009	0.803
August 2009	0.802
September 2009	0.595
Water Year 2009	8.231

Based on the August 2008 24-Month Study projection of the January 1, 2009, reservoir elevation at Lake Powell and in accordance with Section 6.B (Upper Elevation Balancing Tier) of the Interim Guidelines, the annual release volume from Glen Canyon Dam in 2009 was initially scheduled to be 8.23 maf (10,150 mcm). In April 2009, consistent with Section 6.B.3 of the Interim Guidelines, the September 30, 2009 Lake Powell

^[1] A ROD adopting the Interim Guidelines was signed by the Secretary of Interior on December 13, 2007.

^[2] <http://www.usbr.gov/uc/envdocs/ea/gc/2008hfe/index.html>.

^[3] Projected monthly releases reflect compliance conducted in the 1995 EIS on the Operation of Glen Canyon Dam, the Operating Criteria for Glen Canyon Dam, and approved experimental releases, such that the projected annual release volumes meet the annual requirements of the Interim Guidelines. Projected monthly releases are frequently adjusted during the water year, consistent with the Interim Guidelines, as snowpack and projected runoff conditions in the Colorado River Basin change.

elevation was projected to be below 3,639 feet (the equalization level in the Interim Guidelines for water year 2009). Consistent with Section 6.B.3 of the Interim Guidelines, this condition did not trigger Section 6.A (Equalization Tier) of the Interim Guidelines to govern the operation of Glen Canyon Dam for the remainder of water year 2009. For this reason, the annual release volume during water year 2009 from Glen Canyon Dam was maintained at 8.23 maf

A steady flow regime (steady daily releases), as described in the Experimental Releases EA, was conducted during September 2009 (as well as during the first month of the 2010 water year, October 2009). These steady releases were approximately 10,000 cfs during these two months.

3. National Park Service

In 2009, Grand Canyon National Park projects continued to provide significant support to the overall goals outlined in the Grand Canyon Protection Act as described herein.

Archaeological/Cultural Resources: The NPS continued to support Reclamation's implementation of the treatment plan through on-going collaboration on the archaeological excavations, monitoring and stabilization programs. NPS will actively participate with Reclamation's contractor, Utah State University, on field work associated with site treatments for up to 5 sites each year. The NPS, in consultation with Reclamation, also continued work with the affiliated American Indian tribes concerning impacts to traditional cultural areas affected by dam operations. This is on-going consultation.

Humpback Chub Translocation to Shinumo Creek: Fish that overwintered at the Dexter National Fish Hatchery and Technology Center were transported via helicopter to the release site in June 2009. Prior to the translocation, biologists use hoop nets, seines, angling, and electro-fishing equipment to remove non-native rainbow trout from Shinumo Creek.

Biologists will conduct several monitoring trips over the next 3 years to determine the long-term success of the Shinumo Creek humpback chub translocation experiment. In early July 2009, snorkeling and hoop nets were used to collect data on humpback chub abundance and growth in the translocation area. Since all humpback chub will be implanted with passive integrated transponder tags, biologists will be able to record the movements of humpback chub. In addition, the installation of a passive integrated transponder tag antenna near the mouth of Shinumo Creek will assist in tracking the movements of fish; of special interest is whether or not they leave the creek for the mainstem and under what stream flow and temperature conditions. These monitoring data will be used to determine and prioritize the next steps for humpback chub conservation activities in Grand Canyon National Park.

4. U.S. Geological Survey

In 2009, GCMRC continued its efforts to develop and implement comprehensive system wide monitoring programs for resources in the Colorado River below Glen Canyon Dam. Information from these monitoring programs is critical to assessing the status of resources below the dam and the effects of management actions and other factors on those resources. An annual report on the accomplishments associated with approximately 50 projects included in GCMRC's FY 2008 Budget and annual Workplan was completed in early 2009; and a workshop was held in January 2009 to review the Annual Report with the Technical Work Group of the GCDAMP.

GCMRC's FY 2009 budget and work plan contains 42 projects, including two new projects that address related conservation measures included in the 2008 FWS Biological Opinion on the operation of Glen Canyon Dam:

- Implementation of a Near Shore Ecology Study to evaluate the importance of various near shore habitats to humpback chub recovery. This study will also address the effects of late summer–fall steady flows on humpback chub.
- A mainstem nonnative fish removal project for the Colorado River near its confluence with the Little Colorado River. The purpose of the removal effort is to aid in the conservation of humpback chub and other native fishes by removing nonnative fishes (primarily rainbow and brown trout) which are known predators of the native fishes.

GCMRC's Strategic Science Plan and Monitoring and Research Plan will be updated to reflect the direction provided in the 2008 Environmental Assessment and related Biological Opinion.

Studies related to the effects of the March 2008 HFE on resources below Glen Canyon Dam will be completed in FY 2009; final reports will be peer reviewed and published by USGS and presented to GCDAMP stakeholders and management agencies in early FY 2010.

USGS, in coordination with a variety of Federal and State agencies, organized and sponsored the first Colorado River Science and Resource Management Symposium in Scottsdale, Arizona in November 2008 to promote an exchange of information on research and management activities related to the restoration and conservation of the Colorado River. Proceedings of the symposium will be published in early 2010.

The Colorado River Basin supports one of the most distinctive fish communities in North America, including the federally endangered humpback chub. One of only six remaining populations of this fish is found in Grand Canyon, Arizona. In FY 2009 USGS completed an analysis (Coggins & Walters 2009) of recently collected data which indicates that the number of Grand Canyon adult humpback chub—fish 4 years old and older and capable of reproduction—increased approximately 50 percent between 2001 and 2008. When

possible model error is considered, the estimated number of adult chub in the Grand Canyon population is between 6,000 and 10,000. The most likely number is estimated at 7,650.

In late May 2009, aerial photographs and topographic data were collected for the Colorado River corridor below Glen Canyon Dam as part of an ongoing monitoring effort to help manage important Colorado River resources in Glen, Marble and Grand Canyons. The data collected will allow researchers to track the size and number of sandbars and related near-shore habitats. Sandbars are a resource of management concern because they provide habitat for wildlife, support backwaters for fish, and provide camping beaches for recreation visitors. Sand bars have been reduced in size in the Grand Canyon as the result of sediment exports under current dam operations and encroachment of woody vegetation.

In 2005, the GCMRC produced a comprehensive report, which documented the condition and trends of resources downstream of the Glen Canyon Dam from 1991 to 2004 (Gloss and others, 2005). In FY 2009, GCMRC produced a fact sheet (USGS, 2009) which updates the 2005 Report to extend its findings to include data published through April 2009 for key resources. Both the 2005 Report and the 2009 fact sheet are attached hereto.

5. Fish and Wildlife Service

FWS worked with GCMRC, BIA, Reclamation, NPS, and other GCDAMP stakeholders to further support conservation for humpback chub. FWS hopes to support finalization of the Comprehensive Plan and revision of the Recovery Implementation Plan Strategy Report. FWS will again conduct six monitoring trips in the Little Colorado River. The translocation project at Shinumo Creek is scheduled to be completed in cooperation with NPS. Removal of nonnative fish will be reviewed to assess potential need to lower rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and other predatory nonnative fish populations in the general area of the confluence of the Little Colorado River and mainstem of the Colorado River. Monitoring will be carried out by the Arizona Game and Fish Department for the Kanab ambersnail within Grand Canyon National Park. The FWS will work to accomplish other management actions as determined appropriate within the GCDAMP with the stakeholders to conserve humpback chub and other endangered species.