

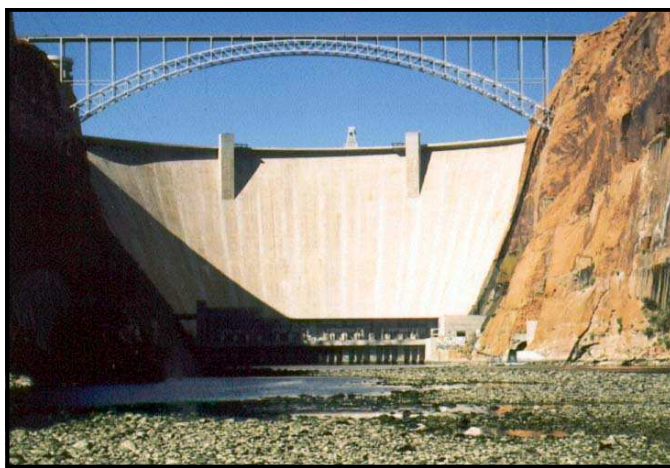
Water Review

A Perspective on Western Water Issues Prepared by the Family Farm Alliance and Its Members

ARIZONA

Glen Canyon Dam Operations

Colorado River Power Interests Seek to Balance Needs



Glen Canyon Dam and Bridge. Source: USBR

Overview

Federal environmental laws like the Endangered Species Act (ESA), the Clean Water Act and the National Environmental Policy Act (NEPA) present significant challenges to the generation of hydropower resources in the Colorado River Storage Project (CRSP). Some cite these laws as justification to operate reservoirs to mimic pre-dam conditions. Unfortunately, this undermines the purposes for which the reservoirs were constructed. For example, reservoir releases to mimic pre-dam floods, or move sediment, often bypass

power turbines and waste the opportunity to produce hydropower.

In the 1980's, litigation nearly brought power production at Glen Canyon Dam to a halt. Eventually, this resulted in an approximately 14-year, \$104 million study of the environmental effects of Glen Canyon Dam operations - more than twice the cost of the construction of Flaming Gorge Dam in 1963! Subsequent restrictions on reservoir operations required the release of stored water when power usage and demand is lowest. As a result, Glen Canyon lost over 30% of its capacity or enough power to serve over 250,000 homes.

The Colorado River Energy Distributors Association (CREDA) plays an important role in educating the public and policy makers about the need to carefully manage reservoir operations during years of good hydrology. In this way, federal agencies can accomplish environmental benefits without affecting the purposes for which Congress authorized the unique water and power resources of the Colorado River.

CREDA – Background

CREDA is a non-profit organization representing consumer-owned electric systems that purchase federal hydropower and resources of the CRSP. CREDA was established in 1978, and

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serves as the “voice” for its members in dealing with the Bureau of Reclamation (as the generating agency of the CRSP) and Western Area Power Administration (WAPA) (as the marketing agency of the CRSP). CREDA members are all non-profit organizations, serving over 4 million electric consumers in the six western states of Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming.

CREDA’s mission is "To preserve and enhance the availability, affordability, and value of CRSP facilities while promoting responsible stewardship of the Colorado River System".

Project Description

Glen Canyon Dam is on the mainstem of the Colorado River near the Arizona-Utah state line. The dam backs up water forming Lake Powell, which contains approximately 27 million acre-feet of water at the normal water surface elevation. The power plant consists of eight units which can generate approximately 162.5 megawatts (MW) each, for a total output of approximately 1,300 MW. The Colorado River Compact requires that 7.5 million acre feet must be released in each rolling ten-year period. The addition of Mexican Treaty water brings this to an average annual release of 8.23 million acre feet per year.

Historic Power Management

Part of the power generated by the dam is used for irrigation pumping and other project uses. The remaining “marketable resource” is sold first to preference customers. Each year Reclamation develops an annual operating plan defining the monthly releases from each of the projects for the upcoming year. Historically, WAPA has been allowed to vary the releases on a daily and hourly basis to meet power demands within the monthly

water release constraints.

Environmental Studies – Phase I

In 1978 the Bureau of Reclamation began evaluating the possibility of upgrading the eight generating units at Glen Canyon. This was possible primarily due to design characteristics of the generators and improved insulating materials. This upgrade was completed in 1984, and the generation was increased from about 1000 MW to 1300 MW. To fully utilize the unit upgrades would require the maximum release of Glen Canyon to be increased from 31,500 cubic feet per second (cfs) to about 33,200 cfs. However, the possibility of increasing maximum releases from Glen Canyon raised concerns with downstream users. After discussion with stakeholders, the Secretary of Interior initiated the first phase of the Glen Canyon Environmental Studies.



High flow tests at Glen Canyon Dam, November 2004.

Source: USGS

In 1982, Reclamation began Phase 1 of the Glen Canyon Environmental Studies. These studies were primarily to analyze the impacts of raising the maxi-

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release from 31,500 cfs to 33,200 cfs on the transport of sediment downstream from the dam, recreation (including fishing and rafting), endangered species (including the humpback chub in the Lower Colorado River), and the riparian habitat along the river banks. The studies concluded in 1987.

The general conclusion of the Glen Canyon Environmental Studies Phase 1 was that the dam had blocked much of the sediment coming down the Colorado River and therefore beaches were not being replenished with sand. However, some felt the studies were incomplete.

"The Phase 1 process did not necessarily follow sound science in that the impact on power and water economics had not been fully explored," said Leslie James, CREDA's executive director.

Environmental Studies – Phase 2

After assessing the Phase 1 studies and a review by the National Academy of Science, the Secretary of Interior determined the Glen Canyon Environmental Studies should be continued. This time, economic impacts would be addressed, particularly as they relate to power, and additional data would be collected to substantiate some of the conclusions in the Phase 1 report. The Glen Canyon Environ-

mental Studies Phase 2 was initiated in 1989. Reclamation hired a Senior Scientist to assist with the development of the Phase 2 studies to assure an appropriate scientific process. Reclamation and the Senior Scientist developed the studies, which included a series of test flows to evaluate the impact

of different operating conditions and to develop response curves for various conditions. Many interested parties, including water, power, recreation, environment, and Native American interests participated in the process.

In July 1989, the Secretary of Interior announced the start of an Environmental



High flow tests at Glen Canyon Dam. Source: USGS

Impact Statement (EIS) on the operation of the Glen Canyon Dam. No specific recommended action was identified. Meetings were held during 1990 to seek input into alternatives that should be considered, and Reclamation determined the alternatives which were to be studied. The EIS was completed and the Record of Decision (ROD) signed in October, 1996.

The result was that Glen Canyon operations were changed to reflect a revised flow regime; approximately one-third of the generating capacity was lost due to changed operations.

The cost of the Glen Canyon EIS was approximately \$104 million, and was funded by power revenues collected from the CRSP customers.

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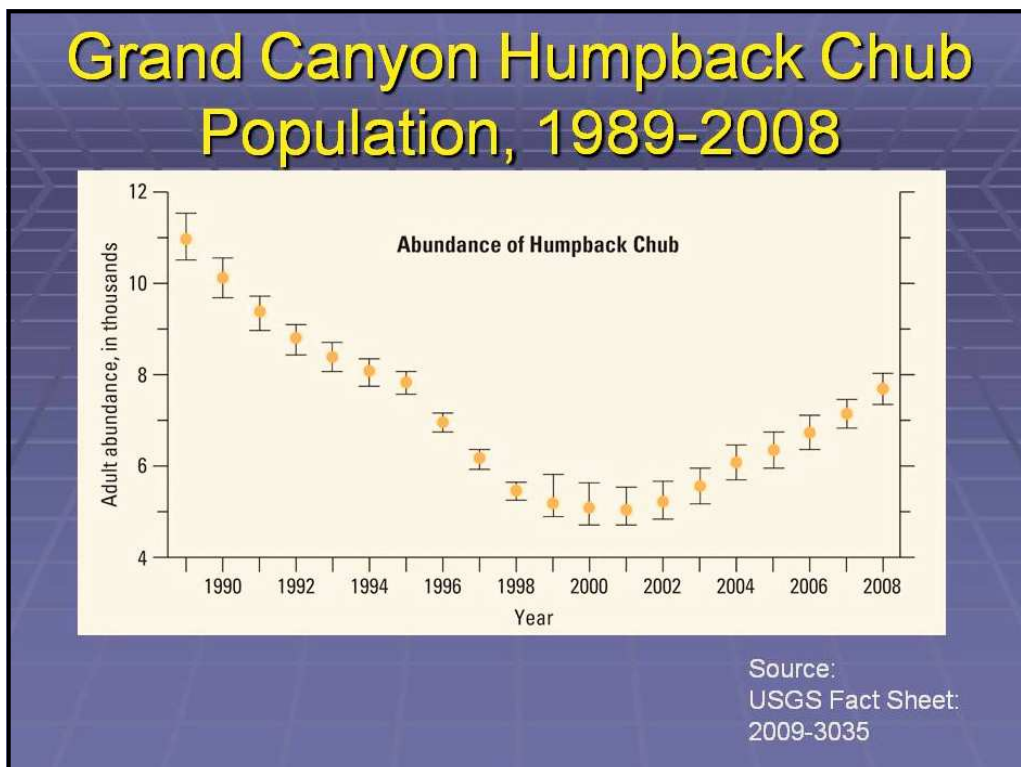
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Adaptive Management Program

CREDA participates on the Federal Advisory Committee charged with making recommendations to the Secretary of the Interior as to operations of Glen Canyon Dam pursuant to the ROD and underlying laws. Funding for this Adaptive Management Program (AMP) is through power revenues. On October 27, 2000, President Clinton signed the Interior Energy and Water Appropriations bill, which includes language (section 204) capping the amount of CRSP power revenues that can be used for the AMP, at \$7,850,000, subject to inflation.

“We support other sources of funding for this program, and we remain concerned about the budget growth,” said James. “We are also concerned that some stakeholders involved in the program view the program in a much broader manner than intended by law.”

In April of 2000, citing hydrologic conditions and a 1994 USFW biological opinion, the federal government decided that a low flow summer experiment would be undertaken. The experiment included high spike flows in May and September, with low flat flows (8,000 cfs) all summer. The purpose was to gain information regarding humpback chub conditions. The low, flat flows had a severe impact on power generation, requiring WAPA to purchase replacement power on the open market at over \$22 million in order to meet contractual obligations to the CRSP customers. The cost of the experiment was over \$3 million, also funded by CRSP power revenues. Unfortunately, ten years after the experiment, the scientific studies undertaken as part of the experiment have not yet been finalized, so it is unclear what the impact to downstream resources may have been.



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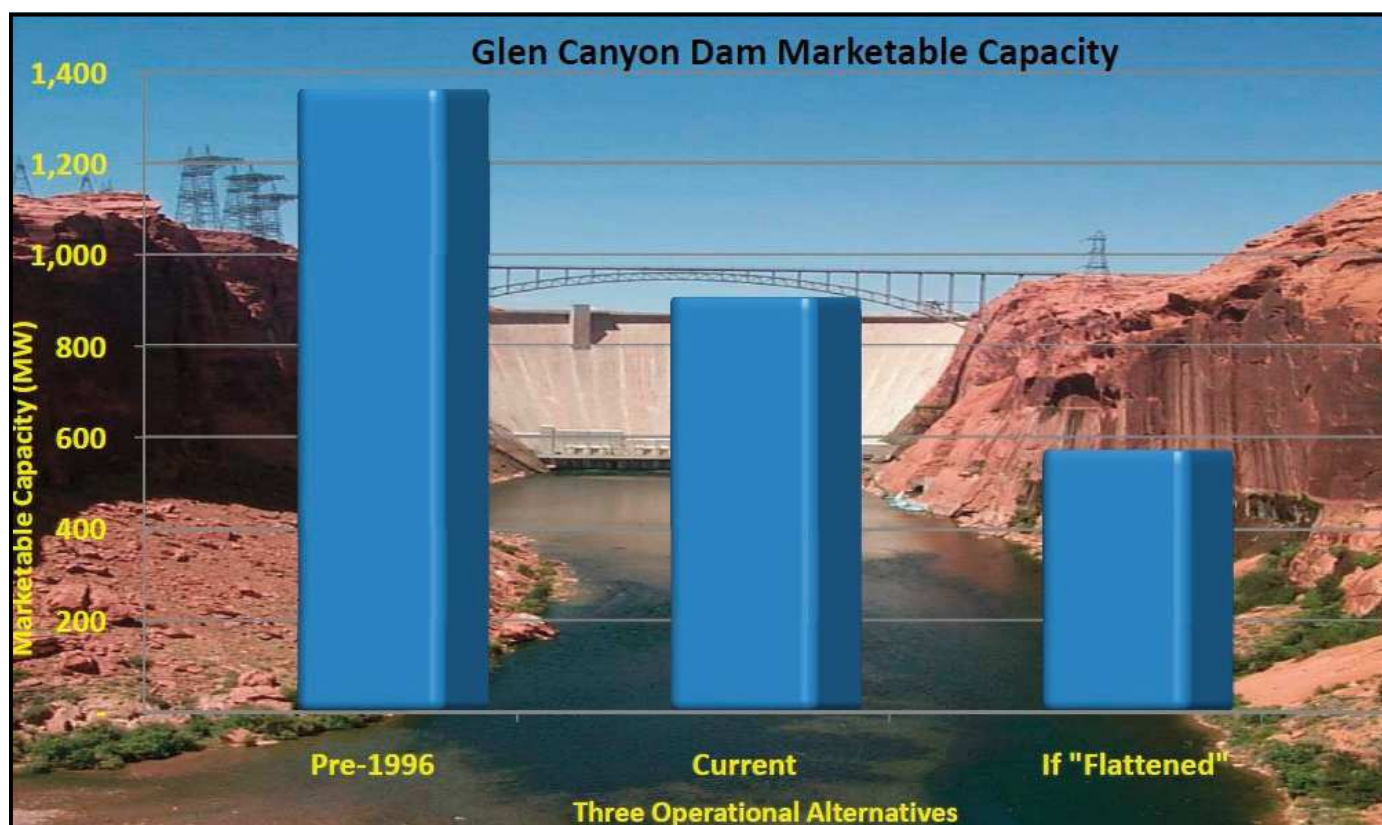
Environmental Processes and Litigation

In April 2002, the Adaptive Management Work Group (AMWG) recommended to the Secretary of the Interior two-year program of experimental flows, intended to improve sediment conditions and improve conditions for the endangered humpback chub. Actions were focused through a program intended to degrade conditions for trout, which are competitors and predators. The Environmental Assessment and ROD were completed in December, 2002. In 2002 and 2003, the requisite amount of sediment input was not achieved, thus the “trigger” for a high release in January was not met. During January-March of the next two years, increased fluctuating flows were intended to adverse the trout population and spawn.

“Preliminary results are very positive,” said

James. “Also, fluctuating flows are beneficial for power production.”

On March 31, 2004, the Grand Canyon Trust filed litigation in Arizona District Court alleging the humpback chub recovery goals were too low and asking the Court to require USFWS to revise the goals. The Court ruled, requiring USFWS to update the goals as to schedule and cost elements. In February, 2006, the Center for Biological Diversity and other organizations filed suit against the United States, asking the Federal Court to interpret the Grand Canyon Protection Act and to require Reclamation to reconsult with USFW on a new biological opinion. In August, 2006, the United States settled with the Plaintiffs. Part of the settlement dictated that an environmental documentation process begin not later than January 31, 2007. In December, 2007, the Grand Canyon Trust again filed litigation



Source: CREDA

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against Reclamation and USFW regarding several aspects of dam operations, Reclamation's annual operating plan process and NEPA and ESA claims. All 7 Colorado River Basin States intervened, as did water agencies and CREDA. To date, the court has ruled almost exclusively in favor of the United States. In its latest pleading the Grand Canyon Trust indicated that it plans to file yet a fourth amended complaint.

In 2008, Reclamation completed an environmental assessment and ROD beginning 5 years of experimental flows, with steady flows in the months of September and October, primarily to investigate impacts on humpback chub.

In the near future, Reclamation will be issuing two environmental assessments for public review and comment. One would be to establish a long-term protocol for future high flow experiments; the second will be to address the issue of non-native fish control. Following completion of these assessments, Reclamation will begin another EIS process to analyze alternatives for long-term operations and management actions.

Impacts

Glen Canyon Dam has already lost about one-third of its capacity as the result of restrictions on operations. Although the Dam's generators are capable of providing power to approximately 1,320,000 residential customers, since the mid-1990's operations have been restricted in an attempt to "balance competing interests and to meet statutory responsibilities for protecting downstream resources and producing hydropower." The economic impact of these restricted operations since 1996 has been over \$511 million. Further restricting Glen Canyon generation could result in an economic impact of \$175 million dollars over a 10-year period. This number is very conservative compared to a recent study by National Renewable Energy Laboratory.

Benefits of Hydropower & Glen Canyon Dam

Hydropower is the largest source of renewable electricity generation in the U.S. Hydropower provides a wide range of benefits to the country. This clean, low-cost source of energy that can be relied upon for long-term, stable production of domestic energy. While hydropower provides approximately 7 percent of U.S. electricity generation, each kilowatt-hour of hydropower is produced at an efficiency more than twice that of any competing energy resource.

Hydropower is uniquely able to meet the fluctuating demands for electricity since it can increase or decrease the amount of power it is supplying to the system almost instantly to meet shifting demand. This means that hydropower has critically important load-following capability, peaking capacity and voltage stability attributes.

As part of the Nation's critical infrastructure, the water stored by Glen Canyon Dam is vital to the growing water needs of the western United States. Over 30 million people depend on the water stored behind the dam for drinking, irrigation, and other municipal and industrial uses. Glen Canyon Dam also provides clean energy to people in the Colorado River basin states. The utilities that purchase hydropower from Glen Canyon Dam have an obligation to provide a reliable source of electricity to their customers, which means that they must have the ability to rely on the availability of Glen Canyon hydropower.

Revenues from Glen Canyon Dam provide funding for important environmental programs. Glen Canyon Dam provides approximately \$20 million annually to the Colorado River Salinity Control Program, the Glen Canyon Dam Adaptive Management Program, and the Upper Colorado River and San Juan River Endangered Fish Recovery Programs. Already, current hydropower operations at Glen Canyon Dam appear to be providing

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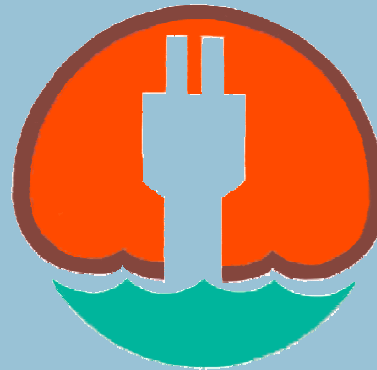
significant benefit to the endangered humpback chub population. Analysis of recently collected data indicates that the number of these Grand Canyon adult fish increased approximately 50 percent between 2001 and 2008.

Hydropower operations at Glen Canyon Dam support also important recreational resources. The Colorado River below Glen Canyon Dam is seen as a blue ribbon trout destination for anglers throughout the U.S. In addition, river rafting below Glen Canyon Dam generates about \$83 million annually in the regional economy, and generates about 600 jobs in the local community. This resource also generates significant revenue for the Hualapai Tribe.

The Colorado River Storage Project Act of 1956 requires that the power plants be operated “so as to produce the greatest practicable amount of power and energy...”. Enhanced hydropower production at Glen Canyon Dam would reduce the amount of energy purchases from nonrenewable resources required to meet the electricity needs of the non-profit customers of this resource. Enhanced hydropower production could avoid significant impacts resulting from “flattening” or further restricting Glen Canyon hydropower generation.

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