

# RECLAMATION

*Managing Water in the West*

Environmental Impact Statement for a Long-term Experimental Plan for the Future Operation of Glen Canyon Dam and Other Management Actions

Lake Mead Water Quality Forum  
October 30, 2007



U.S. Department of the Interior  
Bureau of Reclamation

# Introduction



The Long-term Experimental Plan grew out of several years of experimental flow discussions about what next steps should be taken with respect to Glen Canyon Dam Adaptive Management Program scientific experimentation below Glen Canyon Dam.

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## Introduction (continued)

- A Science Planning Group was formed a couple of years ago to develop proposals for future experimentation. While initial efforts attempted to reach consensus, a range of options was eventually developed for consideration by the Glen Canyon Dam Adaptive Management Work Group.
- These options were forwarded to the Department of the Interior and were used to develop several of the alternatives for this EIS.

# Scoping Process

- On November 6, 2006, Reclamation published a Notice of Intent in the *Federal Register* announcing our intent to prepare an environmental impact statement (EIS) on a long-term experimental plan for the future operation of Glen Canyon Dam.
- A second Notice of Intent was published in the *Federal Register* on December 12, 2006, soliciting public comment and announcing public scoping meetings.
- Two public meetings were held in January 2007 and the public scoping period ran from December 12, 2006, to February 28, 2007.

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## Scoping Process (continued)

- During the public scoping period for this EIS, Reclamation received 160 comment letters and e-mails with 651 distinct comments categorized for analysis in the Scoping Report.
- The Scoping Report was published on March 30, 2007, and is available on our project website at the following address:

<http://www.usbr.gov/uc/rm/gcdltep/scoping/FinalScopingReport.pdf>.

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# Tiering

- The long-term experimental plan (or LTEP) will tier off of a decade of scientific experimentation and monitoring that has taken place as part of the Adaptive Management Program (AMP), and will build on the knowledge gained by previous experiments, operations, and management actions taken under the AMP.

# Past Experimentation at Glen Canyon Dam

- 1996 Beach/Habitat-Building Flow (BHBF) test
- 2000 Low Steady Flow test
- 2002 - 2006 translocation of the endangered Kanab ambersnail and humpback chub and removal of non-native fish
- 2004 Beach/Habitat-Building Flow test
- In addition, drought-induced reductions in Lake Powell elevations caused an increase in dam release temperatures during 2003 to 2005. Considerable monitoring and research of endangered fish, sediment conservation, and other resources in the Grand Canyon were conducted in concert with these actions.
- Past NEPA documents on these experiments can be found at: <http://www.usbr.gov/uc/rm/gcdltep/index.html>.

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# List of the 16 Cooperating Agency Representatives

- Bob Broscheid, Arizona Game and Fish Department
- Charley Bullets, Kaibab Band of Paiute Indians
- Jay Groseclose, New Mexico Interstate Stream Commission
- John Hamill, U.S. Geological Survey
- Amy Heuslein, Bureau of Indian Affairs
- Loretta Jackson-Kelly, Hualapai Tribe
- Arden Kucate, Pueblo of Zuni
- Steve Martin, National Park Service
- Don Ostler, Upper Colorado River Commission
- Clayton Palmer, Western Area Power Administration
- Ted Rampton, Utah Associated Municipal Power Systems
- Randy Seaholm, Colorado Water Conservation Board
- Sam Spiller, U.S. Fish and Wildlife Service
- Dennis Strong, Utah Department of Natural Resources
- Bill Werner, Arizona Department of Water Resources
- Mike Yeatts, The Hopi Tribe

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# Proposed Federal Action

- The proposed federal action is to develop and implement a structured, long-term experimental plan that may include modifications to Glen Canyon Dam releases and non-flow actions such as modifications to Glen Canyon Dam intake structures and non-native fish management.

# Purpose and Need

- The purpose of the LTEP is to continue the application of adaptive management as part of the Glen Canyon Dam Adaptive Management Program to increase understanding of the ecosystem downstream from Glen Canyon Dam and to improve and protect important downstream resources. In particular, and as a result of information developed through the scoping process, the focus of the proposed action will be on **humpback chub** and **fine sediment** in Glen, Marble, and Grand canyons.
- The proposed action will be achieved by increasing scientific understanding through implementation of the LTEP and application of findings to current and future resource experimental and management decisions.

## Purpose and Need (continued)

- Implementation of the LTEP will be consistent with the values for which Glen Canyon National Recreation Area and Grand Canyon National Park were established and with applicable federal law including the Colorado River Storage Project Act of 1956 and the Grand Canyon Protection Act of 1992.
- The action is needed to better understand why key resources have not responded as predicted in the 1995 Operation of Glen Canyon Dam Final EIS and to continue to build on information developed by the Adaptive Management Program through federal actions and experimentation since the initiation of the program in 1997.



Humpback Chub

Fine  
Sediment



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# Primary Focus of the LTEP

- The recent declining trend in the Grand Canyon humpback chub population (observed in 1990-2002) reversed in 2003 through 2006, potentially due to non-native fish control or increased dam release temperatures from the drought-induced decline in Lake Powell elevation.
- The LTEP seeks to determine what role, if any, warming of dam releases, non-native fish control, and stable vs. fluctuating dam releases played in this reversal and what key factors are limiting humpback chub reproduction, recruitment, and survival.

## Primary Focus of the LTEP (continued)

- Since closure of the dam, sediment resources such as camping beaches, eddy and backwater deposits, and sandbars and terraces covering archeological sites have continued to erode.
- The long-term sustainability of these deposits, and whether high flow tests can increase sediment conservation, are key parts of the LTEP.

# Objectives of the LTEP

- Information obtained through public scoping and our cooperating agency process further substantiated the key objectives of the LTEP as:
  1. A desired improvement in humpback chub, and
  2. An increase in the conservation of fine sediment.

# Alternatives



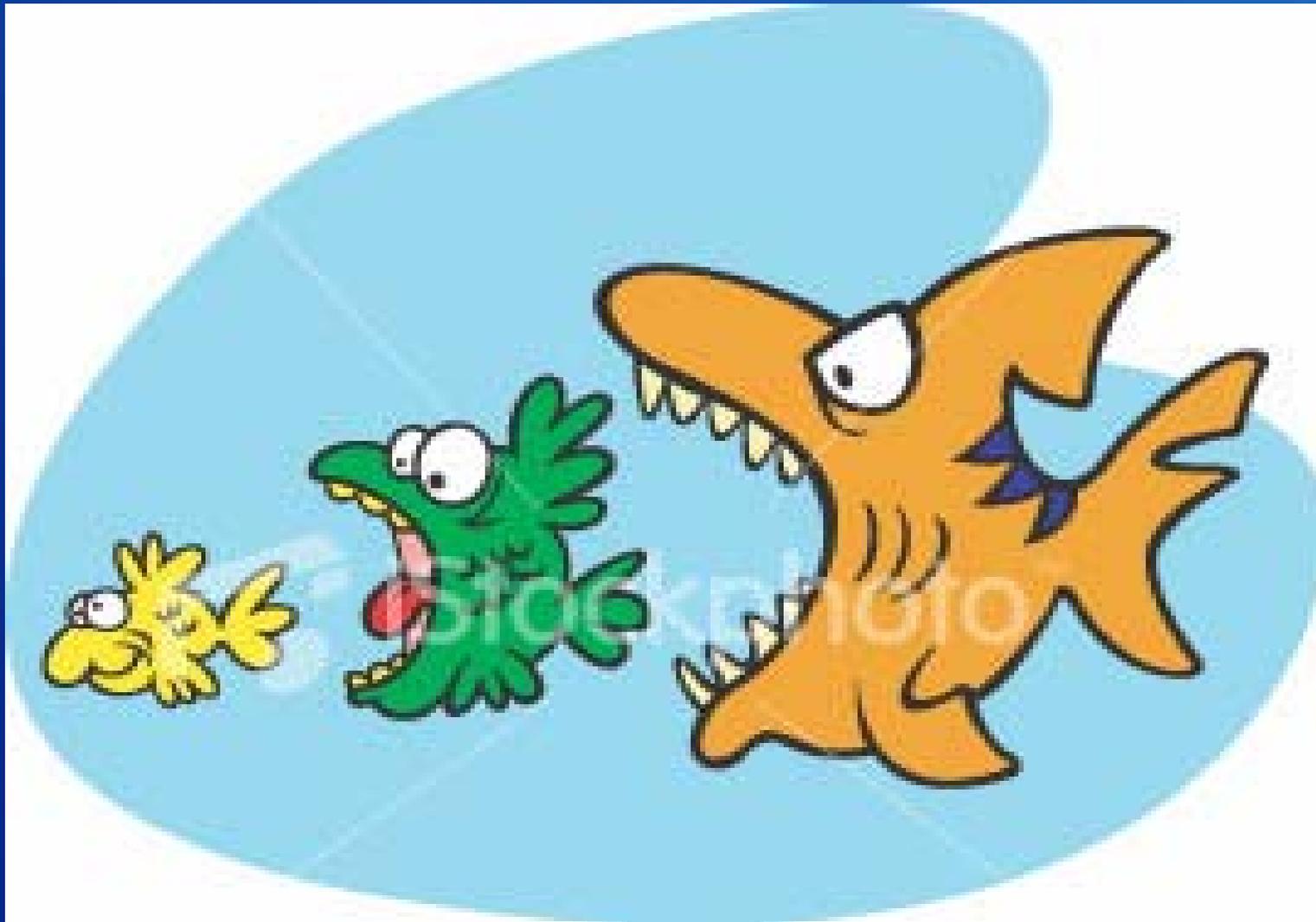
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# Elements of the Alternatives

- As part of the alternatives development process, Reclamation and the cooperating agencies developed and ranked core questions and hypotheses that reflected both the importance of the resource and the aspects needing further understanding and improvement.
- Elements of the four action alternatives to address the key objectives of the LTEP were derived from these core questions and hypotheses. These key elements were identified as:
  1. Water temperature,
  2. Dam release fluctuations, and
  3. High flow tests.

## Elements of the Alternatives (continued)

- Water temperature is an important factor in the reproduction, recruitment, and survival of humpback chub. However, there is significant concern and scientific information available that indicates that warmer water temperatures may also increase the potential expansion of warm water non-native predators.



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## Elements of the Alternatives (continued)

- The alternatives consider installation of a selective withdrawal structure to alter the temperature of dam releases and the use of steady flows to increase the temperature of humpback chub habitat.
- In light of the concern that warmer water may advantage non-native fish that compete with, and in some cases prey upon native fish, the alternatives also analyze non-native control measures.

# Elements of the Alternatives (continued)

- **Dam release fluctuations** are key to the effective generation of hydropower to match power demand patterns, but also affect humpback chub habitat and sediment transport.
- The action alternatives consider various experimental daily release patterns in an attempt to determine impacts to downstream resources.

## Elements of the Alternatives (continued)

- **High flow tests** are releases higher than normal powerplant releases and may include both maximum powerplant releases and maximum powerplant releases combined with use of the bypass tubes.
- High flows are the only mechanism known to restore and replenish beaches above the normal powerplant operations flow level. However, it is unknown whether this approach will result in long-term sustainability of sediment resources in Grand Canyon.

## Elements of the Alternatives (continued)

- There are also actions common to two or more of the alternatives. These other actions include:
  - Testing of alternative release ramp rates
  - Short-term experimental flows
  - Installation of a selective withdrawal structure
  - Non-native fish removal in the mainstem Colorado River and tributaries
  - Translocation of humpback chub
  - Humpback chub refuge planning
  - Vegetation removal

# Alternatives

- The four action alternatives to be described in this EIS represent a range of alternatives to facilitate further learning about the effects of dam operations on downstream resources.
- None of the action alternatives control annual volumes of water released from the dam; rather each of the alternatives vary in their allocation of monthly and hourly releases and ramping rates.

## Alternatives (continued)

- They also vary in construction of a selective withdrawal structure on two of the eight penstocks at the dam, construction of a sediment augmentation pipeline, and experimental design.
- A matrix of the alternatives was posted to our project website on September 7, 2007.

# Summary of Individual Alternatives



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# No Action Alternative

- The No Action Alternative serves as the baseline for comparison with the action alternatives. The No Action Alternative is modified low fluctuating flows as described in the 1995 operation of Glen Canyon Dam EIS.
- Glen Canyon Dam releases would continue to be operated under the constraints of the 1996 Record of Decision, the selected alternative from the Shortage EIS, and the Annual Operating Plan process.

# Alternative 1

- This action alternative was developed based on proposals submitted by the Western Area Power Administration, Arizona Game and Fish Department, and the Federation of Fly Fishers.
- This alternative consists of increased fluctuating flows, experimental high flows, non-native fish control, and humpback chub translocation.

## Alternative 1 (continued)

- The key assumption behind this alternative is that there has been insufficient documentation of the effects of high fluctuating flows and that such flows are not detrimental to the ecosystem. The result is hypothesized to be an increase in hydropower generation value, humpback chub population, and sandbar deposits.
- This alternative does not include construction of a selective withdrawal structure or sediment augmentation.

# Alternative 2

- This action alternative was developed based on proposals submitted by the National Park Service, Fish and Wildlife Service, and Reclamation.
- This alternative consists of fluctuating and stable flows with high experimental flows that would occur if there was sufficient sediment input from the tributaries.
- This alternative includes a selective withdrawal structure, non-native fish control, and humpback chub translocation. It does not include sediment augmentation.

## Alternative 2 (continued)

- The primary assumptions behind this alternative are that humpback chub survival and recruitment would be improved over and above the recent trend of improvement through warmer dam releases and fall steady flows and that sediment conservation in the Grand Canyon would be improved through frequent high flow tests.

## Alternative 3

- This action alternative is based on proposals of non-governmental researchers combined with proposals of the Grand Canyon River Guides.
- This alternative consists of fluctuating flows with multiple high experimental flow tests, non-native fish control, and humpback chub translocation. It does not include sediment augmentation.

## Alternative 3 (continued)

- This alternative includes construction of a selective withdrawal structure designed to increase the availability of warm native fish habitats. However, because of risk to endangered fish from proliferation of warm water non-native fish, an investigation of the feasibility of cold water releases would be included.
- The primary objective of this alternative is to produce warm mainstem aquatic habitats to encourage humpback chub reproduction and recruitment and over time result in increased humpback chub population size.

# Alternative 4

- This action alternative was developed based on proposals submitted by the Grand Canyon Trust.
- This alternative mimics a pre-dam hydrograph, temperatures, and sediment concentrations. It also includes humpback chub translocation and non-native fish controls.
- The primary assumption is that mimicking pre-dam conditions would improve the overall ecosystem by establishing natural patterns and processes.

## Alternative 4 (continued)

- Compared to the No Action Alternative, monthly flow patterns are most radically altered in this alternative. This alternative would implement year-round steady releases mimicking a pre-dam pattern, with spring releases of over 20,000 cfs decreasing to 8,000 cfs in the winter.
- This alternative includes a selective withdrawal structure and sediment augmentation to increase the sediment balance in Grand Canyon.

# How will the LTEP Impact Water Quality in Lake Mead?



andy parrick

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- We do not know what the impacts will be until we complete the analysis in the environmental impact statement.

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# Progress to Date and Schedule

- Drafts of Chapters 1, 2, and 3 have been completed and reviewed by the Grand Canyon Monitoring and Research Center, science advisors, and cooperating agencies.
- We are currently working to incorporate substantive comments received on the first three chapters and expect to have a draft of Chapter 4 completed for internal review by the end of December or first of January.
- We plan to issue the draft EIS to the public in February or March of 2008 (there will be a 45- or 60-day public review period for the draft).
- Formal consultation with the U.S. Fish and Wildlife Service will take place in April or May of 2008.
- The final EIS should be issued in October 2008.
- The Record of Decision should be issued in December 2008.

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## If you have questions, please contact:

- Randall Peterson, Bureau of Reclamation, at (801) 524-3758, or e-mail at [GCDExpPlan@uc.usbr.gov](mailto:GCDExpPlan@uc.usbr.gov).
- Jayne Kelleher, Bureau of Reclamation, at (801) 524-3680, or e-mail at [jkelleher@uc.usbr.gov](mailto:jkelleher@uc.usbr.gov).
- Information about this EIS is posted to the project website at the following web address:  
<http://www.usbr.gov/uc/rm/gcdltep/index.html>.

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