

**GLEN CANYON TEMPERATURE CONTROL
ENVIRONMENTAL ASSESSMENT**

Proposed Alternatives to be Evaluated:

- No Action
- Addition of a Temperature Control Device

Proposed Impacts and Risks to be Assessed:

Costs

- No Action
- Temperature Control Device
 - Construction
 - Post-project testing

Lake Powell

<ul style="list-style-type: none"> Water Temperature Dissolved Oxygen Trace Elements Sport Fishery Forage Fish Reservoir Evaporation 	<ul style="list-style-type: none"> Nutrients Salinity Primary Productivity Recreation Native Fish Power Production
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River below GCD

<ul style="list-style-type: none"> Water Temperature Dissolved Oxygen Trace Elements Native Fish Recreation Air Temperatures 	<ul style="list-style-type: none"> Nutrients Salinity Primary Productivity Non-Native Fish Evaporation
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Lake Mead

<ul style="list-style-type: none"> Water Temperature Dissolved Oxygen Trace Elements Fishery Reservoir Evaporation 	<ul style="list-style-type: none"> Nutrients Salinity Primary Productivity Recreation
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Other

<ul style="list-style-type: none"> Section 7 Consultation (ESA) 	<ul style="list-style-type: none"> 404 Permit
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Progress Review - Implementation of the Glen Canyon Dam Operations Biological Opinion

1 - Adaptive Management Program

Prior to the Secretary of the Interior signing the Record of Decision (ROD) on the Glen Canyon Dam Environmental Impact Statement, Reclamation organized the Transition Work Group (TWG). This group meets regularly, in much the same fashion as the future Adaptive Management Work Group (AMWG) will meet. Steve Magnussen has been named as the Secretary's designee to the TWG. Numerous drafts of the Adaptive Management Workgroup Charter have been circulated for comment, and the final version is currently in Washington D.C. for approval and signature. The ROD was signed on October 9, 1996, formally adopting the preferred alternative, including the AMP and the Grand Canyon Research and Monitoring Center (Center). Activities to staff and house the Center are ongoing.

1A - A Program of Experimental Flows *

The RPA recommends that experimental flows include high steady flows in the spring, and that studies of high steady flows in spring may include habitat building and habitat maintenance flows. A habitat/beach building flow of 45,000 cfs, including appropriate up and down ramps, was conducted in March, 1996. The final reports analyzing the effects of the habitat/beach building flow are due on or before December 31, 1996. Final analysis and integration of the data will require approximately one additional year and should be available in late 1997. Conducting this experimental flow required preparation of an environmental assessment (February, 1996), and a Biological Assessment (November, 1995) for consultation under the Endangered Species Act. Following analysis, a finding of no significant impact was issued. A symposium to discuss the results of the experimental flow is currently scheduled for April 2-3, 1997.

The BO also recommended: "... testing of low steady flows in summer and fall during low water years. Information from final GCES endangered fish reports, researchers who conducted those studies, and other knowledgeable individuals are to be used to develop hypotheses and studies to accompany those flows. Design of the experimental flows and associated studies will begin as soon as possible and be targeted for completion by October 1996". The BO recommended experimental flows be initiated in April, 1997. If sufficient progress and good faith effort is occurring toward initiating experimental flows, implementation of experimental flows may occur later in 1997. If the FWS believes there is not sufficient progress, Glen Canyon Dam would be operated as Seasonal Adjusted Steady Flows during spring through fall (April to October) beginning in 1998.

The Annual Operating Plan for water year 1997, prepared in accordance with the Colorado River Basin Project Act, does not contain requirements to conduct these flows during this water year. This decision is based upon Reclamation forecasting water releases greater than 8.23 maf. Under this release condition, the BO allows implementation of the preferred alternative.

* A copy of the RPA is attached for reference.

Reclamation accepted Fish and Wildlife Service's (FWS) recommended RPA in an April 6, 1995, response to the BO. This letter of response indicated how Reclamation would implement the RPA. In this response, Reclamation articulated that: implementation of experimental flows are to be coordinated through the AMP; the flow experiments will include scientifically based peer reviewed criteria to measure and evaluate their impacts on downstream resources; the research would be managed and administered through the Center; and that appropriate staff and funding levels needed to be identified. Delays in the signing of the ROD have resulted in only partial implementation of the AMP; however, as previously stated, Reclamation has managed to keep these processes moving forward. Dr. Garrett, Center director, has conducted multiple meetings to formulate research needs and is continuing to progress toward a long term research and monitoring plan which will evaluate the flows.

1B - Selective Withdrawal Program for Lake Powell

Funding has been programmed to continue working toward a decision regarding selective withdrawal. Studies of the macro invertebrates below the dam are ongoing, and the final report is scheduled for completion in May, 1997. Studies on chlodophora and gammerous have been completed by Dean Blen. A model which will be used to evaluate the effectiveness of a selective level withdrawal is being set up and calibrated by Reclamation's Denver office. The study will be completed in 1997.

1C - Determine responses of native fish to various temperature regimes and river flows (future research program)

Contracts for certain fish studies have been renewed to preserve a long term data base, avoiding gaps in the data. A large amount of research was conducted during the experimental flow as well. Future research and long term monitoring will be conducted through the Center.

2 - Protect humpback chub population and habitat in LCR by being instrumental in developing of a management plan.

Reclamation contracted with the Navajo Nation to prepare the plan. The Navajo Nation contracted with SWCA consulting firm to produce the document. A preliminary draft was prepared, and Reclamation and the Navajo Nation met to discuss modifications. Reclamation will provide final comments to SWCA by the end of November, 1996. It is anticipated the draft will be completed shortly thereafter. The draft will be circulated to FWS and any other interested party for comment and finalized upon incorporation of the comments. The final LCR Management Plan will then be transmitted to FWS and other parties with the jurisdiction and authority to implement it. Reclamation is willing to participate in the process in accordance with responsibilities under Section 7(a)(1) of the Endangered Species Act.

3 - Sponsor razorback sucker workshop

Reclamation sponsored a workshop on the endangered razorback sucker on January 11 and 12, 1996. Representatives of State and Federal agencies from the seven Basin states, the environmental community, and water and power interests attended. Recognized native fish experts outlined the ecology, genetics, and threats to the razorback in the Colorado River system. The status of the razorback sucker population and a photographic tour of habitat in Glen and Grand Canyons was then presented. The workshop participants engaged in an active discussion, attempting to answer the questions: Should we manage for razorback suckers in this reach of the Colorado River; Can we manage them here; and, What specific actions should be taken in the next three to five years? Although many differing opinions were expressed, overall the group believed razorback suckers could, and should, be managed in Glen and Grand Canyons. Improved communication/dissemination of data, continued research, and investigating the control of non-native fish were the three major actions identified as being needed. The results of the workshop were sent to participants, including the FWS, on February 12, 1996.

The FWS will now recommend a course of action and develop a Memorandum of Understanding.

4 - Establish a second spawning population of humpback chub

Limited activities have taken place on this element. Some evaluation of the tributaries to determine suitability have been undertaken by the FWS through Reclamation funding. Additional work will be conducted through the Center.

Other work related to endangered species

A biological assessment is being prepared to evaluate the effects of the preferred alternative on the southwestern willow flycatcher. The draft is scheduled for completion by the end of November, 1996, and the final by the end of January, 1997. The expected outcome is a request for formal consultation.

Habitat and life history data have been collected on Kanab ambersnails (KAS), and populations were monitored during the experimental flow. Reclamation staff are participating regularly on a KAS working group. One of the activities recently initiated is the evaluation of the potential use of the grassy roof area of Glen Canyon Dam and power plant as a location to establish plant communities needed by KAS. It is thought that if a plant community could be established that possibly an experimental population or 'seed source' population could be used in the establishment of other populations.

Fish Data Integration Work

There are three individual efforts underway regarding native fishes, all of which contribute to the requirements of the Biological Opinion.

A. Arizona State University Summary - This is a summary of all information from GCES Phase II. It includes information on all resources and is similar to the 1988 report put out by Reclamation. It will also include information on what studies were conducted during the Beach/Habitat Building flow. The work is being done by a post doctoral student under W.L. Minkley.

B. Data Integration - During GCES Phase II, the fishery research was divided into four contracts, one each to BioWest; Arizona State University; Arizona Game and Fish; and the FWS. These 4 data sets will be linked and integrated by FWS (Owen Gorman).

C. ~~Synthesis and Risk Analysis - Reclamation awarded a contract for this work through a~~ competitive bid process. Steven W. Carothers and Associates were the successful bidders. SWCA will synthesize existing peer reviewed data and published data on flows and temperature, etc., related to native and non-native fishes to test the hypothesis that the benefits of steady flows to native fish outweigh the benefits to non-natives.

A final step in this process will be synthesis of other data, such as sediment resource data, with fish data.