

Glen Canyon Dam Adaptive Management Work Group
Agenda Item Information
February 3-4, 2010

Agenda Item

Non-native Fish Control Planning

Action Requested

- ✓ Feedback requested from AMWG members.

Presenters

Kara Hilwig, Fishery Biologist, Grand Canyon Monitoring and Research Center
John Hamill, Chief, Grand Canyon Monitoring and Research Center
Sam Spiller, Lower Colorado River Coordinator, US Fish and Wildlife Service
Shane Capron, Technical Work Group Chair (Western Area Power Administration)

Previous Action Taken

- ✓ By AMWG: At its October 2004 meeting, AMWG passed the following motion by consensus: Authorize funds for workshops, and direct GCMRC to further develop warm water species plan with TWG. The workshops include the GCMRC workshop as described in the prospectus for warm water species research, and participation in the Upper Basin Recovery Implementation Plan workshop on non-native fish control.

Relevant Science

N/A

Background Information

Control of nonnative fishes is recognized as an important element in restoration of the native aquatic ecology of the Colorado River ecosystem in Grand Canyon. It is included as a conservation measure of the 2008 Biological Opinion for Glen Canyon Dam Operations (2008 High Flow Test with Five Years of Two-month Steady Flows Experiment):

“*Nonnative Fish Control* – As first presented in the biological opinion on the Shortage Guidelines, Reclamation will, in coordination with other DOI AMP participants and **through the AMP**, continue efforts to assist NPS and the AMP in control of both cold- and warm-water nonnative fish species in both the mainstem of Marble and Grand canyons and in their tributaries, **including determining and implementing levels of nonnative fish control as necessary**. Because Reclamation predicts that dam releases will be cool to cold during the period of the proposed action, control of nonnative trout may be particularly important. Control of these species will utilize mechanical removal, similar to recent efforts by the AMP, and may utilize other methods, to help to reduce this threat. **GCMRC is preparing a nonnative fish control plan through the AMP process** that addresses both cold and warm-water species that will further guide implementation of this conservation measure.” (*emphasis added*)

Non-native Fish Control Plan, continued

GCMRC has written the nonnative fish control plan referenced above entitled, “Nonnative Fish Control in Grand Canyon—Historical Perspectives and Recommendations for Monitoring, Control, and Research” and dated November 17, 2009. The full report can be found at http://www.usbr.gov/uc/rm/amp/amwg/mtgs/10feb03/Draft_Nonnative_Plan.pdf. TWG began discussion of the plan during a conference call in early January, and will continue its deliberations at its January 21 meeting.

This agenda item will begin with a presentation from the primary author of the plan Kara Hilwig on the elements of the plan and the process for its development. John Hamill will then describe the first in a series of proposed annual workshops on the subject. The workshop will include a review of new monitoring and research findings, as well as research, monitoring, and control actions planned for FY 10 and 11. Management agencies will review this information and determine what adjustments are needed to the work plan, if any, to support their responsibilities. The annual workshop is a key element of the adaptive management approach being used to address nonnative fish issues.

Sam Spiller will describe some of the upcoming challenges, such as tribal concerns, management needs to ensure conservation of humpback chub, funding sources to support management actions, and the need to clarify roles and responsibilities among the management agencies, as well as how the agencies will proceed to meet these challenges.

The TWG Chair will present the deliberations by and any recommendations of the TWG. Feedback from AMWG is requested.



Nonnative Fish Control in Grand Canyon—Historical Perspectives and Recommendations for Monitoring, Control, and Research

By Kara D. Hilwig, Matthew E. Andersen, and Lewis G. Coggins, Jr.

Draft U.S. Geological Survey Planning Document—Revised November 17, 2009

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KENNETH SALAZAR, Secretary

U.S. Geological Survey
Marcia McNutt, Director

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Nonnative Fish Control in Grand Canyon—Historical Perspectives and Recommendations for Monitoring, Control, and Research

By Kara D. Hilwig, Matthew E. Andersen, and Lewis G. Coggins, Jr.¹

Executive Summary

The Glen Canyon Dam Adaptive Management Program (GCDAMP) directed the U.S. Geological Survey's Grand Canyon Monitoring and Research Center to develop a nonnative fish management plan for the Colorado River in Grand Canyon. This document seeks to respond to that charge by describing a comprehensive approach for managing and researching nonnative fish species in the ecosystem. This plan is consistent with GCDAMP goals to improve the status of native fish in Grand Canyon, especially the federally listed endangered humpback chub (*Gila cypha*), and to maintain a naturally reproducing population of rainbow trout (*Oncorhynchus mykiss*) above the Paria River to the extent practicable and consistent with the maintenance of viable populations of native fish.

The Colorado River and its tributaries in Grand Canyon are an interconnected system that includes a variety of fish habitats and species. As a result, the threats posed by nonnative fish to native species throughout the system are diverse and require a multifaceted management response. To begin to develop an appropriate response, this plan summarizes the history of nonnative fish management efforts in Grand Canyon, including an overview of recent efforts to protect native species through nonnative control projects. A review of current nonnative fish monitoring and sampling efforts and nonnative fish captures in Grand Canyon are also included. Existing information and data provide the basis for the research, management, and monitoring strategies presented in this plan for immediate implementation. Developing a complete spectrum of nonnative fish monitoring and control methods and a risk assessment will take additional time.

An examination of recent and current fish sampling efforts reveals the need to improve nonnative fish monitoring, address information gaps, and facilitate the ability of managers to share information about and to rapidly respond to emerging and urgent threats caused by nonnative fish. Suggestions for making strides in these areas are included here. A review of exiting information also indicates that the long-term control of nonnative fish populations in Grand Canyon may require the control of nonnative species in the broader watershed. For example, source populations of nonnative fish that impact Grand Canyon native fish may originate outside of Grand Canyon and may not fall within the scope of the GCDAMP.

¹ U.S. Geological Survey, Southwest Biological Science Center, Grand Canyon Monitoring and Research Station, Flagstaff, Ariz.

This plan outlines a comprehensive approach that prioritizes nonnative fish monitoring, removal, and research strategies for Grand Canyon. Monitoring strategies proposed by this plan and presented in the order of their importance are as follows:

1. Expansion and diversification of current mainstem monitoring methods
2. Development of an early detection mechanism for alerting managers to nonnative fish invasions in Lees Ferry and the Colorado River from tributary sources
3. Implementation of a long-term fish monitoring program for Grand Canyon tributary streams

Control strategies for nonnative fish proposed by this plan and presented in the order of their importance are as follows:

1. Maintenance of trout abundance in the Little Colorado River reach at 10 to 20 percent of January 2003 rainbow trout abundance (approximately 600 to 1,200 rainbow trout)
2. Continued removal of rainbow trout from Shinumo Creek using backpack electrofishing in combination with other methods (for example, weirs and angling). Removal efforts will take place in association with translocation efforts and continued removal of trout species from Bright Angel Creek using a weir and backpack electrofishing.
3. Removal of channel catfish (*Ictalurus punctatus*) and bullhead species in and around the Little Colorado River
4. Chemical renovation and barrier construction in tributary streams identified as sources of nonnative fish into Grand Canyon

Control strategies for future consideration include stocking daughterless common carp (*Cyprinus carpio*) and the introduction of infectious agents.

Research strategies proposed by this plan and presented in the order of their importance are as follows:

1. Development of a bioenergetics, or ecosystem modeling, approach to identify nonnative species posing the greatest risk to natives
2. Identification of sources of juvenile and adult nonnative fish into the mainstem, including tributary inflows, dam passage, and stocking, and isotope and larval drift studies to identify spawning areas and natal origins of nonnative fish
3. Improvement of monitoring methods through use of a model or an alternative approach to track changes in abundance and distribution of nonnative fish
4. Implementation of small-bodied nonnative fish and young-of-year (YOY) capture and monitoring studies using slow-shocking techniques in the mainstem
5. Continued development of remote PIT-tag detection technology for use on nonnative fish and in tributary streams
6. Use of large-mesh gill nets to target common carp in the Little Colorado River and its confluence with the mainstem Colorado River
7. Development of targeted flow and temperature manipulations to disadvantage nonnative fish, including continuing efforts to install and operate a temperature control device on Glen Canyon Dam
8. Use of pheromone and sensory attractants to increase nonnative fish captures

9. Implementation of sonic telemetry studies for native and nonnative fish to compare and identify spatial and temporal movement patterns, tributary use, and spawning areas
10. Use of experimental stream tests to investigate mechanisms by which nonnative fish negatively affect juvenile humpback chub
11. Modification of Williams' Carp Cage for application to common carp control in tributary streams

Other activities that could improve the management of nonnative fish include the following measures, which are listed in the order of their importance:

1. Conduct an annual nonnative fish workshop with cooperators, managers, and other nonnative fish experts
2. Initiate a public outreach effort specifically dealing with nonnative fish management issues that emphasizes preventative measures such as deterring illegal stocking
3. Develop a formalized reporting procedure for nonnative fish captured and observed by those professional entities sampling aquatic environments within Grand Canyon

This plan suggests evaluating the use of triggers tied to changes in nonnative species catch rates, distribution, community composition, and length frequency to initiate control efforts. Triggers would be reviewed annually by scientists and managers.

Addressing expansion of nonnative fish species currently present or new to the system could be limited by the capture methods currently available for most species in Grand Canyon. This situation necessitates the use of sampling gears with moderate, poor, or unknown capture efficiencies while newer, more sustainable or effective methods are being evaluated. In the interim, combining several capture methods and focusing on problem areas with the gears that are most likely to capture target species offer the best opportunity to temporarily reduce nonnative species.

Finally, this plan concludes that a contingency fund is necessary to support future pressing nonnative fish control needs and to avoid impacting ongoing monitoring and research activities. The costs of nonnative control efforts will vary depending on many factors, including target species, gear required, removal location, specific project goals, and other factors. Currently, based on the immigration rates observed from 2003 to 2006 and recent (2009) monitoring data, it is estimated that a minimum of two removal trips per year could be required (under a low immigration scenario of 50 fish per month) to maintain the population of 600 to 1,200 rainbow trout in the Little Colorado River reach (10 to 20 percent of the size of the January 2003 population). The cost of a single trip is \$150,000, meaning that two control trips would cost approximately \$300,000. This plan suggests that the GCDAMP contribute \$300,000 annually to a nonnative fish control contingency fund, accumulating up to a maximum of \$900,000 over 3 years. This fund would be available for controlling any nonnative species in Grand Canyon determined to be pose a high risk to humpback chub.