USGS
science for a changing world

Grand Canyon Nonnative Fishes Control Plan I — Short-Term Monitoring and Research Actions

By
Kara D. Hilwig, Matthew E. Andersen
and
Lewis G. Coggins, Jr.
Southwest Biological Science Center
Grand Canyon Monitoring and Research Center

U.S. Department of the Interior
U.S. Geological Survey

Overview

1. Plan purpose and need
2. Plan Development
3. Plan Organization
4. Current Knowledge
5. Management Planning
6. Recommendation Summary
7. Contingency Planning
8. FY09 Projects

USGS

Background Purpose and Need

Nonnative fish implicated in decline of native fish world wide

Glen Canyon Dam Adaptive Management Program called for a Nonnative Fish Management Plan for Grand Canyon

Consistent with 2008 BO Conservation Measures, Comprehensive Plan and Recovery Plans

- **Negative impacts to humpback chub and other native fish**
- **Reduce nonnative fish abundance**
- **Grand Canyon mainstem and tributaries**

Humpback chub, *Gila cypha*

Basic questions, difficult answers

- Species of greatest risk?
- Sources?
- Distribution in mainstem and tributaries?
- Spawning locations?
- Can monitoring protocols detect changes?
- Effective capture/reduction methods?
- Sustainable reduction level?
- Achilles heel?


Hubble image

USGS

Cool/Cold Water Nonnative Fish of Grand Canyon

Rainbow trout

Brown trout

USGS

Warm Water Nonnative Fish of Grand Canyon


Smallmouth bass


Fathead minnow

Plains killifish


Red shiner


Channel catfish


Bluegill


Green sunfish


Bullhead catfish


Striped bass

Abridged inventory

Plan Development

- Internal and external review
- Nonnative fish workshop October 2007

National Park Service

Arizona Game and Fish Dept.

US Forest Service

Colorado St. University

Bureau of Reclamation

University of Florida

Idaho State University

US Fish and Wildlife Service

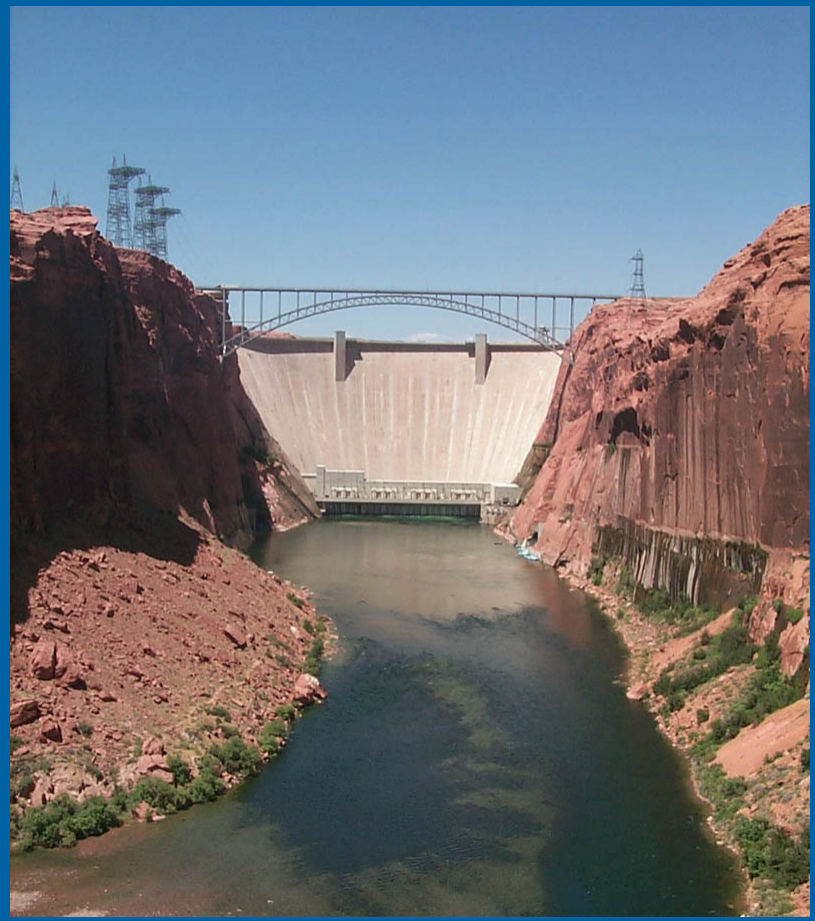
Upper Basin Recovery Program

Utah Div. of Wildlife Resources

USGS

Plan Organization

- **Short term Plan**
  - Identify and address information needs
  - Present available methods
  - Contingency planning
- **Long term Plan**
  - Incorporate new information
  - Risk assessment
  - Evaluate annual pilot projects



USGS

Current Knowledge

Monitoring methods: Electrofishing, hoopnets, angling, seining

- Detect magnitude changes in some nonnative fish populations
- Need to improve capture/control techniques for warm water nonnatives

Control

- Mechanical removal of most species limited effectiveness/efficiency
- Chemical control not practical in mainstem and controversial

Targets

- 'Hot spots' of nonnatives
  - Spawning, recruitment areas
- Non-zero reduction level

Nonnative brown trout with humpback chub

USGS

Recommendations for Management Planning

Monitoring improvements

- Test novel capture methods
  - Increase capture probability
  - Improve abundance estimates
  - Improve ability to detect population changes
- Avoid ‘body count’ method
  - Quantify proportion of population removed
  - Identify and quantify native response
- Target species
  - Warm water expansion potential
  - Currently in system
  - Improve capture methods

Channel catfish pilot project, ‘catfish hoop nets’

USGS

Recommendations for Management Planning

Research Recommendations

- Natal Origins/Source Study
  - Isotope/Otolith evaluation
    - ID hatch location and timing
  - Larval drift samples
  - Native and nonnative
- Sonic telemetry
  - Native and nonnative tributary use
  - Spatial and temporal overlap
  - Spawning areas
  - ‘Hot spots’ for removal
- Remote PIT tag detection
  - Native and nonnative
  - Juvenile fish movement

USGS

Implanting sonic tag in RBT for HFE study

Remote PIT tag detector deployment (Columbia River)

Recommendations for Management Planning

Research Recommendations

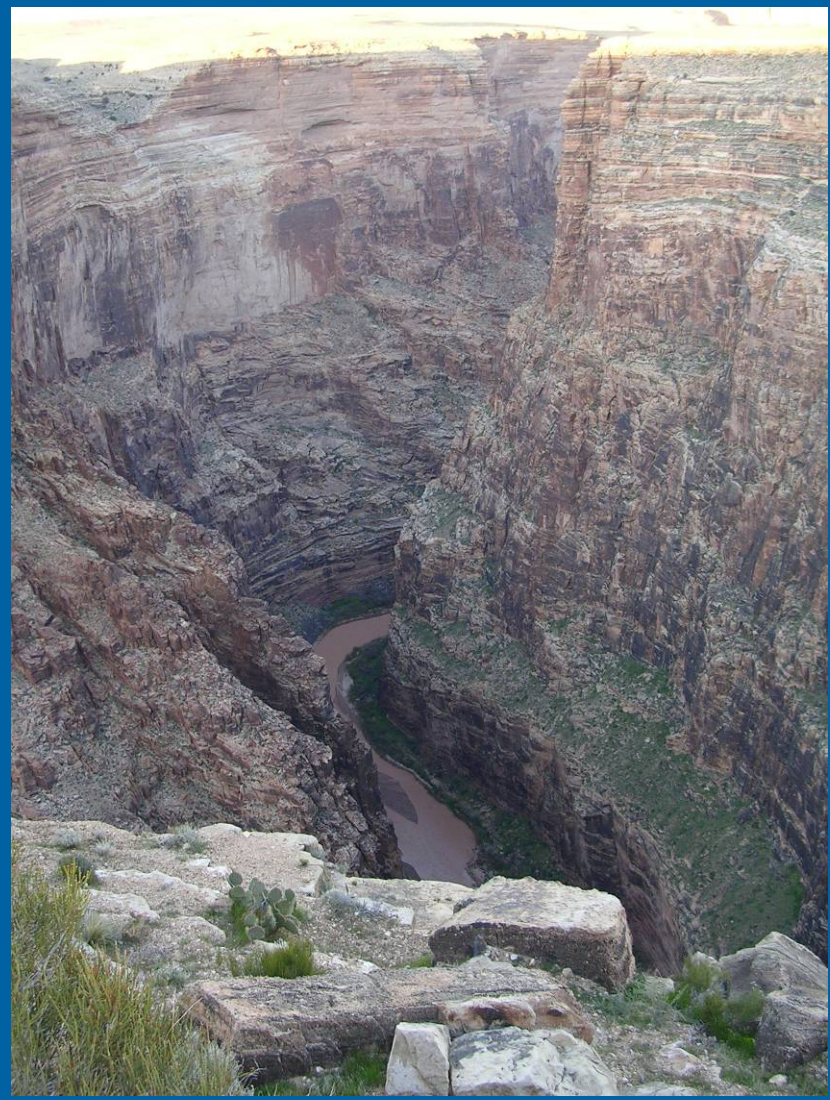
- Small-bodied fish
  - Develop capture techniques
    - ID recruitment areas
    - Trends in recruitment
- Lees Ferry
  - Area of concern
    - New invaders from dam passage or illicit stocking
  - Increase sampling intensity
    - Develop methods to detect new invaders

USGS

Recommendations for Management Planning

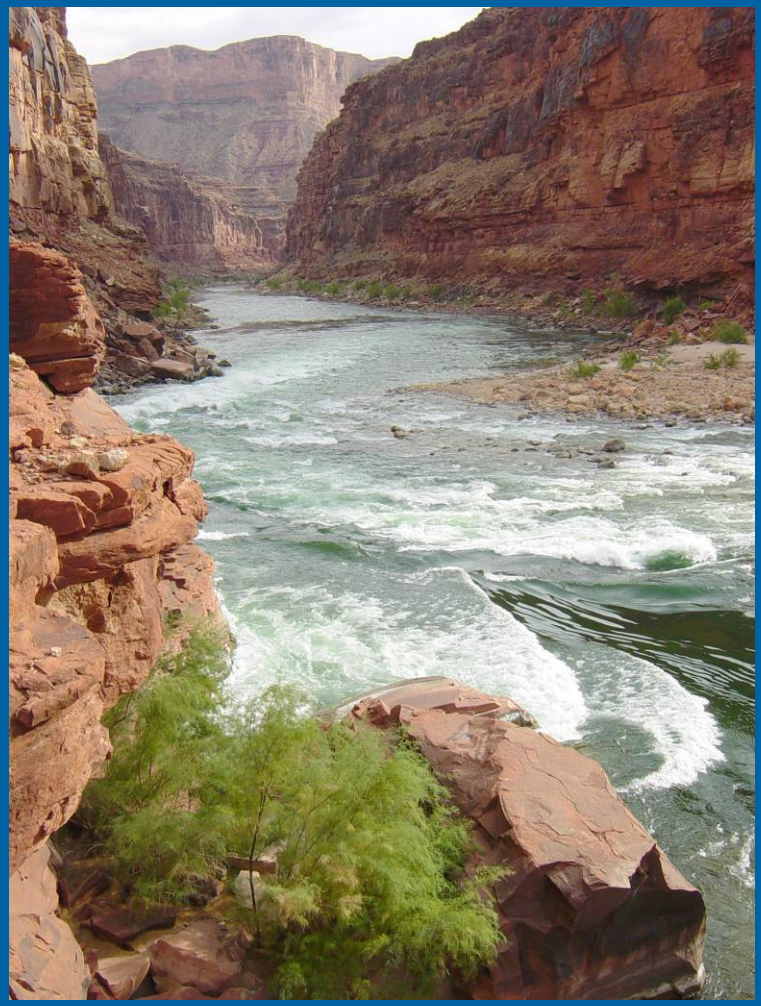
Management Action Recommendations

- Mechanical Removal in proximity of LCR
- Control in Tributaries
  - Weirs
  - Backpack electrofishing
  - Piscicides
- Annual Workshop
  - Prioritize recommendations
- Public Awareness
  - Impact of nonnatives



USGS

Long Term Plan



National Park Service

- Integrate knowledge gained from short term plan
- Target species of greatest risk
  - Most efficient control method
  - Area and time of greatest density and vulnerability
  - To advantage of natives
- ID and control sources
- Reduce to target abundance/distribution
- Maintain target abundance/distribution

USGS

Short Term Plan Recommendations Summary

Monitoring

- Improve captures, ability to detect changes in warmwater species

Research

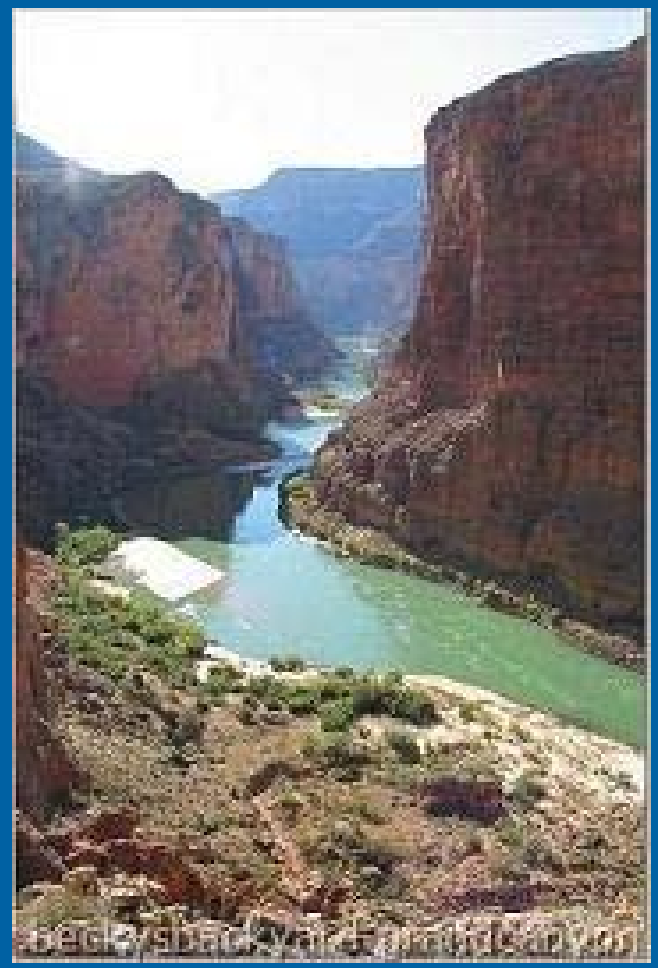
- Natal Origins/Source study
- Sonic tagging
- Remote PIT tag detectors
- Improve small-bodied fish captures
- Improve Lees Ferry sampling

Annual NNF Workshop

- Panel of experts

Management Actions

- Mainstem Removal (LCR Reach)
- Tributary Stream Control
  - Weirs, backpack shockers, piscicides
- Public awareness



USGS

Contingency Planning

How to respond to expansion or invasion?

Rapid reduction of new invaders or nonnative population expansions vital to protect native fish and increases likelihood of reduction success

- **Who responds?**
  - **Which agencies implement management**
- **How do we respond?**
  - **May not have best capture method available**
- **Funding?**
  - **Monitoring and Research funds directed at tracking native and nonnative fish response**

USGS

FY09 NNF Plan Implementation

Monitoring

- Pilot project; gear testing

Research

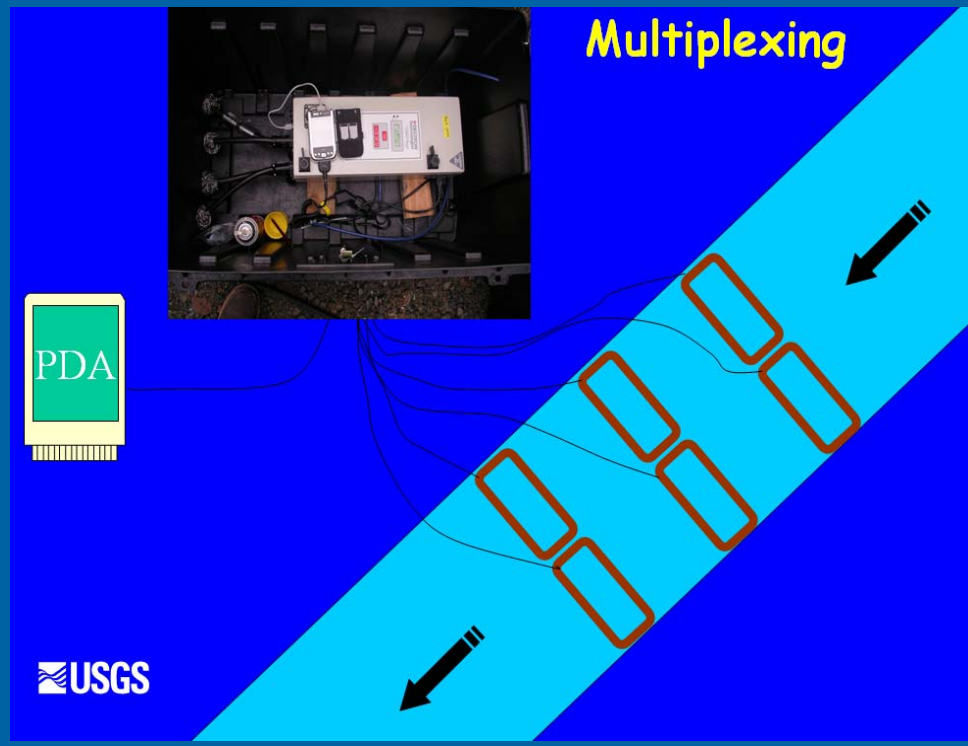
- Remote PIT tag detectors; collaboration with USGS staff in Columbia River Basin
- NSE targeting small-bodied fish

Management

- Trout reduction LCR reach

Annual NNF Workshop

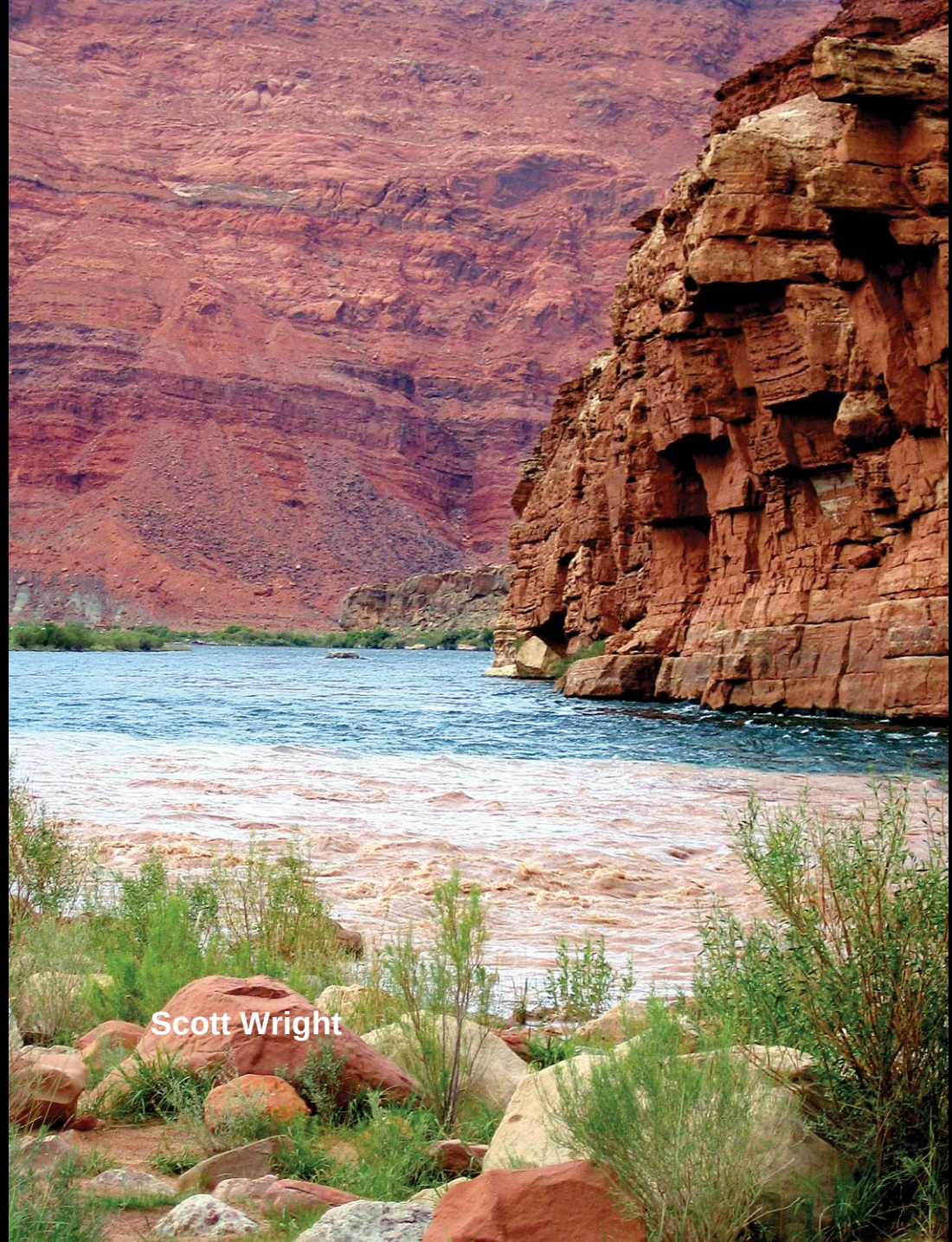
- Panel of experts to be convened



Remote PIT detection system designed by USGS Columbia River Research Lab in Cook, Washington

USGS

Questions?



USGS