



Grand Canyon Monitoring and Research Center



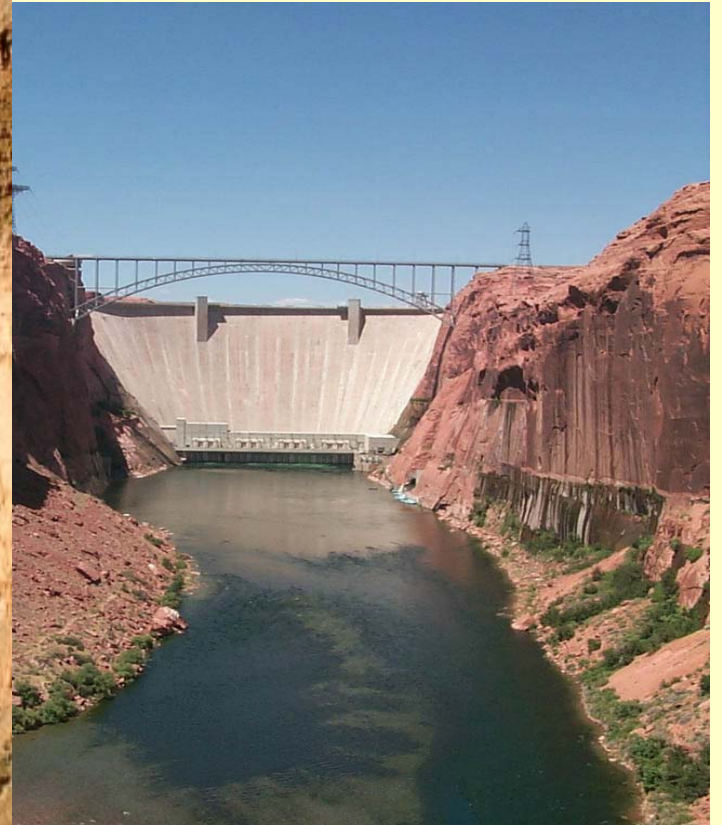
GCMRC and The Glen Canyon Dam Adaptive Management Program (AMP)

**An Experiment in Collaborative,
Science-based Resources Management**

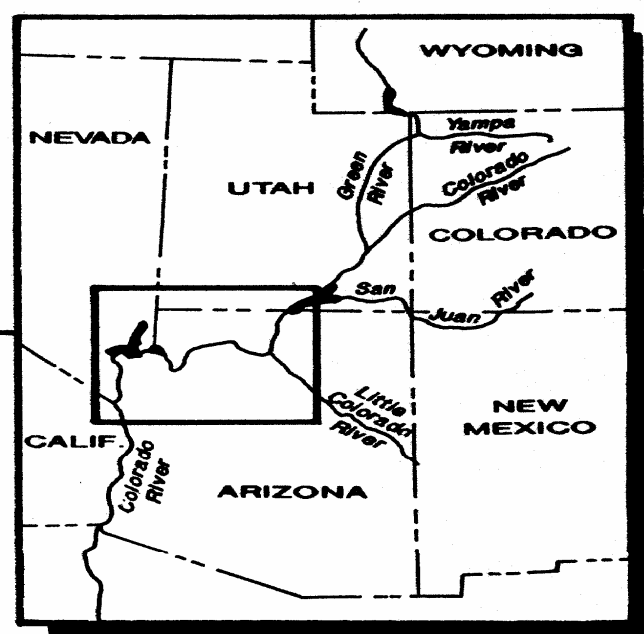
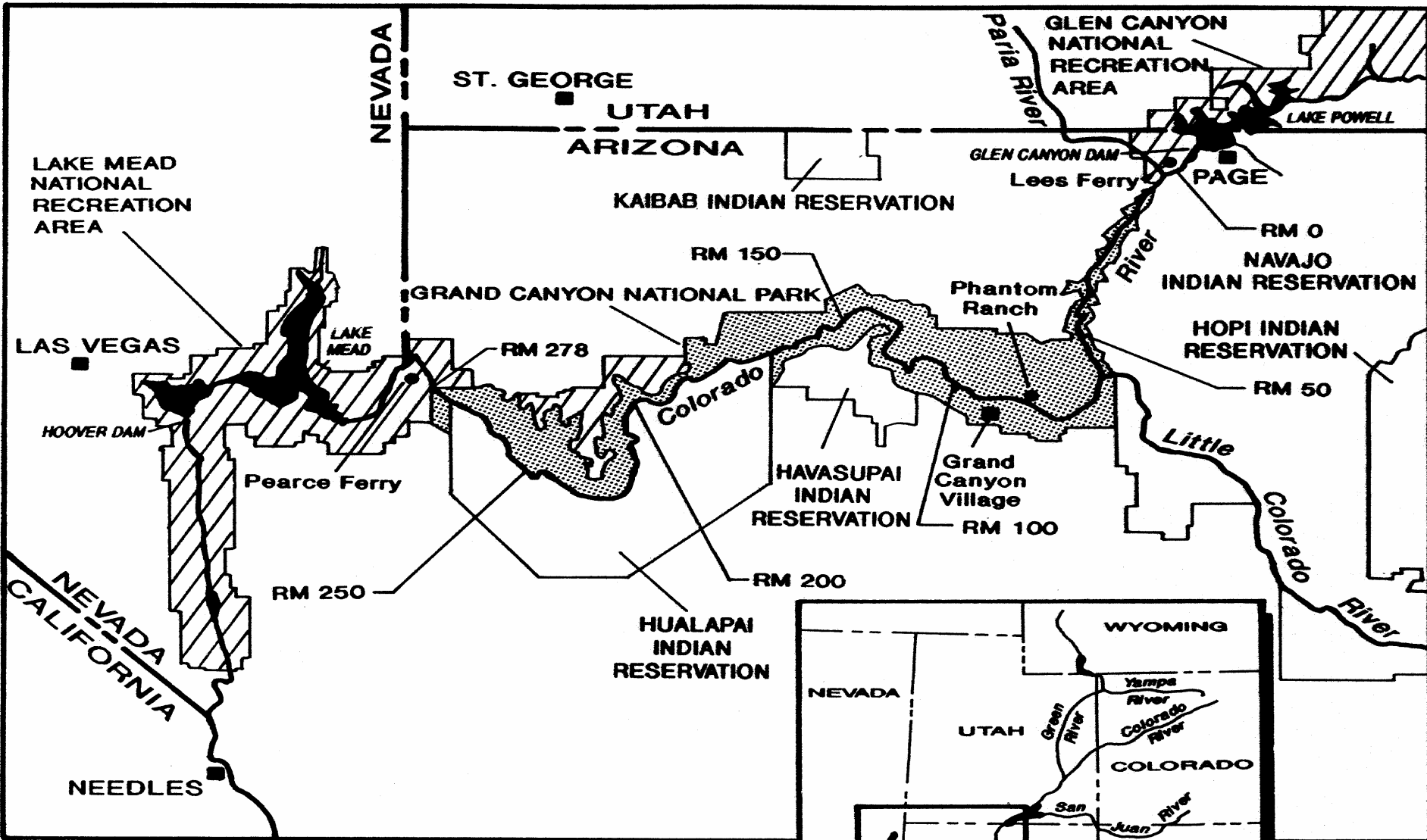
*Southwest Biological Science Center
Flagstaff, AZ*



Glen Canyon Dam



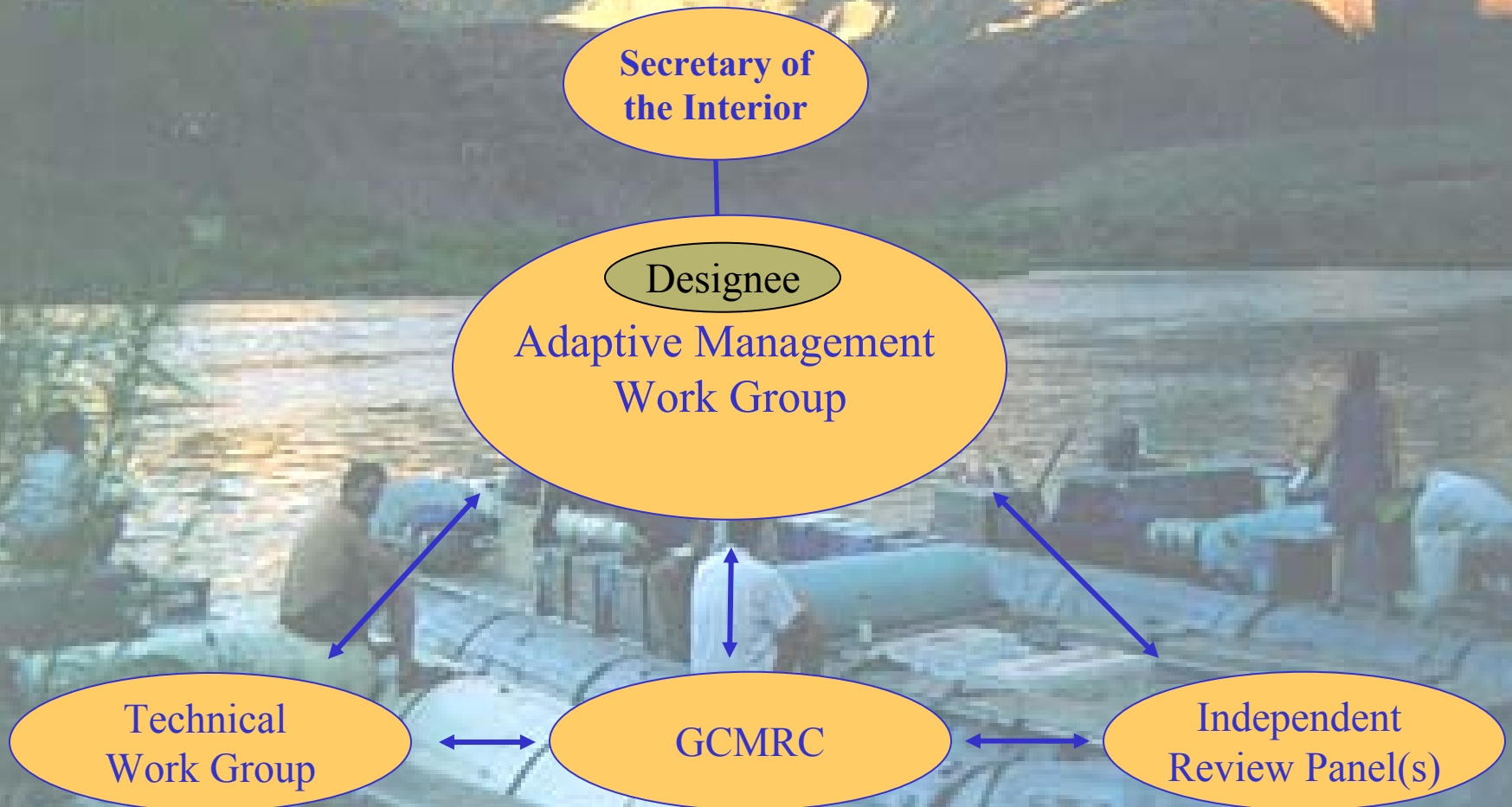
The Colorado River
Ecosystem



Adaptive Management within the GCDAMP

- Embraces a new paradigm of natural resource agencies “governing with people” as compared to “ruling over people.”
- Recognizes uncertainty in agency decisions.
- Stakeholders make formal recommendations to the Secretary (FACA committee).
- Places a premium on stakeholders developing a shared Vision. Requires clarification of stakeholder values and legal and policy boundaries

Structure of the GCDAMP



AMP Stakeholders

- 5 DOI agencies (USBR, USGS, FWS, NPS, BIA) and WAPA
- 7 Colorado River Basin States (WY, CO, UT, NM, AZ, NV, CA) and AZ Game and Fish
- 5 Indian tribes
- 2 Power user groups (CREDA and UAMPS)
- 2 Recreation groups (GCRG and Trout Unlimited)
- 2 Environmental groups (GCT and SW Rivers)



GCMRC

Mission



To provide credible, objective scientific information to the Adaptive Management Program on the effects of operating Glen Canyon Dam on the downstream resources of the Colorado River ecosystem, utilizing an ecosystem science approach.

Expected Benefits of ROD Operations

- Increased aquatic foodbase
- Protect endangered species
- Positive sand storage and improved beaches
- Modest Improvement in RBT
- Protection of tribal cultural resources
- Recreation – increased safety and improved experience
- Improved riparian vegetation
- Acceptable cost to power customers



[See EIS Table II-7]



Status of Selected Resources

Preliminary conclusions after implementation of ROD operations:

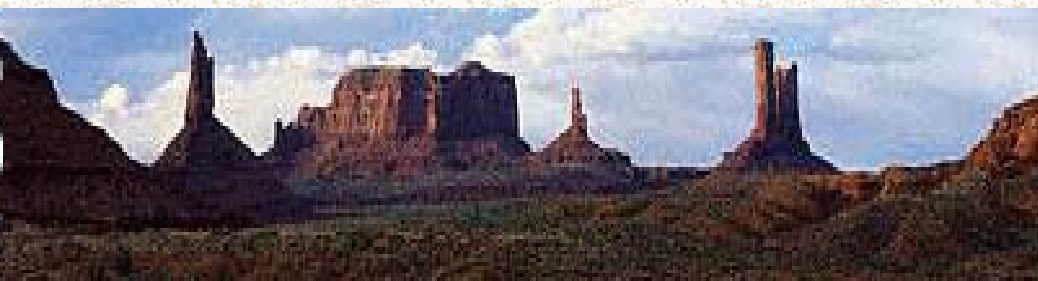
- **Greater aquatic productivity in the Lees Ferry reach**
- **Increased Lees Ferry rainbow trout and many more trout throughout the CRE**
- **Declining populations of Humpback chub**
- **Ongoing erosion of sediment and cultural resource sites**
- **Water compact requirements continue to be met**
- **Experiments have resulted in costs to power customers**

[The specific cause and effect relationship of some of these trends is still unclear.]

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Biological Resources Program FY03

- Terrestrial Ecosystem Activities
 - 5 projects
- Aquatic Ecosystem Activities
 - 7 projects





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Terrestrial Ecosystem Activities 5 Projects

- Terrestrial Ecosystem Monitoring
- Kanab Ambersnail Monitoring
- Research in Terrestrial System
- Terrestrial Habitat Mapping
- Kanab Ambersnail Taxonomy (new)



Kanab ambersnail (*Oxyloma kanabensis haydenii*)

Population estimates based on sub-samples and habitat surveys.

Systematics of *Oxyloma* and out groups.

Plans for development of population model.



Photo by J. Sorensen



Photo by R. Averill-Murray



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Aquatic Ecosystem Activities 7 Projects

- Monitoring Aquatic Foodbase
- Monitoring Downstream Fish
- Monitoring Lees Ferry Trout Fishery
- Population Genetics of Humpback Chub
- IWQP Downstream Activities
- IWQP Lake Powell
- Native & Non-Native Fish Interactions



Humpback Chub (*Gila cypha*)

Population estimates for Little Colorado River using Mark-recapture.

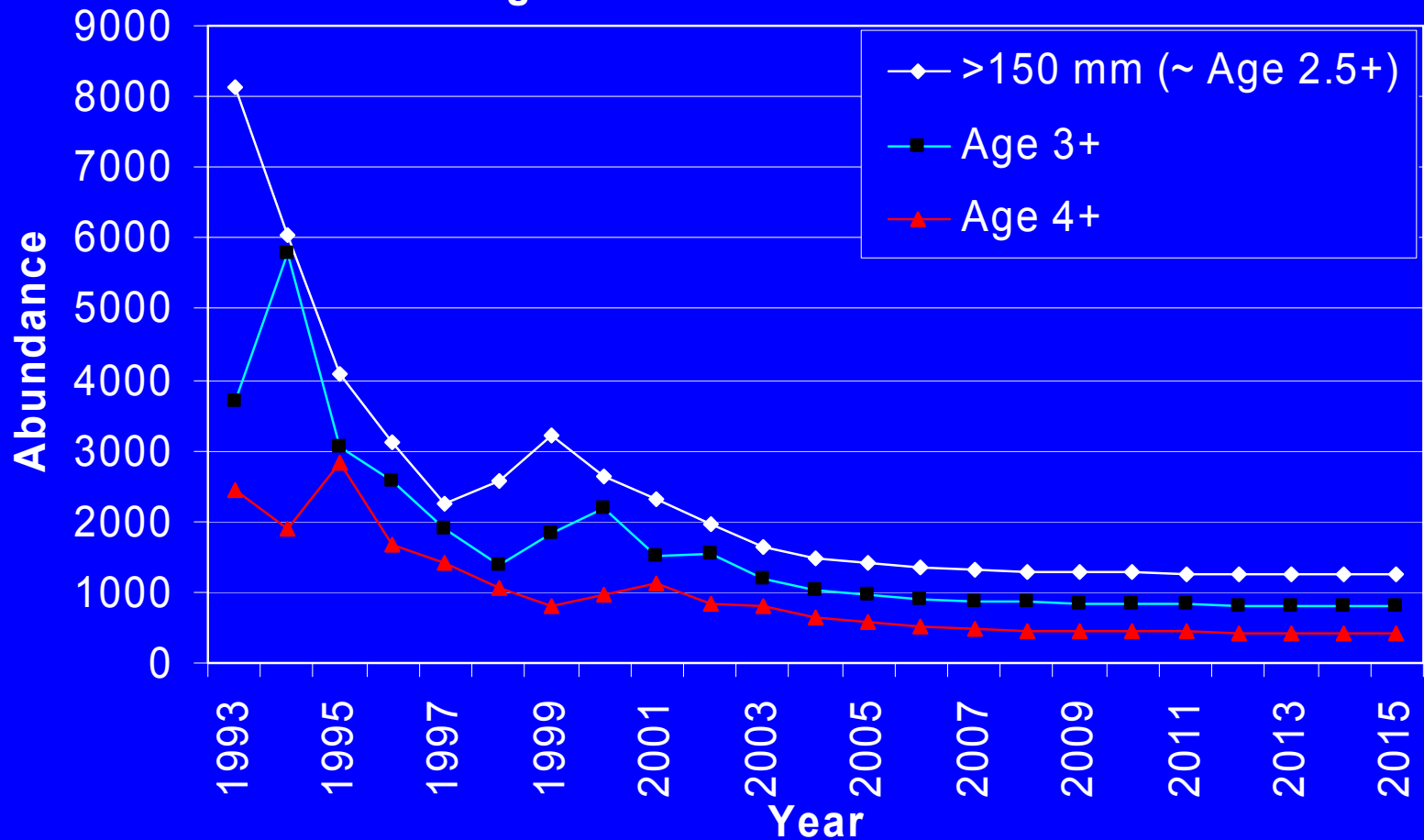
Population genetics to determine relationship of Little Colorado individuals relative to mainstem individuals.

Incorporation of data into stock synthesis/assessment models.

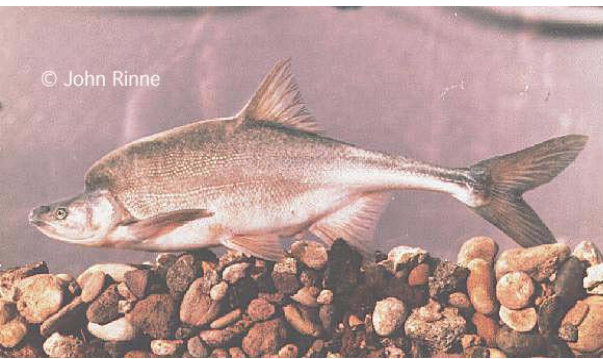


Biology Program Research & Monitoring Example

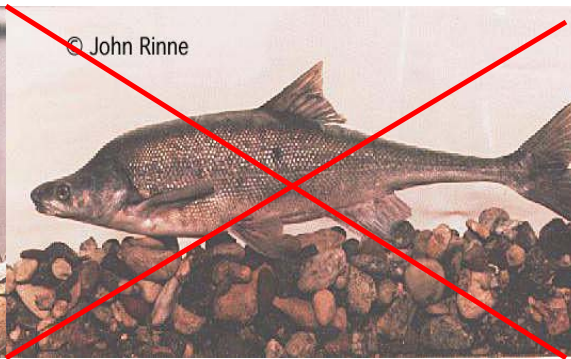
Projected Abundance of Humpback Chub
Assuming 1998 Recruitment Persists



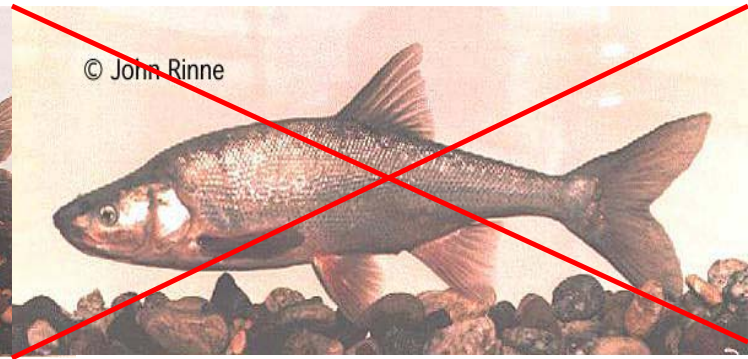
The Present Native Fish Community



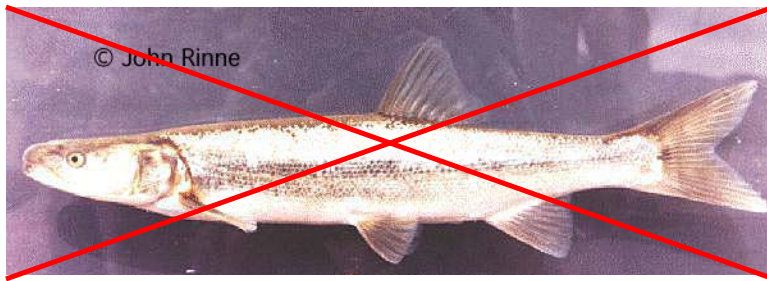
Humpback Chub (*Gila cypha*)
Federally Endangered



Bonytail Chub (*Gila elegans*)
Extirpated



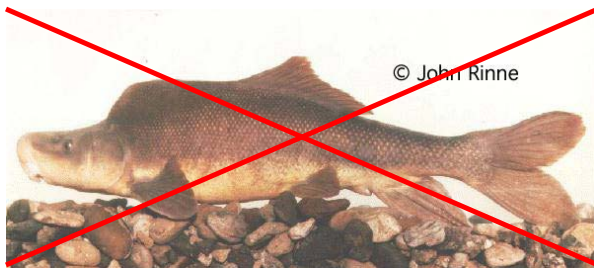
Roundtail Chub (*Gila robusta*)
Extirpated



Colorado Pikeminnow (*Ptychocheilus lucius*)
Extirpated



Speckled Dace (*Rhinichthys osculus*)
Locally Common



Razorback Sucker (*Xyrauchen texanus*)
Extirpated

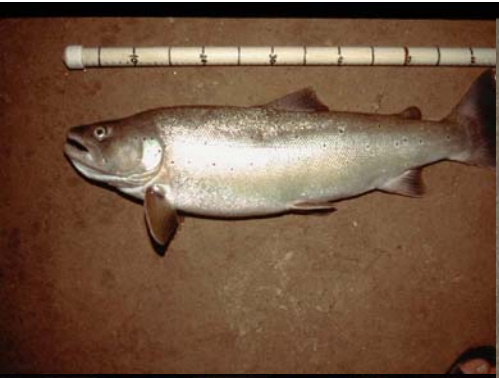


Flannelmouth Sucker (*Catastomus latipinnis*)
AZ Species of Special Concern



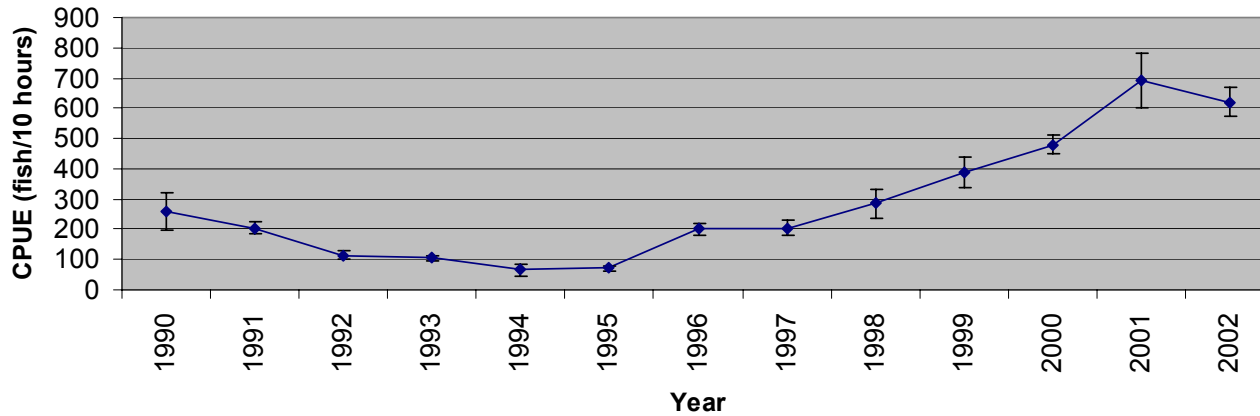
Bluehead Sucker (*Catastomus discobulus*)
Locally Common

What Happened?

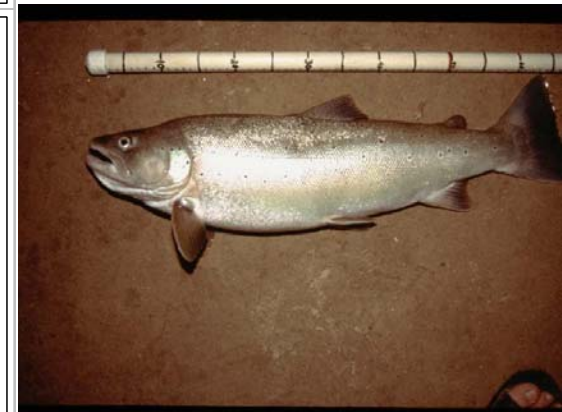
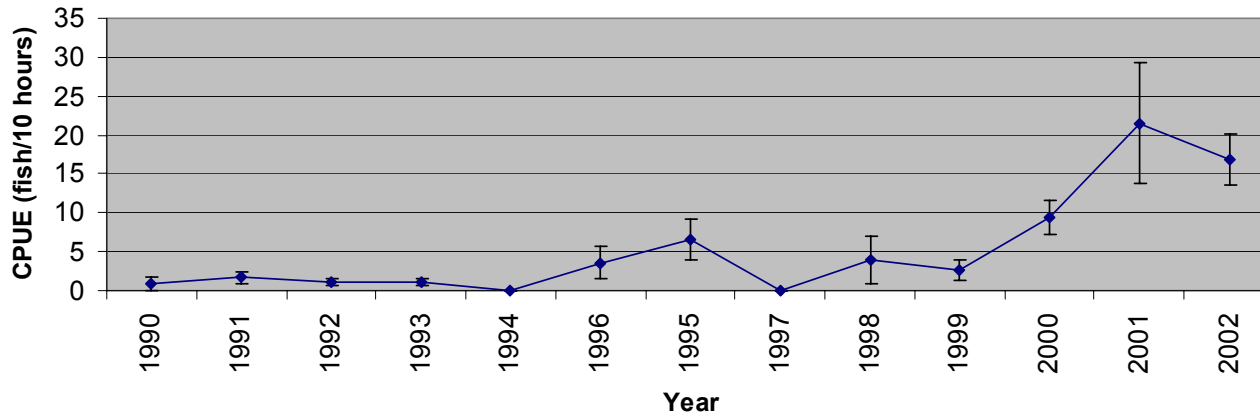


Recent Trends in Salmonid Abundance

**Rainbow Trout Electrofishing Catch Rate
Little Colorado River Reach (RM 56 - 69)**



**Brown Trout Electrofishing Catch Rate
Little Colorado River Reach (RM 56 - 69)**



Socio-cultural Resource Program

Program Components

- **Archaeological Projects**
- **Traditional Tribal Resource Projects**
 - **Recreational Projects**
 - **Public Outreach**

Archaeological Studies

Monitoring of erosion checkdams at archaeological sites

- **Monitoring the success of arroyo checkdams through archaeological sites to test the utility of remote sensing techniques**
- **Monitoring techniques include the use of photogrammetry with in-field survey and mapping**
- **Integrates cultural resource work with the efforts of IT program and staff**

Tribal Resource Studies

Participating Tribal Groups in AMP

Hopi Tribe

Hualapai Tribe

Navajo Nation

Southern Paiute Consortium

**(representing the Kaibab Band, Shivwitz Band, and the Paiute
Tribe of Utah)**

The Pueblo of Zuni



Tribal Resource Studies

Terrestrial Tribal Resource Monitoring

- **On-going effort by three Tribes to participate in biological program project of terrestrial monitoring**
- **On-going activities to include integration of tribal perspectives with western biological methods and perspectives**
- **Project in second year, with expectation to expand to include all five tribal groups**

Recreational Use Studies

Changes in camping beach areas

- **Annual mapping of a roster of recreational beaches to assess beach change and quality for recreational use**
- **Provides information for beach change in critical (narrow) reaches**
- **Project conducted with Physical Resource Program**



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Information Technology Program

1. Surveying
2. Remote Sensing
3. Geographic Information System
4. Database Management System
5. Library Operations
6. System Administration





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Survey

Coordinator: Mark Gonzales

Technician: Keith Kohl

Technician: Kristin Brown

Purpose: Provide support for spatially referenced scientific data collected in the CRE.



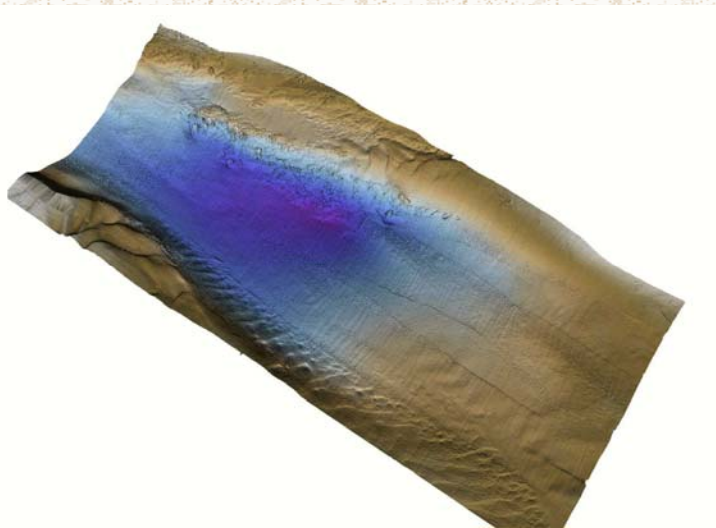


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Survey – cont.

Current projects:

- Ongoing support to GCMRC scientists with area and volumetric measurements.
- Geodetic control network for spatially referencing scientific research and monitoring data.
- Mapping channel bottom to establish bathymetric base map.
- Evaluation and development of new monitoring and research technologies consistent with GCMRC's Long-term Monitoring and Research Strategic Plan.





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Remote Sensing

Coordinator: Steve Mietz, Phil Davis

Purpose: Collect and evaluate remotely sensed data sets that support cultural and natural resource monitoring of the CRE



Current projects:

- Finalize remote sensing initiative reports
- Prepare RFP for FY2003 annual overflight
- QC of May 2002 Digital Orthophotos
- Analysis of LIDAR vs. May 2002 DSM





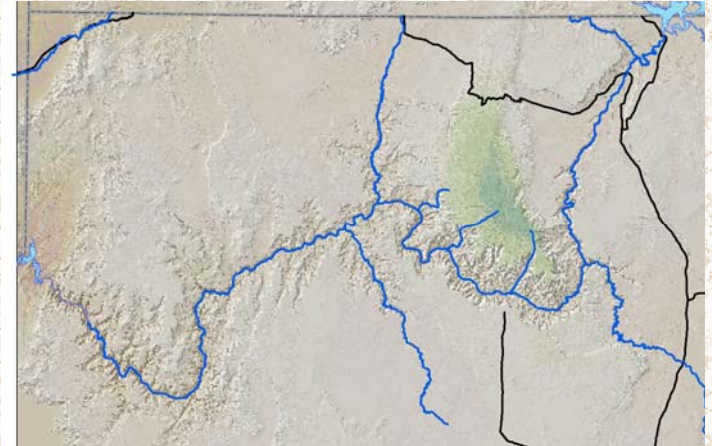
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Geographic Information System

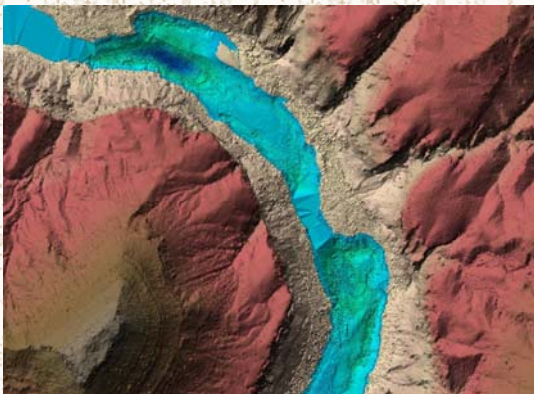
Coordinator: Steve Mietz

Analyst: Tom Gushue

Analyst: Mike Breedlove



Purpose: Provide electronic storage and analysis of spatial data to GCMRC staff and stakeholders. Production of cartographic products.





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Geographic Information System – cont.

Current projects:

- Development of Internet Map Server
- GIS interface to Oracle DBMS
- CRE centerline development
- GCMRC riverguide
- River mile matrix
- Full channel geometry mapping
- Development of vegetation/sediment layer from orthophotography
- Exp. Flows Support (sampling method development)
- SDE Index Layer Development (current and legacy datasets)



THE CAMPING BEACH DOWNSTREAM FROM TAPEATS CREEK



1952 (Kent Frost). Everyone would want to camp here now.



1995. The beach reappeared briefly after the 1996 flood.