



## Grand Canyon Monitoring and Research Center

### *Humpback Chub:* *Factors Affecting Persistence*

#### **Overview**

The humpback chub (*Gila cypha*) is a native fish unique to the Colorado River. This fish was well adapted to the warm and sediment-laden conditions that typified this flood prone river. However, during the dam building era of the early and mid-1900s a series of hydroelectric dams were constructed and water was diverted from this river system. Thus, altering its physical characteristics making it a cold, clear river that lacks the seasonal differences in



flow, temperature and sediment levels. The humpback chub has become extremely rare because of altered habitat coupled with the introduction of non-native fishes. For this reason humpback chub were federally listed as an endangered species.



Presently, this rare and unique-looking fish is only found in a few canyon-bound regions of the Colorado River. The Grand Canyon humpback chub population is located in and near the Little Colorado River tributary. The Little Colorado River contains the only habitat suitable for the humpback chub to successfully reproduce.

Over the last decade the population size of this particular humpback chub has declined to levels that might threaten its continued existence. It appears that young developing fish are not surviving in large enough numbers to replace the adults that naturally die. The underlying cause(s) for mortality in young fish is unknown, and could be related to a number of environmental and/or biological factors including: loss of habitat, parasites, temperature, hydrology, competition and predation.

#### **Experiment**

Although there are a number of factors that might be responsible for the decline in population, the most probable cause appears to be due to predation by non-native fishes. Two of the most likely species responsible are brown and rainbow trout. Both of these species were not originally found in this river system, yet are very well adapted to the cold and clear water conditions.

For this reason, the Glen Canyon Dam Adaptive Management Program and USGS Grand Canyon Monitoring and Research Center have implemented an experimental study to determine whether or not non-native fishes are the underlying cause of the humpback chub decline.





It is not certain that predation has directly led to the humpback chub population decline; however, it is considered likely that non-native fish are negatively affecting humpback chub. Research is to focus on the following objectives:

### ***Research Objectives***

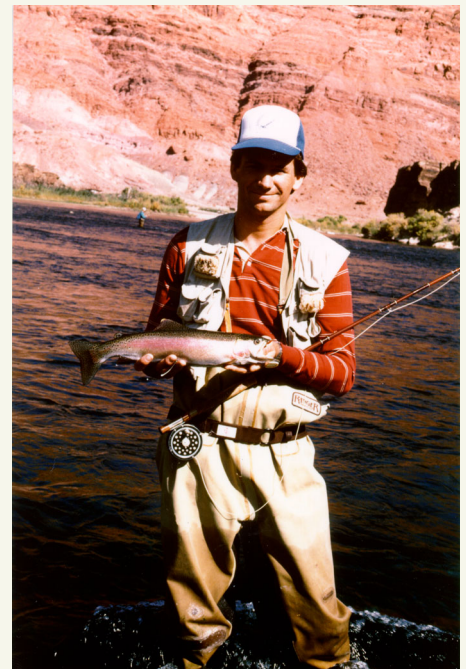
1. To determine if non-native fishes in the Colorado River are the primary factor influencing the declining trend in the humpback chub population.
2. To determine if electrofishing is an effective method for removing non-native fishes in the Colorado River near the Little Colorado River (River Miles 58 to 72).
3. To determine the diet of, and overall proportion of humpback chub consumed by, rainbow and brown trout.

### ***Removal of non-native fishes***

Young humpback chub are sometimes vulnerable to predation or competition by other fish species because they often disperse from the Little Colorado River into the Colorado River main stem. Conceptually, if non-native fish were to be removed from the area downstream of the Little Colorado River than young humpback chub found in the Colorado River main stem might be able to survive and grow to adult sizes, where they would then return to spawn in the Little Colorado River tributary.

The purpose of this experiment is to remove non-native fishes, primarily rainbow and brown trout, to determine if humpback chub populations will increase by lowering the number of predators and competitors. Therefore, this is a long-term experiment requiring sufficient enough time to depress non-native fish populations in the area slightly upstream and downstream of the Little Colorado River tributary.

This study will determine if this removal treatment will result in a measurable change in the humpback chub population. Over the next four years, 24 trips are scheduled to remove and later maintain low numbers of non-native fish along a selected region of the Colorado River (River Miles 58 to 72). Each year, six two-week trips will be conducted. Additionally, stomach samples taken from non-native fish are to be used for determining if humpback chub are preyed upon, and if certain fish pose a greater predatory threat.



Because the Colorado River is a very large and turbulent river it requires special sampling equipment to capture fish. The method used in capturing fish is called electrofishing, which requires a motorized boat that is able to generate an electrical field specifically configured to make fish swim involuntarily to the boats electrode. Electrofishing is conducted during the nighttime because fish occupy the shoreline in larger numbers during the dark. A person then nets the fish out of the water, identifies and transfers the fish into a container where they are euthanized. Information is then gathered on the fish identity, size and diet.

Fish remains are then stored and later transported from the river. The nutrient-rich remains are then used as fertilizer in tribal garden plots managed by the Hualapai Indian Tribe.