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Natal Origins of Rainbow Trout and Survival of Juvenile Humpback Chub

Background

A key objective of the Glen Canyon Dam Adaptive Management Program (GCDAMP) is to increase the abundance of native fishes like humpback chub (*Gila cypha*) in the Colorado River below the dam. Humpback chub is found exclusively within the Colorado River Basin and is uniquely adapted for surviving in the harsh environment of a large desert river. They can live as long as 30 years and reach lengths of almost 20 inches. Humpback chub were first listed as an endangered species in 1967 and today are protected under the Endangered Species Act. The largest remaining population of humpback chub is found near the confluence of the Little Colorado River (LCR) and the Colorado River. Adults migrate into the LCR in the spring to spawn. Some juvenile fish remain in the LCR and grow to maturity, while others migrate into the mainstem Colorado where their survival rate is subject to conditions affected by the operation of Glen Canyon Dam and the presence of nonnative fish. Rainbow trout is the most abundant nonnative species in the mainstem Colorado River near the confluence of the LCR. Preliminary research suggests that the majority of these trout originate upstream of Lees Ferry in the Glen Canyon reach. The rainbow trout population in Glen Canyon is very abundant and supports a popular and unique sports fishery. We suspect that high abundance of trout in Glen Canyon, which is good for the fishery, results in a greater number of trout migrating downstream to the LCR confluence.


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Our research project addresses the question on whether or not the high abundance of rainbow trout in the mainstem near the LCR increases competition and predation on juvenile native fish. We are trying to determine the extent to which trout from Glen Canyon migrate to the LCR confluence area and what factors affect their rate of migration. This project will also help determine whether high trout abundance leads to reductions in the survival rate of juvenile humpback chub near the LCR.


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Field Work

To study the migration of rainbow trout, we implant approximately 10,000 trout in their first year of life with a Passive Integrated Transponder (PIT) tag. This tagging is done from October through December in Glen Canyon. These small (12 mm) glass tags are placed in the gut cavity of the fish, so anglers who harvest fish for consumption will remove the tag in the cleaning process. We use boat electrofishing to capture fish for tagging, and tagged fish are released alive about two hours after initial capture. A small fraction of fish are held in net pens to evaluate whether our sampling is causing mortality of tagged fish (to date, we have observed very limited mortality). We conduct trips in Glen Canyon and throughout Marble Canyon to the LCR area to recapture tagged trout and native fish. The number of tagged trout captured in Glen Canyon and between Lees Ferry and the LCR, can be used to evaluate the extent of downstream migration. These recapture trips are conducted in April, July, September, and January. A key assumption of the mark-and-recapture methodology is that tagged fish represent the


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behaviour and survival of fish that are not tagged. Thus, our sampling and tagging procedures focus on keeping fish alive and healthy. A similar tagging effort is conducted on juvenile native fish near the LCR to study their survival rates.

Our Science and Your Trip

During the months of October through December in Glen Canyon, scientists and technicians work out of the Nine Mile camp for approximately two weeks. You may observe a large motorized raft and smaller workboats at this location. Sampling and tagging is conducted at night to maximize catch rates of fish and minimize disturbance to anglers and visitors. You may observe small net pens used to hold tagged trout between the dam and Lees Ferry. You may also observe small workboats on recapture sampling trips in January, April, July, and September, however their sampling is conducted at night so encounters are unlikely.


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In Marble Canyon, we conduct recapture sampling trips in January, April, July, and September. These trips consist of two or three large motorized rafts and two or three small workboats. Boat electrofishing will be conducted at night. However, every second day, the boats and camp will move downstream approximately 20 miles. We will communicate with river trips to avoid conflicts over camp locations and to minimize sampling in areas used by campers.

The study of juvenile humpback chub near the Little Colorado River is confined to a limited area between river mile (RM) 61 and 64. We will be based out of a research camp at ~ RM 63 on river right. Juvenile native fish will be captured using a combination of boat electrofishing and hoop-netting deployed during night and day, respectively. Visitors may also observe small, spatially-referenced reflectors along the shoreline in this section of river, as well as ropes or nets extending into the water, and we ask that they remain undisturbed. Field logistics were designed to minimize impacts to visitors and all attempts will be made to reduce the presence of scientists and their equipment; however, owing to the type of sampling and the amount of effort expended, private trips preferring isolation may want to avoid camping between RM 61 and 64.


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This work is being conducted by the U.S. Geological Survey (USGS) and Ecometric Research. If you have additional questions regarding this study, please take the opportunity to visit our research camps where we will be glad to provide a field orientation.

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Cooperators

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