RESEARCH GRANT PROPOSAL

Radio telemetry study of hatchery largemouth bass stocked into the Harris Chain of Lakes

Principal investigators

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Introduction

Lake Griffin and other lakes in the Harris Chain of Lakes have suffered a significant loss of sport fish, primarily largemouth bass (*Micropterus salmoides floridanus)* over the last few decades due to lake level stabilization, nutrient enrichment, and related loss of habitat. The demise of the bass fishery has resulted in serious economic losses to the communities and businesses surrounding the Harris Chain of Lakes.

Long-term projects to restore good water quality and habitat in the Harris Chain of Lakes are critical to improving the sport fisheries in these lakes, but the Harris Chain of Lakes Restoration Council has recommended bass stocking as an interim fisheries management tool. The council is hopeful that stocking has the opportunity to mitigate economic losses to the local economy while restoration efforts are underway.

There is still abundant open-water food (e.g., gizzard and threadfin shad) for largemouth bass in Lake Griffin and other lakes in the Harris Chain, i.e., if the bass can grow to a size where they can utilize this food resource. We plan to evaluate whether stocking advanced sizes of hatchery largemouth bass during late spring will allow these fish to feed on young-of-the-year shad and other fish, survive, and recruit into the sport fishery.

We plan to stock advanced fingerling (~3 to 4 inches) largemouth bass into Lake Griffin each spring for three years from 2009 to 2011. This size fish is larger than naturally produced or wild young-of-the-year bass in Lake Griffin. Project biologists plan to conduct pre- and post-stocking evaluations of largemouth bass and the prey species that are eaten by bass. A variety of quantitative fish sampling methods will be incorporated into these studies.

Creel surveys will be used to evaluate if hatchery fish recruit into and improve the bass fishery. A genetic mark (using microsatellite DNA techniques) is currently being developed to differentiate stocked hatchery fish from wild fish during these assessments.

We propose to do a radio telemetry study to evaluate behavior, movement and habitat selection of hatchery largemouth bass, as described in the methods below. However, we need funding to complete this study. We respectively request the use of funds that were allocated by the Florida Legislature for stocking bass into the Harris Chain of Lakes. A budget is outlined on the last page of this proposal.

Study objectives

To evaluate hatchery largemouth bass behavior (i.e., movement, and habitat selection) after being released into a lake, and compare these to wild fish. To ascertain how hatchery fish behavior affects their survival in the wild. To determine if changes can be made in the hatchery culture protocol that would change fish behavior and improve their survival after being stocked.

Justification

Observations of domestication affects of hatchery fish at the Florida Bass Conservation Center (FBCC) have included behavioral (e.g., hatchery bass swim towards people); anatomical (e.g., some hatchery bass have unnatural color); and health (e.g., fatty liver syndrome) alterations in pellet-reared hatchery largemouth bass. Domestication affects that have been reported for other species of hatchery fish include reduced predatory skills, unnatural territorial or homing behavior, reduced breeding success, changes in aggression, and inappropriate habitat selection. Domestication can negatively impact behavior, fitness, and survival of hatchery-reared fish after their release into the wild. We have addressed many of these issues in recent years; however, questions still need further study.

Technological advances in radio telemetry equipment have made it possible to study the behavior of very small animals. Radio transmitters can be obtained commercially that weigh as little as 0.37 grams. For the first time ever, this provides the opportunity to study the movements, behavior, and even survival of hatchery largemouth bass after they have been released into a lake.

The following important questions can be addressed using telemetry studies:

What are the dispersal time, distance, and pattern for hatchery bass?
Are hatchery bass using similar habitats as wild bass?
Are hatchery bass using habitats where prey can be found?
Are hatchery bass using habitats where they can escape predation?
Are hatchery bass using habitats where we typically electrofish?

This information will be useful for biologists to better understand the factors that affect survival rates of stocked fish. It could also lead to better release strategies, which is considered a critical need for improving survival of stocked fish (e.g., stocking fish into desirable microhabitats). This information could also lead to changes in culture protocol at the hatchery, which might positively affect the post-release behavior and survival of fish in the lake.

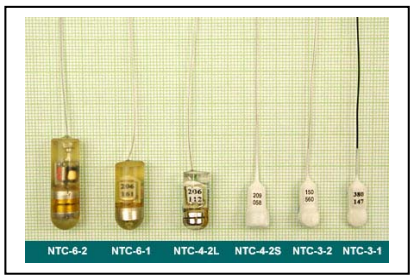
Preliminary assessment of telemetry tags and equipment (Year 1)

Dummy transmitters will be obtained for a preliminary assessment of implantation techniques. Additionally, buoyancy compensation, swimming ability, fish health response, and survival of tagged fish will be evaluated in fish tanks.

These small transmitters have been successfully used to study other species of fish like salmon, but preliminary research needs to be completed on largemouth bass due to differences between the anatomy and biology of different species. Following these lab studies, equipment will be purchased for preliminary field evaluations. Radio transmitter and receiver performance will be measured in a lake with stationary tags to evaluate distance and accuracy of the equipment. Physical structure (e.g., aquatic vegetation, docks, etc) will also be evaluated in the lake to determine how much these obstructions attenuate signal strength. Trials may be conducted with a small number of fish to work out the details and logistics of the radio telemetry study.

Behavior of hatchery stocked bass into a small study lake (Year 2)

With limited knowledge of distance moved by hatchery fish, we are concerned that we could lose radio tagged bass in a system as large as Lake Griffin. Thus, during the first field season, a lake less than 500 acres will be selected for this study to insure consistent and accurate locations of fish, and to work out the logistics and techniques for locating radio-tagged fish. Lake Carlton is being considered as a study lake. We will surgically implant radio transmitters (n = 100) in both hatchery and similar-sized wild largemouth bass for direct comparison of behavior. Hatchery fish will be obtained from the FBCC. Wild fish will be obtained by electrofishing. Each fish will be tranquilized with a sedative (i.e., MS_{222}) and a radio transmitter will be surgically implanted into the abdominal cavity. Hatchery and wild fish will either be released together or released using similar techniques.



Fish locations will be determined three to five times each week for the life of the radio tag, which should last about 10 to 60 days after release. Some diel (24-hour) studies will be conducted to evaluate behavior throughout different times of the day and night. During these studies, fish locations will be monitored every two to six hours.

Spatial and temporal movements, behavioral patterns, habitat utilization, and habitat preference will be characterized for both hatchery and wild fish.

Behavior of hatchery stocked bass in Lake Griffin (Year 3)

During the second field season, both hatchery and wild radio tagged fish will be studied in Lake Griffin using the methods described above.

Proposed Project Budget

	Costs			
	Year 1	**Year 2**	**Year 3**	**Total**
Personnel				
Seasonal technician	$10,000	$10,000	$10,000	$30,000
Equipment				
ATS Receiver (n = 2)	$4,040			$4,040
ATS radio transmitters (n = 100)	$14,000	$14,000		$28,000
ATS antennas (n = 2)	$420			$420
Total	$28,460	$24,000	$10,000	$62,460

The cost of biologist's salaries, equipment (e.g., trucks, boats, and motors), and expenses for equipment operation will be paid by the FWC. Please also keep in mind that this research project is only a small fraction of the total costs of raising the fish, stocking the lake, and conducting stocking evaluations for the next five years.