

**Mechanical Removal of *Gambusia affinis* in Backwater Slough of the Sugar
River**

State Rapid Response Grant Final Report

Russ Wolf and Marcus Miller

Partners: Laura MacFarland, River Alliance of Wisconsin

Dave Marshall, Underwater Habitat Investigations LLC

Volunteer Help: Jamie Jefferson, Jacqueline Komada

January 2013

Introduction:

The mosquitofish (*Gambusia affinis*) is an invasive species that competes with native fish for food and habitat. *Gambusia affinis* shows these aggressive behaviors by biting and physically pushing or thrusting other fish (Mills 2004). These behaviors can negatively impact the populations of other species. *Gambusia affinis* was first introduced into new waters around 1905 to control mosquito larvae (Pyke 2006). It has the ability to reproduce about every 3-4 weeks during the breeding season which can last from mid-spring to mid-autumn, depending on location and water temperature (Pyke 2006). Given the multiple brood strategy that can occur over a long growing season, *G. affinis* can increase rapidly until the population is well established in a short period of time. The *G. affinis* was first discovered within a slough of the Sugar River near Brodhead, Wisconsin in 2009. Although numbers of the invasive fish were initially low, the population of *G. affinis* increased significantly in 2012 following a severe drought, coupled with an early spring and longer reproductive season (*Personal communication* Dave Marshall). The drought also resulted in habitat loss in sloughs that negatively affected blackstripe topminnows, the state endangered starhead topminnow and other off channel native fishes (*Personal communication* Dave Marshall).

This study tested the effectiveness of using only mechanical means to eradicate *G. affinis* from a small slough. Chemical methods are typically used to eradicate *G. affinis* while mechanical methods have not worked previously (*personal communication* Doug Duncan). Use of pesticides may pose a threat to native fishes and requires much more environmental scrutiny that may delay a rapid invasive control response and allow the species to spread further (*personal communication* Dave Marshall). If successful, mechanical eradication of *G. affinis*

may facilitate the recovery of declining native species. **It was expected that mechanical means would be effective for removal of *G. affinis* within relatively small, isolated habitats.**

Methods:

The project area was a backwater slough connected to the Sugar River located west of Brodhead, Wisconsin, just north of County Highway F (42.626304 N -89.387190 W). The slough was approximately 300 meters in length extending from a spring to the confluence with the Sugar River. Public access to this slough includes a boat launch located on the south side of County Highway F. The land surrounding the slough is owned by a private landowner and personal contact was made to gain access to the slough for this project. The project was conducted on Friday, October 12, 2012 by a two person team. Given the high abundance of *G. affinis*, a second attempt was made to remove fish on Sunday, October 21, 2012, using a four person team that jointly electrofished and made seine hauls. Dave Marshall, one of the project partners, also sampled the slough using a six foot long fine mesh dipnet on Friday October 19, 2012.

A block net was set up at the mouth of the slough in an effort to prevent *G. affinis* within the slough from migrating into the main channel of the Sugar River. The slough behind the block net was sampled using a backpack electro-fisher to collect fish. After electro-fishing a 20 foot fine mesh seine net was used to collect additional fish. Native fish were released, and all *G. affinis* were counted, and killed. While it was our intention to sample for three days we limited sampling to two days because at this point removal by mechanical means would no longer be cost effective.

Results:

Using mechanical means a total of 1965 *G. affinis* individuals were removed from the slough. On the first sampling day 653 total fish were removed, while on the second day another 1332 fish were removed. Dave Marshall also returned to the slough during our study and removed approximately 150 additional *G. affinis* from the slough by dip netting the area. **The numbers remaining in the slough were not possible to estimate due to the large schools (over a square meter in size) of *G. affinis*.**

Discussion:

The study focused on an attempt to eradicate *G. affinis* from a backwater slough along the Sugar River in southern Wisconsin, without the use of chemicals. **The results suggest that the gear types we used for a mechanical method of removal would not be effective to remove the fish given the high numbers found in 2012.** The abundance of *G. affinis* in the slough at the beginning of the experiment was much higher than originally thought while planning this experiment. A third sampling day was intended to test if the population remained; however, a third attempt was not made because direct observations indicated that *G. affinis* was abundant after the second day. Following collection attempts on the second day, *G. affinis* were so numerous along the edges of the slough that their schools looked like multiple black circles each over a meter in diameter. Dave Marshall also discovered *G. affinis* downstream from the original slough within an eddy below the county highway F boat launch in the Sugar River. Approximately 50 *G. affinis* were removed from this eddy.

Mechanical methods may be more effective if the numbers and density of *G. affinis* were less than what we encountered. Other limitations faced during this experiment were the excessive amounts of silt and plants within the slough; making it difficult to be effective while electrofishing and seine netting. We determined that this method was not cost effective since

after the second day of the project the number of *G. affinis* was still high. Also, we found that population estimation of the remaining fish in the slough could not be done without significant time and additional funding. At this time many schools of *G. affinis* remain in the slough even after 1,965 fish were removed. The study supports the idea that mechanical eradication of *G. affinis* is not effective, even in small localized habitats.

References

Duncan, Doug. Personal Communication:

Fisheries Biologist, US Fish and Wildlife, Tucson, AZ

520-670-6144

arizonaes.fws.gov

Marshall, Dave. Personal Communication:

Aquatic Ecologist, Underwater Habitat Investigations LLC

underh2ohab@mhtc.net

Mills, M. D., Rader, R. B., & Belk, M. C. (2004). Complex interactions between native and invasive fish: the simultaneous effects of multiple negative interactions. *Oecologia*, *141*, 713-721.

Pyke, G. H. (2005). A review of the biology of *Gambusia affinis* and *G. holbrooki*. *Reviews in Fish Biology and Fisheries*, *15*, 339-365.