

# Using Buffer Zones to Promote Amphibian Populations

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## Objectives:

1. To determine the effects of a 1-meter buffer zone around ponds to bolster cricket frog populations.
2. To determine the effects of the presence or absence of a potential predator (two grass carp, two bluegill sunfish, two crayfish) and to the presence or absence of a sublethal level of the insecticide imidacloprid.

**Start Date:** 2007

**Project Duration:** two years

**Total Funding:** \$46,653

Research was conducted to investigate how the use of buffer zones around water resources could help bolster amphibian populations. We made contact with three golf courses [Twin Run Golf Course (Hamilton, OH), Hueston Woods Golf Course (College Corner, OH), and Oxford Country Club (Oxford, OH)] that each had two ponds: one that they agreed to leave a 1-meter terrestrial grass buffer zone, and another that they mowed to the edge. Additionally, we used two "reference" ponds at the Ecology Research Center (Oxford, OH).

We spent approximately 2 months collecting cricket frog pairs for the golf course and related projects. Eight enclosures were added to each golf course pond. To half of the enclosures 40 cricket frog tadpoles were added, and to the other half green frog tadpoles were added (so that we could examine effects on two species).

Golf courses were checked 2-3 times per week for signs of metamorphosed frogs, and water quality measurements were taken weekly to every other week. The aquatic experiments are still underway and will be terminated by the end of October, 2008.



Cricket frogs were used both at the golf course ponds and reference ponds to test for the effects of imidacloprid.

Cricket frogs that reached metamorphosis were given individual marks and released at the golf course ponds so that subsequent terrestrial survival can be assessed. We will search for these cricket frogs next spring when the breeding season ensues.

In another study, we exposed cricket frog tadpoles and green frog tadpoles reared in cattle tank mesocosm ponds at Miami University's Ecology Research Center (Oxford, OH) to presence or absence of a potential predator (two grass carp, two bluegill sunfish, two crayfish) and to the presence or absence of a



Green frogs were also used to test for the effects presence or absence of a potential predator (two grass carp, two bluegill sunfish, two crayfish) and to the presence or absence of a sublethal level of the insecticide imidacloprid.

sublethal level of the insecticide imidacloprid. This experiment was conducted over the summer and completed at the beginning of September. Currently, we are analyzing the data and preparing the manuscript for publication.

We also conducted a laboratory study with cricket frogs exposed to water from each golf course pond and the presence or absence of a sublethal exposure to the insecticide imidacloprid (which at least one of the golf courses was using). This study allowed us to see how individual tadpoles were affected by the golf course water relative to controls (ponds from the



Eliminating fish from ponds is a critical step because ponds without fish allow for greater abundance of amphibians and more diverse communities.

reference site with aged tap water) in the presence or absence of the insecticide.

This study will give us insight into the effects that we observe in Project 1 located on the golf course. The student collected water from each of the six golf course ponds and one reference site each week, and then raised the tadpoles in this water. In this study, survival was measured daily, and at the end of the study, we determined mass and developmental stage.

Additionally, in a separate study, the student also examined whether the presence of the insecticide and the golf course water affected susceptibility to a crayfish predator. Both studies have been completed and a manuscript is currently being prepared from this work.

## Summary Points

- Research is underway to test for the effects of a 1-meter grassy buffer around golf course ponds on the population of cricket frogs.
- A laboratory study was also conducted with cricket frogs exposed to water from each golf course pond and the presence or absence of a sublethal exposure to the insecticide imidacloprid.
- In a separate study, it was also examined whether the presence of the imidacloprid in the golf course water affected susceptibility to a crayfish predator.