

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 on aquatic and terrestrial life stages of cricket frogs.
2. To determine the effects of presence or absence of a potential predator (two grass carp, two bluegill, two crayfish) and to the presence or absence of a sublethal level of the insecticide imidacloprid on cricket frogs and green frogs.
3. To examine larval development of cricket frogs in closed to open canopy ponds.
4. To determine cricket frog movement on golf courses in mown vs. unmown habitats.
5. To determine cricket frog preference for mown vs. unmown habitat.
6. To determine cricket frog overwinter survival in mown vs. unmown habitats.

Start Date: 2007

Project Duration: two years

Total Funding: \$46,653

We have been working on three local golf courses: Twin Run Golf Course (Hamilton, OH), Hueston Woods Golf Course (College Corner, OH), and Oxford Country Club (Oxford, OH). We have reared cricket frogs in enclosures located in six golf course ponds -three with a 1-meter terrestrial buffer zone and three that were mown up to the edge. We found that the presence of the buffer zone did not affect larval development, as predicted. However, there were large differences in survival among golf courses, suggesting that local management strategies may make some golf courses more suitable for amphibians than others.

We marked and released cricket frogs at the sites where they were reared to determine if presence of the buffer zone influenced terrestrial survival. The number of animals released varied between sites (11-108 individuals) because of differences in the number of animals that reached metamorphosis at each pond. Students searched ponds in the spring and did not recover any marked cricket frogs. This result may have been due to relatively low numbers that were released or because the terrestrial habitat on the course was not suitable.

We released cricket frogs in mown or unmown grass at the Hueston Woods Golf Course. Cricket frogs were dipped in fluorescent powder and released. Hours later, students returned to examine the pattern of the path cricket frogs left to determine if they oriented toward the pond, and how their movement differed between mown and unmown habitat. Preliminary evidence suggested that frogs could use

unmown grass for faster and straighter travel, but that frogs preferred taller unmown grass.

For choice studies, cricket frogs were released in eight enclosures that contained both mown and unmown habitat. After three days, a barrier was inserted and the habitats were thoroughly searched for the cricket frogs. Preliminary evidence indicates that cricket frogs were most often found in the unmown habitat, suggesting that this habitat was more favorable to growth and survival.

In another study, cricket frogs were reared with various potential predators found in golf course ponds (bluegill sunfish, grass carp, crayfish, or no predators) and presence or absence of imidacloprid, a common insecticide used by one of the golf courses in our study area. We found that fish species essentially eliminated cricket frog tadpoles from ponds-even the grass carp, which is an herbivore frequently stocked in golf course ponds. Preliminary analyses of another study suggest that canopy cover can reduce cricket frog populations, suggested that open to intermediate canopy cover is best for cricket frog populations.

Our results are suggesting that maintaining unmown habitat in areas that are out-of play and adjacent to ponds may allow cricket frog populations to use golf course ponds for their full life cycle.



Students searched ponds in the spring and did not recover any marked cricket frogs.

Summary Points

- Golf course ponds are often suitable for aquatic development and survival because they are open-canopy ponds located in a green area. However, all fish species and some contaminants may put populations at risk, so their use should be minimized in and around wetlands.
- Providing unmown terrestrial habitat adjacent to a pond may be critical for terrestrial survival of amphibian populations, because cricket frogs selected unmown grass over mown grass.
- Field studies on golf courses show that cricket frog tadpoles can survive in ponds with or without buffer zones, which suggests maintaining unmown habitat around all of the pond is not necessary for aquatic life stages. However, terrestrial life stages need adequate unmown habitat. Therefore, leaving part of a pond unmown in out-of-play areas will provide essential terrestrial habitat for cricket frogs and should allow populations to persist at these sites.