

Developing Methods to Enhance Amphibian Diversity on Golf Courses: Effects of Golf Course Construction on Amphibian Movements and Population Size

University of Rhode Island

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Start Date: 1998

Number of Years: 3

Total Funding: \$72,000

Objectives:

1. *Determine the pre-construction population size for amphibians breeding at ponds within the boundaries of a proposed golf course.*
2. *Determine pre-construction travel corridors and movement patterns for amphibians at this same site.*
3. *Quantify population size and movement patterns following construction on the golf course.*

Amphibian movement chronology and community structure has been monitored at two ponds and the surrounding landscape within the boundaries of a proposed golf course on the Univ. of Rhode Island campus since mid-February 1998. A total of 13,131 amphibian captures representing 11 species were documented, with six species of reptiles (61 capture events) and 8 species of mammals (1,475 captures) also detected.

In 1998, we found that the young of some species (Green Frog, Pickerel Frog, Spotted Salamander, and Red spotted Newt) dispersed in random directions across the landscape, while other species exhibited habitat selection and avoided edges between wooded habitat and a turf field (Wood Frog, Spring Peeper, Gray Tree Frog, American Toad).

Movement data for metamorph amphibians (i.e., newly transformed young) gathered in 1999 generally supported the patterns observed in 1998. In addition, we did find that adults of some species readily moved across a 68 m wide turf field (Pickerel Frog, Green Frog), while adults from other species were rarely observed crossing this expanse of turf grass (Wood Frog, Spotted Salamander, Spring Peeper, Gray Tree Frog).

Experiments conducted in 1998 showed that amphibians preferred to move through wooded habitats rather than turf, and grass height did not affect frog movement patterns. Data collected in 1998 and 1999 investigating movement patterns of amphibians across the landscape generally verified this relationship, as species richness and abundance was much greater in a contiguous forest patch, than near the ecotone between woods and a turf field.

Surveys of 59 ponds at 32 golf courses in southern New England found that Green Frogs and Bullfrogs dominated most of the ponds (e.g., found in 73% of the ponds surveyed) at golf courses in the region. This is because these species prefer water bodies that are permanently flooded, as their young take 13 years to undergo metamorphosis and disperse from the pond. In contrast, the young of other species of pond breeding frogs and salamanders only remain in the pond for less than 6 months, and their young are out

competed by Green Frog and Bullfrog. A simple management solution may be to modify the hydrology of a pond to increase species richness.

During 1998 and 1999, baseline data were gathered at a pond used by a large number of breeding frogs and salamanders, which was adjacent to golf course under construction during the summer and fall of 1999. Ten species of amphibians visited this pond during 1998 and 1999, with breeding populations of Wood Frog (over 1000 breeding adults), Spotted Salamander (42 breeding adults), and Marbled Salamander (64 adults). We will continue to monitor this pond to determine what affect construction activities have on amphibian populations in the region.

Proposed research for 2000. Future funding for this research project during the 2000 field season will be used support three lines of investigations: (1) we will continue monitoring natural movements patterns amphibians at the URI study site (as in 1999, this research will focus on adult movements to/from breeding sites, which was missed during the 1998 field season); (2) we will continue to quantify amphibian population size at a breeding pond adjacent to a golf course constructed in 1999; (3) we will conduct a series of experimental habitat manipulations at the proposed URI golf course to further refine our knowledge of habitat characteristics of amphibian movement corridors, including creating potential travel corridors in a contiguous forest patch near some breeding