

Terrestrial Habit Use by Pond-breeding Amphibians on Golf Courses in Southern New England

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Objectives:

1. To quantify maximum dispersal distances of spotted salamanders from breeding ponds to identify "life zone" extent.
2. To determine if fairways affect salamander dispersal patterns.
3. To determine what factors may affect the phenology of migration.
4. To assess the effect of landscape composition on emigration behavior of spotted salamanders
5. To examine how disturbance associated with golf course construction might affect spotted salamander emigration.

Start Date: 2003

Project Duration: two years

Total Funding: \$60,000

During the 2003 and 2004 field seasons, we monitored movements of radio-transmitted spotted salamanders to determine dispersal capabilities and habitat preferences of spotted salamanders on golf courses. This study focused on the emigration behavior of spotted salamanders (*Ambystoma maculatum*) on golf courses and protected areas in southern Rhode Island and eastern Connecticut. We also constructed a series of drift-fence arrays to monitor movements of pond-breeding amphibians across fairways.

In 2003, we monitored movements of 30 radio-tagged salamanders at two golf courses in Rhode Island: Shelter Harbor Golf Course (GC) in Westerly and Charlestown, and Beaver River GC in Richmond. The Nature Conservancy's Francis C. Carter Reserve in Charlestown served as a control site. In 2004, we studied movements of 78 radio-tagged salamanders at the Lake of Isles Golf Course, which is owned managed by the Mashantucket Pequot Tribal Nation. Radio transmitters were surgically



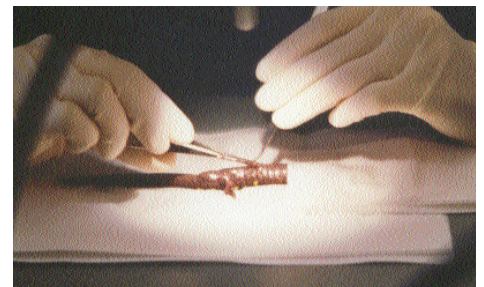
The movement of spotted salamanders was assessed at three golf courses and two control sites to assess how golf courses may affect dispersal patterns.

implanted in salamanders. Less than 24 hours after surgery, salamanders were released next to a suitable cover object at its breeding pond. The University of Rhode Island Animal Care and Use Committee approved all protocols. Animals were radio tracked from April through August. During 2004, we re-implanted new transmitters in 26 salamanders in August and hope to track them through November to determine overwintering sites.

Once released, we attempted to locate each animal at least once every three days using direct overhead localization. When animals were located, we conducted a brief search below the leaf litter around the fix to see if we could visually assess the salamander's location and condition. We recorded each animal's fix using a GPS unit.

Based on data collected in 2003, average migration distances at each of the three sites over a 95-day tracking period were comparable to previous studies: Shelter Harbor GC 186.9 meters, Beaver River GC 120.4 meters, and Carter 111.7 meters. In 2004, we found that females traveled significantly farther from breeding ponds than males. In addition, salamanders on the Lake of Isles golf course emigrated much farther than animals on a control site.

At Lake of Isles, adult salamanders often crossed fairways to reach adjacent forest plots. Animals were most often detected in small mammal burrows, generally 1-40 cm deep. Finally, eastern garter snakes (*Thamnophis sirtalis*) were a major predator of adult spotted salamanders on the Lake of Isles Golf Course, where 12% (7 of 57) radio-tagged salamanders were detected in live snakes.



Radio transmitters were surgically implanted in 108 spotted salamanders to accurately assess their movements.

We also used drift-fence arrays to monitor migration behavior of pond-breeding amphibians across fairways in 2004 from June-September 2004. We captured 466 individuals from 10 species of amphibians. Most species attempted to disperse across fairways and there was some indication that animals would use a "wildlife corridor" where the turf was never mowed.

Summary Points

- In 2004, researchers radio-tagged and monitored movements of 78 spotted salamanders at Lake of Isles Golf Course in eastern Connecticut
- Mean migration distances were greater for salamanders on the golf course (mean = 150 meters) compared to salamanders on an adjacent contiguous forested plot (mean = 100 meters).
- Adult salamanders readily crossed fairways on rainy nights
- Eastern Garter Snakes were a major predator of spotted salamanders at Lake of Isles, with 12% of 78 radio-tagged salamanders preyed upon by snakes.
- Based on drift-fence array captures, 10 species of amphibians were detected attempting to cross fairways.