

# Golf Course Wetlands as Refuges for Turtles

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## Objectives:

1. To contrast freshwater turtle population abundance, population structure, rates of growth and survival, and movement in wetlands on golf courses versus in urban and rural landscapes and protected areas.
2. To develop science-based habitat management guidelines for enhancing the capacity of golf course wetlands to sustain populations of aquatic turtles.

**Start Date:** 2009

**Project Duration:** two years

**Total Funding:** \$75,412

Freshwater turtles are experiencing declines worldwide with habitat loss cited as a major cause. Expanding urbanization contributes to this habitat loss and causes population isolation, road-kill, and habitat degradation by contaminants.

Urban wetlands, particularly golf course associated wetlands, may create "oases" from these threats due to controlled access, nutrient enrichment and hence biological productivity, and restrictions on road traffic. Golf courses could provide valuable habitat for freshwater turtles because they generally provide open-water wetland surrounded by a variety of natural habitat types in largely unroaded areas with controlled human access.

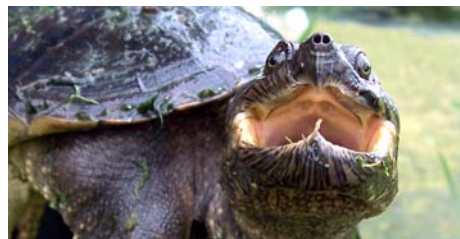
During the 2009 field season, we trapped turtles in a total of 75 wetlands ("ponds") from June 1 through August 15 along an urban-rural land use gradient in the vicinity of Syracuse, New York. We characterized the ponds based on an initial assessment of whether they were in primarily "urban", "golf course", or "protected area" contexts. Of these 75 ponds, 32 were on golf courses (42%), 20 were in urban areas (26%), and 25 were in protected areas (32%).



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We trapped turtles with baited hoop nets for three consecutive nights at each site. A total of 335 turtles were captured in the initial 3-month trapping period. Of these, 190 (57%) were snapping turtles (*Chelydra serpentina*), 144 (43%) were painted turtles (*Chrysemys picta*), and 1 was a musk turtle (*Sternotherus odoratus*).

For each turtle we made morphological measurements (carapace width and length, height, plastron width and length, and pre-cloacal length) and fitness measurements (weight, leech load, and algal cover). We also noted the sex, number of growth annuli, whether turtles had eggs, and abnormalities such as deformities or injuries.



In terms of species composition, golf course wetlands may be more favorable to snapping turtles than to painted turtles.

Initial analyses indicate that the proportion of traps catching at least one snapping turtle varied with comparable relative abundances in wetlands on golf courses (36% traps catching one snapping turtle) and protected areas (40%) versus higher abundances in wetlands in heavily urbanized areas (67%). The proportion of traps catching at least 1 painted turtle also varied among wetlands on golf courses (10%), protected areas (28%) and urban areas (38%).

In terms of species composition, golf course wetlands may be more favorable to snapping turtles than to painted turtles. Among wetlands on golf courses, 79% of captures were of snapping turtles versus 49% in urban wetlands and 54% in protected areas. Golf courses had the most favorable sex ratios of snapping turtles



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(51% females) versus urban areas (38%) and protected areas (21%), whereas the proportion of females among painted turtles caught did not vary among wetlands on golf courses (53%), urban areas (48%), and protected areas (43%).

For the 2010 field season, we will expand the number of sampled wetlands and incorporate other wetland types. We will also measure habitat configurations in detail at each site: wetland depth, shoreline composition, vegetation within and surrounding the wetland, number of basking sites, substrate, and water quality analyses.

## Summary Points

- 75 wetlands were sampled in golf course (42%), urban (26%), and protected area (32%) contexts resulting in 335 turtles captured.
- Golf course wetlands (1) supported turtles populations comparable in size to protected areas but lower than heavily urbanized areas, and (2) had a large percentage of snapping turtles compared to painted turtles (79% snapping, 21% painted).
- Golf course wetlands had sex ratios closest to the expected 1:1 ratio.
- Next season's research will expand the trapping effort to additional golf courses and new wetland types and landscape contexts, as well as examine relationships between turtle populations and landscape and habitat variables in greater depth.