

Do Golf Courses Effectively Sustain Thriving Small Mammal Populations?

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Objectives:

1. To determine the effect of golf course design on small mammal diversity and population structure.

Start Date: 2003

Project Duration: two years

Total Funding: \$60,000

In this project, we are examining the effect of golf course design on small mammal diversity and population structure. In particular, we are trying to determine the minimum habitat patch size that will sustain thriving small mammal populations. To do so, we are assessing population size, genetic diversity, and patterns of animal movement in a series of habitat patches.

With USGA grant support, I was able to hire six student researchers (five through direct grant funding; one through matching funds) to assist me in this effort. During summer, 2003, we established five small mammal trapping grids on wooded golf course "tree islands" situated between greens and fairways. These habitat patches are isolated from one another by intervening greens and fairways, and are thus examples of isolated habitat patches.

We paired each golf course "tree island" patch with a trapping grid of similar size and shape in a nearby woodland, the St. Lawrence University Kip Tract ("mainland" patches) in order to compare differences in species diversity and population structure between the fragmented golf course and the less fragmented woodland. The patches range in size from 0.143 to 1.781 hectares (0.353 to 4.401 acres).

Each small mammal trapping grid contained between 12 and 78 Sherman live traps, depending on the area of the patch. Sherman traps allow for safe capture of small mammals. We had a total of 183 traps set on the golf course and another

183 on the mainland patches, giving a total of 366 traps. These traps were opened five nights per week for a period of nine weeks between May 20, 2003 and July 24, 2003. Thus, our total trapping effort was approximately 12,444 trap nights (one trap opened for one night = 1 trap night).

During the period of study, we captured two common species (deer mice,



During the period of study, nine species of small mammals were captured on the golf course tree islands including deer mice (*Peromyscus maniculatus*).

Peromyscus maniculatus; red-backed voles, *Clethrionomys gapperi*) and an additional seven species (meadow voles, *Microtus pennsylvanicus*; woodland jumping mice, *Napeozapus insignis*; short-tailed shrews, *Blarina brevicauda*; red squirrels, *Tamiasciurus hudsonicus*; gray squirrels, *Sciurus caolinensis*, flying squirrels, *Glaucomys volans*; and chipmunks, *Tamias striatus*).

We caught a similar distribution of species on the mainland trapping grids, but had a total of 11 species, including small shrews (*Sorex spp.*) and rats (*Rattus norvegicus*), that did not occur on the golf course. In general, species richness (the number of species present on the patch) was higher on mainland than on golf course trapping grids and increased with increasing patch size.

Small mammal abundance, measured as the total number of unique animals

captured at a site during the period of study, was markedly higher on the intact woodland patches than on the golf course "tree islands".

Finally, we were able to collect tissue samples from the majority of animals we trapped. Though we cannot, at this time, draw conclusions about genetic diversity among patches, much effort was spent this summer in processing those samples for later analysis. That processing continues during the current 2003-04 academic year.

With USGA grant funding, we were able to establish the necessary trapping grids, humanely trap and collect data from target mammal groups, and begin processing samples for detailed analysis. Though we are still in the early stages of the project, we have established a solid framework for further in-depth study of these small mammal populations in their golf course and woodland habitats.

Summary Points

- The total number of species trapped on the golf course was 9.
- The total number of species trapped on the woodland was 11.
- Species richness increased with increasing patch size.
- Species richness was higher for patches on the woodland than for patches on the golf course.
- Total abundance of animals, measured as the number of unique animals trapped, was highest on the mainlands.
- On the golf course, animal abundance increased with increasing patch size.
- In the woodland, animal abundance increased with increasing patch size.
- In general, mainland patches supported much larger small mammal populations than did golf course patches.