Do Golf Courses Effectively Sustain Thriving Small Mammal Populations?

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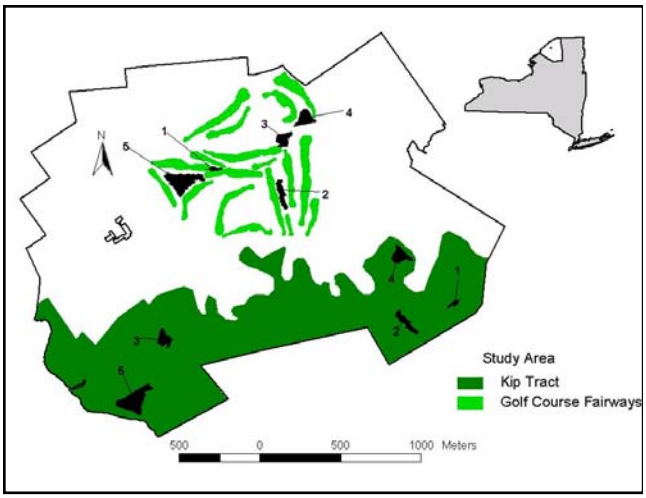
Objectives:

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

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. During the first summer of the grant period, 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.



Study area in northern New York State. Proximity between wooded Kip Tract area and Golf Course is to scale.

During 2004, we had a total of 183 traps set on the golf course and another 183 on the mainland patches for a total of 366 traps, which we opened four nights per week for a period of eight weeks between June 1 and July 25. Thus, our main trapping effort (not including trapping in Oct - Dec of 2003) in 2004 was approximately 11,712 trap nights (one trap opened for one night = 1 trap night).

Over the course of the academic year we were able to spend time in the lab working on genetic data analysis. The results of this work were presented at the annual meeting of the American Society of Mammalogists in Arcata, California in June, 2004. Based on data collected during the summer of 2002, it is difficult to draw meaningful conclusions about genetic differences. On average, there were fewer alleles per locus on the golf course than on the woodlands, indicating a reduction in genetic diversity, but this difference is not statistically significant. We are refining our laboratory approach and are using data from 2003 and 2004 to get a better idea about any genetic structuring that may be occurring in the populations.

We also spent considerable time examining our data to investigate differences in space use by deer mice inhabiting the golf course vs. mainland patches and presented some of this work at the American Society of Mammalogists meeting, as well. There appears to be a rather dramatic difference in space use between deer mice (*Peromyscus maniculatus*) living on the golf course vs. in the unfragmented woodland.

Both male and female deer mice living on the golf course have much larger home ranges than do mice living in the woodland. To measure home range, we note the individual capture locations of each mouse and use those data to calculate a minimum convex polygon home range, analogous to the minimum area the animal must be using in a particular habitat. Then by tallying differences between mice, we are able to look at how mice behave on the golf course relative to in the nearby woodland.

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

Summary Points

- Genetic diversity measured as the number of alleles per locus was lower on the golf course than in the woods.
- New techniques will allow us to better resolve differences in genetic diversity.
- Small populations inhabiting the golf course make genetic inference difficult.
- Mice on the golf course have much larger home ranges than mice in the woods.
- Home range size does not appear to relate directly to patch size.
- Mice on the golf course will spend more energy meeting daily needs than mice in the woods.