Beetle Communities in Golf Course Habitats

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Saproxylic beetles (those using dead-wood) are an incredibly diverse group of insects. Many of the species in this group fulfill ecological roles such as nutrient recycling or waste removal. Also some of these species are of economic importance because they are considered pests of recently harvested lumber. These beetles, along with many others, are victims to resource depletion and habitat fragmentation. The great diversity, economic value, and environmental pressures faced, make this group a great biological indicator for the larger biota in managed systems. This project is part of a larger effort called Wildlife Links. Some of the goals of this bigger project include integrating biodiversity conservation into highly managed landscapes like golf courses and attempting to utilize the golf courses as stepping stone environments.

My overarching hypothesis was that different habitats would contain different communities of beetles even in the highly managed golf course habitats. I tested this hypothesis with data from a recently initiated study that had invovlved placing bolts of wood in different habitats and later rearing out all beetles that colonized these sentinel logs. I tested four predictions stemming from this hypothesis: richness (number of species) will increase as distance away from the playing surface increased, freshly cut logs would have a higher richness than aged counterparts, wood species would affect richness, and finally, the habitat type that the wood was placed in would affect richness.

The experiment was split into two main parts. Maple and pine were both used in the first portion, and each was represented by freshly cut logs and aged logs that had been kept indoors for some time. The two types of each species were then placed into one of three environments; a grass rough area, a treed glade, and a forested area. Each was replicated three times giving a total of 12 logs plus control logs kept indoors. The second part of the study was done exclusively with oak logs. Paired fresh and aged logs were placed along transects at intervals away from the playing surface: 1m, 2m, 4m, 8m, 16m, and 32m. This transect was replicated three times giving a total of 36 oak logs. The logs were all left out from early June to late December 2009. They then had both ends sealed with wax and were brought indoors and immediately placed into rearing tubes. Each tube had a single outlet connected to a vial filled with glycol as a preservative. I emptied these vials each month for the first nine months and every other month afterwards for two years. I identified all adult beetles to species and calculated species richness for each log. I used the R statistical platform to analyze my data.

Five hundred individuals emerged giving a total of 40 different taxa. Only a single beetle emerged from all eight control logs. A linear regression showed that species richness did not change with distance from the playing surface. An ANOVA showed that richness did not vary with age class. Another ANOVA showed that richness did vary with wood species, with pine > oak > maple. To compare richness in different habitats we used only those species that we could identify as saproxylic. Rough grass habitats had a richness of zero and the forested areas yielded the highest overall richness.

This information can be used to recommend strategies for golf course superintendents to increase habitat for beneficial dead-wood beetles, while still limiting pests.