Microhabitat selection of northern and southern flying squirrels in Nova Scotia: analysis of diet

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Project Goals and Objectives

Overall goal: To determine habitat selection for two sympatric species of flying squirrels in Nova Scotia by examining dietary components in stomachs and feces collected from voluntary trappers and live-trapping.

Objectives:

1. To determine the percent composition of fungi, insects, tree buds, seeds, nuts, and other food items in stomachs and feces of southern and northern flying squirrels from Nova Scotia.
2. To compare the diets of southern and northern flying squirrels
3. To look at seasonal trends in diets of southern and northern flying squirrels.
4. To determine what microhabitat components are important to diet, compare this to habitat components used at other scales and thereby determine critical habitat for flying squirrels in Nova Scotia

Background

Through most of its range, the northern flying squirrel eats lichens and fungi and the southern flying squirrel relies on high protein seeds such as acorns and beechnuts (Weigl 1969, VanVoorhes 1976). The distribution of southern flying squirrels across its range may be limited by the distribution of trees bearing mast (Muul 1968, Weigl 1969) while the northern flying squirrel is able to survive on lower energy diets of fungi, lichens, and coniferous seed (Wells-Gosling and Heaney 1984). In Nova Scotia, at the edges of flying squirrel range distributions where the two species coexist, flying squirrel diet has not been researched.

There is evidence that northern flying squirrels are limited by food availability (Ransome and Sullivan 1997), that food is crucial to winter survival and that it influences the number of young produced in southern flying squirrels in North Carolina (Doby 1984).

Many incidental reports of food items for southern flying squirrels have been made (Sollberger 1940, Muul 1968, Dolan and Carter 1977) but few studies have quantified the diet of southern flying squirrels. Harlow and Doyle (1990)

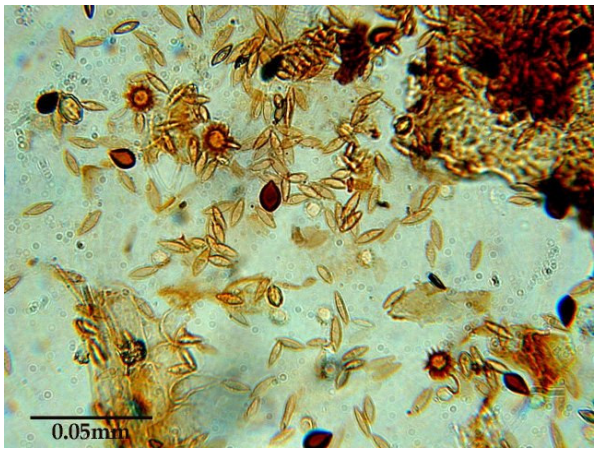
examined the stomach contents of 71 southern flying squirrels collected year-round from South Carolina. Plant material from acorns was present in every stomach and was the most prevalent food item. Other food items (in order of abundance) included the following: pine seeds, holly fruit, tree moss, fungi, hickory nuts, and insects (Harlow and Doyle 1990). Activity levels of southern flying squirrels in Michigan increase greatly during October and November when they are busy caching food (Muul 1968). By storing food, southern flying squirrels are able to stay active all winter while avoiding risky and energetically expensive winter foraging (Doby 1984; Thomas and Weigl 1998). Studies of captive squirrels have suggested that dense nuts are preferred for storing (Avenoso 1968).

The importance of northern flying squirrels as dispersers of mycorrhizal fungi, and thereby contributors to the health of forest ecosystems, is becoming increasingly apparent (Maser *et al.* 1978, Maser *et al.* 1985, Currah *et al.* 2000, Loeb *et al.* 2000). In New Brunswick, northern flying squirrel fiet has been well quantified, it includes plants, seeds, insects, and many species of fungi including mycorrhizal truffles (Gerrow 1996, Blois 2000).

Outline of work completed

- Feces were collected between 2000 and 2002 and prepared with a reference collection in 2004
- Fifty-five samples were sent to Washington State University's Wildlife Habitat Lab where they were analysed with innovative microhistological techniques (Castleberry 2000, Mitchell 2001) in 2005 (Figure 1)
- Results were analyzed statistically
- Presentations were given and reports prepared to communicate results of the project in 2006

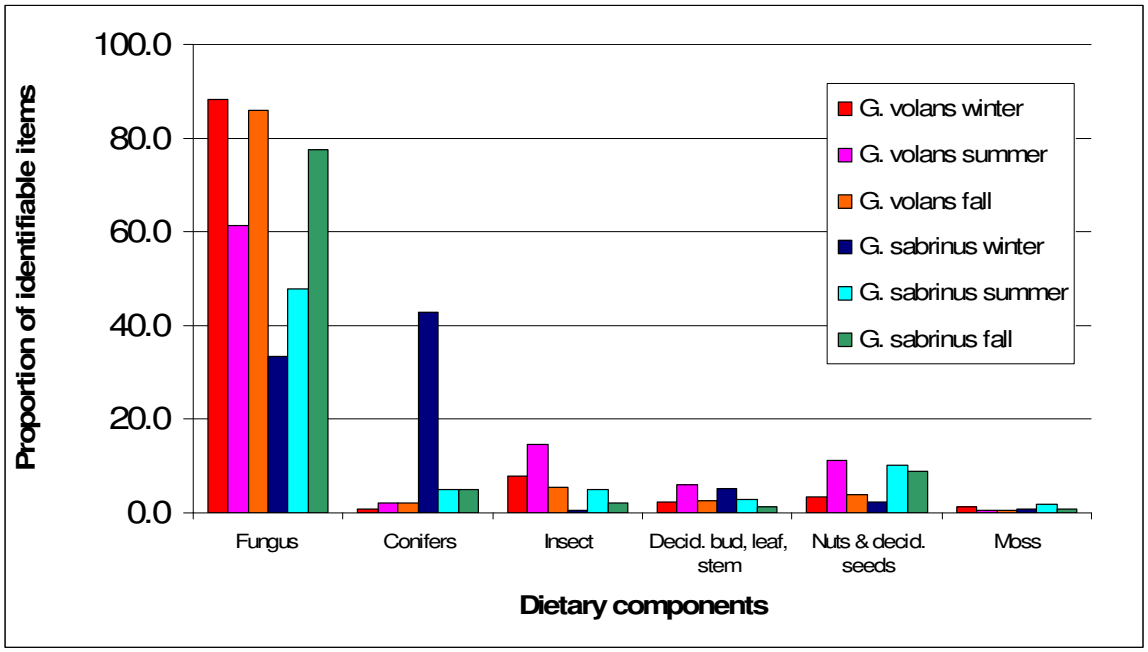
Figure 1. Photomicrograph of summer fecal sample from *G. sabrinus* showing fungal spores.



Results

The proportion of fungi and insects in the diet of southern flying squirrels is higher and coniferous plant material is lower compared to the diet of northern flying squirrels at our study sites (Figure 1). In summer, southern flying squirrels consumed less fungi and more insects and deciduous material (including nuts) than they did at other times of year. In winter, northern flying squirrels consumed more coniferous material and less fungi, nuts, deciduous seeds, and insects than they did at other times of year (Figure 1).

Figure 1. Proportion of identifiable items for each dietary component of *G. volans* and *G. sabrinus* in winter, summer, and fall (n = 55).



What did we learn? How were goals and objectives met?

This project allowed us to quantify the diet of two species of flying squirrels and to thereby better understand their habitat use at the scale of the microhabitat. Flying squirrels have been a poorly understood component of Nova Scotia's native biodiversity and are at risk because of their arboreal behaviour and current industrial forestry practices. This research helps land managers understand habitat requirements of flying squirrels and, in tandem with other research, will provide the science necessary for effective conservation.

Recommendations & Future Directions

The interpretations that can be made from the data are limited: comparisons cannot be made between dietary components because they are not equally detectable. Comparisons can be made between seasons but sample sizes are relatively low because of the cost of the analyses. Comparisons between species suggest that there is some overlap in resource use in space and time but finer scale analyses would be required to determine dietary components within the broad categories identified here. It appears that general assumptions about the diets of northern and southern flying squirrels may not hold true in Nova Scotia where the species are sympatric. Further investigation and communication of results through peer-reviewed publications and other media are warranted.

Project Partners

Partners for this project include the Nova Scotia Habitat Conservation Fund, Nova Scotia Department of Natural Resources, Acadia University, and Kejimkujik National Park and National Historic Site.

Budget

The Nova Scotia Habitat Conservation Fund contributed $10,400 of a total project budget amounting to $20,400.