

Range Extension of Northern Flying Squirrels

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While trapping small mammals in Stevens Point, Portage County, Wisconsin, we examined a northern flying squirrel (*Glaucomys sabrinus*) collected on the University of Wisconsin–Stevens Point campus in 1976. In 1977 in the same area we captured an adult female northern flying squirrel in a Museum Special snap trap set on the ground for small mammals. Dr. C. Long, museum curator at the university, identified and retained the specimen (no. 4927). This evidence extends the known range of the northern flying squirrel south of the previously known range, into Portage County, Wisconsin.

Our study area was the 83-ha Schmeckle Reserve, University of Wisconsin–Stevens Point, an area within the vegetational tension zone (Curtis and McIntosh 1951; Curtis 1959) that includes plants and animals typical of both the prairie and boreal forest ecotone extending northwest-southeast in Wisconsin. Forest composition was 5.7 ha of mixed hardwoods including oak (*Quercus* spp.), maple (*Acer* spp.), elm (*Ulmus* spp.), white birch (*Betula papyrifera*), and quaking aspen (*Populus tremuloides*); 14.3 ha of pine (*Pinus strobus*, *P. banksiana*, *P. resinosa*); 15.6 ha of mixed woods containing mature hardwoods and scattered mature white pine; and 8.9 ha of savanna (Engel 1980).

Our population estimates from live trapping (Overton 1965; Davis and Winstead 1980) were 17 ± 2.5 southern flying squirrels (0.4 per ha) and 14 ± 2.8 northern flying squirrels (0.3 per ha). Density of southern flying squirrels in Virginia was 31–38 per ha (Sawyer and Rose 1985); for northern flying squirrels in Alaska density was 0.3 per ha (Mowrey and Zasada 1984). The lower population es-

timates of southern flying squirrels in our study area, where sympatry occurred, might be due to limited availability of large trees for dens, suitable understory (Sonenshine and Levy 1981; Bendel and Gates 1987), and food in this type of presumably marginal habitat normally associated with range limitation.

A broad zone of potential sympatry of northern flying squirrels and southern flying squirrels exists in North America, coinciding with northern hardwood or mixed vegetation (Hall and Kelson 1959). But little actual overlap in the ranges of the two species of flying squirrel exists, with little evidence of sympatry due to highly variable and often exclusive niches (Weigl 1978). In Wisconsin, records of sympatry exist in Jackson (Rausch and Tiner 1948), Clark (Jackson 1961), and now Portage counties, and in the Upper Peninsula of Michigan (Stormer and Sloan 1976). The potential zone of sympatry in Wisconsin comprises the tension zone (Curtis and McIntosh 1951; Curtis 1959) within which Jackson, Clark, and Portage counties occur. Sympatry of northern flying squirrels and southern flying squirrels is likely in other counties within the tension zone.

We found northern flying squirrels almost exclusively in pine habitat and southern flying squirrels mostly in mixed woods but also in deciduous habitat. Weigl (1978) also found northern flying squirrels associated with conifers and southern flying squirrels with deciduous or mixed woods in North Carolina, where altitude influences habitat. Much (67%) of our study area is pine or a mixture of oak and pine, which Sonenshine and Levy (1981) found southern flying squirrels to use less than lowland deciduous areas. Wells-Gosling

(1985) compiled a list of habitat types in North America occupied by both species of flying squirrel.

The northern range of mast trees limits distribution of southern flying squirrels (Weigl 1978). Both species are omnivores, but southern flying squirrels eat mainly mast in winter, while northern flying squirrels eat fungi and the abundant lichens which most animals do not eat, resulting in an exclusive energy source for northern flying squirrels and little competition for food (Weigl 1978). Also, northern flying squirrels feed on cached fungi in red squirrel (*Tamiasciurus hudsonicus*) middens (Mowrey and Zasada 1984); both species generally are found together in coniferous forests. Population densities were 0.4 per ha for red squirrels and 1.4 per ha for gray squirrels (*Sciurus carolinensis*) in the study area.

Southern flying squirrels use only tree cavities for dens (Weigl 1978). They are not hibernators, and den in aggregations for warmth in winter (Muul 1968). Northern flying squirrels are larger, more thickly furred, and thus more tolerant of cold temperatures. They use tree cavities and outside nests. More tree cavities are available in deciduous than coniferous forests. Although smaller, southern flying squirrels are more aggressive in defending a home range. When both species occupy a deciduous forest, southern flying squirrels can displace northern flying squirrels into less suitable habitat, thus possibly reducing their reproductive success (Weigl 1978).

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