

# Decline of northern flying squirrel symptom of ailing ecosystem

January 24 2011, By David Pacchioli

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(PhysOrg.com) -- Northern flying squirrels are rapidly disappearing from Pennsylvania forests. Southern flying squirrels are taking over.

Most of us would be hard pressed to notice the transformation: These two aerobic species are strictly nocturnal, and so nearly identical it takes a trained eye to tell them apart. Yet the Southern takeover could have significant impact on forest ecology.

For all their similarity, Carolyn Mahan explains, the two squirrels like different habitats, and different foods. The southern flying squirrel, found all over the eastern U.S. from Vermont to Florida, is a traditional mast eater, chowing down on a steady diet of seeds and fruits. It can live almost anywhere, including in household attics, says Mahan, associate professor of biology at Penn State Altoona. Its overall hardiness, in fact,

has made it "probably Pennsylvania's most common squirrel" -- more common even than the ubiquitous gray.

The northern flying squirrel, native to Canada and as far south as the northern Appalachians, is a bit more finicky. It prefers the heavy cover of coniferous forests. And while it certainly munches its share of nuts and seeds, its favorite food is the truffle-like fungi that grow beneath red spruce and [hemlock](#).

Unfortunately, the number of unbroken conifer stands in Penn's Woods is dwindling. Development is carving up forest land, and a warming climate has benefited heat-loving pests like the woolly adelgid, an invasive sap-sucking insect now eating its way through the state's hemlocks. In addition to shrinking the northern squirrel's habitat, Mahan says, fragmentation has brought northern and southern squirrels into close contact. That means trouble for the northern squirrel, she says, because the southern variety carries an intestinal parasite, *Strongyloides robustus*, which is apparently lethal to its northern cousin.

Biologists call it indirect competition. "It's not that the southern squirrel is pushing out the northern one directly," Mahan explains. "The evidence is circumstantial right now. But the fact is that where the two species intermingle, the Northern one tends to wind up dead -- and when we autopsy them many are infected with *Strongyloides*."

As the northern squirrels decline, she notes, an important role in the ecosystem goes unfilled. It goes back to that finicky diet: By eating all those truffle-like fungi, Mahan explains, and disseminating the spores through their scat, "in effect these squirrels are seeding the conifer stands with fungi." The trees, in turn, rely on the fungi to help them absorb nutrients and moisture. Without the northern squirrel, there are fewer fungi, and that means added stress on an already weakened population of trees.

Nor do the ripples end there. "Conifers provide habitat for many other species," Mahan continues. "They cool off mountain streams. When you lose hemlocks, stream temperatures increase and you lose brook trout."

Mahan and her colleagues are still working out the pieces of this complex puzzle. For now, though, she concludes, the rapid decline of the Northern flying squirrel is both symptom of a larger malaise and a contributor to it. "It's the whole conifer ecosystem," she says. "It's not very healthy right now."

Provided by Pennsylvania State University

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