

# Mysterious ‘black-ring condition’ on birches confounds biologists

by Ed Berg



*The black-ring condition pictured on a few birches.*

We don't have any Loch Ness monsters or abominable snowmen on the Kenai National Wildlife Refuge, but we do have one perennial enigma: the “black-ring condition” on birch trees. This is the time of year we start watching for it.

Chuck Schwartz, the former moose biologist with Alaska Department of Fish and Game, first pointed this out to me in 1995 in the birch trees around the gate at the end of Swan Lake Road. A quarter-inch strip of bark on the trunks of young birch trees had been peeled back in a coil; the chunky inner bark was gone, and you could see the wood underneath. The scars appeared to be several years old, because two lips of black scar tissue had formed on either side of the gap.

These black lips made the larger scars quite visible even when driving by on the road. Birch often

shows a black inverted V-pattern around a limb, but these scars were distinctly horizontal and quite different, once you developed an eye for them.

When the scars go all the way around the stem, the stem is effectively girdled and dies above the scar. Indeed, we found a number of dead and broken off tree tops about 1 inch in diameter. On larger stems the scar often doesn't go all the way around, and the tree continues to grow, forming the black scar tissue that will ultimately seal off the wound. Most scars are on trees less than 3 inches in diameter.

At first we thought this scarring might be due to a fungus, so we sent samples to the Forest Products laboratory in Madison, Wis. They cultured pieces of the bark and scar tissue but didn't find any fungi that don't normally grow on trees. We consulted several insect specialists and plant pathologists, but they had never seen anything like this.

We next investigated the idea that sapsuckers might be responsible. Both red-breasted and yellow-bellied sapsuckers, for example, often drill distinctive horizontal rows of holes in trees. Various ornithologists were consulted, but no one had seen this particular pattern of foraging, in sapsuckers or any other kind of bird.

A visiting Russian grouse expert, Alexander Andreev from Magadan, however, pointed out that the groove in the inner bark was just the width of the two front teeth (incisors) of a flying squirrel. He suggested that flying squirrels might peel back the papery outer bark, and then chisel the brittle inner bark with their teeth. Sugars are concentrated in the inner bark (or phloem). Birch branches are often scraped by hares, porcupines and moose to get at the sweet inner bark. In spruce trees the bark beetles (and bears) go for inner bark for precisely the same reason.

One key fact about the black-ring condition is its highly localized occurrence, initially seen at the end of Swan Lake Road. This fact makes the flying squirrel hypothesis plausible. Supposedly, flying squirrels have been seen on the Kenai, but we have never been able to confirm any actual sightings. A single family of

flying squirrels might explain the localized occurrence of the scarring.

In May 1996 we made a breakthrough: we discovered fresh scars on birch trees along Finger Lakes Road, west of Swanson River Road, 14 miles southwest of the Swan Lake Road site. We could see the curls of birch bark, the neatly chiseled inner bark, and fresh wood in the eighth-inch grooves. Lips of scar tissue had not yet formed, so there were no “black rings,” such as we had seen at the end of Swan Lake Road. When we checked this area in 1997, we could see last year’s scars but no new ones. Whatever was eating these trees apparently had moved on.

In April 1997, refuge biotech Todd Eskelin photographed some nice examples of the black-ring condition in Anchorage along the Tony Knowles Coastal Trail. Our last definite sighting of fresh scars was in July 1999 near the end of Marathon Road. This January, however, Todd noticed some birch in the Wolf Lake area where the outer bark was peeled back in narrow strips, but the inner bark was unbroken. The Wolf Lake area, north of Finger Lakes Road, has extensive older scars with well-developed black rings of scar tissue.

In 1999, Mal Furniss, a retired entomologist, sent us a 1956 article from the *Journal of Forestry*, entitled “Damage to paper birch by red squirrels in Alaska” by Prof. H. J. Lutz of Yale. (The Sitka-white spruce hybrid “Lutz” spruce on the Kenai is named after Prof. Lutz, who contributed much to early forestry research in Alaska.) Lutz’s paper described extensive girdling of birch on the north side of Turnagain Arm (Bird and Indian Creek valleys) in 1952, in the Eagle River area in 1954, and also reported a few damaged birches near Bedlam Lake south of Point Possession. Several excellent photos convinced us that Lutz was describing precisely what we had been seeing in the 1990s.

The problem with the Lutz paper, however, is that it contained no evidence whatsoever that red squirrels are the culprit. Lutz checked red squirrel skulls and found that the incisor teeth fit the scars very well, as our Russian visitor Andreev had suggested for flying squirrels. Lutz, however, reported no behavioral observations of red squirrels doing the damage.

We certainly have lots of red squirrels and lots

of birch on the Kenai (and in the Anchorage area, as well), so why is this girdling so rare? We have collected enough observations of this phenomenon on the northern peninsula to feel confident that this is not just one smart red squirrel or family of red squirrels who have discovered a good thing. Lutz reviewed the published literature of red squirrel feeding behavior and found much discussion of tree injuries, such as removing strips of bark 4 to 12 inches long from sugar maples, but nothing quite like what he and we have seen on birch trees.

So, could it be flying squirrels, instead of red squirrels? Flying squirrels are famously hard to see. They come out at dusk and, on rare occasions, are seen flying from trees to bird feeders around Fairbanks and Anchorage. A serious objection to the flying squirrel hypothesis, however, is that we have been able to find no one up in the Interior who has seen such scarring patterns. There is lots of birch in the Interior, and one can imagine that the sweet inner bark might be just the ticket for nocturnal flying squirrels up north. Furthermore, flying squirrels are typically found in mature forest habitat, whereas most of our scarred trees are in the relatively young 1969 burn or 1947 burn areas.

Todd Eskelin suggests that there may be a several-step process here, and that we shouldn’t bank on finding the missing flying squirrels to explain this phenomenon. Perhaps there is a disease or insect that occasionally gets into the birch and then squirrels (of whatever type) or birds or whatever feed on that diseased site or insect by peeling back the bark to expose it.

In any case, we need more examples of this scarring to put some of these speculations to the test. I encourage readers who have seen such scars (especially fresh ones) or, for that matter, who have seen any flying squirrels, to please give me or Todd a call at 260-2812. We need some more breakthroughs!

*Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.*