

## Did beetle-kill forests burn in the past?

by Ed Berg

We have a lot of dead beetle-killed spruce forest on the Peninsula, and we have had two scary fires in these forests in recent years. The 1996 Crooked Creek Fire northeast of Ninilchik spread quite rapidly with a strong wind and covered 17,510 acres in a remote area. The 1998 Hutler Road fire east of Homer could have burned up many homes, but fortunately homeowners generally had prepared good defensible spaces, and quick response by the firefighters prevented a major disaster.

If however we look further back into the past, can we see evidence of beetle-killed forests burning? This question has puzzled me for several years, and I am tentatively prepared to argue that over the last two hundred years, we have at this point no evidence of fires in beetle-kill. We have looked at tree-rings in 17 stands on the Peninsula, from Kachemak Bay to the Swanson River oilfield northeast of Kenai. We see evidence of bark beetle outbreaks over the whole in the Homer area Peninsula in the 1810's–1820's, and regional outbreaks on the southern Peninsula in the 1870's–1880's, and the northern Peninsula in the 1970's. We also see evidence of local outbreaks at various other times, such as the Mystery Hills in the early 1980's. In none of these sites do we see any evidence of a stand-replacing fire after a beetle outbreak.

There are two areas that would seem to be particularly good candidates to find evidence of fire after beetle kill: the Tustumena benchlands and the forests south of Deep Creek to the Anchor River. The Tustumena benchlands experienced a series of burns, dating at 1871, 1891, and 1910 reburn, according to trapper Andrew Berg who lived in the Tustumena Lake area from the 1890's until his death in 1939. The tree-rings show that the central and southern Peninsula forests near the coast experienced heavy beetle kill in the 1870's, so the timing is right for the 1871 benchlands fire.

Up on the benchlands one can still find a lot of dead and partially burned wood in certain areas, which probably escaped the 1910 reburn of the earlier burned areas. On two trips we have examined a lot of this wood for beetle scars, but have never found any sign of them. In the Homer area, however, we have found old

(unburned) snags, which died in 1884 with good beetle scars. (We look for the maternal galleries, which are 3-4 inches long and a quarter inch wide, lying parallel with the axis of the tree. These can be quite visible on old barkless wood.) The absence of evidence, of course, proves nothing, but is possible that benchlands escaped the 1870's beetle infestation because of the higher elevation (above 1000 feet) and cooler environment.

The second area for a possible beetle kill-and-fire connection is the broad forested zone from Ninilchik to Anchor Point. This forest is predominantly continuous white spruce with not much hardwood. It has experienced 90-100% mortality of the mature spruce, and has been heavily logged in recent years. Last month we looked in detail at an uncut stand on East Road, southeast of Ninilchik, which is being considered for a prescribed burn next year by the Alaska Division of Forestry. This stand is representative of the area, but it is only one sample of a large area and our results must be considered tentative.

This stand had a somewhat “even-aged” mature look, where the largest trees are about the same size, i.e., 15-20 inches in diameter in this case. Even-aged stands are typically formed after a fire; the largest trees are all about the same age and were recruited within 10 years or so after the fire. Appearances can be deceiving, however, and we were definitely fooled by this one. The largest trees dated from the late 1700's to the 1850's, indicating that they only appeared to be of similar age but really were not. Furthermore, we found no burned wood in the stand, which one would expect from a 19th century burn. We took Pulaskis and opened up old moss-covered logs on the ground, hoping to find charcoal (or beetle scars) on these logs as evidence of fire, but only found thoroughly rotten wood. These unburned rotten logs indicate that at least one generation of trees has come and gone on this site before the present generation of trees.

We did find locally abundant charcoal-covered wood in the soil, especially among exposed roots in throw mounds of blown-over birch trees in an adjacent logged area. This charcoal shows that the stand did burn at some point within the 8000 years that spruce

forests have been on the Peninsula. We are getting a radiocarbon date on this charcoal, but we expect that it will show that the stand has not burned for at least 400-500 years.

In the tree-rings from this site we can see a growth release in the 1880's, which is typical of our southern Peninsula sites, and we can say with reasonable certainty that this forest was thinned by the bark beetles during the regional outbreak of the 1870's. So once again, we see that a forest that did not burn after a beetle outbreak.

To sum up, in the Tustumena benchlands we had a fire in 1871, but apparently no beetle-kill, whereas in the Ninilchik East Road site we had beetles but no fire afterward. The East Road site is thus typical of the 16 stands, which we have previously studied, which show beetle outbreaks at various times but no evidence of fire.

Should a homeowner draw consolation from these

studies? Unfortunately, no. The climate is warmer and drier today. Basically, it is drought, not beetle kill that creates the real fire hazard. A drought-stressed live spruce next to your house is every bit as flammable as a beetle-killed spruce. We have had an unbroken run of warm summers since 1987, which has increased evapotranspiration and caused a regional drying of the landscape. This drying can be seen in falling water tables in wetlands and closed-basin lakes. Dead or live, our spruce trees burn just fine when they are dry. Residents in the 1996 Big Lake Fire no doubt remember how that fire burned so destructively in well-dried black spruce that was quite alive and had no beetle-kill in it.

*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/>.*