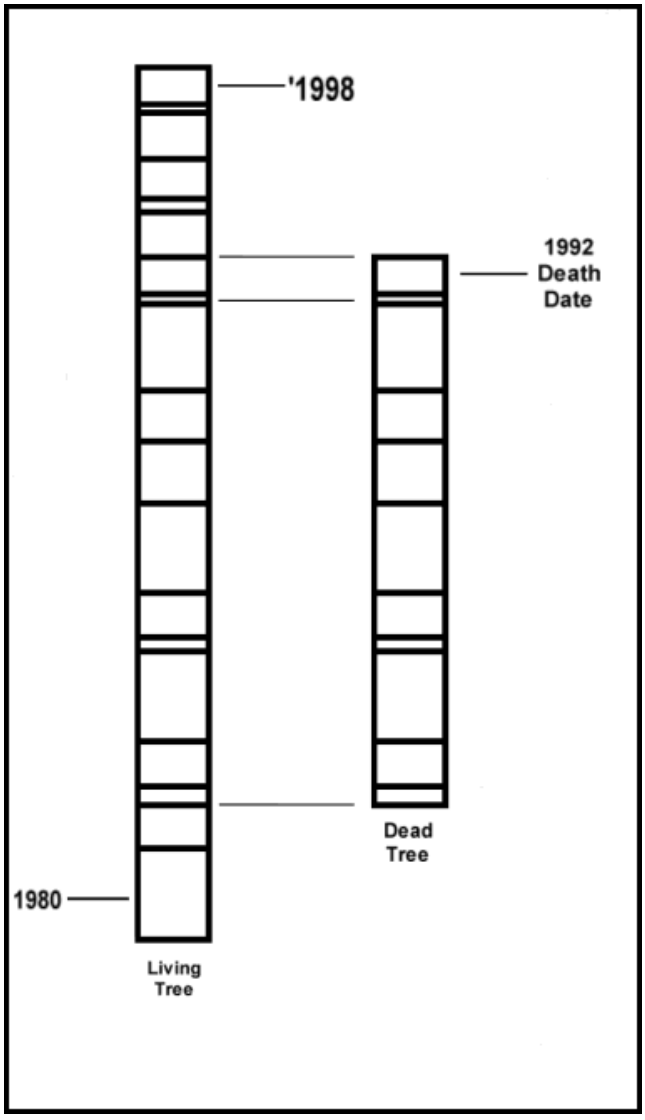
Dead trees can tell some tales

by Ed Berg



Dead men may tell no tales, but dead trees can often tell better tales than live trees, especially if the trees have been dead for a long time. Take for example a log from a turn-of-the-century trapper's cabin or from a 13th century Stave Church in Norway. Tree-rings in such wood can tell exactly the year when the tree was cut, or more precisely, when the tree died (its "death date").

Tree-rings are one of my favorite tools for my forest ecology studies on the Kenai National Wildlife Refuge. To use tree-rings, however, I have to precisely date every ring of a tree. This dating starts with the last (outermost) ring and counts backward, so I have to first determine the date of the outermost ring, i.e., the death date of the tree.

To determine the death date, I first extract a sample (or core) of wood from the tree with an increment borer, which is a threaded 3/8" steel tube. The borer is screwed into the tree, aiming for the center. The sharp end on the tube cuts out an 1/8" cylindrical wooden core like a dowel rod. I glue the core to a grooved wooden stick, and sand it to a furniture-grade polish so that the rings are clearly visible.

Next I measure the width of each ring under a good binocular microscope at 20-60x power. In the Refuge lab we have a sliding bench micrometer hooked up to a computer, which can accurately measure ring-widths to 0.001 millimeter or 0.00004 inch. This amazing device is similar to a lathe with a very fine screw, and it uses an electronic pickup borrowed from an industrial milling machine. It takes me about 20 minutes to measure a core with 200 rings (years).

With my 200 ring-widths in hand I use the computer to compare these widths with an average set of ring-widths (called a chronology) that I have collected from live trees. I started with live trees because I know the dates of the outermost rings if the trees are alive when I core them. The computer matches fat and thin rings in the core with fat and thin rings in the live trees (see drawing). This matching process can be done by eye, using narrow marker years, but the computer does it much faster.

Once I have properly lined up the core with the live tree chronology, I can simply read the death date of the core off the matching ring on the chronology. It's a simple idea, but it takes good measurements to make it work. It also requires a fair amount of climate-driven year-to-year variation in the width of the rings; it doesn't work if the trees are always fat and happy, and put on the same nice wide rings every year.

Graduate student Andy DeVolder is studying fire history in black spruce north of the Kenai River, and has used death dates and fire scars to determine fires in 1708, 1762, 1801, 1828, 1833, 1834, 1849, 1867, 1874, 1884, and 1888, and 1898.

Refuge postdoctoral researcher Chris Fastie dated an old white snag with spruce bark beetle scars near

Homer with a death date of 1884. This death date coincided with a massive 1880's growth release (pulse) in trees which we studied on the west side of Homer, assisted by Stan Eller's biology classes at Homer High School. The 1884 date together with beetle scars helped confirm our idea that growth releases occur in small surviving trees after the beetles kill the large trees.

I am currently dating old logs in a big log jam on the Killey River in order to find out how often the Killey has flooded over the last hundred years. Historian Gary Titus has located a number of cabins that trapper Andrew Berg built around Tustumena Lake between 1890 and his death in 1939. We are interested in dating the logs in these cabins, if we can find solid wood to core.

Ed Berg has been an ecologist at the Kenai National Wildlife Refuge since 1993.