



Insect Outbreaks

Resource Brief

Importance

In the past, high latitude forests have experienced widespread mortality and/or loss of canopy cover due to insect and disease outbreaks. Variation in climate and/or changing land use patterns may affect the population dynamics of insects and forest pathogens, potentially altering forest structure and composition in the future.

Status

Since 1989, the spruce bark beetle (*Dendroctonus rufipennis*) has killed roughly 3 million acres of spruce forest in south-central and southwest Alaska, including approximately 172,500 acres in Lake Clark NPP (LACL) and Katmai NPP (KATM). Beetle activity has recently increased on the Alaska Peninsula, particularly in the Iliamna and greater Naknek watersheds.

Tree-ring data have been widely used to address issues of past disturbance and long-term climate variability in forested ecosystems. In 2005 and 2007, tree cores were collected from 15 sites in LACL and KATM to determine whether bark beetle outbreaks occurred historically. As beetles kill older, larger trees in the stand, younger trees in the understory are released from competition and show an increase in growth, or 'growth release,' evident in the tree rings (Fig. 1). Preliminary results from the LACL collections have shown growth releases in the 1810s, 1870s, 1910s, and 1970s-1980s, synchronous with release events recorded from the Kenai Peninsula. In KATM, major growth releases were recorded in the 1910s, one to three years following the 1912 Mt. Katmai eruption, and in the late 1970s-early 1980s.



Figure 1. Examples of growth release observed on tree-ring cores collected from the Tliikakila River, LACL. The cores represent a release in the 1910s.



Recent spruce bark beetle-induced tree mortality, Crescent River-Polly Creek, LACL.

Discussion

Tree-ring reconstructions from the Kenai Peninsula and LACL indicate that widespread forest thinning has occurred at a mean return interval of roughly 50 years over the last 250 years. In LACL, tree-ring evidence suggests that stand conditions were historically sufficient to support regional-scale outbreaks. In KATM, the tree-ring records are shorter, but stand-level releases during the last century coincide with the regional release events recorded for the Kenai Peninsula. The degree to which new outbreaks in southwest Alaska could disrupt ecological processes is unknown and will likely be the subject of future monitoring efforts. In addition, ongoing analyses are examining the relationship, if any, between release events and climate.



Dr. Ed Berg (left) and field assistant Matt Boswer examine spruce bark beetle damage at a site in LACL.

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