Alaska's Forest Health Issues

Aspen Leaf Miner Activity, 1996-2006

Aspen leaf miner, Phyllocoptes populnea Chambers, is a native moth in the family Gelechiidae that feeds on quaking aspen and balsam poplar. Before 1989, this insect was at endemic population levels and hardly visible on the landscape. In recent years the infestation ballooned, reaching 659,500 acres in 2005. Areas most severely affected included along the Alaska Highway between Delta Junction and Tok, Fairbanks area, Yukon Flats, Yukon River Valley, and the Tanana River Valley. Aspen was also affected by severe drought in 2004 and 2005, and many aspens already on dry or marginal sites succumbed to the combined effects of leaf miner and drought.

Spruce Beetle Activity, 1980-2006

The spruce beetle, Dendroctonus rufipennis, is the major tree-killing insect of Alaska's spruce forests. Most spruce beetle outbreaks have been and are occurring throughout southern and western Alaska. Recent Alaskan spruce beetle outbreaks have been associated with spruce stands having been felled by severe drought and producing, or capable of producing, at least 20 cubic feet per acre per year. The epidemic infestations on the Kenai Peninsula and in the Copper River Basin are now declining because the beetle has killed much of the mature spruce in those areas, thus eating itself out of house and home. Current management focuses on removing dead trees to minimize wildfire hazards. White, Sitka, and Lutz spruces are commonly attacked by the spruce beetle. Black spruce is rarely attacked.

Infestations have occurred primarily in older, slower growing spruce. Small diameter, rapidly growing trees are least susceptible to attack. Susceptibility to infestations increases when a forest is composed of more than 70% spruce over 10-in. diameter, and with a slower than average growth rate. Fast 10-year average annual growth of many Kenai Peninsula Lutz spruce stands is negative, indicating that mortality exceeds annual growth.

Early Detection and Eradication of Spotted Knawep

Spotted Knawep, Centurus uferensis DC., is a notorious problem in many western states, is a prime candidate for early detection and rapid response in Alaska. Although small patches of this species have been discovered in several locations, it has not yet become widespread in Alaska. Spotted knawep is listed as rare in at least 15 states, and is known to spread rapidly, eliminating surrounding vegetation through the production of allelopathic chemicals. Monocultures of spotted knawep displace native vegetation, degrade wildlife habitat, and increase soil erosion.

In 2002, an infestation of spotted knawep was discovered in the city of Valdez, and was eventually hand-pulled in 2003 and 2004. The site was revisited in 2005 and appeared to be free of knawep, but regular scouting will be necessary for several years. A single plant was recently discovered on the Kenai Peninsula, and was pulled and placed as an educational specimen. Two known infestations of spotted knawep occur south of Anchorage, along Turnagain Arm. Continued pulling has greatly reduced one of the infestations, but the second is expanding rapidly. Regular monitoring and continued control efforts will be essential if these incipient infestations are to be eliminated. Spotted knawep is one of the many invasive plants threatening Alaska's ecosystem.

Early Detection and Monitoring for Exotic Insects

In Alaska, increasing tourism and international trade elevates the risk to forested ecosystems from exotic insect introductions. It is widely accepted that the most effective and lowest cost-defense against exotic species introductions is to have an effective monitoring system designed to detect introductions early and that allows for rapid response control. The recent introduction of the amber-marked leaf miner has helped to highlight the increasing risk to Alaskan forests and emphasizes the need to further develop an early warning system with a wider scope for detecting introductions.

Climate Change and Forest Health

Alaska, like other arctic and subarctic regions, is experiencing a change in its climate, with well-documented increases in mean annual temperatures, maximum daily temperatures, minimum daily temperatures, growing degree days, and the frost-free season. Changes in the health of Alaska’s forests are expected because their living components of an ecosystem, such as trees and insects, and non-living components, such as fire, respond to climate.

Climate-related forest health problems have already been documented in Alaska. The spruce beetle outbreak on the Kenai Peninsula has been linked to a warmer and drier climate, which caused the spruce beetle to shift from a two- to a one-year reproductive cycle. In interior Alaska, the first recorded spruce budworm outbreak, 1930-1935, may have resulted from elevated summer temperatures that produced drought stress in the host white spruce trees. The 2004 wildfire season, the largest on record, was a direct result of recent temperatures and little precipitation. In the discontinuous permafrost regions of southern and interior Alaska, increasing temperatures have been associated with both the loss of wetland habitats and increasing rates of the development of thermokarst topography, both of which result from permafrost thawing. Thawing –the collapsing of thaw-rich ground surfaces—in forested landscapes can lead to the loss of forested land area. In addition, data provided by Dr. Scott Goetz and his colleagues’ (new data—interpolated for visual representation), indicate that much of Alaska’s boreal forest demonstrated reduced photosynthetic activity from 1982 through 2003, possibly due to factors such as fire disturbance, drought stress, nutrient limitation, and insect and disease damage.

Yellow-cedar Decline

Decline and mortality of yellow-cedar panicles as one of the most spectacular forest problems in Alaska. Approximately 500,000 acres of decline have been mapped during aerial detection surveys since 1980. Extensive mortality occurs in a wide band from north of Sitka to the Ketchikan area.

In 2004, it was discovered that yellow-cedar decline extends approximately 105 miles south into British Columbia. Canada. The entire distribution hints at a change in climate as a trigger for initiating the forest decline.

Research suggests that contagious diseases are not the primary cause of this extensive mortality. Some site factors, probably associated with poorly drained peat-moor, soils, appears to be responsible for initiating and continuing forest decline. A leading hypothesis to explain the primary cause of forest death in the late winter that allows solar radiation to penetrate open-canopy forests, triggering a premature loss of cold tolerance in cedars, thereby predisposing trees to freezing injury in spring during cold periods.

Research continues; other tree species are largely unaffected. Yellow-cedar wood is extremely valuable by many people, most recognizable is its use in totem poles.

Biological Control of an Introduced Birch Leaf Miner in Alaska

The birch leaf miner, Protorhina thomsoni, has recently become one of the most common insect pests attacking native and ornamental birch trees (Betula spp.) in Interior Alaska and the Anchorage area. Presumably, Alaska had remained free of this non-native insect until damage was first noticed in Anchorage about 1995. Introduction was likely from infected birch nursery stock transported into the local big box stores and possibly also into private nurseries and greenhouses. Since 2002, P. thomsoni has been defoliating more than 35,000 acres annually throughout the Anchorage Basin.

A cooperative biological control program was initiated in early 2003, to establish a parasitic ichneumon wasp, Lathraulnesia lactulosa, in the Anchorage community. This wasp attacks only late-stage larvae of P. thomsoni. Biological control is preferred because it is long-term, perceived as ‘natural’, and should reduce the use levels of chemical pesticides which provide only a short-term solution for control. This project has entailed the collection of parasitized larvae and parasitized adults in Canada, importing the biological material to Alaska, then rearing adults from these collections and releasing emerged adults in Anchorage during 2003-2006.