

The spruce aphid, a non-native species, is increasing in range and activity throughout coastal Alaska

by Elizabeth Graham¹ and Jason Moan²



Figure 1: Sitka spruce trees heavily infested with spruce aphid in Halibut Cove. Photo Credit: Garret Dubois

Issue

The spruce aphid originated in continental Europe and became a major pest in the 1800s and 1900s after widespread planting of Sitka spruce. It eventually made its way to North America, likely via nursery stock, first reported in 1915 in Vancouver, British Columbia. Spruce aphid, *Elatobium albetinum* Walker, was first reported in Alaska in 1927 in the southeast town of Wrangell, but outbreaks did not become frequent, extensive, or severe until 1967 where it was found injuring ornamental spruce in Sitka. It has since been a reoccurring pest of Sitka spruce throughout the coastal areas of Southeast Alaska, such as Juneau, Ketchikan, Craig, and especially Sitka. During heavy outbreak years, over 40,000 acres of damage was attributed to spruce aphid during aerial detection surveys. It has previously been detected in the Prince William Sound area, most notably in 2005 when it was mapped on over 4500 acres, but significant damage was not reported outside Southeast Alaska again until 2015 when it was found on the Kenai Peninsula.

Concerned homeowners on the Kenai Peninsula reported numerous Sitka spruce trees with brown needles (Figure 1). Entomologists from Forest Health Protection and AK Division of Forestry identified the causal agent as the spruce aphid, confirming a considerable expansion of the

aphid's known range in Alaska (Figure 2). In maritime environments, spruce aphid outbreaks are directly correlated with mild winters. Spruce aphids begin actively feeding in late winter, and research indicates that actively feeding aphids cannot tolerate temperatures below -7°C for prolonged periods or frost events at even lower temperatures (Day and Kidd, 1998; Powell and Parry, 1976). Aphids become inactive during prolonged periods of cold and eventually starve to death. Alaska is on the forefront of climate change; over the last 60 years temperature has increased an average of 6°F state-wide (Chapin et al., 2014). The warming climate may have triggered a spruce aphid range expansion or alternatively increased chance of establishment and outbreak after separate introduction(s) into these areas.

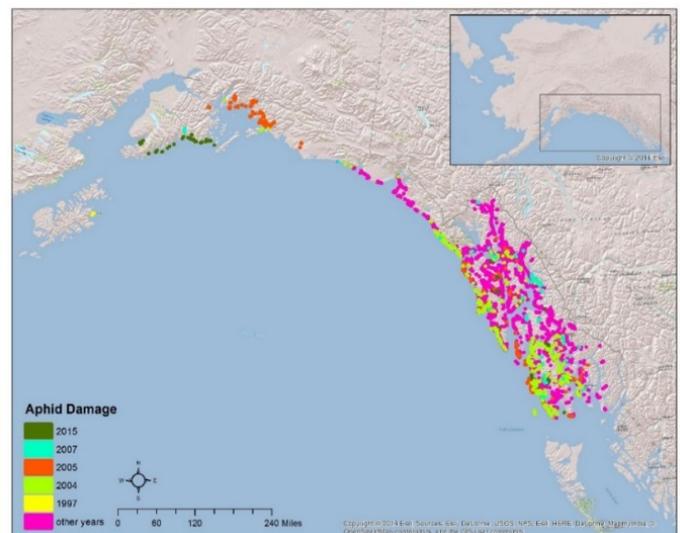


Figure 2: Spruce aphid damage mapped during aerial detection survey since 1987. Years with heavy aphid outbreaks are distinguished by color. Spruce aphids were confirmed on the Kenai Peninsula for the first time in 2015.

Aphid feeding is restricted to mature (one year old and older) needles, with new foliage being nutritionally inadequate. Feeding damage causes the needles to turn yellow then brown and fall off, leaving the crown looking thin (Figure 3). Repeated years of heavy defoliation can lead to mortality or subject the tree to secondary damage agents, such as spruce beetle.

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Current situation

Spruce aphid activity is on the rise in 2016 with confirmed activity on the western side of the Kenai Peninsula. Concerned citizens from Homer reported damage associated with these aphids, with severe defoliation observed in some of the infested trees. A site visit conducted by FHP and Alaska Division of Forestry specialists in late February 2016 found scattered infested trees throughout the Homer area, varying in severity of defoliation. Damage appeared to be confined to trees in close proximity to the coast. FHP staff also surveyed for spruce aphid in the towns of Seward, Whittier, and Hope, as well as along Turnagain Arm, the Hope Highway, and the Portage area but no signs of aphid activity were observed.



Figure 3: Spruce aphids feeding on the needles of Sitka spruce.

The mild winter temperatures in 2016 promoted aphid activity. There is concern that the aphids may gradually move into higher elevation forests or further inland. There is also concern about the potential susceptibility of

spruce aphid-weakened spruce to spruce beetle on the Kenai Peninsula. Spruce beetles preferentially attack and kill weakened trees. The combination of aphid and beetle activity could lead to increased mortality.

To answer some of these questions and concerns a long-term plot network will be established in 2016 to monitor the impact and range of spruce aphid throughout coastal Alaska. FHP entomologists will be working in collaboration with an entomologist from the Rocky Mountain Research Station to establish a risk assessment model for predicting aphid outbreaks. High-value trees can be treated with insecticides to prevent or limit aphid attack and the proposed risk assessment model can serve as an indicator of when treatment may be warranted and as a warning system to land managers prior to an outbreak.

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