



Integrated Pest Management Issues

Geometrid moth defoliation and activity on the Kenai Peninsula and South Central Alaska • Update: July 2011

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What is eating my trees and berries?

An unusual outbreak of insect defoliators is currently occurring in various locations in South Central Alaska including the Matsu Valley and the Kenai Peninsula. Especially severe outbreaks can be seen on various tree and shrub species at the upper reaches of Hiland and Arctic Valley Roads, around Summit Lake, near Homer, and near Seward on the Kenai Peninsula where hundreds of trees have been completely or nearly completely defoliated. A similar outbreak on berry crops was recently reported from Nanwalek on the southern Kenai. If you had looked close enough as the leaves started expanding this spring, you would have seen caterpillars munching on the foliage. Various insect species (especially geometrid moths) have been collected from affected trees, and the specific insect culprit depends on what plants are affected and where, but the current thinking is that the main causes are the autumnal moth and the Bruce spanworm. Other leaf eating insects are undoubtedly involved also.

When did the infestation start and where is it happening?

During the summer of 2009, residents of Nanwalek began noticing intense defoliation of alder and salmonberry bushes on hillsides near Dogfish Bay about 7 ½ to the south of Nanwalek. The mountains were notice-

ably brown where the Sitka spruce forest stopped and woodland vegetation dominates at 500-800 ft elevation and higher. During 2010, damage to plants intensified in Dogfish Bay and was found northward into the English Bay river and lake system about 2 miles south of Nanwalek. A similar caterpillar infestation occurred in other areas around the Matsu Valley and the Kenai Peninsula the same year. The caterpillars had severely defoliated native and ornamental plant material above 1400 feet in these areas. After documenting the infestation and collecting adult specimens that were very numerous during the fall of 2010, the moths were identified as the Bruce spanworm, *Operophtera bruceata*, and the autumnal moth, *Epirrita autumnata*, both geometrid moths.

Other moths were identified but were not considered major actors in this defoliation event. In the current 2011 summer season, geometrid moth caterpillars and defoliation of berry crops and other native hardwood species has been documented in Anchor Point, Nanwalek, Port Graham, Ninilchik, Seward, and mountain passes on the Kenai Peninsula, including Summit Lake and Turnagain Pass. Near Anchorage, Geometrid moth damage has been documented in Powerline Pass in the Chugach State Park, Arctic Valley, Eagle River Valley, Peters Creek Valley, Eklutna Lake and as far north as Hatcher's Pass. During the current 2011 season, the Bruce spanworm is also thought to be responsible for blueberry defoliation along the Herbert Glacier trail in Southeast Alaska.



Bruce Spanworm moth. June, 2011

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Have the defoliated plants died?

Probably not, but they sure do look dead! Usually it takes several years of continuous defoliation to kill native deciduous trees/shrubs and berries. Although the leaves are gone from affected trees, the ability to produce a second crop of leaves later this summer has not been lost for many plant species, especially if weather conditions remain mild. Most importantly, plant vigor and vitality before the defoliation event occurred will be the most important factor in whether or not the plant material will survive.

What kinds of plants does this happen to?

A wide variety of tree and shrub species have been infested. In the Matsu Valley, willow, birch and high elevation shrubs have been especially affected. On the Kenai Peninsula and elsewhere, berry crops, including salmonberry and blueberry, as well as alder have been damaged. The Bruce spanworm and the autumnal moth both have wide host ranges and are known to infest these species. We still need to learn more about the other insect species that have been found, and what their roles might be in these outbreaks.

What can we do about this problem?

To help ensure that defoliated trees do not succumb, good growing conditions need to be maintained, where possible. Adequate water and protection from other insects and diseases that are attracted to stressed trees should be considered. Defoliated plant material should be watered heavily this current season and it may still reflush with growth later this season. This refoitation occurred on woody plant material during the 2010 season and may have been helped by a wet summer and fall. Little can be done for pupae or the flying adults that will undoubtedly be so plentiful this fall. Certain berry crops and highly prized ornamental species may be sprayed with an appropriate insecticide beginning around the end of May 2012, and



Bruce Spanworm caterpillar. June, 2011

lasting into the first week of June 2012.

The location and elevation of the plant material will dictate when they will bud out and this will determine the exact timing of the Bt spray. Because there are so many predators, including birds and beneficial and non-target insects present at the same time as the caterpillars, and they will inevitably be responsible for ending this moth outbreak, we should exercise caution with the pesticides that we use to target the moth caterpillars.

What does the future look like?

The damage was done early in the spring. Caterpillars were found as early as the middle of May, when they began to chew on the opening buds and expanding leaves. At least some of the same caterpillars have been found at all the above mentioned areas. Although active defoliation is occurring in some areas, most of the defoliation occurred early and was completed by the end of June. At this point, the caterpillars were parachuting out of the canopy on silken threads and heading towards their pupation sites in the soil.

The adult Bruce spanworm and autumnal moths will again emerge beginning in August and continue emerging until November. During this period, the wingless females will be fertilized and lay egg masses on the twigs and branches that will once again give birth to a caterpillar explosion during the spring of 2012.

Like other geometrid moth outbreaks that have occurred in Alaska in the past, this current outbreak should run its course in a few years. Areas on the southern Kenai should see a significant decrease in moth activity in the next year as they have had heavy defoliation for multiple years now. The northern Kenai Peninsula and Matsu Valley areas will most likely have another year or so of heavy defoliation.



1st instar geometrid moth caterpillar with parasitic wasp, most likely using caterpillar as host (food). May 2011



Male and female geometrid moths. Female is wingless/flightless. Eklutna, AK
Photo by Sherry Bottoms



Willow/alder/birch defoliation along Symphony Lakes trail, Chugach State Park, Hiland Rd, Eagle River.

These geometrid moth outbreaks are caused by the reproductive life strategies of this insect that enables it to take advantage of certain environmental conditions, where it can go from hardly present to epidemic levels in just one season. The outbreaks generally disappear just as quickly, to the point that the moth caterpillars will be difficult to find. Predation from many sources, disease and competition among the caterpillars themselves will conspire against them to the point that their populations will crash. Although this is apparently only the second year of intense defoliation around Eagle River and the third on the southern Kenai, if trees growing in affected areas experience drought or other extreme weather conditions for extended periods of time this summer, trees may

start to die. Also, defoliated trees are more susceptible to other insects and diseases that thrive on stressed plants.

Already we are seeing birds specifically targeting the geometrid caterpillars and many of the caterpillars are feeding on plant material that will not sustain them into adulthood. They are feeding on certain plant material out of desperation and it will not be sufficient for their survival. The processes that will bring this outbreak to a conclusion are already occurring and this natural cycle can be easily viewed in our backyards and during our hikes. The repercussions and potential damage to the forest stands and berries is something that will require further study and investigation.



Willow defoliation in Arctic Valley. Photo by John Lundquist