# Southeast Defoliator Survey- Trip Report

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**Figure 1:** Western blackheaded budworm damage north of Juneau, Alaska.

**Purpose and Background:**

Southeast Alaska conifer forests are currently experiencing an outbreak of endemic defoliators. It began in 2018 with hemlock sawfly as the predominate damage causing species. Hemlock sawfly populations crashed in 2020 and since then western blackheaded budworm has been the predominate defoliator. A ground survey in late July 2022 was conducted along the road system in Southeast Alaska to determine which species were active, the amount of damage visible from the ground, and whether there are any indicators that the outbreak will continue into 2023. Members of the USFS Forest Health Protection (FHP) and Alaska Division of Forestry and Fire Protection team from across the state came together to record this natural phenomenon that occurs roughly every 30-40 years. The team met in Petersburg and

visited multiple sites together to train and calibrate ensuring data collecting is done the same across the region. This not only provided a chance for the entire team to see the extent of the damage for themselves but also allowed for teambuilding opportunities and for some colleagues to meet in person for the first time! The team then dispersed to different locations to conduct surveys simultaneously across Southeast.

**Figure 2:** Region 10 Forest Health Protection Team (Left to Right): Isaac Dell, Garret Dubois, Dr. Lori Winton, Jessie Moan, Jason Moan (Alaska Division of Forestry and Fire Protection), Betty Charnon, Ali Gilchrist, Steve Swenson, Dr. Sydney Brannoch, Michael Shephard, Dr. Karen Hutten, Dr. Elizabeth Graham

**General Summary of Trip:**

Ground surveys were conducted from July 20th to 30th. Surveys were based on the 2019 FHP hemlock sawfly survey and were limited to areas with accessible road systems. Due to the limitations of fieldwork in Southeast Alaska some areas were not visited by FHP crew, however data were collected in Angoon by Youth Conservation Corps crews. That data has not been reviewed at the time of this report. Plot points were randomly created in ArcGIS using the FS road system and hemlock component (from the Ellenwood model) as required characters. The actual plot location was selected based on host tree accessibility, which may have been up to ¼ mile from the randomized point. At each plot, defoliation ratings were determined for the overstory and understory, additionally the amount of topkill or mortality within a tenth acre was also recorded. Hemlock and Sitka spruce with accessible branches were randomly selected for defoliator sampling. For each selected tree, the species, size class, and defoliation rating were recorded.

Defoliators were sampled using a 28" square beating sheet, upon which the FHP surveyor knocked insects from branches. The number of western blackheaded budworm, hemlock sawfly, green striped looper, and saddleback loopers knocked onto the canvas beating sheet were recorded, as well as any additional defoliators. Western blackheaded budworm infected with a viral or fungal disease were recorded separately from healthy budworms; western blackheaded budworm and hemlock sawfly pupae were also recorded separately. Infected hemlock sawfly were observed at one location on Prince of Wales Island. In total, 55 ground plots were surveyed for hemlock defoliators throughout Southeast Alaska. In addition, a Ground Detection Survey with Timed Meander was conducted at most sites, adding an additional 300 observations!

**Conclusions or Findings:**

*By the numbers:*

*Plots visited: 55 sites with 550 trees beaten*

*Western blackheaded budworm counted: 1237 of which 106 were diseased*

*Hemlock sawfly counted: 212*

*Topkill recorded: 7 trees in 4 sites*

*Mortality recorded: 1 site*

*Observations added to Ground Detection Survey: 301*

Western blackheaded budworm was the most common defoliator observed during ground surveys in all locations. One notable exception was in Ketchikan, where the total average number of hemlock sawfly larvae observed was greater than western blackheaded budworm larvae, however the rate of occurrence was higher for western blackheaded budworm. Hemlock sawflies feed in aggregates therefore their numbers can be misleadingly high if the right branch is hit over a beat sheet.

Defoliation ratings were light in most locations, with the exception of Juneau. Topkill associated with defoliation was recorded on 7 trees at 4 locations located on Mitkof, Wrangell, Zarembo, and Prince of Wales Islands. Mortality associated with recent defoliation was only recorded in one location on Wrangell Island.

The presence of diseased larvae and pupae are positive indicators that the outbreak may have reached its peak. While we can expect defoliator activity to continue in 2023, we are predicting that populations will begin to decrease. The impacts of western blackheaded budworm feeding may seem dramatic due to the expansive reddish coloration of hemlock and spruce foliage, but in most cases the trees will recover. Mortality caused by these defoliator outbreaks has been observed in some select areas— most notably along western Admiralty Island. Unfortunately, these areas were not along the road system and were not able to be surveyed from the ground.

**Management Options:**

The defoliator outbreaks happening in Southeast Alaska are a natural part of the forest ecosystem. Attempts to manage the outbreak would not be feasible nor would they be cost-effective. While some trees will die and topkill may become more apparent in the coming years, this can provide habitat for wildlife and creates new gaps in the forest, increasing light to the forest floor. Additionally, the larvae create a large amount of frass, which, when coupled with their half-consumed foliage, act as an energy-boosting fertilizer for the forest. The larvae themselves also provide a valuable food source to birds and small mammals. The only course of action is to let the outbreak play out naturally; resilient forests will withstand this outbreak but may look a little different in the years to come.

**Appendix:**

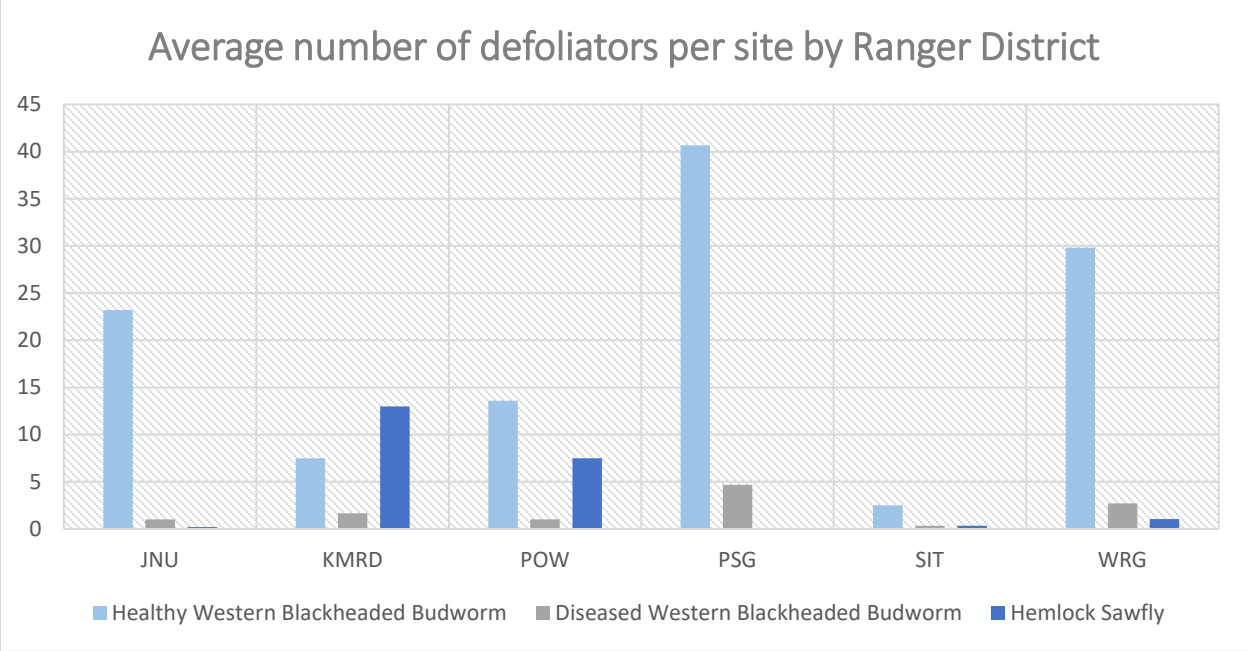


**Figure 3:** Average number of defoliators found at each site by Ranger District, via beat sheet collection method. Western blackhead budworms were the most abundant defoliator found, except for Ketchikan Misty Fjords Ranger District, where hemlock sawfly larvae were found in greater numbers but less often. Sites per district: Juneau (6) Ketchikan (6) Prince of Wales (15) Petersburg (6) Sitka (6) Wrangell (17).

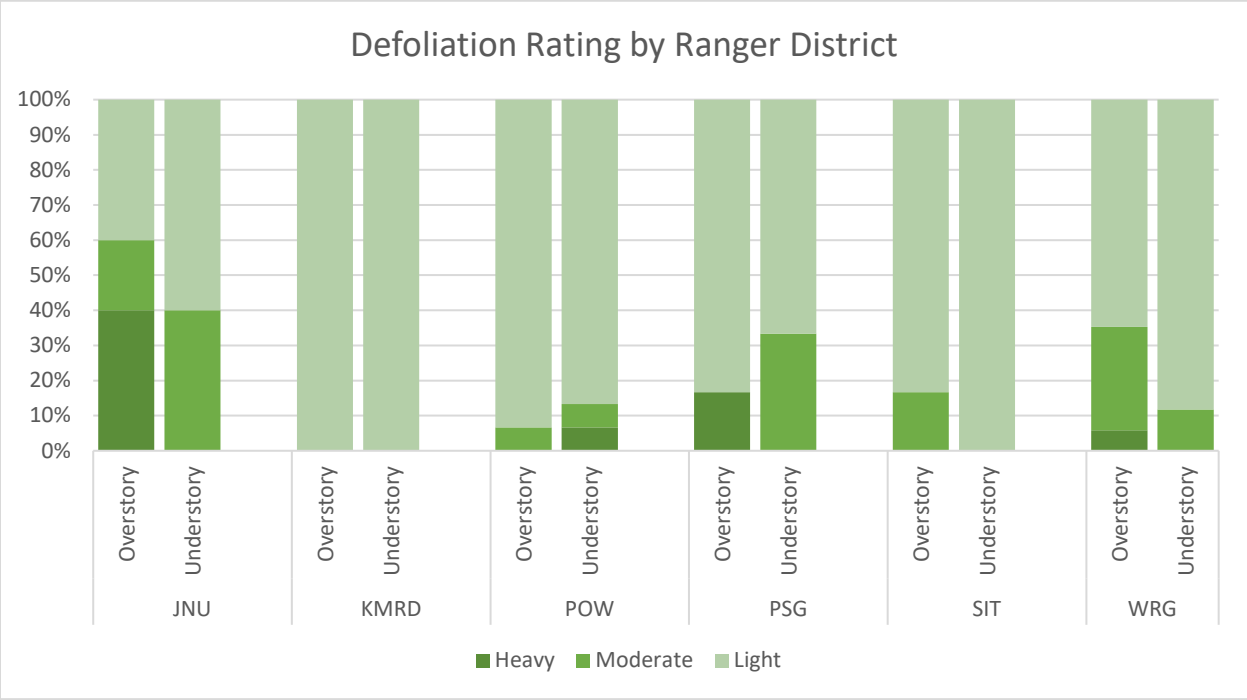


**Figure 4:** Defoliation ratings for the overstory and understory at each plot by Ranger District. A rating of light (0-30%), moderate (31-60%), or heavy defoliation (>60%) was noted for hemlock and spruce trees.

**Figure 5:** Defoliation damage on Mitkof Island from the current western blackheaded budworm outbreak and the previous hemlock sawfly outbreak. Topkill is evident in the old growth and there are also some scattered dead trees throughout the stands. Active defoliation appears red and is visible in the young growth.

**Figure 6:** Forest Health Protection team members from across the state are trained on how to identify the common defoliators in Southeast Alaska. Clockwise from center: Jason Moan, Dr. Lori Winton, Steve Swenson, Betty Charnon, Garret Dubois, and Dr. Karen Hutten.

**Figure 7:** Left- diseased western blackheaded budworm caterpillar (circled). Right- healthy western blackhead budworm caterpillar. Diseased larvae are a good indicator that the outbreak may be at its peak.

**Figure 8:** A parasitic wasp (black arrow) attempting to lay its eggs inside a western blackheaded budworm pupa (white arrow). This is one of 16 known natural control agents that can reduce populations and lead to the end of the outbreak.