



# Pine Sawfly Report

*An Outbreak in Elbert County, Colorado*

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## Introduction

On July 23, 2014, forestry experts visited several sites in southeastern Elbert County, along the eastern fringe of the ponderosa pine forest type in Colorado, to conduct a preliminary evaluation of a pine sawfly outbreak. Several reports have been received of heavy defoliation in the area, accompanied by large numbers of larvae.

## Background

Pine sawfly populations have been active in southeastern Elbert County for a number of years. In 2005, several small areas of aerially visible pine defoliation were mapped during the annual aerial forest health survey conducted by the U.S. Forest Service and Colorado State Forest Service. In 2009, large numbers of larvae were reported by several landowners in the affected area. Larvae were collected, reared to the adult stage and submitted for identification. The species was subsequently identified as *Neodiprion autumnalis* by Dr. David R. Smith, USDA Agricultural Research Service, Systematic Entomology Laboratory, National Museum of Natural History, Smithsonian Institution. No reports of larvae or defoliation were received between 2010 and 2013. According to Dirk Murphy, a local rancher whose pine forests suffered severe defoliation in 2014, larvae and some defoliation have been present each of the 16 years that he has resided in the area.

*Neodiprion autumnalis* is a commonly occurring pine sawfly species found throughout the western U.S. and adjoining portions of Canada. Adults, which are small wasps (Fig. 2), emerge in fall, hence the species name *autumnalis*, and deposit eggs on pine needles, where they overwinter. Larvae hatch the following spring and feed in colonies (Fig. 3) until late summer, after which they pupate in the soil and litter. Adults begin to emerge in mid-September, when they mate and deposit rows of eggs in slits on pine needles. Widely spaced, pole-sized trees growing on dry sites with poor soils tend to be most heavily damaged. In addition to the nearly complete consumption of older needles, during outbreaks, mature larvae can clip current-year needles on many trees (Ciesla and Smith 2011).



**Figure 1.** Heavy pine sawfly defoliation in ponderosa pine in southeastern Elbert County, Colo. Photo: William M. Ciesla

## Life Stages of a Pine Sawfly



**Figure 2.** An adult male. Photo: William M. Ciesla



**Figure 3.** Mature larvae. Photo: William M. Ciesla

## Key Findings

Extensive areas of nearly complete defoliation of ponderosa pine forests were seen southeast and northeast of Kiowa and Elizabeth, especially along county roads 21, 25 69, 73 and 77 along the Highway 86 corridor (Fig. 1). Pine sawflies typically feed on 2-year-old and older needles, leaving tufts of new growth. Sawfly larval populations were so heavy that, in most cases, larvae also had eaten the current year's foliage (Fig. 4).

Defoliation was accompanied by large numbers of larvae that were migrating to the base of defoliated trees in search of food. Most of the migrating larvae were in instar stages III and IV, which means they were immature and not yet capable of pupating. Some larvae were trying to feed on dry grasses, while others had died in large numbers at the base of host trees (Fig. 5).

The few foliated branches that remained on the infested trees had colonies of 30-40 mature (instar V) larvae (Fig. 6). Small groups of younger, sapling-size trees also contained larval colonies. This species of sawfly prefers to feed on open stands of mature trees and usually does not feed on seedling and sapling-size trees.

A small number of dead larvae with flaccid, dark-colored bodies were seen on infested trees and appear to have been killed by a nuclear polyhedrosis virus (NPV) (Fig 7). However, considering the excessively large numbers of larvae observed, the level of apparent NPV infection was considered to be low.



**Figure 4.** Larval colony feeding on the current year's foliage. Photo: William M. Ciesla



**Figure 5.** Immature pine sawflies larvae at the base of a tree. Photo: William M. Ciesla



**Figure 6.** Large larval colony feeding on a young ponderosa pine tree. Photo: William M. Ciesla



**Figure 7.** Larvae with classic symptoms of infection by a polyhedrosis virus. Photo: William M. Ciesla

## Discussion and Conclusions

The annual aerial forest health survey of the infested area will occur in August. The survey will provide a map of defoliated areas and an estimate of acres affected by this outbreak.

Because most of the larvae aggregated at the base of infested trees were immature, it is likely that they will die, rather than form pupal cases in the soil and emerge later as adults. This could lead to a massive population collapse in the heaviest defoliated areas. Moreover, because virtually all of the needles have been consumed by the feeding larvae, and adults deposit eggs on pine needles, there will be few, if any, egg deposition sites in these areas.

However, a number of ponderosa pine stands with partially defoliated trees were observed on the northern edges of the outbreak. Moderate to severe defoliation also has been observed on the north side of Highway 86 to Singing Hills Road, which is northeast of Elizabeth and southeast of Parker, where county roads 21, 25 and 33 intersect. Larval survival rates could be much higher in these areas, leading to a potential for more severe defoliation in 2015. It also is likely that many of the severely defoliated stands could suffer from varying levels of tree mortality during late summer and fall.

## Control Measures

Many natural control agents can affect sawfly populations, including the nucleopolyhedrosis virus diseases, parasitic wasps and flies, and predation of cocoons by mice, voles and invertebrates. Unfavorable weather, such as rain and cold temperatures when larvae are feeding, also can cause the collapse of sawfly outbreaks.

Early spring (May-June) is the most effective time to employ direct control measures, which includes the use of chemical insecticides via aerial and ground applications. This is when the eggs begin their hatch and the larvae begin to feed on the needles. Several insecticides have been effective, including Malathion, Orthene, Sevin and Astro.

The most effective time for direct control this year has passed. The only area where chemicals may be effective now is where partial defoliation has occurred and there is a high risk that larvae will be able to pupate and develop into adults.

The egg population will be monitored this fall to help determine the potential for additional damage in 2015, so that landowners can take appropriate direct control measures (aerial and ground application of chemicals) during the early spring months.



**Figure 8.** In some cases, the larvae are depleting the food sources, dropping to the ground early and are not expected to survive. Photo: William M. Ciesla



**Figure 9.** Larvae typically prefer to feed on open stands of mature trees. Photo: Meg Halford

## References

Ciesla, W.M. and D.R. Smith 2011. Diprionid sawflies on lodgepole and ponderosa pines. USDA Forest Service, Forest Insect and Disease Leaflet 179, 12 pp.

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