



Forest Health Note

Pine Butterfly (*Neophasia menapia*)

September 2010

Hosts:

Prefers ponderosa pine, but may feed on Douglas-fir, lodgepole pine, western white pine, western larch, and western hemlock.

Importance:

The pine butterfly occurs in ponderosa pine stands in the western United States and British Columbia. Populations of this insect are usually quite low, but large outbreaks are believed to have occurred periodically in the past in Oregon, though none have been specifically documented until recently. Outbreaks are short-lived, but can cause severe defoliation over large areas leading to growth loss and tree mortality (Figure 1). Host trees that survive pine butterfly outbreaks in a weakened condition may become more susceptible to bark beetles.



Photo by: Kirk Ausland, ODF

Figure 1: Ponderosa pine heavily defoliated by pine butterfly in eastern Oregon.

Look For:

June - July

Immature larvae emerge from overwintering eggs and feed together, often on a single needle. Later instars feed individually (Figure 2).



Photo by: Don Scott, USDA-FS

Figure 2: Pine butterfly larvae are green with lateral white stripes and can be seen feeding together or alone.

August - September

Pupae occur on needles, branches, bark crevices, and surrounding vegetation. Peak adult flight occurs from mid-August through September (Figure 3). Adults mate and females oviposit in rows on the current year's foliage.

October - May

Populations overwinter in the egg stage. As new shoot growth begins in the spring, larvae emerge and begin to feed on older needles.

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Pine Butterfly, cont.



Figure 3: Pine butterfly males are white with black wing markings (left) and can be seen in large numbers during outbreaks in tree canopies (right).

Photo by: Rob Flowers, ODF

Biology:

Pine butterflies have one generation per year. Eggs are green and can be found in rows along the needles, laid in shingle-like fashion at angles of about 45°. Immature larvae are pale green with black heads, while mature larvae are 1-inch long, have two lateral white stripes, and green heads. While some pupae are also green with white stripes, others, apparently females, are brown in color with white stripes. Adult males are white with black wing markings and have a 2-inch wingspan. Adult females have a yellowish cast and heavier black markings; and some possess orange-red spots along the apical margins of the hind wings. Larvae generally feed only on the older needles, but may consume new growth during outbreaks.

Infestation Characteristics:

Populations of the pine butterfly usually exist at low levels, with outbreaks occurring rarely at irregular



Photo: Rob Flowers, ODF

Figure 4: Pine butterfly outbreaks occur at irregular intervals, with damage recently observed over thousands of acres in eastern Oregon.

intervals.

Ponderosa pine is the preferred host, but other hosts in mixed-conifer stands may be fed on as well, especially during outbreaks. Pine butterfly outbreaks have been documented previously in Washington, Idaho, Montana, and in undescribed locations in Oregon, affecting small areas up to tens of thousands of acres. Outbreaks are usually short-lived, lasting 2-5 years, before they decline to endemic levels under natural controls. Growth loss and tree mortality in affected areas is highly variable and is often dependent on outbreak severity and persistence, among other factors. Individual tree mortality appears to be associated with the percent crown defoliation that occurs, but this may be greatly influenced by site and stand conditions (Figure 4). Bark beetle infestations, in trees weakened by defoliation, are common near the end of pine butterfly outbreaks.

Control:

Natural

Insect predators and parasites are the major natural enemies of pine butterfly. The ichneumonid wasp parasitoid (*Theronia atalantae*) has been largely credited with reductions of past outbreaks. Build-up of this parasite's populations often



Photo: Jerald Dewey, USDA-FS

Figure 5: Hemipteran predators and other natural enemies help to regulate pine butterfly populations.

lags 1-2 years behind that of the pine butterfly. Large numbers of a fly parasitoid (*Agria affinis*) and hemipteran predator (*Podisus placidus*) have been commonly observed as well (Figure 5). Larval starvation and winter egg mortality also appear to play a role in regulating pine butterfly populations.

Silvicultural

Silvicultural actions to reduce pine butterfly damage are best applied during the years between outbreaks, and are not recommended during or immediately following an outbreak. Tree health and vigor, prior to defoliation, is a good indicator of how well it will recover from

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defoliation, and may be increased by management focused on maintaining vigorous growth and favoring species diversity where appropriate. No correlation has been observed between crown classes or diameters and resulting tree mortality following defoliation.

Insecticides

Insecticides are most effective when applied in early summer before pine butterfly larvae have matured. Large-scale applications of insecticides are generally ineffective in controlling defoliator outbreaks of this type, due in part to regular re-invasion from surrounding areas. Small-scale applications can help to preserve foliage in higher-value areas or provide additional time for stand management activities to be completed; however, annual applications of insecticides for several years may be necessary to protect trees until the outbreak subsides.

The following insecticides are registered for pine butterfly control in Oregon:

- **Aerial application to forest trees:**

Bacillus thuringiensis (B.t.)

- **Ground application to ornamental trees**

Bacillus thuringiensis (B.t.)
esfenvalerate

Remember, when using pesticides, always read and follow the label.

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