May 2004

4.10
WEB July 2010

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Management Guide for

Pine Engraver

***Ips pini* Say**

Pine engraver will attack almost any species of pine in the West, but prefers ponderosa and lodgepole pines.

Though usually secondary attackers, *Ips pini* can become aggressive tree killers during droughts or following stand disturbances.
Outbreaks can result in considerable mortality but they are usually brief, seldom lasting more than one season.

Topics

Key Points

- Populations build rapidly in slash and broken or damaged trees.
- Overcrowding and drought also can lead to outbreaks.
- Manage slash to minimize outbreak potential.

  Thin to maintain vigor.

Always present and occasionally damaging

Pine engravers maintain their populations in logging slash, wind- or storm-damaged trees, or tops of trees weakened or killed by other agents. Most frequent damage is in second-growth ponderosa pine stands where overstocked pole-size trees (2 to 10 inches dbh) are killed.

During outbreaks, group killing becomes widespread and groups may include hundreds of trees. Smaller trees are killed outright; top killing occurs in larger trees. Attacks are often associated with other bark beetles in the genus *Dendroctonus*.

Normally, there are two generations of the beetle each year, but in dry years, three or even four generations may occur. This can result in rapid buildup of populations.

Silvicultural management strategies are most effective, particularly stand thinning to maintain tree resistance to attack. Timing of pine slash creation and disposal is also of critical importance in avoiding outbreaks of pine engraver.

Management Overview

⇒ Thin to improve vigor of stands.
⇒ Avoid creating pine slash between January and June.
⇒ Dispose of slash promptly.
⇒ Provide a “green chain” of slash throughout the flight period.
⇒ Remove infested trees and destroy brood.

Life History

Each male attracts several females which, after mating, construct egg galleries radiating from the nuptial chamber.

This gives the galleries their unique Y or star -shaped appearance.

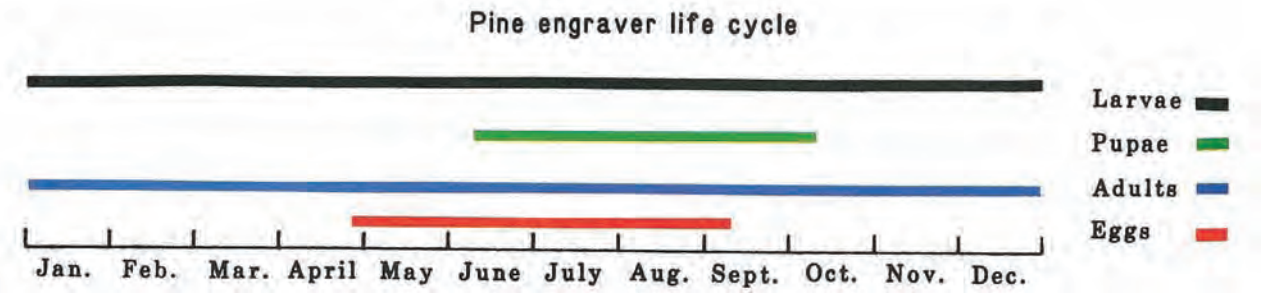
Normally, there are two generations of the beetle each year. In dry years, three or even four generations may occur. Winter is passed primarily in the adult stage, beneath the duff on the forest floor or within infested material. Adults become active early in the spring, infesting fresh slash or winter-damaged trees. Initial flights vary with weather but probably occur most often in late April to early May.

Attacks are initiated by male beetles which construct nuptial chambers beneath the bark. Each one then attracts several females which, after mating, construct egg galleries radiating from the nuptial chamber. Egg galleries are kept free of boring dust and frass-unlike those of many other bark beetles.

Eggs hatch in a short time-4 to 14 days. The larvae mine laterally, feeding on phloem tissue, for 10 to 20 days. A pupal cell is formed at the end of each gallery where pupation takes place.

New adults emerge in about 10 days, completing their development in only 40 to 55 days. This generation then seeks out new material to infest, preferring slash but attacking standing trees if none is available.

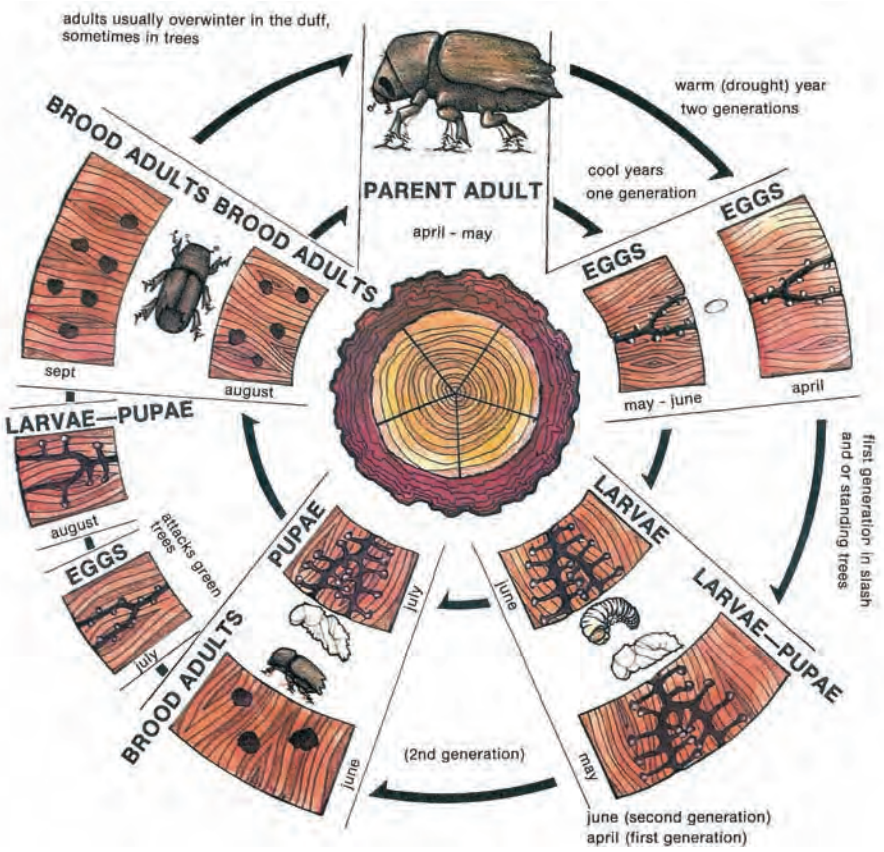
Another generation is completed in this material by mid- to late-August in a normal year. Warm, dry weather can result in an additional generation. Usually adults emerging at this time of year seek sheltered places to hibernate for the winter. Sometimes this generation makes feeding attacks prior to hibernation where no new brood is produced, but all phloem is consumed by the adult beetles.



Natural Control

Competition among developing brood often reduces adult emergence from small-diameter host material. In larger material, competition with other bark beetles and wood borers often reduces food available for engraver beetle broods. Predation by woodpeckers, beetles, flies and mites is common, as is parasitism by wasps and nematodes.

Pine Engraver Life Cycle



Conditions leading to outbreaks

Most pine engraver problems are associated with disturbances such as windthrow and ice breakage, drought in spring and early summer, thinning, logging, fires, road construction, or housing development (Livingston 1979). Logging slash, or trees weakened by such disturbances, provide ideal conditions for beetle attack and population buildup.

Pine engraver beetles overwinter in the adult stage and normally infest green slash only in the spring. Therefore, logging slash created from December through June can be especially hazardous by providing large amounts of breeding material. Slash should not be created during this time period unless it can be treated prior to beetle emergence. During years of extremely low, spring soil moisture, overwintering beetles have been known to attack and kill living trees.

The percent of normal precipitation between April and July has been used to accurately predict the intensity of beetle outbreaks in California and Oregon. If precipitation is 75 percent of normal or less, moderate to heavy tree mortality can be expected in overstocked, second-growth ponderosa pine stands. Damage may continue for 2 to 3 years.

Under conditions of extreme drought, large groups of young sawtimber have been attacked and killed (Livingston 1979).

Preventing population buildups through timely thinning and slash disposal will accomplish more than after-the-fact control measures.

Direct Suppression

Suppressive efforts directed at these beetles usually are not warranted as infestations are likely to be brief.

Several methods of brood destruction in infested material have proven to be effective. Among them are treatment with toxic chemicals, piling and burning, covering with clear plastic (or other material) which will raise temperatures to lethal levels and/or prevent adult escape.

Damage Prevention: Tips for Homeowners

Promptly remove trees with root disturbance, or large patches of bark torn off.

In housing developments, avoid disturbing roots of trees that are to be left as ornamentals. Excessive damage will usually weaken them and render them susceptible to beetle attack. Weakened or badly damaged trees should be removed prior to completion of construction. Pine slash created near housing developments should be disposed of as soon as possible. It should not be left near residual pines as attacking beetles may overflow slash and infest standing trees. Avoid backfilling over root areas. Four inches or more of dirt over roots often stresses trees, making them attractive to attacking beetles.

When pines are cut, do not stack slash, fresh logs, or pieces against standing green trees. Beetles that develop in firewood or logs are more likely to attack adjacent or nearby trees when they emerge. Older dead wood, too dry to support beetle development, does not pose a similar threat, however (Livingston 1979).

Prevent Outbreaks by Thinning Pine Stands

Thinned, vigorous stands of ponderosa pine are less attractive to pine engraver beetles. During drought years, stand vigor is even more important. Stands in which basal area has been reduced to 80- 100 square feet have been found to be less susceptible to beetle attack.

Recently thinned stands may temporarily be more attractive because of the presence of fresh slash or logging damage to leave tree.

Outbreak Prevention: A Season for Slash

The optimum time period for management activity in ponderosa pine, where slash will be created, is August to November. Activity earlier, and especially later, increases the likelihood of subsequent tree killing.

Fresh pine slash should be minimized, or not created, during approximately the period December through June. If beetles do not have fresh slash in early spring, populations will subside.

Slash created in the fall or early winter will usually dry sufficiently to be unattractive the next spring, or may be infested by competitor beetles. Slash covered by early snows, however, may still be "fresh" enough to attract pine engravers in spring.

Avoid damaging residual trees.

Fall trees into openings and use established skid trails to avoid damaging the residual stand.

Outbreak Prevention: Options for "high-risk" slash

When it is not practical to avoid creating slash during "high-risk" months, several management practices can be used to help minimize potential impacts.

Destroy slash generated in high -risk months (December to June) before brood matures. Dozer trampling of slash is effective in reducing the amount of breeding material by removing bark and drying inner bark. Chipping is a very effective means of slash disposal- perhaps more useful in developed areas. When slash is burned, avoid scorching standing trees as this makes them more attractive to numerous species of wood-boring insects.

Lop and scatter to increase drying rate Where general slash disposal is impractical, lopping into smaller pieces and scattering it into openings is effective. Exposing the slash to direct sunlight dries it faster making it unsuitable for beetle development.

Green chain to keep beetles in slash and out of trees. When beetle populations in slash constitute a threat, creating a continuous supply of fresh slash during the flight period of emerging adults will generally attract the beetles keeping them out of standing green trees. This technique is known as providing a "green chain." New slash should be produced just as the beetles enter the pupal stage. Once started, this technique should be continued for each generation of that season. An alternative to this method, more recently shown to be effective, is the early creation of very large slash piles. If piles are big enough so that interior pieces do not dry before beetles from initial generation emerge, new beetles are apparently attracted deeper into the pile (Livingston, personal communication).

Principles of Slash Management

- ⇒ **When possible, avoid creating slash during the high-risk months between December and June.**
- ⇒ **Destroy slash created during high-risk months.**
- ⇒ **Use a "green chain" to keep beetles in slash and out of trees.**

Pheromone Strategies

For Population monitoring— Attractant pheromones of pine engravers have been identified, synthesized, and are used to monitor beetle populations.

For prevention of attack— Anti-attractant pheromones are being tested and may soon provide valuable tools to help prevent slash from being infested until it is either dried or otherwise treated.

Pine engraver egg gallery.

Recognizing Pine Engraver Attacks

The first indication of a pine engraver attack in slash or standing trees is the characteristic reddish-orange boring dust which emanates from the beetle's point of entry. In slash or logs, this boring dust appears as mounds around an entrance hole on the upper surface of the host material. On standing trees, the dust is most notable in bark crevices and around the base of the infested tree. Removing the bark reveals a Y -or a star-shaped gallery pattern usually running with the grain of the wood.

Adult beetles are cylindrical, dark reddish-brown to black and one -eight to three-sixteenths inch long. All members of the genus *Ips* are characterized by an elytral declivity- a dish-shaped depression at their posterior end. On each side of this depression the species pini has four small spines.

Other Reading

Livingston, R. L
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1966. The pine engraver, Ips pini (Coleoptera, Scolytidae), in ponderosa pine thinning slash in eastern Oregon. M.S. Thesis, University of Idaho, Moscow, ID, 37 pp.

Sartwell, C., R. F.Schmitz, and W.J. Buckhorn.
1971. Pine engraver, Ips pini, in the western United States. USDA For. Serv., Forest Pest Leaflet 122. 5 pp.

Forest Health Protection and State Forestry Organizations

Assistance on State And Private Lands

Montana: (406) 542-4300

Idaho: (208) 769-1525

Utah: (801) 538-5211

Nevada: (775) 684-2513

Wyoming: (307) 777-5659

Assistance on Federal Lands

US Forest Service
Region One
Missoula: (406) 329-3605
Coeur d'Alene: (208) 765-7342

US Forest Service
Region Four
Ogden: (801) 476-9720
Boise: (208) 373-4227