

Douglas-Fir Beetle

Attacks and kills Douglas-fir trees

Name and Description—*Dendroctonus pseudotsugae* Hopkins [Coleoptera: Curculionidae: Scolytinae]

The Douglas-fir beetle is a common bark beetle that kills Douglas-fir trees. Adult beetles are cylindrically-shaped and about a 1/4 inch (6 mm) long. The head and thorax are black, and wing covers are reddish brown. Eggs are white and very small (1/25 inch [1 mm] long). Larvae are legless and white with light brown heads. Larvae can grow up to 1/4 inch (6 mm) long. Pupae are white, and some adult features are often present.

Hosts—Douglas-fir

Life Cycle—Douglas-fir beetles have a 1-year life cycle and overwinter as adults or larvae. Beetles usually emerge mid to late spring, when the temperature is 60° F and above. However, a small portion of beetles emerge later in midsummer. Some adults that make early spring attacks can reemerge and make a second attack from late June to August. Distinctive vertical egg galleries (5-12 inches [13-30 cm] long) are constructed by the female in the phloem layer (fig. 1). Eggs are laid in groups, alternating along opposite sides of the gallery. Eggs hatch in 1-3 weeks, and newly hatched larvae mine out at right angles from the egg gallery. Mature larvae construct a pupal chamber at the end of their mines.

Damage—The larvae feed under the bark in the phloem layer, introducing fungi, yeasts, and other organisms, and lead to tree death. The first sign of attack is reddish orange frass in bark crevices that is expelled by attacking beetles (fig. 2). However, frass can wash away and attacks may be above eye-level, making it difficult to locate attacked trees. Pitch-tubes are not usually present, but many trees will have pitch streaming (clear resin) down the tree bole from the top of the beetle-colonized area. Tree foliage discolors several months to a year later, transitioning from green to reddish brown in that time.

Douglas-fir beetles prefer to attack trees that are injured by fire scorch, defoliation, windthrown, or root disease. When low beetle populations are present, individual or small groups of trees will be attacked. Once populations build up, large outbreaks can occur that kill thousands of trees. Stand conditions and weather can also strongly influence Douglas-fir beetle populations.

Management—The best management is to promote stand vigor by thinning. Prompt removal of windthrown, severely fire-damaged trees or trees damaged by other stand disturbances is also recommended. Because Douglas-fir beetles preferentially attack burned trees, removing fuels from beneath large-diameter Douglas-fir trees before a prescribed burn can reduce tree scorch and, consequently, the tree's susceptibility to attack by Douglas-fir beetle. Attacks are most severe in unmanaged stands, on trees that are largest in diameter, and in dense stands. If direct



Figure 1. Douglas-fir beetle egg and larval galleries. Photo: Kenneth Gibson, USDA Forest Service, Bugwood.org.



Figure 2. Reddish orange frass from Douglas-fir beetle attack. Photo: Sandy Kegley, USDA Forest Service, Bugwood.org.

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control is deemed necessary, trees can be protected using the anti-aggregation pheromone methylcyclohexanone (MCH), which disrupts beetle aggregation. Combining MCH with salvage of infested trees has been successful at reducing subsequent tree mortality. However, under condition of intense or long-lived outbreaks, even MCH has sometimes failed to protect trees. Direct control is usually implemented in small, high-value areas.

1. Furniss, R.L.; Carolin, V.M. 1977. Western forest insects. Misc. Publ. 1339. Washington, DC: U.S. Department of Agriculture, Forest Service. 654 p.
2. Schmitz, R.F.; Gibson, K.E. 1996. Douglas-fir beetle. Forest Insect and Disease Leaflet 5. Washington, DC: U.S. Department of Agriculture, Forest Service. 8 p.

