IDAHO DEPARTMENT OF LANDS

Forest Pest Fact Sheet

Douglas-fir Beetle
(Dendroctonus pseudotsugae)

Hosts

Douglas-fir beetle typically breeds in windthrown, scorched, or weakened Douglas-fir, though it can also infest windthrown western larch that is still green. Healthy Douglas-fir are killed usually after populations build up in down logs.

Distribution

Douglas-fir beetle occurs throughout Idaho, wherever Douglas-fir occurs.

Life Cycle

Douglas-fir beetle has one generation per year, and most overwinter as adults. Beetles fly in the spring and attack trees into the summer. Douglas-fir beetle outbreaks usually start due to external disturbances such as wind events, fire, or defoliation that stress Douglas-fir. Endemic or background level infestations typically occur on trees weakened by other factors such as root disease, drought or competition.

Damage

Adult beetles (Figure 1) feed under the bark and excavate egg galleries. Larval feeding girdles the tree, they introduce a stain fungus which interferes with water transport. Unlike the blue-colored stain in pines, in Douglas-fir the stain does not degrade the wood if trees are salvaged in a timely manner. A sapwood rotting fungus is also introduced by beetles which will decay the sapwood within a year or so of tree death (Figure 3). The large diameter trees (> 14” DBH) are usually attacked first. Trees begin to fade to yellow the following spring, and are red by late summer. Adult beetles are usually gone by the time the tree turns red. Outbreaks are usually of short duration, but mortality can be locally severe.

Recognition

The first indication of attack is reddish brown boring dust in the bark crevices or around the base of the tree during the spring and summer months. (Figure 2). Beneath the bark, vertical galleries 6-8” long are excavated and packed with frass, and larvae can be seen feeding radially from the parent gallery (Figure 4). Conks of the sapwood rotting fungus usually appear on the bark a year after the tree is attacked (Figure 3).

Figure 1. Douglas-fir beetle adult.

Figure 2. Douglas-fir beetle frass on bark at base of tree.

Figure 3. Conks of sapwood rotting fungus on Douglas-fir bark.

Figure 4. Vertical adult galleries of Douglas-fir beetle with lateral larval galleries.

For more information (IDL Forest Health Page): http://www.idl.idaho.gov/forestry/insects-and-disease
US Forest Service Management Guide: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5187396.pdf

Douglas-fir Beetle Management

Silvicultural Management

Identify Hazard Douglas-fir beetle causes most damage in stands with the following characteristics: Age is over 120 years, Douglas-fir composes more than 50% of the stand, average diameter is greater than 14 inches, and the basal area of all species in the stand is over 250 feet^2 per acre. Basal area is a measure of stand density, and is the cumulative area (in square feet) of the cross section of all trees in an acre of forest (at 4.5 feet above the ground).

Timing of Harvest Since DFB is highly attracted to down and cut timber with green phloem, timing harvest during beetle flight will attract large numbers of beetles to the log decks. When the logs are removed, so too are the beetles. Clearing landings and skid trails and using Douglas-fir as trap trees will also create logs that will attract beetles. Trap trees are large diameter trees cut in the springtime in the shade to attract beetles. Logs can be processed and decks left on site until the beetle flight is complete, usually by the end of July. It is imperative that infested logs be removed before snowfall, or a new infestation may be created the following spring.

Sanitation and Salvage Remove green, storm damaged and fire scorched trees to reduce suitable breeding sites and potentially minimize localized outbreaks. Beetle-killed timber can be salvaged, but this will not impact the beetle populations because the beetles have already left the trees. Green trees within a tree length of beetle-killed groups should be checked for evidence of attack and harvested during salvage operations. Look for frass in bark crevices in May and June. Beetles will emerge from infested trees the following spring. **Infested trees should be removed before snowfall,** because waiting until springtime may result in wet conditions that prevent tree removal before beetle flight.

Thinning Reducing the density of stands below 120 ft^2 per acre reduces susceptibility to Douglas-fir beetle. Reducing the proportion of Douglas-fir in a stand is effective for reducing DFB susceptibility, but it is also effective for mitigating other forest health issues like root diseases and defoliators (such as the Douglas-fir tussock moth and western spruce budworm). **Care must be taken if root disease mortality has been identified in the stand.** In this case, root disease susceptible species such as Douglas-fir and grand fir should not comprise more than 30% of the residual stand, or additional mortality can be expected later due to root disease.

Summary Like all bark beetles, Douglas-fir beetle problems are best prevented through silviculture. Once successfully attacked by bark beetles, trees cannot be saved. Remove green storm-damaged and fire scorched trees to minimize suitable breeding sites. Stands that are healthy and the density is managed below 120 ft^2 per acre basal area are usually less susceptible to attack.

Management with Pheromones

Antiaggregation pheromones Bark beetles use pheromones (chemicals that signal other members of the same species) to communicate and mass attack trees. Aggregation pheromones signal other beetles to attack susceptible trees. Antiaggregation pheromones are used to signal that a given tree is fully occupied. The antiaggregation pheromone for Douglas-fir beetle is methylcyclohexenone (MCH). MCH has been synthesized and is commercially available in pouches. Pouches are stapled to trees in the spring before beetle flight, and have been proven very effective at protecting individual trees or entire stands. To protect individual trees, two pouches are stapled on the north side of the tree as high as possible. Stands can be protected by stapling pouches to trees in a grid pattern with a spacing of approximately 40 feet. Pouches are effective for one season.

Seek advice from a forest entomologist or consulting forester when considering DFB management.

For more information: US Forest Service MCH publication: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5157034.pdf

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