

Secondary Bark Beetles of Douglas-fir (*Scolytus* and *Pseudohylesinus* species)

Introduction

Bark beetles are insects that feed under the bark of trees. In Idaho, there are several species of bark beetles that can cause top kill and/or tree mortality in Douglas-fir. Douglas-fir beetle (*Dendroctonus pseudotsugae*) is known as a 'primary bark beetle' because it can cause significant mortality even in mature and healthy Douglas-fir trees. 'Secondary bark beetle' is a term describing species of bark beetles that usually only kill tree tops or small trees weakened by another agent such as drought. During dry years, many Douglas-fir trees of all size classes can be killed by secondary bark beetles. These species are native in Idaho, but they rarely cause significant mortality.

Species/Hosts

There are many species of secondary bark beetles, but three species in particular cause mortality and top kill in Douglas-fir. Douglas-fir engraver (*Scolytus unispinosus*), and another species with no common name (*Scolytus monticolae*) rarely cause damage, but were responsible for significant mortality of all size classes of Douglas-fir in northern Idaho after the drought of 2015-2016. Douglas-fir pole beetle (*Pseudohylesinus nebulosus*) also attacks small trees or the tops of larger Douglas-fir.

Life Cycle/ Recognition

Bark beetles find host trees in the spring or summer, bore under the bark, mate and excavate tunnels or galleries to lay eggs. Larvae feed outward from the parent gallery, leaving distinctive patterns scored into the bark and wood (Figures 1 & 2). The larvae develop into adult beetles beneath the bark, then emerge from the tree to find new host trees. Different species of bark beetles often produce unique gallery patterns and may overwinter in different life stages. Therefore, these traits are useful tools for bark beetle identification. It is important to be able to recognize the difference between species because the management is often different for different beetle species.

Douglas-fir engraver beetle galleries are usually short and have an enlarged portion (nuptial chamber) at one end (Figure 1A). The galleries of *Scolytus monticolae* and Douglas-fir pole beetle are also usually short (rarely >6") and have a central nuptial chamber (Figure 1B). Although their gallery patterns are similar, *Scolytus monticolae* and Douglas-fir pole beetle can be differentiated by the timing of their life cycle development (Figure 3). *Scolytus monticolae* overwinter as larvae beneath the bark, whereas Douglas-fir pole beetles overwinter as adults in bark niches. It is important to be able to distinguish these secondary species from the Douglas-fir beetle, which requires much different management due to its aggressive nature as a primary bark beetle. Douglas-fir beetles produce long (usually >12"), vertical, J-shaped galleries (Figure 2) with eggs laid on alternating sides. For more information on Douglas-fir beetle, see the Douglas-fir beetle fact sheet on our IDL Forest Health Web Page.

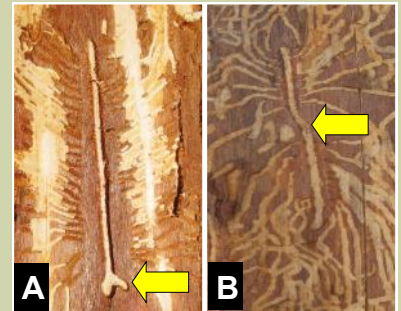


Figure 1. A. *Scolytus unispinosus* gallery on Douglas-fir. Note terminal nuptial chamber (arrow). B. *Scolytus monticolae* gallery on Douglas-fir. Note central nuptial chamber (arrow).

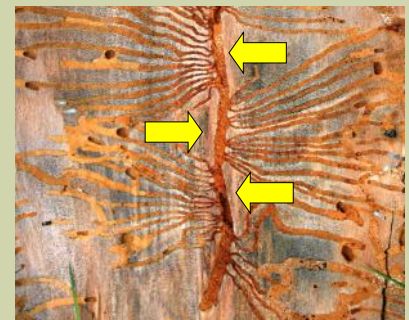


Figure 2. Douglas-fir beetle gallery on Douglas-fir. Note alternating larval mining (arrows).

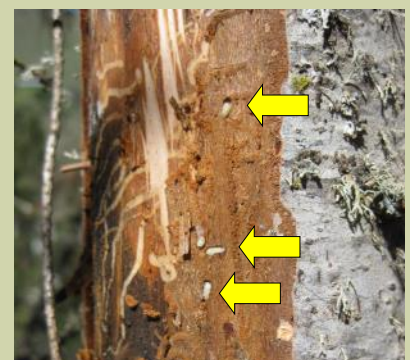


Figure 3. *Scolytus* species will have white larvae or pupae in the gallery in the spring and larvae in late summer. These are *S. monticolae* pupae in Douglas-fir in April, 2015.

Secondary Bark Beetles

Damage

During most years, secondary bark beetles feed on weakened trees or the tops or branches of larger trees, but healthy trees are not usually killed. During droughty periods such as 2015, many apparently healthy trees were attacked by these secondary bark beetles. Larger diameter Douglas-fir were being killed, but there was no evidence of Douglas-fir beetle, the bark beetle normally responsible for killing larger trees (**Figures 4A and 7**). *Scolytus monticolae* were found infesting enough branches to kill the trees (**Figure 4B**). Through the spring and summer of 2016, dead trees of all size classes were a common sight and secondary bark beetles were responsible for most of the mortality (**Figure 5**). In a normal year, most calls for Douglas-fir mortality would be caused by Douglas-fir beetle or root disease.

Predisposing Factors

Shallow or rocky soils were frequently associated with affected stands and dead trees in 2015 and 2016 (**Figures 5 and 6**). Trees growing on rocky or well-drained soils do not have as much water available during periods of drought. The incidence of dying trees and requests for assistance decreased dramatically in 2017 and 2018 as rainfall normalized.

Management

Management of most bark beetles involves preventing or mitigating conditions that increase stress on trees. With many primary bark beetle species such as Douglas-fir beetle, thinning stands to increase availability of resources such as light, water and nutrients is very effective. Little is known about the life history of these secondary bark beetle species, but recent observations in northern Idaho indicate that thinning may not be an effective management tool. The best practical advice is to grow the right tree in the right place. Pines are better adapted to drier aspects and sites than Douglas-fir.

Figure 7. *Scolytus monticolae* gallery under bark of larger diameter Douglas-fir. This tree was approximately 16" in diameter at 4.5 ft above ground (DBH).

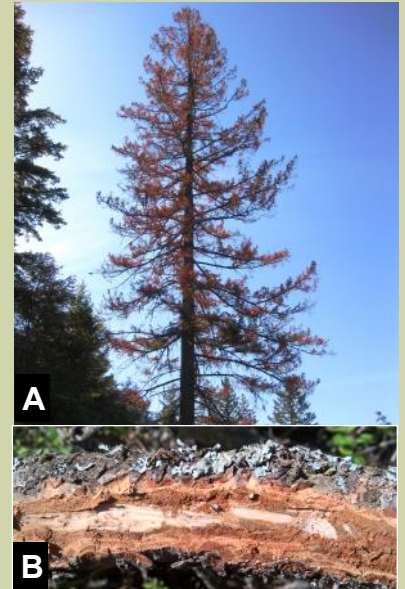


Figure 4. **A.** Mature Douglas-fir tree killed by *Scolytus monticolae*. No other bark beetles were observed in the trunk. **B.** *Scolytus monticolae* larvae and gallery in branches of this tree.



Figure 5. Young Douglas-fir growing on shallow, rocky soil killed by *Scolytus monticolae* November, 2015 in Post Falls.

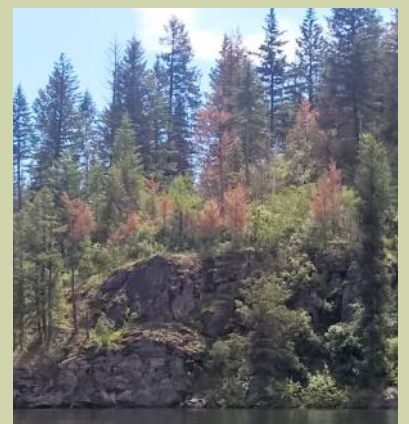


Figure 6. Young Douglas-fir mortality on rocky lake shore. June 2016, Lake Coeur d'Alene.