

## Management of Bark Beetles in Fuel Reduction Treatments in the Black Hills

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There has been increased thinning of ponderosa pine forests in the urban-wildland interface as a means of reducing hazardous fuels. While this activity is beneficial for fuel management, it may be detrimental for management of bark beetles.

Pine engraver beetle populations have increased in the past year and with background population expansion there has also been a noticeable increase in standing tree mortality. Generally pine engraver beetles are attracted to dead or dying tree tops or fresh down branches or logging slash (cut

branches and twigs from thinning operations generally less than 5 inches in diameter). However when pines are stressed by drought or other agents, the beetles can become tree-killers. This shift from colonizing dying trees and slash to live trees was noted during the last drought episode in the early 2000s and this current episode is repeating the pattern. This means that managing pine engraver beetles may become as important to land managers as management of the mountain pine beetle. Fortunately, pine engraver beetle outbreaks are usually of very short duration, often lasting less than three years. Once spring and summer precipitation returns to at least 80% of normal, the beetles generally are no longer tree-killers.

The pine engraver beetles typically have two to three generations a year. They overwinter as adults in the duff layer, though may also remain beneath the bark of infested trees. The overwintering adults emerge from the duff or tree beginning in late March or early April and generally are attracted to fresh logging slash and recent windthrows or broken tree tops or branches as a result of an ice storm. The second generation emerges in late spring, about 2 months after the first generation begins to colonize slash, and will move to standing trees. However, if trees are stressed by drought or other agents both the late March and May-June flight may colonize standing trees. Furthermore there is not a concise flight period and it is possible in the Black Hills to capture adult pine engraver beetles from late winter to late summer though the adult population decreases as the season progresses. The pine engraver trapping that was conducted in 2002 and 2003, during the last outbreak, had a significant decrease in capture after the first week of August.

The greatest risk for ponderosa pine mortality occurs when slash is generated between late winter and spring. This debris remains moist long enough to allow the beetles to reproduce and their offspring to survive and emerge as adults. However the material is now too degraded to be used as a food source for this second generation and they will focus on standing stressed

trees. The lowest risk is slash generated between late summer and early autumn as the host material declines quickly during this time period and is not suitable material for the offspring to survive and mature. Also there are fewer adult beetles flying during this time periods so there is a smaller population to attack trees.

### **Management during thinning operations**

Slash, chips and other woody debris should not be created at the same site two years in a row as the background population of pine beetles can increase and will be attracted to the new slash and adjacent trees the following year. A buffer of 2 miles between slash production from one year to the next is optimum (the beetles typically fly less than ¼ mile from emergence site so a 2 mile buffer provides excellent protection).

### **Other tactics to reduce ponderosa pine mortality in stands that are being thinned.**

**Removal.** Remove slash within 3 weeks of thinning. Removing the slash will prevent the expansion of engraver beetles from the slash. The slash should be moved to an area that is at least 2 miles from ponderosa pine stands.



**Chipping.** Pine engraver beetles and other bark beetles are attracted to newly chipped stands, particularly when the chips are scattered throughout the site. The beetles cannot reproduce in the chips but the host volatiles released by the chipping will draw them into the site. If there is no fresh slash on the ground to colonize, and if the standing trees are stressed by drought, the beetles will attack the residual stand. Chipping from late March through June and even early July increases the stand's attractiveness to bark

beetles as this is the time the greatest number of beetles are flying and colonizing trees or slash. Chipping in mid-August thru February is the time when the risk is lowest. Furthermore, if chipping during August and September, whenever possible and practical, remove the chips from around the base of the residual trees. Raking the chips away for a distance of 4 or 5 feet will further reduce the possibility of attack. However do not windrow these chips in piles near the tree as deep layers of chips can interfere with regeneration of pines and other vegetation. Chip depth should not exceed 2 inches.



**Semiochemicals.** These are chemicals produced by the insect to communicate with other insects. Pheromones, semiochemicals used to attract members of the same species, have been synthesized and used to reduce pine engraver beetle attacks on standing trees. These chemicals are placed in Lindgren funnel traps, generally in clusters of 3 placed as a triangle with spacing about 15 feet apart, in an area to prevent the beetles from attacking live trees. The use of pheromones is an excellent means of monitoring populations and can aid in population reduction but is not a substitute for proper management of slash, chips and other debris.