

## **THINNING AND SANITATION: TOOLS FOR THE MANAGEMENT OF BARK BEETLES IN THE LAKE TAHOE BASIN**



Susan Donaldson, Water Quality Education Specialist  
Steven J. Seybold, Research Biochemist

---

### **INTRODUCTION**

Tree mortality in the Lake Tahoe Basin increased markedly during the late 1980s and early 1990s due to attacks on conifers (evergreens) by bark beetles. Over this time period, bark beetles killed at least 30% of the conifers in the Tahoe Basin. In some areas, 70% to 80% of the trees were killed. The high levels of tree mortality increase the risk of catastrophic fires in the urban-wildland interface in and around the Basin. From 1994 to 1996, five interstate forest fires in eastern Sierra Nevada forests chronically infested with bark beetles claimed \$40 million in housing and property damage, timber loss, and soil stabilization costs.

### **INTEGRATED PEST MANAGEMENT OF BARK BEETLES**

Integrated pest management (IPM) involves the use of a variety of mechanical, cultural, biological, and chemical techniques to monitor and control a pest problem. In any IPM program designed to reduce bark beetle-caused tree mortality in the Tahoe Basin, there are two key aspects: 1) the health of uninfested trees, and 2) the sanitation, or removal and disposal of infested standing trees and uninfested ("green") and infested tree limbs and stem material from the ground. These aspects apply to coniferous trees in the Tahoe Basin residential landscape, as well as to large tracts of coniferous trees in publicly or privately owned forests. However, different techniques or levels of management might be applied by homeowners or municipal resource managers versus managers of large forest tracts. Most of the forest management and sanitation techniques developed for the management of bark beetles in various regions of western North America have not been tested directly in the Tahoe Basin, or elsewhere in the Sierra Nevada, so local homeowners and resource managers should be aware that there may be regional differences in the effectiveness of the techniques described in this fact sheet.

## THINNING

In both residential and forest settings, the health of residual trees can be promoted by thinning. Thinning, or removal of selected trees from small groups or stands, is used before bark beetles attack. Whether removing a few uninfested trees in a backyard, or removing many uninfested trees over acres of forest, the goal is to promote the health and vigor of the remaining trees. These trees benefit from decreased competition for moisture, sunlight, space, and nutrients, and are better able to withstand any future attacks. Scientific studies from some forested regions in western North America have shown that tree mortality due to bark beetles can be reduced by lowering the density of trees in the stand. The effect of thinning on tree mortality due to bark beetles is currently being studied near the Tahoe Basin by USDA Forest Service scientists. In residential settings, the health of uninfested trees in already thinned groups can be further promoted by cultural practices such as watering, minimal fertilization, or reduction of soil compaction. The Nevada Division of Forestry (702-849-2500) can provide assistance in suggesting the optimal tree density and cultural practices for a given stand of trees.

## SANITATION

Another method of managing bark beetles in residential and forest settings involves the common sense removal and disposal of infested trees, and uninfested or infested tree parts already on the ground. These sanitation measures can range from removal and transport of recently infested trees from the forest floor for wood products, called salvage logging, to the chipping of green, uninfested branches from a residential pruning program. Further development and emergence of new adult beetles from infested trees or cut materials may jeopardize valuable neighboring trees in the urban landscape or the forest. Even freshly cut, uninfested materials may attract and provide breeding sites for bark beetles. The sanitation of these materials in residential and forest landscapes is an important component of bark beetle IPM.

### SANITATION IN THE RESIDENTIAL LANDSCAPE

Freshly cut material from pruning, thinning, or tree removal in residential or landscape areas must be carefully managed to ensure that breeding populations of bark beetles do not infest the green inner bark. There are a number of techniques available to the homeowner for disposal of this material. If trees and branches are cut between May and September, to be effective, treatments should be completed within five weeks of cutting. Immediate treatment is always best. Trees and branches cut during winter months should be treated prior to May 1.

**Chipping:** Chipping is very effective at reducing bark beetle populations in woody materials from pruning, thinning, or tree removal in urban areas. Chipping destroys the habitat for beetles in uninfested material and destroys the beetles, offspring, and habitat in infested materials. Commercial providers may be able to chip material up to 12 inches in diameter, while home chippers will be limited to the processing of smaller branches. The chipped material can then be safely scattered as a mulch. Never scatter fresh chips near a tree of the same species to avoid new attacks. The same rule applies if newly cut logs are piled while their bark is still attached.

**Firewood Tarping:** Debarking is the optimal way to prepare bark beetle-infested or uninfested green logs for firewood storage. This is especially true for thick-barked logs. However, in some regions outside the Tahoe Basin, it has been shown that bark beetle-infested wood can be stored for use as firewood with the bark intact if it is carefully tarped and sealed with clear plastic. This method is currently under investigation by the USDA Forest Service in the Tahoe Basin and surrounding areas. Consult the "Further Reading" section at the end of this fact sheet if you are interested in learning more about firewood tarping.

**Debarking:** Removing the bark destroys the inner bark (phloem) habitat where the adult bark beetles lay eggs and the larvae feed. Once the outer bark is separated from the wood, neither the bark alone nor the wood alone will support bark beetle reproduction. It is easier to debark wood that is still green or has been freshly cut. If a tree is dry or seasoned, any remaining bark beetles will have matured and left the tree, so it is not necessary to remove bark from dry, seasoned trees. It is especially important to remove bark from thick-barked, green logs. Debarking is an effective technique for all bark beetle species if the eggs have just been laid, or the larvae have just hatched out. The technique is effective for nearly all bark beetle species even if the larvae have already progressed to the pupal stage. After debarking, the wood can then be stored on site and used later for firewood without the need for other storage methods (see below). Commercial debarking devices are available to speed up the process.

**Pile and Burn:** This treatment technique can be very effective in killing bark beetles, and the cost is low. Contact your local fire department for information on burn permits and safety issues. Burn seasons are generally limited to those times of year when air quality is not a factor and when woody material can be burned without threat of wildfire.

## **SANITATION IN FOREST MANAGEMENT**

After commercial logging or thinning operations, woody material called slash is left behind. Slash includes branches and small diameter sections of tree stems. There are several ways to ensure slash in the forest will not support breeding populations of bark beetles. These treatments include logging and scattering or piling and burning. In some intensively managed forest stands, such as state parks, chipping may be applied. To be effective, these treatments must be completed within five weeks of slash generation, or before beetle broods emerge. Immediate treatment is always best. Avoid logging and tree removal activities if green slash must be left untreated on the ground in spring and summer.

**Lop and Scatter:** This technique involves removing and scattering of "green" branches or short pieces (several feet or less) of the main stem three inches or larger in diameter. Lopping and scattering slash is recommended when pine trees are being logged or thinned, especially when beetles of the genus *Ips* (pine engravers) are common in the area. The effectiveness of this method depends on heat exposure and drying. Scatter the slash in a sunlit area. Heat from the sun warms the slash and increases the rate of drying in the inner bark, reducing the breeding success of bark beetles.

**Pile and Burn:** As mentioned for sanitation in the residential landscape, burning can be very effective and economical in controlling bark beetles. Disposal of woody debris by burning can be integrated into prescribed burning programs. However, to be successful, burning must occur within five weeks of cutting in spring and summer. Fire danger is usually too high during this period, so this method can only be practically applied during the fall and winter.

**Removal of Infested Stems:** In forest management, removal of infested trees is desirable to prevent attack of remaining live trees, and to obtain wood products from a rapidly deteriorating resource. To be effective, the tree stems from these salvage operations must be removed from the forest prior to beetle brood emergence, and care must be taken to avoid storing infested tree stems adjacent to healthy trees.

## **SUMMARY**

There are many methods available for treatment of wood from bark beetle-infested trees. Prior to using any of the methods, check with the Nevada Division of Forestry (702-849-2500) to ensure that the trees being removed are currently infested. Nevada Division of Forestry personnel can also provide advice on permits prior to tree removal, and on the most appropriate method for disposing of infested wood.

## FURTHER READING

Amman, G.D., M.D. McGregor, and R.E. Dolph, Jr. 1985. Mountain pine beetle. Forest Insect and Disease Leaflet 2, USDA Forest Service.

Buffam, P.E. and D.D. Lucht. 1968. Use of polyethylene sheeting for control of *Ips* spp. in logging debris. *Journal of Economic Entomology* 61:1465-1466.

DeMars, C.J., Jr., and B.H. Roettgering. 1982. Western pine beetle. Forest Insect and Disease Leaflet 1, USDA Forest Service.

Krawczyk, J. H., C. J. Kostichka, G. L. Worf, and D. L. Mahr. 1982. Polyethylene tarping of elm firewood to prevent elm beetle flight. *Journal of Arboriculture* 8: 292-295. McGregor, M.D., G.D. Amman, R.F. Schmitz, and R.D. Oakes. 1987. Partial cutting lodgepole pine stands to reduce losses to the mountain pine beetle. *Canadian Journal of Forest Research* 17:1234-1239.

Mitchell, R.G., R.H. Waring, and G.B. Pitman. 1983. Thinning lodgepole pine increases tree vigor and resistance to mountain pine beetle. *Forest Science* 29:204-211.

Sanborn, S.R. 1991. Controlling bark beetles in wood residue and firewood. California Dept. of Forestry and Fire Protection Tree Notes Number 3.

Sivhra, P. 1987. Suitability of elm firewood to bark beetle attack stored under polyethylene sheeting. *Journal of Arboriculture* 13:164-166.

The project "Community-based Non-toxic Bark Beetle Management: Education, Research, and Implementation in the Tahoe Basin" was funded by a joint grant from the University of Nevada Cooperative Extension and the Nevada Agricultural Experiment Station.

Wood, D.L., R.W. Stark, W.E. Waters, W.D. Bedard and F.W. Cobb, Jr. 1985. Treatment tactics and strategies. In: *Integrated Pest Management in Pine-Bark Beetle Ecosystems*, eds. W.E. Waters, R.W. Stark, and D.L. Wood. John Wiley & Sons, New York, pp. 121-139.

---

*The project "Community-based Non-toxic Bark Beetle Management: Education, Research, and Implementation in the Tahoe Basin" was funded by a joint grant from the University of Nevada Cooperative Extension and the Nevada Agricultural Experiment Station.*

UNIVERSITY  
OF NEVADA  
RENO

The University of Nevada, Reno is an Equal Opportunity/Affirmative Action employer and does not discriminate on the basis of race, color, religion, sex, age, creed, national origin, veteran status, physical or mental disability, or sexual orientation, in any program or activity it operates. The University of Nevada employs only United States citizens and those aliens lawfully authorized to work in the United States.