



Understanding and Controlling Deer Damage in Young Plantations

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This publication familiarizes woodland owners with ways to minimize or prevent damage by black-tailed and mule deer in young plantations. Knowledge of their behavior and habitat requirements helps managers identify conditions likely to result in heavy deer damage. Although localized damage by mountain beaver, pocket gophers, mice, and elk also can be severe, damage by deer is dispersed more widely and uniformly throughout the Pacific Northwest because of deer abundance and mobility. Black-tailed deer are found west of the Cascade crest to the Pacific Ocean. Mule deer live east of the Cascade crest, though groups occasionally are sighted in certain areas of southwest Oregon (Douglas, Jackson, and Josephine counties).

Deer Habitat Requirements

Deer need cover, forage (food), and water. Cover shields deer from weather extremes and protects deer from predators, such as coyotes, domestic dogs, mountain lions, and humans. Deer typically feed in forest openings that have been created by timber harvesting activities or natural disturbances (wildfires, high winds, insects, or disease). These openings produce forage of high food value including grasses, forbs (broad-leaved flowering plants), and young shoots of woody shrubs. Deer use the nearby timber for cover.

The timber harvest pattern of small, dispersed clearcuts common on small woodland properties can produce almost ideal deer habitat. If you consider management for deer a primary objective, biologists recommend interspersing small, open patches of forage (40 acres or less) within expanses of timber. Deer can use these patches for forage during plantation establishment and for cover as the plantation matures.



Deer Damage Patterns

The forage that deer prefer includes grasses, forbs, and young shoots of woody shrubs, but at certain times of the year they also browse on tree seedlings. During fall and winter, when availability of preferred forage is limited, deer may damage conifer seedlings. During the spring budburst, when the food quality of conifer seedlings is high, deer may prefer seedlings over other browse, and damage may be severe.



Figure 1a.—This bushy Douglas-fir tree has been browsed repeatedly for several years, resulting in loss of height growth.



Figure 1b.—The tree on the right has escaped deer browsing, while the one on the left still is under browsing pressure.

Areas that encounter high damage year-round may require different control measures than areas where damage is seasonal. Failure to use adequate control measures during seedling establishment can lead to partial or full failure of the plantation.

Seedlings under stress or in competition with grass or brush are more likely to be impacted by severe browsing. Vigorous seedlings, on the other hand, may survive browsing, but they will appear bushy because of repeated loss of laterals and leaders (Figures 1a and 1b).

The order of preference for conifer browsing appears to be Douglas-fir, western redcedar, grand fir, western hemlock, and Sitka spruce. However, damage has been found on all these species, and preference may vary by geographic region. The extent of damage seems to vary with geographic location, behavior of a given deer population, and the species planting mix. Where mule deer live, damage to ponderosa pine is of greatest concern.

Identifying deer damage

Browsing of new growth usually leaves a clean break that becomes blunt after the broken face of the succulent shoot forms a callus during healing (Figure 2). Browsing of more mature woody vegetation during the dormant season creates a ragged, splintered stem. In early spring, browsing of older shoots may cause the bark to slip, leaving a stripped stem some distance below the break.

You easily can distinguish deer damage from that of rodents, which is characterized by a 45-degree-angle slice on laterals and terminals (Figure 3) or by distinctive tooth marks on larger seedlings.

The impact of deer damage

Damage to planted seedlings is in one of several ways.

- Seasonal height growth is reduced if deer browse terminal and primary laterals.
- The loss of needle tissue reduces food production and the ability of the seedling to recover from other stresses and to survive or grow.



Figure 2.—This Douglas-fir seedling was browsed in the early spring and has formed a callus.

- Deer occasionally pull newly planted seedlings out of the ground.
- Seedlings can be trampled by deer, although the damage usually is low compared with trampling by domestic livestock or elk.

Evaluating a Deer Problem

The best approach to deer damage is *prevention*, which involves evaluating the new plantation based on site characteristics known to attract deer. Table 1 lists a series of questions designed to help you assess a potential deer problem.

If the probability of damage seems high, the best decision is to protect the seedlings. Protection helps minimize establishment costs during the first 3 to 5 years (reentry to protect or replant costs more than early preventive treatment) and maximize the seedlings' chances for survival and rapid growth.

If you decide not to protect, you need to monitor your plantations for the first 3 to 4 years to see if any damage is occurring, so you'll know whether corrective action is necessary. Fall is a good time to monitor seedling survival and deer damage because the grass has died back and the seedlings are easy to see.



Figure 3.—Mountain beaver clipping is characterized by a 45-degree angle.

Table 1.—Do you have a potential deer problem?^a

1. Do you frequently see deer in the area?
2. Are deer signs (hoof prints, nipped twigs and leaves, feces, etc.) readily apparent on or in the vicinity of the unit you wish to regenerate?
3. Have you found browse damage on previous plantations in the vicinity of your new one?
4. Does damage to these plantations occur only in the spring, around the time of budburst?
5. Does damage on these plantations occur more than once (spring and fall) during the year?
6. Do you or your neighbors accommodate deer by forage seeding or winter feeding?
7. Does the unit you wish to plant have good cover on one or more sides?
8. Will the unit provide a readily available forage source for deer?
9. Do you anticipate a brush or grass competition problem developing?
10. Do people with whom you've talked (neighbors, forestry agent, professional foresters, service forester, etc.) believe you have a potential deer browse problem?

^a Interpretation: If you answer "yes" to more than half of the questions, chances are good that the seedlings in your new plantation will be subjected to some degree of browse damage. The extent of damage will determine whether you need to take protective measures (such as tubing) at time of planting.

Be sure to monitor your plantations systematically, especially areas prone to high deer use (near timber cover, along skid roads, on benches and flat areas). Surveys providing this type of information don't take long, are extremely valuable for detecting potential or current problems, and can save money by allowing you to respond quickly to avoid a partial or total plantation failure.

Protection methods

Control methods include fencing, physical barriers (for individual trees), repellents, habitat manipulation, stand management modifications, and hunting. Physical barriers and fencing are the most effective tools. However, the success of any control method may vary, depending on site characteristics and/or behavior of a given deer population. So, you need to evaluate the positive and negative aspects of alternatives to select the best control method(s).

Fencing

Fencing has been used effectively to protect entire plantations (Figure 4). However, construction and maintenance costs are high, especially in rough terrain. Use fencing only when it's apparent that you cannot reforest by other means, and when the seedlings are of extraordinary value.

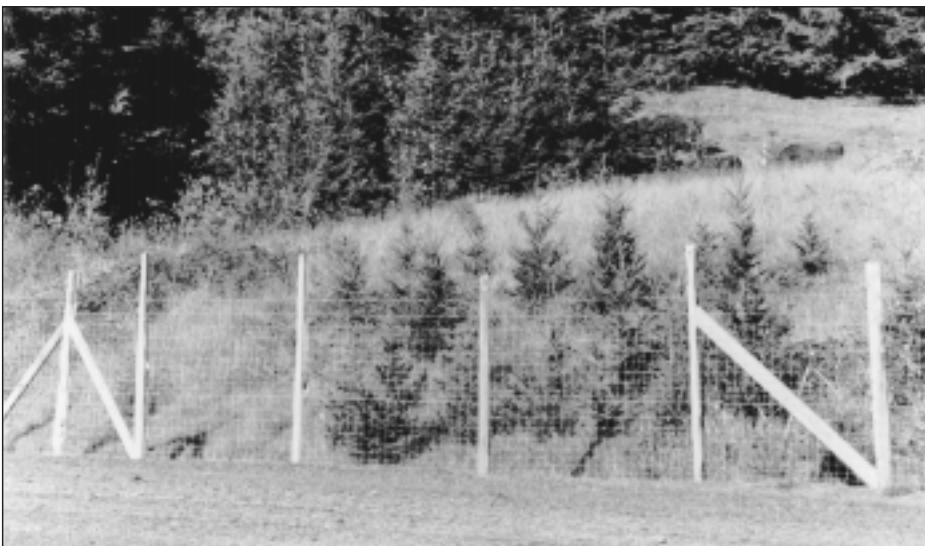


Figure 4.—Fences are available in many configurations and types. Woven wire fence is the most common.

There are two types of fencing: non-electric and electric. The most commonly used nonelectric fence is the woven wire fence. This fence requires posts every 20 to 50 feet and must be at least 8 feet high. Be sure to anchor the fence to the ground so deer can't crawl under it.

Several types of electric fences are available at comparable or lower cost: a single row, 5-wire fence; a single row, 10-wire fence; and a double row, staggered wire fence. All electric fences measure between 7 and 8 feet in height. Deer normally attempt to go under or through a fence rather than jump over it, though jumping it is not a difficult task.

Physical barriers (whole tree or terminal leader)

Physical barriers protect individual trees, or parts of the tree, from deer browsing. (Although physical barriers can be effective in minimizing incidental elk damage, they tend to be poor alternatives in areas intensively used by elk.)

Vexar tubes (Figure 5) are rigid polypropylene mesh tubes that are available in a variety of height and diameter combinations. The material is photodegradable, breaking down under the influence of sunlight after 2 to 5 years. The polypropylene material usually breaks up more quickly on southern than northern exposures. Vexar tubes do prevent browse damage effectively and have no adverse effect on seedling survival.

Vexar tubes are difficult to install on already planted and established seedlings. They also require plantation maintenance to be sure they are straight, and leaders are not tangled from growing through the tubes. It's important to use stakes to support the tubes for small seedlings, on sites with strong winds, and for taller tubes. Vexar tubes are effective for multipest control, particularly when damage by deer, mountain beaver, mice, or elk all occurs at about the same time.

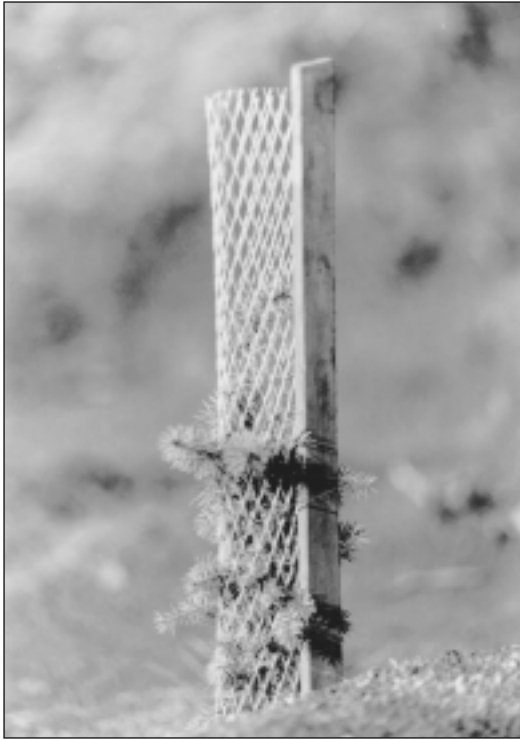


Figure 5.—Vexar tubes may be staked, or they may be installed without stakes by burying a portion of the tube at time of planting.

Vexar leader tubes are physically similar to Vexar tubes, but because they are used exclusively to protect the seedling terminal, they are smaller in diameter, length, and mesh size. Leader tubes are effective in preventing browse damage to terminals on older seedlings.

Attach the leader tube to a wood stake (arrow shaft or bamboo stake) driven into the soil next to the seedling. Larger seedlings or those browsed repeatedly for several years can support the leader tube without a stake (Figure 6). Stapling the leader tube to a small lateral branch can help prevent loss of the leader tube in high winds.

Paper budcaps are rectangular pieces of weatherproof paper that are folded lengthwise and stapled around the terminal leader and bud, forming a protective cylinder. If you observe browsing after terminals elongate beyond the top, don't pull the existing cap further up on the terminal before midsummer, because newly formed terminals are too weak to support the cap, and they topple over. You can provide temporary protection in these situations by applying repellents (see "Repellent" section).

Budcaps normally require annual adjustment or replacement. You'll need to replace paper budcaps lost during windy conditions. Try stapling the budcap to a small lower branchlet to help prevent loss on windy sites.

Paper budcaps have no adverse effect on seedling height growth. Incidence of bent terminals generally is low but may be more likely on sites subjected to strong winds, particularly if you use budcaps on smaller seedlings.



Figure 6.—Typical application of a leader tube on a larger, established seedling.

Repellents

Repellents include bone meal and putrefied fish or egg solids. Repellents made of putrefied egg solids are the most effective. They're available in powders or premixed liquid formulations, and frequently include a latex sticker to make them rain resistant. Common trade names are Big Game Repellent (BGR), Deer-Away, and Ropel. The disadvantage of repellents is that only the existing vegetation is protected, so the product must be reapplied throughout the growing season.

Habitat manipulation

In areas where deer populations are not high, or seedling damage is not severe, habitat manipulation may reduce deer impacts to more tolerable levels. Habitat manipulation consists of:

- Planting preferred forage with the seedlings
- Improving the quality and quantity of forage in areas away from damage-susceptible plantations
- Planting species of conifers less preferred by deer
- Leaving uncleared slash as a physical barrier to deer movement

Planting and/or sowing alternative, preferred forage can deter deer and elk from browsing on seedlings. Forbs usually are sparse or absent during May and June when most summer browsing occurs on Douglas-fir seedlings. As preferred forbs become abundant, browsing on seedlings usually decreases. Native forbs planted as alternate forage in the moist Oregon coastal zone include cat's-ear, fleabane, hawkweed, phacelia, and redstem fireweed.

Unfortunately, native forbs are not readily available in the quantities needed. Combinations of domestic legumes (white and subterranean clover) and certain grasses

have proven effective in reducing browse damage in young plantations and easily are obtained in quantity. Because many grasses can out-compete newly planted seedlings for water and nutrients, use them cautiously in areas where they might limit the availability of moisture and nutrients.

Leaving logged areas unburned discourages deer from browsing seedlings by restricting deer access to the seedlings and preserving existing forage (Figure 7). However, this also creates habitat for small pest mammals, such as mountain beaver and rabbits, which may damage coniferous seedlings too. In addition, it increases the fire hazard.



Figure 7.—Logging slash can be an effective barrier to deer.

Planting large seedlings

Planting larger trees, 24 to 30 inches in height and $\frac{1}{8}$ inch or more in diameter, is an effective defense against deer browsing. Large seedlings are better able to compete with brush and grass and to withstand moderate levels of browsing. Though more costly, this practice has proven effective in areas where late summer moisture is not limited. This approach is suitable for very moist, protected coast range areas, but avoid it on areas exposed to high winds or droughty conditions in mid- to late summer.

Summary

Deer browsing in plantations is a common phenomenon and can be tolerated at moderate levels. Deer browsing on young conifer seedlings frequently decreases the probability of seedling survival and retards growth, especially on sites where seedlings compete with brush and grass for available moisture, sunlight, and nutrients. The interaction between competing vegetation and high deer populations causes damage levels that warrant concern.

Other publications

Rochelle, James A., "Deer and Elk." In: *Silvicultural Approaches to Animal Damage Management in Pacific Northwest Forests*, Hugh C. Black, ed., PNW-GTR-287 (USDA Forest Service, 1992).

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For Further Reading

OSU Extension publications

Duddles, Ralph E. and Chal G. Landgren, *Selecting and Buying Quality Seedlings*, EC 1196 (Oregon State University, Corvallis, revised 1993). \$1.25

Duddles, Ralph E. and Mike Cloughesy, *Introduction to Conifer Release*, EC 1388 (Oregon State University, Corvallis, reprinted 1998). \$1.00

Emmingham, William H., Brian D. Cleary, and David R. DeYoe, *Seedling Care and Handling*, EC 1095 (Oregon State University, Corvallis, reprinted 1998). 75¢

Fitzgerald, Stephen A., *Site Preparation: An Introduction for the Woodland Owner*, EC 1188 (Oregon State University, Corvallis, reprinted 1998). \$2.50

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