

Restoring Recreational and Residential Forests

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Several decades of fire suppression following logging around the turn-of-the-century has produced dense, even-age stands of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). They contrast with the original forests where frequent, low-intensity fires gave rise to open, parklike, and often uneven-age stands of ponderosa pine. Forests in current conditions are prone to insect infestations, disease outbreaks, and severe wildfires. As residential development and recreational use of this forest type continues to increase, the need for low-impact treatments for mitigating the wildfire, insect, and disease hazards likewise increases. Some forest managers have developed "ecosystem management" treatments such as thinning coupled with prescribed burning to address these concerns. However, special considerations must be made in treating high-value forest land like recreation areas and private home sites. This paper emphasizes silvicultural and harvesting concerns with some additional comments on the use of prescribed burning.

Residential and recreational forests are valuable largely because of their aesthetic appeal, so any proposed treatment must consider the preservation or improvement of aesthetic quality. Forest managers have been concerned with the visual quality of forest treatments for quite some time now. However, their concern has generally concentrated on distant views, like those of a mountainside from a town or highway. By contrast, visual quality concerns in residential and recreational forests occur at a finer scale—within a stand of trees, along a trail, in a picnic area, or at a rural home site.

Treatment Design

In designing a restoration treatment for residential or recreational forests, the forester must consider the impact of both the silviculture and the harvest method on aesthetic quality.

Silvicultural Considerations

Silviculture dictates which trees are to be harvested and which are to be retained. A final harvest that removes most of the trees from a site is obviously not desirable from a visual quality standpoint. More appropriate silvicultural treatments are commercial thinning and single-tree selection (STS), also called uneven-age management. Uneven-

age management aims to perpetuate trees of nearly all ages in the stand. Under the classical STS system, at any given point in time the forester tries to maintain more trees in each progressively smaller size class (younger age class). The result is a pleasing forest of both large and small trees, open-grown enough to mitigate hazards resulting from wildfire and insect and disease epidemics.

The other appropriate silvicultural treatment is a commercial thinning. Foresters recognize several broad types of thinning, notably a high thinning and a low thinning. In a low thinning the largest dominant and codominant trees are favored for retention while the smaller, weaker trees are harvested. A high thinning is quite similar except that some of the dominants are harvested and more codominants are retained. This is done because the dominant trees are often less growth-efficient than codominant trees due to the larger amount of tissue they must respire, but also increases the economic viability of the treatment. In general, a low thinning will produce a more visually pleasing stand but a high thinning will increase residual stand growth more. Provided that limbs and tops of harvested trees (slash) and other fuels are treated, thinning will significantly reduce fire, insect, and disease hazards. Given the visually-sensitive nature of residential and recreational forests, a low thinning is usually a better choice.

A forest stand cannot be restored to more desirable conditions by a logging treatment in which only the most economically valuable trees are removed. Such practices generally worsen an unhealthy condition and create an unattractive forest.

Harvest Method

The second factor that must be considered when undertaking a restoration treatment in a residential or recreational setting is the method of harvesting the desired trees. Small, independent loggers working on private and government land often use a rubber-tired skidder or a crawler tractor (bulldozer) for dragging logs to a landing, where they can be loaded onto a truck. The trees are cut with a chainsaw but the limbs and tops are left attached and are skidded to the landing with the logs, where a chainsaw is used to remove the limbs and top. This "whole-tree" skidding method is cost effective because slash can be disposed of at the central landing. Unfortunately, the limbs and treetops contain nutrients that are potentially useful to the remaining forest, so it is better for long-term forest health to leave most of the limbs in the woods. As the limbs decompose or are burned, the nutrients are released into the soil. Another drawback of "whole-tree" skidding is the large landing area required to process the trees and make a pile of limbs and tops. Moreover, the residual trees are often scarred in the process of skidding whole trees, inviting disease.

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Some larger logging contractors use a more automated approach for harvesting trees. The feller-buncher can grab hold of a tree, saw it off, and place it on the ground, making a stack of whole trees oriented with the butt facing the landing. A skidder with a grapple (claws) instead of a winch grabs the whole stack of trees and travels to the landing. At the landing a mechanical delimber removes the limbs and cuts the tree into logs, leaving a pile of limbs for disposal by burning. This fully mechanized harvesting system is quite productive, so logging costs can be kept low. However, the machinery is expensive to move from one job to another, so it is rarely used on the small private properties common in residential areas. Moreover, the machines are large and difficult to maneuver without scarring the residual trees in a stand that is being lightly thinned.

The next generation in harvesting equipment is a feller-processor that makes decks of logs already cut-to-length. An off-road machine called a forwarder carries the logs to the landing without dragging. This system leaves slash on the site to decompose or be burned, but is very expensive and is seldom used on small properties.

Fortunately for private landowners and recreational area managers, there are a wide variety of relatively inexpensive, low-impact harvest methods available. One is perhaps the oldest logging method known—horse logging. Trees are felled with a chainsaw, delimbed and cut into logs right where they fall. Horses are used solo or in tandem to drag the logs to the landing. Limbs are piled by hand and burned, or scattered and left to decay. Horses can be used on any size property and are generally limited to skidding logs downhill or on flat terrain.

Farm tractors modified for use in the woods can be used in restoration treatments where visual concern is high. The harvest method is similar to horse logging, but the tractor uses a three-point hitch-mounted winch (powered by the tractor's power takeoff shaft) to pull logs to the tractor, working effectively even up or down short pitches of very steep slopes. When a full load has been winched to the tractor, the logs are raised (using the tractor's three-point hitch) and skidded to the landing. The winch has a blade that stabilizes the tractor and can be used to organize logs at the landing. Experienced operators can use four-wheel drive tractors with harvesting winches in some areas having moderately steep terrain.

Other methods include the use of all-terrain vehicles (ATV) to skid small logs. A trailer for posts and poles or a skid pan or sulky for logs can be towed behind the ATV. Unlike the farm tractor, an ATV cannot move logs uphill. Forest engineers in Europe have developed other small tracked and wheeled machines that can be used in restoration treatments where mainly small trees are to be harvested.

On steep slopes (greater than 25 percent), plastic chutes (PVC pipe cut in half longitudinally) can be fastened end-to-end to slide small material like firewood and posts to a road or other access point. Wood up to 8 inches in diameter can be "chuted" if the PVC pipe is 10 inches in diameter. This system has been used successfully on slopes over 500 feet long. The kinetic energy on the moving firewood piece can be used to split the wood by mounting a heavy splitting wedge at the bottom of the chute.

Prescribed Burning

Appropriate use or non-use of fire is usually a sensitive consideration in undertaking restoration of a residential or recreational forest. The ponderosa pine type produces large quantities of highly flammable fine fuels (pine needles) each year, and this forest can burn under dry conditions from early spring through autumn. Prescribed burning, after high initial fuel loadings have been reduced by other means, has several advantages from an ecological viewpoint (Arno and Harrington, this proceedings). Prescribed fire is often used to help maintain ponderosa pine forests in public recreation areas, but such burning is uncommon in residential areas because of the higher values at risk and a dislike of the initial visual effects of an underburn. Applying an underburn in a tract of forest near a home clearly requires professional planning, equipment, and execution, but that may be available through insured prescribed fire consultants perhaps aided by cooperating volunteer fire districts.

Conclusions

The forester has many considerations to make when designing a forest restoration treatment in a recreational or residential setting. Fortunately, there are existing silvicultural tools and unique low-impact harvest methods available for restoring forests in an aesthetically sensitive manner.