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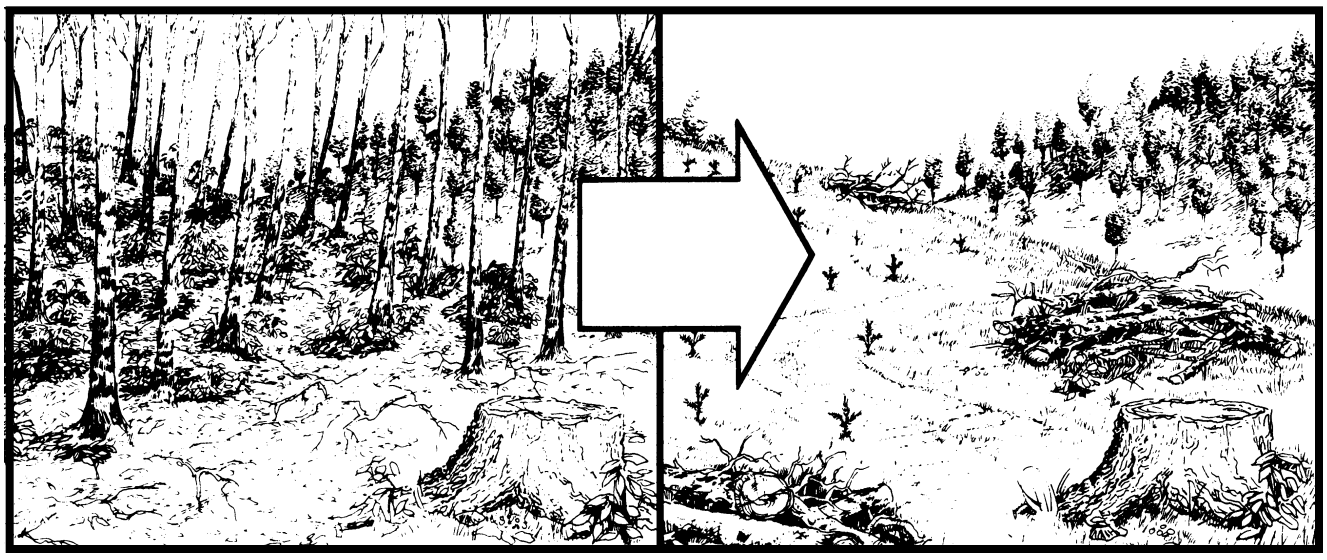
The Woodland Workbook

Stand Management

Converting Western Oregon Red Alder Stands to Productive Conifer Forests

M.C. Bondi and W.H. Emmingham



It doesn't come easy! Does any of your woodland property look like the alder stand at the left? If your goal is to convert this kind of ground to a productive conifer forest, you should know it can be a challenging task. You'll have to do something with all that brush in the understory of the alder stand.

Then there's all the leftover wood after an alder harvest—it may need special treatment, too. And don't forget animal damage. Even though we don't see them here, you can bet big game and rodents will be around to feed on your newly planted trees. Read on for more information . . . .

Michael C. Bondi, Extension agent (forestry), Clackamas County, and William H. Emmingham, Extension silviculture specialist, Oregon State University.

OREGON STATE UNIVERSITY EXTENSION SERVICE

Contents

References to other publications

When you're referred to another OSU Extension Service publication, you'll find additional information in "For Further Reading," page 12.

Some forest landowners in western Oregon have lands now occupied by red alder *(Alnus rubra).* Alder is a very fast growing tree, especially during its first 15 years, and it can be beneficial for soil improvement in areas of nitrogen deficiency. However, many replace these hardwood stands with conifers because of their greater potential economic return per acre under today's market conditions.

Our purpose in this publication is to describe the methods commonly used to convert (change) alder forests into conifer forests. First, we'll describe the different types of alder stands commonly found in the Northwest. Then we'll examine conversion methods useful for either pure alder stands or mixed forests that have at least one-half their area occupied by alder.

We'll describe advantages and disadvantages of each conversion method, its practical application, and estimated costs. Besides specific how-to's, you'll read about the guidelines necessary to ensure the successful establishment of your new conifer planting.

Our purpose is not to convince you to convert your hardwoods today. We'll merely look at the methods available once you've decided this will be your course of action. The decision to convert existing alder forests to a conifer plantation depends on the age and size of the trees, current market opportunities, and equipment or contractor availability, as well as your objectives for management.

If you've decided to convert your alder, this publication is for you! For help with the decision itself—whether or not to convert—see also *Managing Red Alder*, EC 1197.

Owners of nonindustrial private forest land should be aware that alder conversion projects may be eligible for Federal cost-share assistance. Depending on the county where your land is located, funds may be available for site preparation, tree seedling purchase and planting, weed control, and precommercial thinning.

Cost Sharing and Woodland Management, EC 1119, discusses this program. Your local office of the Oregon Department of Forestry (ODF), the OSU Extension Service, or the USDA Farm Service Agency (FSA) can provide details about this program for your county.

Other possible sources of assistance are the State reforestation income tax-credit program and the Forest Resources Trust loan program. In Oregon, these programs are designed to encourage landowners to convert younger alder forests and underproductive brush lands into conifer forests. There are specific requirements on the location of alder forests and the size of the trees that qualify under these programs. Contact your local ODF office for more information.

(By the way, the technical terms we use in this publication are all defined in *Glossary of Woodland Words*, EC 1155.)

Note: This publication does not recommend herbicides for specific situations. These recommendations change from time to time. For the latest information, see your county Extension agent or consult the latest edition of the *Pacific Northwest Weed Control Handbook.*

Characteristics of an Alder Forest

There are a number of ways to convert an alder forest into a productive conifer forest. The method you select depends on:

1. The number of acres in your project
2. The steepness of your land
3. The size of the alder
4. How much usable wood volume exists
5. Local markets for the alder and the distance to them
6. Whether any conifers are mixed with the alder
7. What type of shrub layer occurs in the forest understory
8. What kind of equipment you'll use (or is available in your area)
9. How close your project is to environmentally sensitive areas like streams

There are several characteristics common to most young alder forests in western Oregon.

First, these areas frequently have many individual tree stems present. This high density usually results from natural seeding after a previous logging activity or burning. As a result, there may be large quantities of wood present, some marketable and some not.

Depending on the harvest system used, the amount of slash left after logging in alder stands varies. When sawlogs alone are harvested, a great deal of slash will remain. When whole tree harvest is used and slash is utilized for hog-fuel, little slash will remain onsite. Heavy slash requires special clearing that you must handle during site preparation to meet fire prevention goals of the Oregon State Forest Practices Act. (Later, we'll discuss several site-preparation methods useful in alder stands; see "Site-preparation Methods," page 5.)

Third, any logging or clearing operation or prescribed burn in a hardwood area usually prepares an excellent seedbed for the further establishment of *another* alder stand. Alder seeds, which are very small and light, are carried great distances by the wind. These seeds typically require a disturbed or exposed mineral soil to germinate.

Landowners converting alder forests must be prepared to control young alder that can reseed, compete, and possibly crowd out planted conifers.

Many typical alder lands in western Oregon, especially in the coastal area, have a dense layer of shrub species growing under the alder canopy (Figure 1). These plants not only create potential landclearing problems, but they also influence the size of seedlings planted and their survival and growth.

Shrub species usually resprout vigorously and compete with conifers for space, moisture, light, and nutrients. Attention to shrub control is essential for successful conifer establishment in alder conversion areas.

Because alder sites are shrubby and often located on fairly moist sites or near streams or creeks, they present ideal habitat for wildlife. Big game browsing is frequently a problem facing conifer establishment.

Furthermore, such moist sites, plus slash concentrations after a clearing program, often create excellent homes for small rodents like mountain beaver. Protecting your newly planted seedlings from animal damage is a must if you're going to achieve acceptable reforestation.

Finally, where an alder forest grows, there's usually plenty of available soil nitrogen. This happens because alder is one of the few trees that can take nitrogen from the air and eventually release it into the soil.

However, most of this nitrogen production and soil improvement occurs during the first 10 or 15 years of the forest's growth, except on very nitrogen-deficient soils.

Types of Alder Stands

For purposes of clearing or site preparation, we can divide alder stands into three major size categories: small-sized, mid-sized, and large-sized.

Small-sized alder (up to 4" d.b.h., less than 10 years old)

These young, dense alder thickets often exist as pure stands. They frequently develop in cut-over or disturbed sites where a seed source is located nearby. These stands often have 1,000 to 10,000 stems per acre.

Because the thickets are so dense, little light reaches the forest floor, and a shrubby understory can't develop. Patches of shrubs in openings are common. At 10 years, these trees can be 30 to 40 feet tall.

Since very little of this material will be marketable (except for local specialty markets), the primary objective in conversion is to kill everything. Many owners choose to wait a few years for the possibility that the larger alder can be used to pay for the conversion.

Mid-sized alder (4-12" d.b.h., 10–35 years old)

Because alder that's 4- to 12-inch diameter at breast height contains considerable marketable wood

Figure 1.—*This small-sized alder forest (600 to 1,000 trees per acre) shows an understory of salmonberry, vine maple, elderberry, and blackberry.*

volume in the larger trees, these forests often are excellent choices for converting to conifer.

This depends on local prices paid for the wood, as well as your logging and hauling costs. Firewood sales may be possible where good road access is available. In some localities, pulpwood can be sold from alder logs down to a 4-inch diameter, or even smaller, at the small end of the log.

However, the d.b.h. of these products must be at least 7 inches to manufacture a log with a 4-inch diameter at the small end. Logging pulpwood this small can be very expensive, and market values sometimes are low.

Alder sawlogs usually are purchased to a minimum diameter of 4–6 inches at the small end. In mid-sized alder forests, you'll find few such merchantable sawlogs. Sawlogs can be sold for pulp, but at a lower value.

An alder forest that has developed for 10 to 25 years often has a dense understory of shrubs. This almost always is true on coastal sites.

The presence of this shrub community makes the conversion of these sites more difficult. Unless you properly control them, your entire conifer forest planting could be overtaken by resprouting shrubs and hardwoods soon after you plant.

These older alder forests also have considerably more and larger branches on each tree. This can add greatly to the slash disposal problem. As a result, landowners often remove this debris with machinery or fire before planting.

Leaving this slash will increase the cost of planting—but leaving it may still be cheaper than piling, burning, and planting. If the slash is extremely heavy, it becomes impossible to successfully plant the area.

Where you can find a market, harvest these mid-sized alder forests to remove as much wood and slash as possible. Even if the harvest operation doesn't pay all its costs, it can save enough in later slash disposal to make it worthwhile.

If you do your own work and have the proper equipment, innovative marketing and maximum use can help dispose of a large portion of the otherwise wasted wood. This further reduces your cost of disposal.

Mid-sized alder forests often qualify for conversion projects under cost-sharing programs and the State reforestation tax credit. These funds can help make your conversion project a reality.

Larger alder (more than 12" d.b.h., 35 years and older)

Most of the characteristics of these older alder forests are similar to those described for mid-sized alder. However, the larger material makes logging more profitable. Sawlogs, as well as pulp and firewood, are marketable from these lands.

Although the economic return on these logging operations will vary depending on local markets, they should pay their way and leave you with an established conifer forest. This especially is true if you obtain Federal cost-sharing funds.

If you can log and market your products when the prices are high, the operation can be much more profitable. Quite often, alder brings a better price during the winter or when markets for conifer logs are depressed.

Slash disposal is still a major problem when you log these older alder stands. More debris may be present after harvesting because of the large amount of waste wood and breakage that occurs during alder logging. Whole-tree logging is a good way to avoid leaving much of this waste on the forest site, and to reduce limbing and bucking costs.

Site-preparation Methods

After logging, there are various methods you could use to prepare the site for planting. Mechanical, fire, and chemical site-preparation methods—and combinations of these—are most commonly used.

Table 1 arranges these methods by the approximate size of the alder trees. The size influences marketability of the wood products, and also the volume of waste material that you'll need to treat or remove. Notice that these choices are not absolute and that they overlap between adjacent sizes. However, Table 1 does provide a framework for looking at your choices.

Mechanical

Machine piling of waste material can be done with a tracked machine like a bulldozer or an excavator with a bucket. You can use the dozer's blade to push over the standing alder and pile the debris. A toothed brush blade on the dozer assures minimal soil movement when you uproot the alder and move it into piles.

It's important to pile the slash material without pushing the topsoil into the piles (Figure 2). The rich topsoil is needed for tree seedling survival and growth. You either can push the waste material into piles or windrow it (make long narrow piles).

Burning the piles and/or windrows will reduce the potential habitat for

Table 1.—*Suggested site-preparation methods for alder stands of different diameters.*[a]

Method	Size of alder		
	Small (<4" d.b.h.)	Mid-sized (4–12" d.b.h.)	Large (>12" d.b.h.)
Mechanical			
Machine piling	X	X	
Hand piling	X	X	
Harvest/pile		X	X
Fire			
Harvest/burn		X	X
Hand slash/burn	X	X	
Chemical			
Hand spraying	X		
Aerial spraying	X	X	X
Injection		X	X

[a] Combinations of these methods are possible, too. For example, use the chemical herbicide treatment and follow it with a light mechanical scarification. Another example: Chemical-fire combinations (known as "brown and burn") are used on small and mid-sized alder (see page 7, "Hand slashing/burning").

Figure 2.—*This area was logged and site-prepped with a bulldozer during the previous summer (note the brush pile, left foreground). Seedlings were planted the following winter. Most of the weed growth covering the area is annual forbs, grasses, and brush.*

small rodents that could harm planted trees. Mechanically piling all the material on a site usually is done when it's not economical to harvest the wood. But even after harvesting stands with larger and marketable trees, machine piling frequently is used to dispose of the debris left from logging.

Even though machine piling is a commonly used conversion method, there are four potential problems every landowner should know about:

1. Alder usually occurs on moist sites where the season of dry soil suitable for machine work is very short.
2. Soil compaction can occur unless you have good quality control and proper equipment and pay attention to weather conditions.
3. If the slope exceeds more than 30 to 35 percent (that is, 30 to 35 feet of rise per 100 feet of run), operating tracked machinery like dozers becomes dangerous, difficult—or impossible.
4. Disturbing the ground and exposing mineral soil almost always will ensure the invasion of another alder stand or grassy vegetation.

Such mechanical clearing works best where you have at least 5 acres. Because move-in costs can be high for contract operators, larger acreages are necessary to make your project practical. You may be able to coordinate your project with similar work on a neighbor's land. Check out these details ahead of time.

Although costs will vary widely depending on your site, clearing should cost from $100 to $150/acre. A contract operator can clear 4 to 8 acres in a day.

Hand piling. Hand slashing, using a chain saw or brush hook to cut all stems, can be used on young, small alder. Although the productivity or number of acres cleared per workday usually is very low compared to the mechanical clearing with a machine,

this method may be useful on steeper slopes and on smaller projects where moving in a piece of heavy machinery isn't cost effective.

Frequently, the cost per acre is similar to, or even greater than, that for the machine project because of the lower productivity. In addition, this can be very dangerous work—*do it only with extreme care!*

The major disadvantage of the hand-clearing method is the lack of slash disposal. The material that's cut is left where it falls. Unless the waste is piled by hand, this material can make planting difficult.

Planting costs will go up significantly, and animal damage may increase because of the greater shelter the slash provides. These problems are especially important in alder stands more than 10 years old.

Finally, young alder can resprout vigorously after cutting. Where stems are smaller than 4 inches in diameter, anywhere from one to several sprouts can develop. To minimize resprouting, cut stumps within 1 to 2 inches of the ground during July or August. Older stumps and those larger than 6 inches will not resprout vigorously.

Logging/piling. Whenever markets exist for alder wood, harvest as much material as possible to reduce your disposal problems. This is especially important if you don't plan to burn the waste material. On flat ground and on steeper lands, a good approach is to whole-tree log whenever possible.

This removes the entire tree, with top and limbs, to a central landing. Although you'll need a much larger than average landing, you can limb and buck the trees for the highest value, and you can concentrate all the waste in one area for burning.

Most importantly, the conversion site will be relatively clean. There may be no need to treat the site before you plant. However, treatment of the shrub patches is necessary. On flat ground, you can use tracked machinery with a toothed blade to uproot shrubs. If you treat the resprouting shrubs with herbicides, you'll minimize chances of soil disturbance and compaction caused by machinery.

Where whole-tree logging is not possible, market as much usable wood as you can. Then pile or pile and burn the remaining material (broken pieces, tops, limbs) with machinery or by hand, as mentioned earlier ("Machine piling," page 5).

Fire

Logging/burning. This conversion method harvests the alder site, then disposes of the waste wood and slash existing on the site by broadcast burning. This method is particularly useful on steeper sites where machine piling isn't possible.

Although prescribed burning is a common method on larger ownerships, it's not a tool that small woodland owners frequently use. There's certainly a risk involved in using it, as well as the advance need for planning, fire trailing, fire equipment, safety requirements, and permits.

Insurance is available to help solve possible liability problems if the burn moves across your property line. Some forestry contractors and consultants offer burning services to smaller landowners. Investigate these alternatives thoroughly and work closely with your local ODF office.

To use the fire method successfully, you must have adequate amounts of debris on the forest floor to carry the fire. You'll need to spread this material over the entire logged area to ensure complete coverage. Slopes are easier to burn than flat areas.

For a hardwood site, the most important element of burning is fuel preparation. Hardwoods seldom make a flashy fuel—they don't ignite easily or burn quickly unless they're very well cured (especially on north slopes). Ferns and herbs may need a killing herbicide treatment to make them carry the fire.

As a result, costs will vary widely for burning projects, depending on the size and nature of your area and the weather. Costs as low as $150/acre are reported where projects exceed 30 acres and no herbicide treatment is needed. Smaller projects cost more per acre.

Hand slashing/burning. Where hardwood yields are too low to warrant logging material to make pulp, firewood, or sawlogs, a technique of slashing and burning sometimes is used. All the hardwoods are felled, and the debris then is allowed to cure several months before broadcast burning. Although most useful with small and midsize alder stands, this method sometimes is used on large alder when no local markets exist to allow salvaging.

An alternative is to "brown and burn"—treat the standing hardwoods with an herbicide that prepares them for better burning. Most often aerially applied on larger acreages, the herbicide can be applied to small areas with a backpack sprayer, as long as the vegetation is not too tall.

Herbicides can be used to greater effect if you can begin the operations in the fall before you've scheduled the burn.

Chemicals

Hand spraying. Clearing alder lands chemically is another management option. Hand-application equipment is feasible on smaller

projects (less than 8 acres). Backpack sprayers holding 3 to 5 gallons of spray mix commonly are used.

Hand spraying of alder foliage really is practical only when you treat small alder. The maximum height for spraying foliage is about 12 feet. When the foliage is taller, it's very difficult to get adequate coverage for proper control.

It may be possible to spray 4 to 12 acres per day, depending on the terrain and the density of the alder. One important factor is how far you have to walk to refill the sprayer.

Where a foliar spray is not possible, basal applications can be an alternative. Using the hand sprayer, apply herbicides directly to the bark of the trees, near ground level. You can use basal applications on alder up to 6 inches diameter.

Basal treatments generally are effective, but they're expensive—and hard work.

Injections. You can also clear chemically by injecting herbicides into the stem of standing alder trees. This method kills the alder "on the stump." Injection is easily done on smaller acreages and where the tree size is at least 4 inches in diameter.

Aerial spraying. On projects greater than 8 to 10 acres, aerial herbicide applications often are more practical. A minimum size generally is needed to allow the helicopter maneuvering room for proper spray deposit. Aerial spray projects are suitable for either flat land or steep sites.

However, closeness to homesites, water sources, or other environmentally sensitive areas may limit your use of this method. Significant damage can occur to gardens and ornamentals if the wind carries spray in their direction. But there currently is no evidence of danger to human health or to water supplies if you use herbicides *according to their labels.*

Move-in costs may also be prohibitive on smaller aerial projects. If this is the case, consider trying to coordinate a spray project with several nearby woodland owners, including industrial timber companies or the Oregon Department of Forestry. Local ODF service foresters frequently coordinate aerial spray projects for smaller private owners to help cut costs.

For projects 40 acres and larger, aerial spray costs can range from $20 to as much as $50 per acre, depending on the herbicide you use.

Whether you use the hand or the aerial site-preparation method, leave the dead alder standing. Plant your conifer seedlings right away; they grow up through the disintegrating tree canopy. The dead alder will remain standing for 3 to 5 years. Some seedlings may be crushed as the debris falls to the ground.

It's a good idea to use large transplant seedlings or wildings to ensure quick establishment on these areas.

As with all chemical methods, the presence of a shrubby understory will hamper the survival and growth of the newly planted conifers. When shrubs are present, you may need a separate treatment, using a backpack sprayer or aerial application. If you don't treat the shrubby understory, it will respond to the additional light from above and totally dominate your site.

Use herbicides safely!

- **Wear** protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
- **Read** the herbicide label—even if you've used the herbicide before. **Follow closely** the instructions on the label (and any other directions you have).
- **Be cautious** when you apply herbicides. **Know** your legal responsibility as an herbicide applicator. You may be liable for injury or damage resulting from herbicide use.

Establishing Your Conifer Planting

Once you've completed the job of clearing the alder on your property, your next step is reforestation. There are several important guidelines to follow, to ensure the successful establishment of the next forest crop. These deal with matching the conifer tree species to the site, selecting a stock type, protection against animal damage, and follow-up brush control.

Matching species to site

The sites red alder occupies in western Oregon can range from moist uplands to both well-drained and poorly drained bottomland. In some situations, alder may be the best adapted tree for growing on your site. In most instances, though, it occupies lands that can also grow high-valued Douglas-fir, western hemlock, or western redcedar.

If your alder sites are well-drained uplands, Douglas-fir is the tree most frequently used for conversion. In areas near the coast or in the fog belt, western hemlock may be the best choice (see *Managing Woodlands in the Coastal Fog Belt,* EC 1131*)*.

In general, Douglas-fir and hemlock will tolerate soils where standing water is present for up to 5 days during the winter. Periods longer than this can lead to reduced vigor and/or death of the trees.

On these wetter sites, western redcedar is often a good choice. In the fog belt, Sitka spruce is a good wet-site species. Both redcedar and spruce can be used in areas where wet-site indicators are present—plants like skunk cabbage, sawgrass or cutgrass, and rush (known sometimes as *tussock* or *bunch grass).*

Another wet-site indicator is the "rotten-egg" odor released by digging a hole in the soil during the winter time. When you have this condition, Douglas-fir or hemlock eventually will fail.

Selecting a stock type

As with any reforestation project, the use of high-quality, vigorous seedlings is your first step toward successful establishment. This is even more important when you're converting alder areas. Any soil disturbance when you clear the land for your project will help prepare an excellent seedbed for another alder crop.

Any nearby alder more than 5 years old is capable of producing seed. Since this seed easily can travel 300 feet with average wind conditions, reseeding will occur! This will be less of a problem if you can remove nearby seed sources.

If you expect big game damage, consider a stock type's susceptibility to browsers and clippers.

Plant as large a conifer seedling as possible. This will help trees survive and become established before competing shrubs or alder take over. You'll need a minimum of 2-0 stock or its equivalent (at least 15 inches top height and 5- to 7-mm caliper).

Use the larger 1-1 and 2-1 transplant stock wherever this is possible, but especially in hand-slashed areas. Although these trees can cost more than 2-0 stock and planting costs may be higher, the advantages can be well worth the initial costs.

Good transplant seedlings are 18 inches high or more; have a stem caliper of 6 to 10 mm; and have large, well-developed root systems. Very large wildings have been used with excellent success, too.

Successfully establishing a conifer is difficult because so many things influence the seedling from the nursery to the planting site. See *Selecting and Buying Quality Seedlings,* EC 1196, and *Seedling Care and Handling,* EC 1095, for helpful hints on carrying out a successful planting.

Protection against animal damage

Nothing is more discouraging than seeing your beautiful, fast-growing young seedlings eaten by wildlife. Be alert to the potential problems and use the "ounce of prevention" approach. Keep a close eye on your plantation—and don't hesitate to take action as soon as problems appear.

Larger seedlings also help ensure survival when you expect animal damage problems. One bite of a small 2-0 or containerized seedling may remove 30 to 70 percent of the tree's foliage or food factory—but one bite of the larger transplant stock may be only 10 percent of its foliage. Larger seedlings will also grow up out of the browse zone faster than the small trees.

When you can expect heavy big game damage, use protective devices on all or a portion of your trees:

1. Paper budcaps commonly are used on Douglas-fir.
2. Redcedar can be protected for short periods of time with chemical repellants or rigid plastic tubes.
3. Redcedar and western hemlock are difficult to protect effectively because of their drooping growth habit.
4. Hemlock and Grand fir usually are bothered less by big game.
5. Spruce usually needs no big game protection.

Rodent damage, especially from mountain beavers or boomers, can be a severe problem on alder conversion sites. These former hardwood stands are often infested with boomers.

The most successful control methods currently available for these animals are burning the site and trapping, preferably both combined. Other methods, such as mechanical protectors, give short-term relief, but won't solve the problem.

Boomer damage will be most severe on alder conversion projects where considerable debris and slash remain on the site. To be most effective, trap the areas before you plant the conifer crop. Burning will not only remove the shelter or habitat these animals need, but can also reduce their numbers.

Shrub control

After planting conifers, followup shrub control or release from competition often is needed to guarantee plantation success (Figures 3a, 3b, and 3c). This is especially true when you reforest with Douglas-fir. This species requires full sunlight for rapid growth and development.

Hemlock, spruce, and redcedar actually can tolerate more shading and still survive and grow if competing shrubs and alder are present. However, they'll grow best where they're given more adequate light.

Shrub control often is needed on reforestation sites 1 to 5 years after planting. This time gap between planting and shrub control or release depends on how effective your

Figure 3a.—*After its third growing season, this Douglas-fir is being taken over by alder and blackberry. If the owner doesn't control this competition, the shrubs eventually will kill this tree.*

Figure 3b.—*This hillside was predominantly alder. After logging 3 years ago, the land was prepared with a bulldozer; all brush piles were burned. Now it's a shrub field. Tree seedlings are trying to get through, but they won't, unless the owner uses a release program—mechanically cutting the brush or chemically spraying it.*

Figure 3c (right).—*Controlling resprouting shrubs and trees, especially big-leaf maple, is an important task when you convert alder. This is the regrowth possible from a sprouting maple stump—just 1 year after felling.*

clearing operation was, how fast new plants either resprout or seed in, and what size planting stock you used.

Good weed control also helps seedlings survive damage by wildlife.

Don't wait until a lot of your trees are in deep shade. Control shrubs early to prevent them from becoming a major problem. Backpack spray patrols early in the plantation's life may be a useful approach as problem areas develop.

Summary

Converting your red alder areas to productive conifer forests can be accomplished with proper planning and attention to several details described in this publication. Well-stocked conifer stands will be more valuable as a forest asset than hardwoods—at least based on current market values.

Converting your hardwoods at a time when the prices for alder are favorable or waiting until the alder is larger can help generate funds to finance clearing and reforestation activities. If Federal cost-sharing programs are available in your area, they can help defray a portion of your costs.

Successful conversion projects will be possible only if you pay close attention to detail. You *must observe these points:*

1. Prepare your forest site as well as possible; clean the ground of most debris left from logging or clearing.
2. Plant as large a tree seedling as possible—preferably a 1-1 or 2-1 transplant stock or large wildings.
3. Protect seedlings from animal damage—monitor this regularly.
4. Control alder that seeds in or shrubs that resprout—pay attention to this for at least the first 5 years.

Converting alder forests to conifers is no easy task. Ignoring potential problems like animal damage and competing shrubs is a sure way to failure. To establish a successful and productive conifer forest, plan ahead, know what's involved, and understand what you'll have to do. Figure 4 shows two typical sequences of operations necessary for a successful conversion project under different starting conditions.

Sample conversion plan
for a 15-acre Willamette Valley
or Cascade foothill alder stand
(trees average 8-inch diameter breast height)

1st summer	Whole-tree log for sawlogs, pulp, and firewood.
1st fall	Order tree seedlings.
1st winter	Plant seedlings.
2nd fall	Spray reestablishing shrub patches, using backpack sprayer; check seedling survival; order additional trees, if necessary.
2nd winter	Replace dead seedlings.
3rd fall	Continue backpack spray program, if necessary.
Later years	Continue to monitor shrub regrowth and seedling survival and growth; take appropriate steps.

Sample conversion plan
for a 40-acre coastal alder stand
(trees average 14-inch diameter breast height)

1st spring	Log for sawlogs, pulp, and firewood.
1st summer	Prepare logged site, using dozer with brush blade; pile debris; order seedlings.
1st fall	Burn piles, weather and smoke-management permitting.
1st winter	Plant seedlings; protect with budcaps (especially if you use smaller seedlings).
2nd fall	Monitor shrub regrowth, seedling survival, mortality; order additional seedlings, if necessary; readjust budcaps.
2nd winter	Replace dead seedlings; readjust budcaps.
3rd fall	Monitor shrub regrowth; aerial spray wiith herbicide, if necessary.
Later years	Continue to monitor shrub regrowth, seedling survival and growth, and animal-damage protection needs; take appropriate steps.

Figure 4.—*Sample conversion plans for two types of alder stands.*

For Further Reading

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Emmingham, William H., and Michael C. Bondi, *Managing Woodlands in the Coastal Fog Belt*, EC 1131 (Oregon State University, Corvallis, reprinted 1993). $1.00

Emmingham, William H., Brian D. Cleary, and David R. DeYoe, *Seedling Care and Handling*, EC 1095, (Oregon State University, Corvallis, revised 1996.) 75¢

Fletcher, Richard, *Cost Sharing and Woodland Management*, EC 1119 (Oregon State University, Corvallis, reprinted 1992). 75¢

Fletcher, Richard, and Bert Udell, *Glossary of Woodland Words*, EC 1155 (Oregon State University, Corvallis, reprinted 1994). $2.00

Hibbs, David E., *Managing Red Alder*, EC 1197 (Oregon State University, Corvallis, reprinted 1996). $1.25

Landgren, Chal G., and David R. DeYoe, *Selecting and Buying Quality Seedlings*, EC 1196 (Oregon State University, Corvallis, revised 1993). $1.25

Pacific Northwest Weed Control Handbook, a Pacific Northwest Extension publication (Oregon State University, Corvallis, revised annually). $19.50

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