Forest Management for Small Landowners

Growing Red Alder

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Introduction

Until 1972 red alder (*Alnus rubra*) was considered to be a weed species. Many companies slashed mature stands just to be able to start over with a more valuable stand. In a very short period of time this all changed, and many foresters were bemoaning all the alder they had cut down. Around 1970 the alder mills learned how to stain it so it could look like other desired species. A lot of this stained wood went into interior furniture pieces, but some also went into high quality furniture construction. Around 1985 one of the larger forestry companies began a project of planting alder in order to capture a market that they saw as going away with the reduction of alder in the forest landscape. Ten years later the planting of alder went away because a change in management felt it was not profitable. So it was planted in a big way for 10 years and then cancelled, however those plantations have already come online for logging and there are still many to yet hit the market. Other companies have tried planting small amounts but the economics of planting a species that need intensive management, and has a non-predictable seedling availability are just too much for most companies. Small non-industrial tree farmers have been digging natural alder seedlings and transplanting them for many years, but to actually plant and manage it on a large acreage basis was relatively recent, and has already become history in some companies. There was a tremendous learning curve for reasons this chapter will cover. Foresters are still guessing on some of the recommendations that are covered here. Here at the beginning and again at the end of the chapter.

, I recommend that if you want to plant alder, then contact the Washington Hardwood Commission for help and the most recent information on how to grow it.

General Background

Alder is worth considering when a landowner is replanting a harvest unit but must be considered in context with the other species also grown in the Pacific Northwest for its value to the landowner. It is a very good choice as an alternate species in areas of heavy root rot, and it has the advantage of growing in a short rotation (*approximately 28-35 years*). On the other hand, numerous issues need to be considered prior to ordering and planting alder seedlings. The requirements for a successful plantation will discourage many landowners. Alder is especially finicky and needs a lot of dedicated time spent on the ground evaluating what to do. It takes a lot of monitoring and frequent management options, but for those willing to take on new challenges the rewards can outweigh the other issues.

General Information

- Red alder is the most common hardwood species in the Pacific Northwest.
- It is shade intolerant and like Douglas-fir needs lots of sunlight to ensure good growth.
- Alder is considered a pioneer species. Lake-bottom pollen records show alder to be one of the first trees to be found after the glaciers of the last glacial age receded.
- Following logging the seed can be wind-blown a long distance and it often seeds in very heavily.
- Natural seeding is usually very irregular in its seeding patterns. As a result, it is not wise to rely on natural seeding of alder.
- Its life span is short, generally less than 100 years.
- The replacement species that follows alder in a natural stand will generally be shade tolerant (*able to grow in shade and come up through a canopy environment*) and able to live a longer life span.
- A nitrogen-fixing bacterium found on alder roots will absorb nitrogen from the air and make it available for the tree, and tree species that follow the alder rotation. You can dig it up and see the nitrogen nodules on the roots, even on small seedlings.
- High quality planting stock is very important. Most plantation failures have been contributed to poor planting stock! As you will read later, it is very difficult to control the early juvenile growth in the nursery, so seedlings often are very tall (*4-6 feet*) for field planting. It is possible to plant a 6-foot seedling but the cost to plant a large seedling would be much greater than most landowners want to incur.
- Because alder is a shade intolerant species, the lower limbs will rapidly die and drop off in the absence of light in a well-stocked stand.
- Because of its rapid juvenile growth and equal slowing of growth in just a few years, all release treatments must be conducted at an early age. If you elect to prepare the site in the hopes of a natural seeding during the winter, the stocking can come in from 10 to 10,000 seedlings per acre. At the higher rates you will need to be there very soon to reduce stocking over several slashing or thinning operations.
- Good site preparation is important because alder is very sensitive to chemicals after planting. A lot of the herbicides normally used in Douglas-fir management will injure or kill alder. Or as a friend said, “release spraying won’t work!”
- It does not have the capacity to re-build its crown like Douglas-fir so it must be watched very closely. Alder will reach its maximum height growth relatively early (*sometime in its 20s*) so if the crown is allowed to recede to less than 50%, then that is the crown it will have until you cut it, or it dies. It does not continue to grow in height like Douglas-fir!
- On good alder sites the height growth can exceed 6 feet per year for the first few years.
- The wood will rot very rapidly if it is in contact with moisture. A 5-inch diameter log will rot down in just a few years. Even 10- to 12-inch diameter logs will show signs of decay over winter.

What is Necessary in Selecting an Alder Site

Wild alder seed can fall on a variety of sites and out-compete Douglas-fir in its early years of growth. However, planted alder does not grow and react the same as wild alder. Over the last few years, we have learned that planted alder has some very specific requirements.

- It needs a well-drained soil, yet not one that would be considered as droughty.
- Definitely do not plant it in a swamp, an area of poor drainage, or where there is standing water in winter.
- Absolutely avoid any possibility of a frost pocket. This may be difficult to determine if the area has just been harvested and you do not know the frost history in that area. Look for pockets or depressions in low areas near the bottom of a slope. If there are recent harvest units nearby, then look at the Douglas-fir seedlings for signs of frost damage (*burned needles or damaged terminals*). If you see frost damage on adjacent Douglas-fir seedlings for 50-100 feet above the valley floor, then it is likely you will have the same in your proposed alder unit. Douglas-fir is a little more frost hardy and can continue to grow from new buds after a frost so eventually it will outgrow the frost pocket. The damage to the alder is generally too severe and it usually will not outgrow it.
- Also avoid summer drought and heat stress by picking the right slope. South and west slopes will be the hardest on young seedlings in the Pacific Northwest. There are some cases of young alder stands of 10 – 15 years of age just shutting down for long periods due to heat! South and west slopes also have increased wind damage potential.
- Alder also needs to be planted on very high-site land. Like Douglas-fir it wants the best possible soil to grow in.

Alder Assessment Form

- Dr. Connie Harrington, researcher for the U.S. Forest Service, wrote an excellent publication to help determine where to plant alder. “A method of site quality evaluation for red alder” which can be found at https://research.fs.usda.gov/treesearch/5556
- Complete the form in this publication to get a better idea of what makes a good alder site and if you should proceed with alder or plant an alternate species.
- A video of a presentation by Dr. Harrington on the subject can be viewed on the Washington Farm Forestry Association YouTube channel, under the title “Where should I plant red alder?”

Reasons for Growing Alder

- Alder can be grown in places where root rot diseases are a problem for Douglas-fir.
- It can be grown in as short of a rotation as 28 years. At this age, the landowner will have a product the mills will want (*if the thinning requirements have been kept up*) but will not have large diameter logs.

- A site will not grow the same amount of volume of alder as of Douglas-fir in 40 years, but the shorter rotation age will help offset much of the difference in values.
- For the last 10–20 years alder has held a very high market value. All commercial species have up and down markets, so do not expect a continued high price for the logs.
- Prices for alder logs can increase from $25 to $125 per inch of diameter from 6-inch logs to 12-inch logs. The most valuable logs are those over 12 inches. To get these logs, the landowner will need a longer rotation, 40-50 years. Foresters are still learning how managed alder will grow but a 40-year rotation is probably within reason to maximize log values.
- Alder has a very rapid juvenile growth. It will grow more than 3 - 4 feet per year immediately after planting and 6 feet in the second season. It is very impressive to see a species that can outgrow the competition once it is established.

Things to Consider Before Growing Alder:

- Check your soil for droughty conditions (*heavy to sand could be considered as droughty*). A droughty soil (*not a technical term*) can cause the stand to shut down or severely reduce its growth at a very young age when it should be producing at its highest growth rate.
- Alder is very particular in where it grows. Natural seedlings may germinate in places where nursery seedlings will not grow (*or at least grow well*).
- It is sensitive to most vegetation site preparation and release chemicals. However, it still needs a chemical site preparation in order to get established. To get a recommendation on chemical use, look in the Northwest Woodlands magazine for chemical company contact information. (*Join WFFA to get Northwest Woodlands*)
- As already noted, it is important to complete Dr. Harrington's alder site assessment form to ensure you are really planting in an appropriate site.
- The wood is very soft, breaks easily, and is almost impossible to fall it without some breakage.
- As a result of easy breakage, it is very susceptible to wind, ice, and snow loading damage. Nothing will bring an alder plantation owner to tears more than a young plantation that appears to be demolished from heavy ice and/or snow.

Around 1995 the Pacific Northwest had a severe cold spell that lasted a week or more, long enough to freeze most juvenile trees and branches. Near the end, a warm front rode up over the cold layer and rained heavily on all the frozen vegetation and ground, adding additional ice to the tree and branches. Douglas-fir limbs 2- to 3-inches in diameter broke and fell to the ground. But the most severe damage was to the alder and other hardwood stands. The alder broke off at 4- to 5-inches in diameter, wiping out the entire treetop. It was very sad to drive the local roads and see all the shiny new broken tree trunks sticking up through a mass of broken limbs and treetops. A similar storm hit the Portland, OR, and south area following a winter snowstorm in 2021. A tremendous amount of damage was done to alder and other hardwood species from that ice storm.

- More post-harvest waste (*limbs and other woody debris)* is generated than with Douglas-fir harvests (*The limbs may break down faster than Douglas-fir, but you will have to deal with it at planting time.*)

- The advantage of growing short rotation alder may be lost if it is mixed with Douglas-fir in the same unit, as it is not practical to harvest the alder at 30 years of age and then come back in 10 years and harvest the Douglas-fir that was intermixed with the alder.
- Alder is even more susceptible to frost as a young seedling than Douglas-fir, so frost-free sites need to be found. It is recommended that planting be done after all chance of frost has passed. If you do get a frost, you may lose a lot of your seedlings! However, by waiting you also may face drought conditions that late in the spring. The weather patterns have been changing over the last few years, and there have been several recent summers when very little rain fell from March to September, which is very hard on newly planted seedlings!
- Alder seedlings are generally grown for one season in the nursery and even then they will be 3- to 4-feet tall at the minimum. When the seedlings are that tall, the planter can only pack a few at a time, so a lot of time is spent going back and forth for trees, and it takes a lot of extra care to plant them properly. Hiring a contract crew may be expensive!
- All plants are phototropic, meaning they grow towards light. Alder is especially prone to grow toward light, especially if grown with clumpy spacing or with large openings. As a result, the bole will have an increased sweep, which can often be seen along forest roads. A well-spaced stand will help minimize this tendency.
- The availability of alder seedlings may be a problem because over the last few years many of the larger nurseries have stopped growing alder. One has focused on supplying their own lands and cut back on outside sales. So if you are interested in growing alder, be sure to check with local nurseries before making too many plans.

How Many Trees to Plant and When to Thin

Giving a recommendation of how many trees to plant is very difficult without knowing the alder site, topography, slope, frost history, and the landowner's rotational desires. The first prescription comes from work that was done by Weyerhaeuser Company and the Washington Hardwood Commission. The second prescription is one the industry has evolved to fairly recently. Don't take this to the bank without doing a lot of homework, but it is the best we can do at this point.

525 Planted TPA, thinned to 230 TPA
Courtesy OSU Hardwood Silvicultural Coop

Prescription 1

- Plant a minimum of 538 TPA (*9 x 9 foot spacing*)
- Thin to 250 TPA (*13x13* feet) when the crown is 50% of the total stem height.
- Multiple thinnings: If there are naturals that boost the stocking, then do multiple thinnings over a period of a few years.

- Commercial Thin (*if you elect to*) using the same 50% rule. During commercial thinning operations alder can be damage from breaking portions of the leave tree crowns, to stem damage from rubbing trees or equipment.
- Harvest at 28–30 years of age at the earliest but hold for up to 40 years if you want a larger bole or log diameter to sell.

Do not use this prescription unless you intend to do a series of thinnings! There is nothing that says the stand can't be held longer than 40 years, but if so, it will have to be watched closely as it is a short-lived species and will begin to show signs of deterioration at some point.

Prescription 2

The forest products industry does not like to undertake very many intensive management options on their land they want to make the minimum financial input possible. As a result they have evolved to a planting prescription that is much less than Prescription 1 and one you should at least consider.

- Plant a minimum of 250 TPA (13*x13 foot spacing*).
- Watch the early stand completion closely and do a hand slashing of competing vegetation and natural seedlings at an early age.
- Other than the slashing, there should not be a need for any thinning's.
- With the lower stocking you should end up with a larger sizes diameter log in a shorter period. Watch the spacing closely to ensure a uniform spacing.
- A final harvest of 150-170 TPA (17x17 to 16x16 stocking) would be reasonable with normal mortality
- Harvest at 28–30 years of age at the earliest but hold for up to 40 years if you want a larger bole or log diameter to sell.
- A higher stocking modification of this if you are leery of the stocking would be:
    - Plant 350 – 400 (11x11) but if so, this option will require at least one thinning or slashing.
    - Thin to 250 TPA (*13x13* feet) when the crown is 50% of the total stem height and follow up with a second thinning or commercial thinning as needed.
    - Commercial Thin (*if you elect to*) using the same 50% rule.
    - Final harvest from 30-50 years depending on how long you want to maintain the stand. The final stocking will likely be in the same 150-170 TPA range.

Logging and Mills

- The proximity of a hardwood mill should be considered before planting alder. It may be that the hauling cost will be too great to make it profitable to grow alder.
- Most alder mills prefer the logger to send the longest log possible and let the mill merchandise the log. Alder mills are not as concerned about log sweep as Douglas-fir mills. The alder mill will take a long log with sweep and by cutting just the length they need, will likely merchandize more wood than the logger could do by bucking at the landing.

- Some of the older processors have a toothed wheel that moves the log through the de-limbing and merchandizing phases. This in itself is not normally an issue, however in alder, wood quality is at stake.
    - The teeth will cause deep damage because alder wood is soft (*despite its classification as a hardwood*).
    - Also, the toothed wheel generates a much larger surface area for fungal spores to land and infect the wood, and fungal stain causes a big deduct in alder, especially in the summer.
- Because of stump splinters and the tooth merchandizing issue, the mills would prefer the logger to hand fall and hand merchandize the logs. This is nearly impossible with today's trend to minimize jobs with high risk. Most loggers have become nearly 100% mechanized to reduce insurance rates with the Department of Labor and Industries. A hand faller and merchandizer operation will cost the landowner a lot more money, and it may be difficult to find a hand faller. The best you may be able to do is find a logger who can minimize the use of equipment that will cause problems. Check with your hardwood buyer for some ideas of loggers that they deal with.

Alder Products

- Alder is ideal for cabinet construction because it can be stained to look like most any hardwood species.
- It also is used for cabinet framing.
- Lower quality alder can be used in the inner cores of plywood, allowing a higher quality wood to be used on the outer layer.
- Alder slicing is a process that has paid prices comparable to cedar, ranging from $1,500 to $2,000/MBF!
    - High-quality short logs are sliced into very thin veneers, then laminated to another board, leaving a very high-quality surface for furniture construction.
    - The logs desired are 9 feet long with a diameter of 13 inches or greater, generally the butt log of a 40-year-old alder tree.
    - A buyer will most often field check your trees and select the trees/logs they want. When the buyer receives them, they wax the ends to help prevent cracking, and then box them up in shipping containers and ship to mills outside the area.
    - They do not purchase alder in the summer because it degrades too quickly in the heat. Unfortunately, summer is when most small landowners do their logging.
    - This is not a large market and most often the volume is so low that the buyer will have another forestry job to provide full-time work. As a result, the buyers are not in the yard full time to purchase individual logs. They prefer to work with industry or large landowners that have a constant supply of good quality short logs. With this in mind it may be difficult for the small landowner to tap into the market.

Profitability of Growing Alder

Economic evaluations are very difficult to put together because there are just too many variables such as alder site, how many trees planted, how many trees was the site thinned to, what size of log the landowner is trying to grow, and what the price of the wood will be in 30 years. Additionally, there are too many environmental risks such as wind, snow, ice build-up on limbs, and animal damage, for anyone to give a hard and fast number that you can bank on.

An alder mill representative may skew the numbers in favor of alder or compare to a longer Douglas-fir rotation age of 40- to 50-years. On the other hand, a Douglas-fir mill representative may do the same skewing of numbers in their favor. None of this has to be intentional; it often is an honest mistake from lack of knowledge.

The important point is you have the option of raising an alder stand in as little as 28 years on very high site land and producing a product that the hardwood mills will want. (*You will not get the 12 inch and larger logs, but you can always grow the stand longer to get them.*) If this interests you, then don't worry about all the financial equations you will see out there.

I have found that industry tends to use financial equations to make hard fast rules of what to plant, how many, and to what rotation age, all in an attempt to maximize the financial return on their investment. On the other hand, we small landowners do not generally abide by the same rules. Yes, it is important to know and understand what the financial equations tell you. However, you may rock a road just to insure you have year-round access or plant more seedlings just to ensure a good crop is established or hold your stands for longer than industry because you want to sell a larger product. None of these decisions are made because an equation told you to. You make these decisions because you have the cash available, or it is what you want to do.

My wife and I have a well-rocked access road that would not pay off with any financial equation. We have it because we have pride in our ownership, and we enjoy walking our roads and trails. When you own something, you often will do things that others will not do, all because of your pride of ownership and enjoyment of your land!

Closing Comments

Alder has increased in value over the last 50 years and changed from an unwanted competitor to a valuable option for the forest landowner. Like cedar, it cannot be grown with a cookie-cutter recipe like Douglas-fir, but will require a lot more work, especially in site selection.

- The spacing of alder is much more critical than with Douglas-fir due to the phototropic nature of the species.
- Alder management can require more silvicultural entries in the juvenile stages than Douglas-fir management.

- Most of these entries are for stocking reduction (*pre-commercial thinning*).
- It is much more sensitive to wind, snow, ice, and freezing conditions. It also is very susceptible to south, southwest, and west wind damage.
- It does not like droughty soils and will shut down growth very early if the soil does not have adequate water. For instance, a sandy soil would not be a very good alder soil unless it rained every month of the summer.
- The management is much more complex than Douglas-fir and should not be undertaken without a commitment to be there when needed.

For More Information

Washington Hardwoods Commission
This organization promotes hardwoods by hosting an annual meeting, open to the public, with presentations about hardwoods. The presentations of past meetings are available on their web site, as well as other resources about hardwoods.

Oregon State University, College of Forestry, Hardwood Silvicultural Cooperative
The Hardwood Silviculture Cooperative (HSC) is a multi-faceted research and education program focused primarily on the silviculture of red alder. It has the oldest and most extensive red alder growth database in existence. The HSC web site has lists and links for publications about alder.

A 1-hour webinar presented by David Hibbs and Andrew Bluhm describes the planting and managing of alder stands on forestland in the Pacific Northwest. It is available on YouTube.

USDA Forest Service, Pacific Northwest Research Station
Many publications about alder have been published by this agency and all are available online as pdf files, free to download. Two are of particular interest:

- A Method of Site Quality Evaluation for Red Alder, by C.A. Harrington. USDA FS PNW General Technical Report PNW-GTR-192. 1986. 22p.
- Red Alder: A State of Knowledge. USDA FS PNW General Technical Report 669. 2006.
- To search for others, go to www.fs.usda.gov/treesearch Use “red alder” as keyword and “PNW” as Station.