Forest Management for Small Landowners

Wildlife Issues

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Sharp-shinned hawk

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Introduction

Great horned owl

The vast majority of the wildlife in Pacific Northwest forests will have no negative impact on the growth or health of your plantations and forest, rather they are part of the reason many of us enjoy owning forest land.

When we first purchased our property, we started tracking both wildlife and plants in a notebook with a page for each week. We write bird and mammal sightings and plant development on the page for the appropriate week. Now we can look back to see when to expect the swallows to arrive or when the Trillium usually starts blooming, as well as unusual wildlife sightings.

We have done many things to encourage wildlife on our property. A few months after purchasing our property *(over 30 years ago)* we installed a wood duck box near a beaver pond and were almost immediately rewarded with a nesting wood duck. Wood ducks and hooded mergansers regularly used our boxes until the beavers and their ponds disappeared. We have left the boxes in place because the flying squirrels use them.

We have over 25 small bird houses which were put up to entice western bluebirds (*Sialia mexicana)* to nest in our area. For 20 years tree swallows (*Tachycineta bicolor*) and violet-green swallows (*Tachycineta thalassina)* have utilized the boxes until finally, in 2012, we got a nesting pair of bluebirds. Now each spring we notice squabbles between the swallows and the bluebirds over possession of the houses, but we have at least 3 successful bluebird nests each year. In the fall we see groups of 10 or more so more may be nesting nearby.

Bird boxes and feeders

Westerm bluebird on box

A few years ago, I heard a new bird call and identified it as a purple martin (*Progne subis*), the largest of the swallow family. From that original pair that surprised us by nesting in a swallow box, the population has grown to at least four pairs on our property and several on adjacent land. We enjoy watching them soar overhead scooping up bugs to feed their young. Both bluebirds and purple martins are more common in open prairies than in forests, so we may lose them as the clearcuts grow up.

Purple martin

Purple martin boxes

Like us, every tree farmer we know is interested in admiring the wildlife on their property, whether it is watching birds, capturing photos with game cameras, or just enjoying them when they see them.

However, some wildlife can and does cause minimal to major damage to the seedlings, and that is the topic of this chapter.

Clipping and Girdling Animals

All the animals that cause clipping or girdling damage (*except black bear which are covered near end of this chapter*) use their incisor teeth to do the damage. The girdling damage done by the smaller animals is done horizontally. They turn their head and scrape a section of bark in a horizontal stroke to get to the sweeter cambium layers. With experience, you will be able to tell the difference between the damage by mice and the larger animals by the tooth size on the stem.

Mice, Voles and Shrews

Nearly 20 mice and vole species live in western Washington and Oregon.

- The deer mouse (*Peromyscus maniculatus*) is probably the most common field mouse on tree farms.
  - They grow up to 7 inches in length.
  - They normally eat insects, insect eggs, seeds, nuts, fungi, and fruit.
  - They prefer a forest habitat.
  - They breed throughout the spring and summer with litter sizes that vary from 4-7.
  - The young may begin breeding at 2 months of age.

- Voles and shrews include meadow vole (*Microtus* sp.), Gapper red-backed vole (*Clethrionomys gapperi*), and shrew (*Sorex trowbridgi)*. These may or may not be found on your tree farm, and if found the damage is similar to mice.
- Under a heavy grass crop the mice and voles can live and eat in relative safety from predators. In a plantation with no grass, the mice and voles have lower populations and tend to not girdle the seedlings, possibly because they are too scared of the predators to take the time or because there is no cover to protect them. It is when the predators can't get to them that the population multiplies, and they do the worst damage. If you have a heavy grass crop and there is a layer of snow during the winter, then you may suffer up to 100% seedling mortality from mice and vole girdling!
- Mice, voles, and shrews will girdle the base of the seedling.
- They clip lateral branches but are not able to climb the seedling or reach up very far from the ground.
- Their teeth are the smallest of the girdling animals, and you may need a hand lens to see the small parallel lines of their front teeth.
- Control methods
  - The best all-around method of lowering the mice and vole population is to remove the grass cover.
    - The most effective way is to spray with a chemical that kills grass.
      - The best way is to do a site preparation spray which will give the seedlings a weed-free growing environment for at least one year.
      - If your site preparation spray did not work or you did not do one, then you need to schedule a release spray (done over the seedlings to release them) in the early spring before the seedlings become active. The problem with this release spray is that you are reacting to a problem and it's likely that

Field mouse girdling damage

Mice and voles like heavy grass

Hawk perch

the grass problem will not be solved for at least a year. (It will take a while for the grass to die down to where the hawks, owls, and coyotes can control the mice and vole population.)

- Newspaper, cardboard, or black plastic can be put down on top of the grass but doing anything more than around one tree is a huge project.
- A hawk or owl perch will encourage predation.
- Rodent protection netting, a heavy 17 mil strand gauge, can be placed over and around the base of the seedling. Normally a 5-6 inch piece is used, and it may need to be buried or stapled to the ground if rodents are able to get under it. (*Staples are "U" shaped and 6 inches long.*)
- Some tree farmers have wrapped the base of the stem with aluminum foil.
  - You need to be careful not to cook the cambium of the seedling from the sun warming the foil!
  - Some of the larger girdling animals will tear the foil off and continue with their girdling.
- A last resort would be placing treated oats or other similar products into the tunnel system (*Tomcat with Bromethalin Meal Bait is a product that can purchased at local farm stores*).
  - If you do this, then be sure you are placing the product into a true tunnel. I have found 4-5 dead end tunnels for every true tunnel.
  - A small funnel with a one inch opening is good for getting the product back into the tunnel. It can then be pushed back further with a gloved finger to keep it out of reach of other animals.
  - Your hope is that the animal dies in the tunnel where no predators can get to it. If predators eat the poisoned vole or mouse, they too can be affected by the chemical. Check with local regulations before trying this option.
  - You need to think this option through as to whether you want to use a product like this or look at other options.

One winter my wife and I witnessed a fascinating scene while driving the auto route in the Ridgefield National Wildlife Refuge. A snow cover was melting, and a large grass field along the route was filled with hawks, eagles, and great blue herons catching the field mice and voles whose tunnels through the snow and grass were being exposed.

Rabbits

Brush rabbit (*Sylvilagus bachmani)* and snowshoe hare (*Lepus americanus)* can sometimes be a problem in young plantations if their populations are high and the predators are few. However, if the rabbit population is high, then the predator population will grow right behind it and bring it under control very soon.

- If you are on your tree farm in the early morning or late afternoon, you may get an idea of the population by the number of rabbits along the roads.
- Their parallel tooth marks are larger than a field mouse or vole.
- If you have a rabbit issue, you will probably see the rabbits, where the field mice and voles are too small to see unless you are mowing a grass field.

- There is not much you can do for control other than to encourage your neighbors to target practice or try some vegetation control to eliminate the cover around the seedlings.
- One animal, the coyote, eats the mice and voles that cause damage to the seedlings, and both coyotes and bobcats will kill rabbits and mountain beaver.
- In the early 1970s I saw a lot of plantations with heavy rabbit damage but in the past 30 years have not noticed the same levels on our tree farm.

Mountain Beaver (*Aplodontia rufa*)

Mountain beaver

- It is one of the world's most primitive living rodents and is the only member of the genus *Aplodontia* and Family Aplodontiidae. It is not related to the American or flat-tailed beaver.
- Lewis and Clark (1804-05) described the animal based on Chinook Indian descriptions and called it a sewelel. David Douglas, who visited the area in 1825-1827, was able to purchase and send back to Europe a fine chestnut-colored robe sewn from 27 hides, but he also was never able to see a live animal.
- Their entire range is in a narrow coastal belt following the coastline of northern California to the coastal mountains of British Columbia, Canada. The closer your tree farm is to the Pacific Ocean, the more likely you will find evidence of them.
- They are 12-14 inches long and resemble an overgrown hamster.
- If they were larger, their fur might be valuable. It is short and soft to the touch.
- They are herbivores and eat a wide variety of plants, including several tree species! Their favorite tree species is western hemlock.
- They are a burrowing animal that makes their presence known by their tunnels and piles of kicked out dirt. Their tunnel system can be very extensive and cover several acres.
- Somewhere in the tunnel system they will build a den to live and raise their young. Many of the den sites and tunnel entrances are under logs or stumps.
- Due to their tunnel system and preferred nocturnal nature, they are not seen very often.
- They like wet ground, even including a small stream flow through the tunnel system. However, they do not like standing water.
- To see if a tunnel is currently in use, reach in and bring out any loose vegetation.
    - If the vegetation is relatively fresh, then it likely is an active tunnel.
    - If there is no vegetation, or if it is old and dry and your hand comes out with cobwebs, then it is an old and abandoned tunnel system.
- Mountain beaver are generally not a problem in well-established stands unless the population is high enough to girdle and clip the tree roots. It mostly is a problem

immediately after logging when an area with a high mountain beaver population has food shortages.

- Damage is caused by clipping.
  - They will clip new seedlings in a new plantation near the ground line.
  - They prefer limbs and small seedlings up to one inch in diameter.
  - They will clip the laterals to make a ladder to reach a higher terminal.
  - They sever the seedling in one cut, as compared to mice and voles which make a series of small cuts.
  - They prefer hemlock but will also clip Douglas-fir.
  - In heavy population centers, they can totally decimate a young or recently planted plantation.
  - Also in heavy population centers, they will girdle the roots of larger standing trees.
- Control: If you have major clipping damage, trapping is the only method of control.
  - The most commonly used trap is the Conibear 110 trap.
  - It is approximately 5- to 6 inches square, made of a heavy gauge wire. There are two of these squares with spring clips at either side.
  - Rotate each square 180˚ to set.
  - Place trap inside a tunnel with the trigger device hanging from the top side of the trap.
  - Look for active tunnels under logs and stumps.
  - Try not to locate in a new construction site (*kick-out*) as the animal will be backing up and throwing dirt back down the tunnel. The flying dirt may trip the trap, and once a trap is tripped, the animal will become leery of all traps.
  - Secure the trap by placing a small branch between the wire squares. If an animal is caught, this stick will not be in the way as the trap will catch the animal after going 90˚ of its 180˚ swing.
  - The trap has a chain and ring at the end of the chain, to insert a heavy stick to secure it in place.
  - Set several traps in an area you think is a colony area.
  - Flag the site with a ribbon to ensure you can find it again.
  - Check daily or every other day to re-set traps or find new areas to trap.
  - Your trapping will not eliminate the mountain beaver from your tree farm. At the best you will reduce the population level to something you can tolerate.

North American Porcupine (*Erethizon dorsatum)*

- The porcupine is the only animal in North America with quills.
- Like the mountain beaver, the porcupine is almost exclusively nocturnal.
- Like the other girdling animals, the porcupine is after the inner bark and the cambium layers.
- Unlike the other animals, they will climb trees to get to the smaller diameter and thinner bark of upper branches and tree trunk.
- They don't always confine themselves to young trees as they will climb 50- to 70 year old trees to chew on the bark of the treetop.
- Their teeth are the largest of the clipping and girdling animals.
- The horizontal tooth marks are very evident.
- Look for small chunks of bark on the ground if you are looking for signs of any damage.

Porcupine damage

I once had to go into a 50-year-old Douglas-fir stand with binoculars to find the girdled tops of trees that had been seen from a helicopter!

- Look for their dens in hollowed-out stumps or brush piles left from logging.
- I have known of people who could trap porcupine but I suspect that skill is long gone.
- The best way to find them or their den is to track them in snow

American Beaver (*Castor canadensis*)

- The American beaver, sometimes called the flat-tail beaver, is America's largest rodent and has a large, flat, scaly tail that is paddle shaped.
- It will eat leaves and the inner bark of trees and shrubs, but prefers willow, cottonwood, and alder over Douglas-fir.
- Their dams will back up water, and if the ground is flat the dammed pond can be several acres in size.
- In other areas of the country, they build their characteristic mound houses in the dammed pond. However, in western Washington they generally burrow their tunnels from under the water into the hillside adjacent to the dammed pond, often under a large stump, to create their den to live and raise their young. When the dam has failed or the beaver have moved on, you can see the tunnel entrance below the previous water level.
- Damage
    - The biggest damage to your plantations is the standing water over your seedling roots, and the trees they cut down to feed themselves and their young.

- Control is next to impossible without trapping and moving the animals to other areas or euthanization.
  - I have seen many examples of landowners wrapping barbed wire, hog wire, and various screens around the streamside trees and seedlings. Most do not work.
  - Trapping is effective on small creeks, but larger streams are built-in highways that bring new beaver to the site, sometimes overnight!
  - Check with neighbors, look for a trapper, and ask anyone you can think of for help. It's a difficult problem if you live on a major stream.
  - If the beaver settle into a small creek with steep sidewalls that will contain the pond, you may be able to live with them. If so, the wildlife that comes to the pond will offer some compensation for the land lost to the pond.

American beaver

Which Animal Do I Have?

Hopefully you will not have all the girdling animals on your property! To determine what you have, start by eliminating what is not a problem by evaluating the size and type of girdling.

- Small seedlings or large?
- At the base of the tree or higher up the trunk?
- Bark chunks at the base? Large or small?
- Size of the tooth marks? Horizontal or vertical?

Once you have a description of the damage you have, you can compare it to the descriptions above or other resources. Also, if you have neighbors with forested land, ask them. Problems are often localized, and neighbors may be able to assist with identification and control.

Browsing Animals and Other Big Game Animals

Black-tailed Deer *(Odocoileus hemionus)*

Black-tailed deer

Most small private tree farms are located in the lowlands, intermixed with cities, small communities, farms, and most importantly rural homes. Most deer hunters go to public or industrial forest lands where they can hunt all day and not see a single city, farm, or home. As a result, many small tree farms have higher deer populations than the industrial lands, and because of the homes and children nearby, we tend to not want hunters on our land. On our tree farms we have major browse and tree rubbing issues, but do not allow modern rifle hunting due to the close neighbors. We encourage bow and muzzle hunting on our property, but the deer reproduction rate seems to keep up with the harvest rate.

If you were a farmer with an annual crop being damaged by deer or elk, assistance programs are available through the Washington Department of Wildlife. But as a tree farmer we have no such rights, so we just have to keep trying to find solutions on our own.

Rubbing

There are two major kinds of deer damage to plantations. The first is antler rubbing on the tree trunk of 3- to 20-year-old trees. There is not much a landowner can do other than to encourage hunters to lower the deer population. The rubbing issue is hard on the Douglas-fir but even worse on western red cedar and pine. Deer seem to like the bark conditions of the pine and cedar families over any other species. If you plant cedar, beware and consider fencing.

Deer rubbing

Results of severe deer rubbing

Browse:
The deer browse we are most concerned with is when the terminal is damaged, and the height growth is lost. Depending on where you live, browse may be a spring or possibly a fall and winter issue. Browsing rarely causes mortality, but a young seedling browsed right after planting and browsed again in the fall may die. Generally speaking, browse will set the growth back, but the seedlings will ultimately come out of it. If a harvest unit is over 20 acres, then the browse problem will probably be spread out enough that you can live with it. What is browsed in the first year may be skipped over the following year and ultimately the seedling will reach a height beyond the deer's capacity to reach the terminal. However, if the unit is small (*like 5 acres*), then deer may browse every tree seedling. Nothing is worse than driving to your tree farm and finding the deer have browsed almost all the seedlings you just planted! If the seedlings do not get a little growth with a late summer lammas flush, then you will get almost zero growth the first year! In small clearcuts the deer browse will often set the free-to-grow stage back by 3- to 5 years. If this happens, then you are more likely to need a release spray because there will be enough time for unwanted vegetative competition to become established.

Browsed seedling – notice torn needles

Seedling with no browse

Deer do not have sharp incisor teeth like rabbits and mountain beaver, so they grab the new growth, clamp down with their mouth and break the stem or needles. If you look at fresh browse, you will see the torn needles. They like the fresh new season's growth because it is soft, tender, and sweet. Once the growth has aged a few months, and certainly through a winter, the woody stem is much harder for deer to browse. Deer will graze on new grass and clover, but mostly they are known for browsing woody vegetation and tree limbs.

There are several treatment options available for deer browse.

Browse Treatment Option - Repellents
Big Game Repellents (*BGR*) are available in egg, blood, and seashell-based formulas. Check with your tree farm neighbors to see what works best in your area. These products have all been around for many years and would not have lasted if they did not work.

- Most come in dry formulations that you need to mix with water.

- It is very time consuming and messy to mix and then apply.
- Most tree farmers treat only the top portion of the terminal.

Recently, spraying only the tops of the seedlings, I treated 382 seedlings with one box (*2.2 pound*) of Plantskydd (*which is a dried blood product)*. Each box is supposed to make 10 quarts of mix. It is hard to say just how much it really makes as it foams very easily when mixing. The trees I treated were all 2- to 3 years old and about 2- to 3 feet tall (*heavily browsed*).

- Even if you spray only the terminal, the cost per acre can be very high.
- The spray application will last a variable amount of time, mostly dependent on the amount of sun and rain. After a few weeks or some heavy rainstorms, check your plantation and if you see multiple terminals that have been browsed since you applied the BGR, then re-treat very soon.
- Once the seedling terminals have hardened off (*standing straight up in Douglas-fir*), deer browse will generally taper off.
- You will need to come back in the fall to ensure you are not getting any fall browse on the late summer lammas growth. If you are, then consider some more terminal treatments.

Mixing and application suggestions

- Get a couple of 5-gallon buckets in good condition.
- Purchase a paint mixing device that fits into a hand-held variable speed drill. The end of the mixer should be at least 3- to 4 inches in diameter.
    - Hint: if you start out mixing at full speed with your hand drill, you will end up with mix all over yourself. Mixing repellents can be a very messy process!

Browse Treatment Option - Flexible Netting

Most tree farmers do not use netting on Douglas-fir, either because their browse damage is not severe, or because they are willing to live with the browse damage. When they do use netting, they install a bamboo pole inside the netting to help support the seedling. With some ribbon to secure it, the netting can be pulled up as the terminal grows in height.

Roll of flexible netting

- Heavy Protection Netting
  Pacforest Supply Co. in Springfield, OR, sells several types of netting. The 15 mil strand gauge is 12 inches in width when stretched out (*much more than you will normally stretch it*). The listed life is 12- to 18 months but will last much longer if shaded. In full sunlight it will fall apart at the touch by the 3rd year. It comes in 1000 foot rolls to be cut to the length you want.

- Light Protection Netting
  The light netting is 8 mil strand gauge that will stretch a maximum of 9 inches. It comes in 1,000 or 10,000 foot rolls.
- Tiller Netting
  Tiller netting has a large opening and is easier to stretch out to place it around a seedling and maintain the seeding shape. It is listed as having a 12- to 18 month life expectancy and comes in 1000 and 5000 foot rolls.
- Rodent Protection Netting
  See the rodent control section above.
- Budcaps
  Budcaps are paper or plastic mesh that can be wrapped around the terminal bud and stapled together into a cone shape. Often they are installed at time of planting and the landowner just turns their back on it and assumes they worked.
    - Advantages:
        - They are fast and easy to install.
    - Disadvantages:
        - They will only protect the terminal bud and 2- to 3 inches of new growth.
        - A newly planted seedling is young and very succulent. Any weight on the seedling terminal will most often cause it to bend over. The plantations I've seen are usually 40-100% bent over and this does absolutely nothing to help the seedling, but instead sets growth back several years.

12 yr. old netting on a suppressed & shaded tree

Budcap bent over on dead seedling

Our Experience with Flexible Netting

We put netting on Douglas-fir seedlings in our small clearcuts for 15 years because we were unwilling to accept the high level of deer browse we received without it.

The process we used was as follows: (*see page 14 for series of netting pictures*)

1. Cut a 12 inch length of netting off the compressed roll of 15 mil netting prior to the browse season (*spring or fall*).
2. Roll it like a sock and stretch it out a small amount to get it over the seedling.
3. Hold it at the base end and pull it over the terminal approximately 3-4 inches.
4. Place a bamboo stake inside the netting and push or pound into the ground.
5. Tie a short piece of flagging ribbon around the bottom of the netting and the stake to keep it from blowing off.

6. Come back often as the seedling begins to grow beyond the netting and pull up the netting so it again covers the terminal.
7. Each subsequent year, come back repeatedly during May and June and pull up the netting as the terminal grows. Add more ribbon ties to keep the tree close to the stake. Cut off multiple terminals that develop.
8. Maintain netting and stakes until the trees are 4-6 feet tall, or above the normal browse level of deer. Deer like to reach down to do their browsing, however they can reach up and occasionally will stand on their hind legs and reach 7- to 9 foot heights. However, the majority of its browsing is below head level, so when the trees are 4- to 6 feet tall, it is usually safe to remove the netting.
9. When the seedlings reach "free-to-grow" (*FTG*), the ribbon and netting need to be removed, no small project after years of adding ribbon to the stakes.

Browsed base & 2 years top growth put the tree at Free-To-Grow stage

Advantages of this process

- It is an effective way to keep the deer off your seedlings and allow them to reach the "free-to-grow" stage in 5- to 6 years.

Disadvantages of this process

- It is a very time consuming project! Don't even start unless you are willing to put in many hours of time installing and maintaining the netting.
- When the trees are still small and the deer are hungry, they will reach inside the netting 2- to 3 inches to nip terminal buds.

Deformity and high angle limbs caused by netting

Laterals caught up in netting

- The netting forces lateral branches upwards, so tends to create multiple terminals that can produce spike knots and deformed branches (*These limbs are the first to die back from light exclusion so don't get too worried about them at this young age.*

When the tree is harvested, the high angle limb will only occupy a small area near the core.)

- If the deer browse the laterals instead of the protected terminal, the decrease of branches and needles reduce diameter growth, so the seedlings become tall and flimsy, unable to stand-up in a heavy wind, rain, or snow event.
- See Page 16 for photos showing installing process of flexible netting.

Deer browse comes at different seasonal times depending on where your tree farm is located. In Lewis County we have mostly spring browse or occasionally winter browse if we have a heavy snow fall. Fellow tree farmer Tom Westergreen in Whatcom County has mostly winter browse. Where we put netting on the terminals and keep it in place for several years, he places Tiller netting over entire cedar seedlings in the early fall and removes it in the spring. We have lateral limb deformities because of the netting being on for many years and Tom has none! Remember, vegetative competition, wildlife browse, and other wildlife issues will vary just a few miles away!

Netted plantation at age 3

Same plantation at age 7

Netting Installation

12 inch piece of netting bunched-up on hand

Place over top of the seedling

Hold the top and slide down the seedling

Hold bottom and pull up on the top to get everything in place

Completed placement of netting & bamboo stake

View of completed project

Browse Treatment Option - Rigid Tubes (Vexar)

Vexar tubing on cedar

- The heaviest of the deer and elk protective tubes, Vexar tubes have been available for over 35 years.
- They will last 2- to 5 years depending on how much sun hits the tubes during the summers. When they break down, they come apart at the triangular joints and ultimately just totally break down into little chunks. Like the netting, the Vexar tube will last a long time if they are located under shade and competition.
- Tube sizes range from 3- to 6 inches in diameter and 18- to 36 inches in height. Bigger is better, especially in diameter. The smaller ones just don't give the trees enough room to develop. Even with the largest ones, tree branches will be deformed.
- Bamboo stakes are usually used to support the tubes and in most cases, you will need 2 bamboo per tube because they tend to twirl around the seedling with only one stake. Threading the stake through the tube is usually necessary or the deer will easily pull them off.
- Bamboo sizes range from 2- to 7 feet in length and 8- to 20 millimeters in diameter. Bigger is not always better, because some of the longer ones have diameters that are impossible to thread through the Vexar tubes.
- Bamboo is imported from China, so if it is not available, ask about Port Orford cedar stakes
- Vexar tubes work well but are much more expensive than the netting options and they take continual maintenance because the deer will constantly be testing them, trying to pull them off or push them over. It is most commonly used on cedar plantations, rarely on Douglas-fir.

Our Experience with Vexar on Western Red Cedar

In 2007 we planted western red cedar in two small areas (*1- to 2 acres each)* where blowdown had been salvaged. Because Douglas-fir doesn't do well in small openings, we chose to plant western red cedar. Knowing that there would be deer browse issues, we installed Vexar tubes immediately and maintained them for about 5 years, repeatedly pulling the tubes up as the seedlings grew. Although every branch outside the tube was browsed, the terminals ultimately grew above the reach of the deer, and we now have a very nice stand of cedar established.

In 2017 we planted cedar again in a smaller area, a few rows along a shade line and a property line. This time we had less success and more frustration. Every time we arrived at the site, we would find a dozen or more tubes pulled completely off, and the trees browsed. After repeatedly replacing them, we added small plastic ties to attach the tubes to the bamboo stakes. The deer had to work a little harder, but they could still

get at the trees by breaking the stakes or pulling stakes and attached tube completely out of the ground. And we made it a lot harder for ourselves because we had to cut the plastic ties in order to pull the tubes up to a higher height. It's been a 5 year battle, and the deer may be winning! If we ever plant cedar again, we will seriously consider fencing the area!

Ryan Parker Port Blakey Tree Farm, inside a fenced cedar site. Note lack of browse & rubbing

Browse Treatment Option - Fencing

Although it seems like an expensive alternative, fencing may be the most cost-effective way to establish a plantation of western red cedar. For more details, see Chapter 15, "Growing Western Red Cedar."

Browse Treatment Option – Planting a Cover Crop

In 2018 we logged 16 acres and did not want to install netting on that many acres. We decided to plant some deer feed in the dirt roads in the hope of enticing the deer away from the new terminal growth the following spring. We tested winter rye, red, white, and crimson clover, and a commercial deer browse mix. None of them worked the way we had hoped! The deer did eat it to some extent but preferred to browse on the new Douglas-fir terminals more than the clover and rye seed we planted. It may work for you, but we were not very impressed and seed is expensive.

Crimson clover foreground, winter rye in background trail

- Note that winter rye can re-seed and become a future competitor if you are not careful!

If you plan to log 5 acres or less in an area that has a heavy deer population, then my advice is to prepare yourself for lots of browse. If on the other hand you log 10-20 acres, you now have enough tree seedlings that some of them will get through the season with no browse. Over the next few years more and more seedlings will be able to grow above the browse stage. You may lose one or two seasons of growth on some of the seedlings, but they eventually will make it past the browse stage.

Roosevelt Elk *(Cervus elaphus)*

Roosevelt elk

Elk can be a very serious problem if you live in their territory and especially if they are present in the wintertime.

- Elk prefer a mix of open areas to mature forests.
- The Roosevelt elk lives on the west side of the state while the Rocky Mountain elk lives on the east side of the state.
- They are predominantly grazing animals, but they do browse trees and shrubs, especially in the winter.
- They do several kinds of damage.
    - When trees are being planted, their cantankerous nature comes out. They will follow the planters by hours or days, pulling the trees out of the ground and tossing them over their heads and shoulders. They rarely take a bite; it is more a playful thing. These trees can be replanted if you are able to do so in a matter of hours (*not days*) after it happens.
    - When winter snows limit their ability to reach other foods, they will straddle a 6- to 16 foot tall tree and walk it to the ground, then eat the topmost branches.
    - During the late summer as their antlers harden off, they will rub trees to remove the velvet. Because they are such large animals and have large antlers, they can easily break off 4- to 6 inch diameter trees. So, if the gentle rubbing does not girdle the tree, then the vigorous rubbing breaks it in half.
    - Many forest landowners have fences around their property. When the elk are spooked, they will take off at a run, trampling seedlings and taking out fences!
- Serious control
    - Some of the big game repellents may work.
    - The Vexar tubes may also work but will take lots of maintenance.
- Humorous control: butcher paper *(shoot, dress, hang one week, cut-up, package, and freeze the meat).*

American Black Bear (*Ursus americanus*)

During the previous summer and fall, the trees sent carbohydrates (*food produced in the tree crown*) down the trunk through a series of connected cells called phloem (*a very thin layer of tissue just beneath the bark*) and stored those carbohydrates in the roots. In the early spring when the daylight hours are increasing and air temperatures are approaching 50˚-60˚ degrees Fahrenheit, this food begins a long journey back to the crown from the roots to the thousands of buds on the tree terminal and lateral branches. This food movement through the outer layer of the xylem is called “sap flow”. In the spring when the sap flow is the heaviest, the bark is looser than normal and as a result the black bears will often rip off large chunks of bark to eat the sugary sap. Because of this bark slippage it also is a difficult time of the year to commercially thin.

- Bears will eat almost anything that is available. They primarily are herbivores and eat a lot of grass, vegetation, berries, and plant roots, but will eat carrion if available and kill other animals if the opportunity arises.
- Their habitat occurs mostly within forested ground.
- They are nocturnal by nature, rarely being seen during daylight.
- They have a large home range and may only take up residency on your tree farm for a short period, or just pass through.

Black bear

- They used to be hunted during the fall deer and elk hunting time period, and prior to the mid-1980s the hunters were allowed to use dogs.

> Shortly after the hunting rules changed in the mid- to late 1980s, a wildlife biologist told me the average life expectancy of a bear prior to the rule change was 3 years in Washington State. Within 10 years of the hunting rule change, the average age had risen to 7-10 years! Hunting is still allowed during the fall hunting seasons but is difficult without dogs.

- This increased population has resulted in a lot of girdling damage to young Douglas-fir.
  - In the spring when the sap flow stage is in progress, the bear can slab-off large chunks of bark, using their claws in a horizontal swipe.
  - They will then take their lower jaw and run it vertically up the tree to collect the sweet sugary sap.
  - Look for faint horizontal claw marks and deep vertical incisor tooth marks on the tree trunk/bole that was girdled or damaged.

Bear damage

  - Porcupine damage can look similar but does not have vertical teeth marks or large chunks of bark at the base of the tree.
  - This can continue until the sap flow stage is done, generally from the end of June to early July.
  - The girdling is not an instinctive trait, rather something the young cubs are taught by their mothers.

- Tree farmers may find two kinds of damage patterns.
- A local female may park herself and her cubs on your tree farm and proceed to girdle some or all of the nearby trees. Not all the trees will die, but those that do not die will usually suffer from root rot problems at harvest time. This means 10-20 feet of the first log (*the most valuable*) will be left on the ground due to root rot issues.
- A boar (*male*) may pass through your tree farm, girdling selected trees on his path to who knows where.
- A year later you can be on a hilltop looking at your tree farm and know how much damage you suffered and the kind of damage by the trail of dying trees (*red flags*). A wandering trail is likely a boar, while concentrations are likely a sow.

Bear damage from above

- Control: If you have bear damage or your neighbor does and you suspect you will have it soon, contact the Washington Department of Fish and Wildlife (*WDFW*).
  - Unfortunately, you need to suffer some level of damage in order to take any kind of action.
  - Hopefully, you will find girdled or partially girdled trees shortly after the damage was done. Take pictures and GPS locations of the trees you find. Partial girdled and girdled trees are treated equally the same.
  - Girdling damage typically begins by mid-April and ends around the end of June. By July, the bears have moved on to other food plants that are available.
  - There is an application process that the WDFW can tell you about. Note: this entire permit process has been an absolute nightmare for some tree farmers!
  - The hunting options will vary, depending in part on your location, agency approval, and hunter availability. You may be issued a “kill” permit, but if so, it most likely must be done by a certified bear hunter.
  - You may get a permit and the hunter may get a bear, but you will not know if they got the problem bear until the next girdling (*damage*) season.
  - If you do happen to live in an area of heavy bear damage to young forests, it is likely you will have new bears every year until your trees are at least 20 years old.
- Feeding bears a mixture of oats and molasses for the 2- to 3 month period of sap flow and damage to timber has been done for over 30 years, mostly by the large timber companies. It is effective in reducing damage but is expensive and may just attract more bears to your property and grow old, healthy ones. If your property is adjacent to a company with an active feeding program, you can check with them to see if you can join their program.