Unit	1012
Title	Conduct Stand Tending Treatments
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BC **Forest Safety**

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Unit Introduction

What you will learn in this unit

By the end of this unit, you will be able to demonstrate knowledge of:

- Pruning
- Brushing and spacing
- Stand tending for wildfire fuel management
- Stand tending hazards

Section 1012-01: Pruning

What you will learn in this section

1.1 Pruning

Key Point 1.1: Pruning

Pruning is the removal of live or dead branches from trees. It's done to:

- Produce clear, knot-free timber for high-value saw logs or veneer
- Control the spread of pests, such as the white pine blister rust that enters through the needles of lower branches
- Remove branches that can act as fuel ladders and carry ground fires up into the tree crowns

Learning Point

Pruning should be carried out on young trees so a maximum of clear wood can be gained. Pruning scars are covered over as trees grow.

It takes many years to achieve the improvements in wood quality that result from pruning.

Pruning Basics

These are general pruning guidelines. You will be following a specific prescription that designates pruning height, species, etc., as set out by a professional forester.

- Pruning is best carried out in cold weather, when growth is minimal, or the tree is dormant. Pruning should be avoided in the spring when the bark is loose and stem damage may be high.
- Ideally, pruning should be started when trees are about 10 cm DBH (diameter at breast height) and 4 to 5 metres tall.
- The first pruning or 'lift' should be to a height of approximately 3 metres and can usually be done with a saw or pruning pole saw. (A lift is the pruning of lower branches that essentially lifts the canopy of the tree).
- Always leave the top 1/3 of the live crown intact, otherwise the tree will not have enough branches and needles to photosynthesize and grow at a healthy rate. Trim all branches from the stem of the tree, working your way up, then leave the top 1/3 of the live branches intact
- For branches larger than 10 cm in diameter, it may be necessary to cut in two steps: start with an undercut to prevent the bark from ripping below the branch when the top cut is made. Undercutting can also help control where the branch will fall
- Branches should be pruned as close as possible to the main stem without causing damage. If a branch stub is left, it will

result in a delay in the formation of clear wood, as it may take two to five years for the stub to heal over

- In general, all dead branches (without needles or leaves) should be removed, as they will produce loose knots if left on the tree and could also pose a fire hazard

CAUTION!
Do not use a chain or brush saw to cut above shoulder level.

Unpruned stand (above) vs. pruned stand (below) (images from Private Forest Landowners Association)

Further Guidelines

Prune the best dominant and codominant trees (straight stem, unscarred, single top).

Pruning activities should be timed to minimize impacts on known wildlife habitats during breeding, calving, and other sensitive seasons of maximum use. Security cover, forage concerns, and wildlife trees must be considered before pruning.

Pruning is recommended in conjunction with a thinning program to maximize the growth of the pruned trees and the production of high-value wood.

Pruning will slow tree growth for a few years, so unpruned trees left on site will have a potential growth advantage over the pruned crop trees. In situations where thinning is not carried out, it is possible that unpruned trees could actually overtop and suppress the crop trees.

Pruning—Self-Quiz

1. What is the purpose of undercutting?

   - ☐ It can help determine where the branch falls
   - ☐ It keeps the weight of the branch from snapping the partially sawed limb and peeling the bark needed to help heal the pruning wound
   - ☐ It helps you control the pruning tool
   - ☐ All of these answers

2. When should pruning be started?

   - ☐ When the tree is 4 to 5 metres tall
   - ☐ In spring
   - ☐ When the tree is 20 cm diameter at breast height
   - ☐ All of these answers

Now check your answers on the next page.

Pruning—Self-Quiz Answers

1. What is the purpose of undercutting?

   Answer: **All of these answers**

2. When should pruning be started?

   Answer: **When the tree is 4 to 5 metres tall**

Section 1012-02: Brushing and Spacing

What you will learn in this section

2.1 Spacing

2.2 Brushing

Key Point 2.1: Spacing

Spacing refers to thinning out young trees, around 5 to 12 years old, with the goal of making sure the planted forest grows with healthy trees of the right species and at a healthy density for the site.

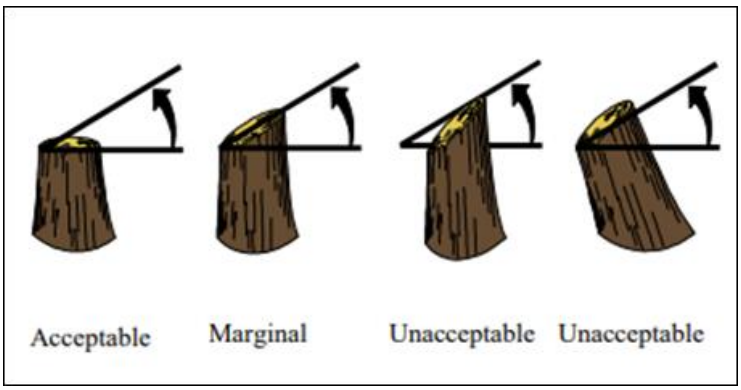
Any trees with disease or that are growing poorly, or trees of the wrong species, are cut by chainsaw or brush saw and left to decay on site, adding nutrients for the remaining trees.

The first thinning treatment is usually called juvenile spacing, since it removes very young stems. This treatment is also referred to as pre-commercial thinning, since the stems removed are too small to be sold as a commercial crop.

Juvenile Spacing Guidelines

Where juvenile spacing is carried out by power saws or brush saws, stems should be cut according to the following guidelines:

- Trees should be cut as close to the ground as possible (stumps less than 30 cm high).
- Cuts should be made below the lowest live branches. Where this is not possible due to slash or terrain, all live branches should be cut off the stump to prevent them from becoming replacement main stems.
- Cut angles should be horizontal or within the acceptable range stated in the prescription.
- All stems should be cut cleanly (i.e., no hinges).
- All damaged (accidentally or otherwise) trees must be cut.
- Trees should be felled in a way that avoids damage to crop trees.
- Cut material should be laid flat to the ground so it doesn't act as ladder fuel, and to speed decomposition.
- All conifers (other than crop trees) taller than 1 metre must be cut.
- Cut back all woody vegetation within 1 metre of crop trees
- Reduce spacing by 50% around natural openings, old skid trails, and roads.
- Do not leave cut trees "hung up" in crop trees.



Cut angle should be horizontal or within prescribed range (image from Government of BC https://www.for.gov.bc.ca/isb/forms/lib/fs251.pdf)

The two photos below illustrate the benefits of juvenile spacing. The photos are of the same forest type with similarly aged trees, but the stand in the top photo was spaced and pruned in its juvenile stage, while the stand in the bottom photo was not.

Sallas Forest, Sidney Island, BC. Forest stand spaced and pruned in its juvenile stage (image from Private Forest Landowners Association)

Sallas Forest, Sidney Island, BC. Forest stand not spaced and pruned in its juvenile stage (image from Private Forest Landowners Association)

Commercial thinning is carried out later in the life of the stand and removes stems large enough to be sold as saw logs or other commercial products.

Spacing to Prescription

You will be required to thin and space to prescription. You'll need to identify the preferred crop tree and assess size, height, vigor, density, and other conditions. You may also need to recognize non-competitor trees and ghost trees.

A non-competitor is a tree that is not a significant crop competitor and should not be felled during juvenile spacing. Non-competing trees may be specified in terms of their proximity or size relative to crop trees.

A valuable or protected tree species may be designated as non-competing and retained in the stand regardless of its proximity or size. Such a tree is called a "ghost tree," and is specified in the prescription and juvenile spacing contract as reserved from cutting (e.g., western white pine or western yew).

Aspen Thinning Site (Source: Eli Sagor)

Spacing—Self-Quiz

1. What is the purpose of spacing?

   - ☐ Remove diseased trees from the stand
   - ☐ Give crop trees an advantage through better access to air, light, and nutrients
   - ☐ Remove unwanted tree species
   - ☐ All of these answers

Now check your answers on the next page.

Spacing—Self-Quiz Answers

1. What is the purpose of spacing?

   Answer: **All of these answers**

Key Point 2.2: Brushing

Brushing is the first—and in some ways the most important—stand treatment you'll carry out. Brushing refers to the removal of unwanted vegetation (brush) from the immediate area surrounding seedlings.

Learning Point

Competition for light, nutrients, and water at the early stage of a tree's life poses a threat to its growth and survival.

By reducing competition from other vegetation at the beginning of the crop cycle, brushing helps trees become firmly established.

Manual brushing is done with a chainsaw, brush saw, or hand tool to mechanically cut the targeted competing vegetation.

Hardwood competition being removed from a 5 year old spruce plantation

Source: https://www.abltimber.com/gallery

Chemical brushing can be done by applying a herbicide directly into a physical cut made on the stem of a targeted plant orr the herbicide might be broadcast sprayed onto certain broad-leaved types of vegetation to kill them. You need to be trained and certified in herbicide application before you can perform chemical brushing.

Brushing Prescription

As with all stand tending work, you'll follow a site-specific prescription when doing brushing work, and you'll need to identify crop trees, ghost trees, and competing species—both woody and herbaceous. This information varies greatly between sites and will be specified in the stand treatment prescription prepared by a professional forester. The prescription must be understood before any work begins.

Brushing site – (source Eli Sagor)

Brushing—Self-Quiz

1. Before performing chemical brushing, you must:

   - ☐ Understand the prescription
   - ☐ Be certified in herbicide application
   - ☐ Have the correct PPE
   - ☐ All of these answers

Now check your answers on the next page.

Brushing—Self-Quiz Answers

1. Before performing chemical brushing, you must:

   Answer: **All of these answers**

Section 1012-03: Stand Tending for Wildfire Fuel Management

What you will learn in this section

3.1 Fire management

3.2 Slash management and fire risk management

3.3 Volume or crown closure

3.4 Prescriptions

Key Point 3.1: Fire Management

Densely spaced trees can have higher crown closures (less separation between tree crowns), as well as increased inter-tree competition. This can lead to suppressed or dead standing trees that act as ladder fuels to carry ground fires to the tree canopy.

Tightly spaced trees may also support more dangerous and hard-to-control running crown fires.

Potential fuel ladders should be removed to reduce the risk of a fire bridging the gap to the canopy.

Removing ladder fuels requires pruning any low limbs, potentially as high as 15 feet. The required height depends on how low the branch tips hang, the steepness of slope, and the height and spacing of other nearby vegetation.

Learning Point

The goal in eliminating ladder fuel is a state where a ground fire could burn to the trunk of a tree, which is protected by its bark, but the more flammable branches, leaves, and needles can't be reached by the fire.

Apart from tree limbs, anything that would help the fire move up into the tree canopy is a fuel ladder. This includes shrubs and even tall grass or weeds. Heavy underbrush and fallen limbs are generally removed from the stand.

Fire Management—Self-Quiz

1. In what way can densely-spaced trees contribute to fire hazard?

   - ☐ They act as fuel ladders
   - ☐ Densely spaced trees may support dangerous and hard-to-control running crown fires
   - ☐ They promote ground fires
   - ☐ All of these answers

Now check your answers on the next page.

Fire Management—Self-Quiz Answers

1. In what way can densely-spaced trees contribute to fire hazard?

   Answer: **Densely spaced trees may support dangerous and hard-to-control running crown fires**

Key Point 3.2: Slash Management and Fire Risk Management

Juvenile spacing and other stand treatments can create large amounts of slash that are a potential fire hazard to the stand.

Managing slash to reduce fire risk can include one or more of the following practices:

- Laying the slash flat on the ground to facilitate decomposition and to keep it away from tree foliage.
- Lop and scatter the slash to reduce fuel depths, where practical.
- Leave a buffer strip. Untreated strips can be left along roads, where there is greater fire risk. An untreated buffer strip also provides better cover for wildlife.
- Slash may be pulled to cleared areas—such as roadways—for burning or chipping. Care should be taken to remove slash from roadsides where sparks or untended cigarettes are a potential danger.

Pile Burning Safety Considerations

Safety is top priority when conducting pile burning operations, whether at the roadside or dispersed. Read the following bulletin for burn ignition plans, ignition considerations, and a tail-gate meeting checklist.

Reference

BC Forest Safety
Pile Burning Hazards and Safety Considerations
https://www2.bcforestsafe.org/files/Safety_Alert_Canfor_2012-9-28.pdf
When you are finished, continue in this section.

Slash Management—Self-Quiz

1. Which slash management techniques are available to reduce the wildfire hazard associated with excessive slash buildup?

   - ☐ Lop and scatter the slash
   - ☐ Lay the slash flat
   - ☐ Pull the slash to cleared areas for chipping or burning
   - ☐ All of these answers

2. What is the correct fuel mix for pile burning?

   - ☐ 50% diesel, 50% gas (50/50 mix)
   - ☐ 70% diesel, 30% gas (more diesel than gas)
   - ☐ 30% diesel, 70% gas (more gas than diesel)

3. You should not burn if winds exceed:

   - ☐ 10 km/hr
   - ☐ 30 km/hr
   - ☐ 60 km/hr

Now check your answers on the next page.

Slash Management—Self-Quiz Answers

1. Which slash management techniques are available to reduce the wildfire hazard associated with excessive slash buildup?

   Answer: **All of these answers**

2. What is the correct fuel mix for pile burning?

   Answer: **70% diesel, 30% gas**

3. You should not burn if winds exceed:

   Answer: **30 km/hr**

Key Point 3.3: Volume or Crown Closure

A wildfire mitigation plan or forest fuel reduction plan will often include details on stem density, volume, and crown closure. For this reason, it's important to understand these terms and how they relate to one another.

Crown closure is measured as a percentage of the surface area as viewed from above and is often determined using aerial photographs.

Density is measured as stems per hectare (sph), or the number of trees growing per hectare.

Volume is measured in cubic metres per hectare (m3/ha of logs grown).

When seedlings are first planted, the branch and leaf area exposed to the sun is very small relative to the total stand area. The crowns of small trees may only cover 1% of the ground. As the trees grow, the branches reach out and eventually overlap, closing the gaps so no sunlight reaches the ground and the crown closure is 100%.

As the crown closes, some of the trees that are smaller or shorter get shaded out and eventually die because they can't get sunlight, so the density (sph) decreases as the trees mature and the crown closure increases.

We "over plant" knowing this. For example, we may plant 600 trees per hectare, but expect to harvest 400 stems per hectare at harvest time (survival of the fittest).

It is typical for a prescription to call for a reduction in stand density and fuel load (dead branches and trees). Lowering density, or increasing gaps in the crown, slows the spread of fire in two ways:

- Reduces crown fuel
- Allows deciduous trees to mix in

Learning Point

It is beneficial for forests to have some fire activity at ground level, but we want to prevent ground fires from reaching the crown where the wind can quickly spread them.

Volume or Crown Closure—Self-Quiz

1. Volume is a measurement of the number of trees growing per hectare.

   ☐ True

   ☐ False

2. Crown closure, and density typically increase at similar rates.

   ☐ True

   ☐ False

Now check your answers on the next page.

Volume or Crown Closure—Self-Quiz Answers

1. Volume is a measurement of the number of trees growing per hectare.

   Answer: **False**

2. Crown closure, and density typically increase at similar rates.

   Answer: **False**

Key Point 3.4: Prescriptions

Stand tending work requires you to follow prescriptions set out by a professional forester. Prescriptions are specific to the requirements, conditions, and objectives of a site, with the goal typically being to regenerate a stand over time.

Wood Left

Prescriptions stipulate how much wood is to be salvaged and how much can be left on site (and whether it is to be gathered and piled, and to what depths). Debris at roadside will be salvaged, burned, or chipped.

Fire Site Restoration

Burn site replanting prescriptions will stipulate species, source, densities, etc. Access roads no longer in use may be deactivated and replanted at the same time.

Pruning Heights

Pruning heights are measured from the ground up and must allow for at least 1/3 of the live crown to be retained.

Pruning is typically required as part of a fire or fuel management prescription, or a prescription targeting diseases, such as white pine blister rust.

Pruned White Pine (Source: Eli Sagor)

Wildlife Considerations

In new plantings, measures may be needed (e.g., coverings) to protect seedlings from deer or elk.

To protect wildlife, roads may be deactivated after harvest to restrict access for hunters.

SENSITIVE AREAS
Mud Lake, 200 m north of the block, has been designated as a sensitive area for the white pelican. Pelican habitat is to be conserved in accordance with the sensitive area objectives.
Prescribed site conditions:
The block boundary is located to ensure that a minimum 200 m unlogged buffer is maintained along the lake. Harvesting operations will not be permitted during the summer months when pelicans are present.

Example of considerations for sensitive areas in a silviculture prescription (source: Silviculture Prescription Guidebook https://www.for.gov.bc.ca/TASB/LEGSREGS/FPC/FPCGUIDE/PRE/SPGuideb.pdf)

Road Density

After harvest, smaller roadways may be deactivated to increase space for replanting. For example, road density (kilometres of road per hectare) could be 5 during harvest, with a goal of 2 for the next rotation.

Stakeholder Considerations

There could be any number of considerations included in a prescription. For example:

- Drinking water considerations for a nearby district could require that you ensure ditches are clear and roads near creeks are deactivated
- There could be specific requirements around wildlife or sensitive areas
- Specific trees or groups of trees could be designated culturally or environmentally significant and require protection from harvesting and special instructions for pruning and other treatments

WATERSHED
This block falls within the Tenas community watershed. Tenas Creek (2.0–4.0 m wide) borders the southwest boundary of the block. The stream has a riparian classification of S3. A fish inventory did not indicate the presence of fish.
Prescribed site conditions:
A 40 m riparian management area will be established along Tenas Creek consisting of a 20 m reserve zone (RZ) and a 20 m management zone (MZ).
Within the RZ, machine traffic will be restricted to designated crossings indicated on the prescription map. No felling of trees other than danger trees will be permitted within the RZ.
Within the MZ, approximately 20% of the dominant trees will be removed to create a feathered effect between the clearcut and the reserve zone. Trees will be felled away from the RZ. All deciduous species within the MZ will be reserved from felling, except on designated trails/roads.

Example of watershed considerations in a silviculture prescription (source: Silviculture Prescription Guidebook https://www.for.gov.bc.ca/TASB/LEGSREGS/FPC/FPCGUIDE/PRE/SPGuideb.pdf)

Prescriptions—Self-Quiz

1. Which of the following might be stipulated in a prescription?

   ☐ How much wood should be salvaged

   ☐ Considerations for riparian areas

   ☐ Culturally significant trees

   ☐ What to do with the wood left behind

   ☐ All of these answers

2. When pruning, always leave the tree with enough foliage so it can photosynthesize and stay healthy. Always leave at least what portion of the live crown intact?

   ☐ 1/3

   ☐ 1/5

   ☐ 1/10

Now check your answers on the next page.

Prescriptions—Self-Quiz Answers

1. Which of the following might be stipulated in a prescription?

   Answer: **All of these answers**

2. Always leave at least what portion of the live crown intact?

   Answer: **1/3**

Section 1012-04: Stand Tending Hazards

What you will learn in this section

4.1 When a chainsaw should be used instead of a brush saw

4.2 When a faller is required to fall a tree

4.3 Hazards related to stand tending

Key Point 4.1: When a Chainsaw should be used instead of a Brush Saw

A brush saw is used to remove brush and small trees. It can easily cut several small trees (up to 2.5 cm in diameter) in one swing.

Larger trees are more efficiently cut with steady pressure rather than a swinging motion. Depending on the size of the brush saw and the type of tree, a base diameter of about 5 cm is likely the practical upper limit for cutting with this tool.

A chainsaw is used to cut anything that's too large for a brush saw. It's also used for pruning lower branches (up to shoulder height) and for other vertical cuts, like cutting up a fallen tree.

Key Point 4.2: When a Faller is Required to Fall a Tree

In British Columbia, any worker who fells a tree larger than 15 cm in diameter (at 30 cm stump height) must be certified to the BC Faller Training Standard (BCFTS). This person is known as a faller.

Faller at work (Source: BC Forest Safety Council)

If a tree this size needs to be removed, notify your supervisor. You may be asked to tag the tree with ribbon.

A faller could also be required if there is a large tree across a road after a windstorm. Even though the tree is felled, if its size or its position pose a challenge, a faller should be called.

Some situations may require an assessment by a danger tree assessor. For example, dead trees, partially dead trees, or trees hung up after a windstorm might pose a hazard. Notify your supervisor if you have safety concerns with a tree in your work area. Danger tree assessments will always be done after a wildfire before you are permitted to work in the stand.

When a Faller is Required to Fall a Tree—Self-Quiz

1. What is the maximum size of a tree you can consider falling without a certified faller?

   ☐ 30 cm in diameter at breast height

   ☐ 15 cm in diameter at breast height

   ☐ 15 cm in diameter at 30 cm up from the ground

   ☐ None of these answers

Now check your answers on the next page.

When a Faller is Required to Fall a Tree—Self-Quiz Answers

1. What is the maximum size of a tree you can consider falling without a certified faller?

   Answer: **15 cm in diameter at 30 cm up from the ground**

Key Point 4.3: Hazards Related to Stand Tending

Silviculture workers face many hazards and need to understand how to work safely. Some of the common hazards and how you can be prepared and plan to stay safe include the following:

- Weather and environmental hazards
- Overhead hazards
- Ground hazards
- Dehydration/poor nutrition
- Wildlife
- Injuries
- Tension or spring pole
- Wood chipper

Weather and Environmental Hazards

Silviculturists work in most weather conditions and need to be prepared. Always plan ahead.

- Make sure you know which weather stations and alerts you should be monitoring (ask your supervisor).
- Anticipate changing weather conditions, particularly at higher elevations.
- Your clothing must keep you dry, warm, and protected from the sun. Layer your clothing, have good rain gear, and carry a change of socks.
- Excessive rainfall (95mm in 24 hours) will usually lead to a work shutdown due to landslide hazards and the possibility of roads washing out and stranding you.
- Windstorms can fell trees and cut off road access. Be aware of any wind warnings. It may be helpful to familiarize yourself with the Beaufort wind scale (below) to recognize hazardous wind levels while in the field.
- Be aware of fire shutdown periods. BC's fire danger rating is updated every afternoon and indicates how easily fires can start and spread in an area.
- If there's a fire nearby, be aware of the prevailing wind direction. Plan less strenuous activities or change work areas if dealing with smoke.
- Use and carry sunscreen and insect repellent. Try to time activities to avoid exposure, if possible. For example, work in shady areas in the peak heat of the day. And avoid wet swampy areas in spring when insects are teeming.
- Be aware of avalanche hazard ratings and ask your supervisor where to monitor them.

Reference
BC Forest Safety
Extreme Weather Hazards for Silviculture Operations
https://www.bcforestsafe.org/node/3507
When you are finished, continue in this section.

Beaufort Scale

Beaufort number	Wind Speed (mph)	Seaman's term		Effects on Land
0	Under 1	Calm		Calm; smoke rises vertically.
1	1-3	Light Air		Smoke drift indicates wind direction; vanes do not move.
2	4-7	Light Breeze		Wind felt on face; leaves rustle; vanes begin to move.
3	8-12	Gentle Breeze		Leaves, small twigs in constant motion; light flags extended.
4	13-18	Moderate Breeze		Dust, leaves and loose paper raised up; small branches move.
5	19-24	Fresh Breeze		Small trees begin to sway.
6	25-31	Strong Breeze		Large branches of trees in motion; whistling heard in wires.
7	32-38	Moderate Gale		Whole trees in motion; resistance felt in walking against the wind.
8	39-46	Fresh Gale		Twigs and small branches broken off trees.
9	47-54	Strong Gale		Slight structural damage occurs; slate blown from roofs.
10	55-63	Whole Gale		Seldom experienced on land; trees broken; structural damage occurs.
11	64-72	Storm		Very rarely experienced on land; usually with widespread damage.
12	73 or higher	Hurricane Force		Violence and destruction.

Beaufort wind scale

Overhead Hazards

Overhead hazards are an issue for all forestry workers. Wherever possible, work sites should be cleared of overhead and other hazards, or they should be clearly marked and communicated to the crew.

You may want to add overhead hazards to your pre-work inspection or site inspection form.

Where possible, do not stop or park vehicles or mobile equipment where there is an obvious hazard.

Potential overhead hazards: a hung-up tree, limbs from standing dead timer, and snow load (Source: BC Forest Safety)

Reference
BC Forest Safety
Overhead Hazard Safety Alert
https://www2.bcforestsafe.org/AOM_October_2011
When you are finished, continue in this section.

Ground Hazards

You will be working on rough, uneven ground and often in steep terrain. Take your time, watch your step, and make sure you are comfortable with the load you're carrying and can manage it safely.

Watch for tripping hazards, including small stumps, rocks, fallen trees, and "spears." Make sure your footing is solid before starting any work.

Dehydration/Poor Nutrition

For optimum hydration: sip (don't chug) your water and aim for 1/2 cup of water every 15 minutes. Every 2 to 3 hours stop for a small snack/meal of carbohydrates (carbs) with low-fat protein to fuel your brain and improve reflexes.

Reference
BC Forest Safety
Fit to Work Nutrition and Hydration Resources
https://www.bcforestsafe.org/resource/fit-to-work/

When you are finished, continue in this section.

Wildlife

Check with your supervisor about potential wildlife hazards in your work area. Carry bear spray and follow these rules in case of an encounter.

Bears

- Remain calm. Do not run or climb a tree. Slowly back away, talking to the bear in a quiet, monotone voice. Do not scream, turn your back on the bear, kneel down, or make direct eye contact
- Keep away from the bear. Do not try to get closer to it. If the bear gets too close, use pepper spray (within 7 metres) or something else to threaten or distract it
- Stay together. If you are with others, act as a group
- Watch the bear until it leaves. Make sure the bear has a clear escape route. If there is a mom and cubs, make sure you are not between them
- If the bear approaches or charges, don't run! Use your bear spray. Usually bears charge or attack because they feel threatened. If you don't have bear spray and the bear makes contact with you, roll on your stomach, cover the back of your neck, remain still, and play dead

Video 8:04
WildSafeBC
Bear spray: Safe use and deployment
When you are finished, continue in this section.

More information on bear safety can be found at:

Reference
BC Forest Safety
Wildlife Awareness Safety Resources
https://www.bcforestsafe.org/resource/wildlife-awareness/

When you are finished, continue in this section.

Cougars

- Stay calm and keep the cougar in view. Back away slowly, ensuring the cougar has a clear avenue of escape
- Make yourself look as large as possible and keep the cougar in front of you at all times. Never run or turn your back on a cougar. Sudden movement may provoke an attack
- If a cougar shows interest or follows you, respond aggressively: maintain eye contact with the cougar, show your teeth, and make loud noise. Arm yourself with tools, bear spray, rocks, or sticks as weapons
- If a cougar attacks, fight back. Convince the cougar you are a threat and not prey. Use anything you can as a weapon and focus your attack on the cougar's face and eyes

Physical Fitness

Being physically fit and healthy lowers the risk of injury, improves well-being and production. Benefits to improved fitness, hydration and nutrition include:

- Improved alertness and faster reaction times
- Increased energy levels
- Reduced muscle and joint pain; restore lost function from previous injuries
- Improved work performance; do a better job and make fewer mistakes
- Improved overall health; lower blood pressure and sugars, improve sleep quality, enhance immune system, reduce depression and anxiety

The Fit to Work program consists of a core manual that includes nutrition, hydration and fitness information plus menus, recipes, exercises and motivational strategies. Additional resources include pamphlets, posters and tips booklets.

Reference
BC Forest Safety
Fit to Work: Fitness and Nutrition Programs for Forestry Workers
https://www.bcforestsafe.org/resource/fit-to-work/

When you are finished, continue in this section.

Injuries

See the first aid attendant for injuries, such as burns, cuts, or sprains. Avoid repetitive strain injuries by keeping muscles and joints warm, working ambidextrously wherever possible, and learning proper techniques from an experienced crew member. Have an exercise routine to maintain your fitness level in the off season.

Reference
BC Forest Safety
Healthy Worker: Reducing Your Risk of MSI
https://www.bcforestsafe.org/wp-content/uploads/2021/03/res_BCFSC_MSI_Poster11x17.pdf

When you are finished, continue in this section.

Spears

After cutting a small diameter tree, the stump that remains can be a hazard especially if it is cut at a sharp angle or there is difficult terrain that might lead to workers tripping or falling. Read the following fatality alert to learn more about these hazards.

Reference

BC Forest Safety
Fatal leg injury while working alone in isolation
https://www.bcforestsafe.org/node/3569
When you are finished, continue in this section.

Tension or Spring Pole

A spring pole is a limb or sapling that is bent under a fallen tree. It is usually under extreme tension (like a catapult) and is potentially dangerous.

Spring pole (image from Minnesota Department of Labor and Industry)

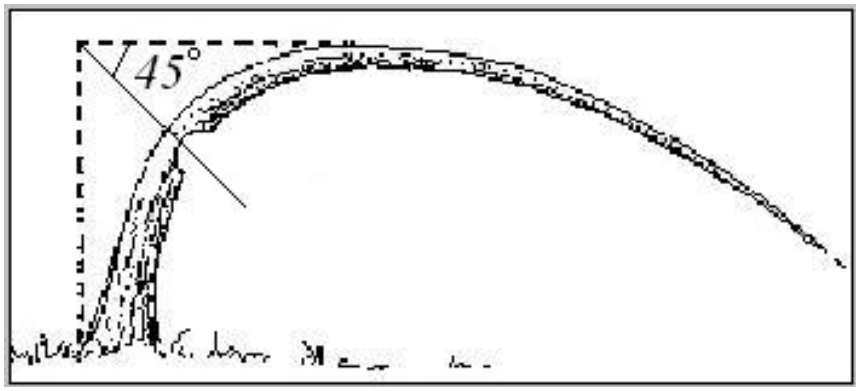
If you can leave it and work around it, do so, and be mindful that it's there.

If you need to remove it to work in the area, the safest way to release the spring pole is to shave a sufficient amount of wood (about 25% of the diameter) from the underside to allow the wood fiber on the top to release slowly.

To find the best point to shave or release a spring pole:

- Determine a straight vertical line up from the stump.
- Find where it meets a horizontal line from the highest point of the bend.

- Come down at a 45-degree angle from where the two lines intersect.



Locating the best point to shave/release a spring pole (image from Logging Safety: A Field Guide (New York State Department of Health https://www.health.ny.gov/publications/3132/logging_section_four.htm)

Video 2:21
Public Resource Org
Releasing a Spring Pole
When you are finished, continue in this section.

Wood Chipper

Wood chippers are powerful machines!

Branches are manually fed into the machine's hopper, where they're grabbed by in-feed rollers and pulled in. The blade then chips the branches, and the wood chips are propelled through a discharge chute into a chip truck.

CAUTION!
To use a wood chipper safely:

- Feed brush from the side of the feed table, never from the front.
- Wear close-fitting clothing to prevent getting snagged.
- Make sure there is an emergency stop, and check that it works.

Video 2:46
WorkSafeBC
Wood Chipper Accident Investigation
When you are finished, continue in this section.

Hazards Related to Stand Tending—Self-Quiz

1. If a cougar shows interest in you or follows you, you should:
   - ☐ Play dead
   - ☐ Run
   - ☐ Respond aggressively like you are a threat and not potential prey
   - ☐ None of these answers
2. The best way to mitigate hazards is to:
   - ☐ Plan ahead and be prepared
   - ☐ Be aware of weather conditions and alerts and plan accordingly
   - ☐ Observe hazards at the work site and have a safety meeting
   - ☐ Talk to your supervisor if you have any concerns
   - ☐ All of these answers
3. To use a wood chipper safely:
   - ☐ Make sure there is an emergency stop and check that it works
   - ☐ Feed brush from the front of the feed table
   - ☐ Do not wear work gloves in case they get snagged
   - ☐ All of these answers

Now check your answers on the next page.

Hazards Related to Stand Tending—Self-Quiz Answers

1. If a cougar shows interest in you or follows you, you should:

   Answer: **Respond aggressively like you are a threat and not potential prey**

2. The best way to mitigate hazards is to:

   Answer: **All of these answers**

3. To use a wood chipper safely:

   Answer: **Make sure there is an emergency stop and check that it works**