

2.2 Working as a Team

A climber and a ground person make up the basic climbing team. One ground person can serve several climbers, but must be able to maintain visual and voice communication with all climbers at all times. Roles are interchangeable, so all team members shall be certified climbers who are qualified to perform every aspect of the climbing assignment. All team members shall have current medical training equivalent to at least an American Red Cross basic first-aid course. The team shall establish radio communications with the forest or district office or central dispatch from the climbing site before climbing. An established sign-out system shall also be in effect with the local forest/district office or central dispatch.

All team members shall be completely equipped to climb and shall thoroughly rehearse the climbing methods and techniques they will use. Working as a team includes the following:

1. All team members shall perform an equipment check on each team member's equipment before climbing.
2. The ground person and the climber should switch roles, as necessary, to prevent undue fatigue. Alternating roles from tree to tree gives the climber an opportunity to rest. The ground person shall NOT sleep, but shall remain alert while climbers are aloft.
3. Both climber and ground person should remain alert to hazards in the tree and the environment, discussing potential problems as they arise.
4. The ground person should carefully watch the climber and communicate any problems; it is often easier for the ground person to identify hazards and recognize unsafe climbing practices than it is for the climber to do so.
5. The ground person should assist the climber by helping with harness adjustments, inspecting equipment, and attaching or removing items from the haul line.
6. The ground person should maintain verbal and visual contact with the climber. When the climber is collecting cones, the ground person should assist by pointing out areas where cones can be collected.
7. The ground person shall be prepared to perform a rescue or render first aid at all times.
8. The ground person shall not be directly underneath the climber at any time unless first cleared by the climber to be there. Whenever a ground person is underneath a climber, the climber remains in an "at rest" position until the ground person is no longer there.

2.3 Checking for Hazards

Any number of hazards may prevent a tree from being climbed. The climbing team must perform a thorough tree hazard assessment before any tree is climbed. Remember, no tree is worth a human life.

Hazards are generally grouped into two categories: environmental hazards and tree hazards. The following lists of potential hazards represent a starting point for the focus of a hazard tree assessment. In special situations where hazards cannot be mitigated, consider seeking additional help from specialists or receiving additional training before performing any work.

2.3.1 Environmental Hazards

The climbing team must assess the environmental hazards at each tree and monitor the weather throughout the day for changes that could make climbing more hazardous. Never climb a tree under any of the following conditions.

- The wind speed exceeds 25 mph or the wind is blowing in gusts. In light winds, try to keep your back to the wind. Do treetop work first, when conditions permit. If winds increase later, it may still be safe to work lower in the tree.
- It is not fully daylight. Visibility is especially important late in the day when fatigue is a factor. Do not start a tree climb that cannot be completed in full daylight.
- Air temperature is low enough to create an unsafe condition. Be particularly aware of cold temperatures. Cold impairs dexterity, especially in the fingers, which can jeopardize your ability to accomplish tasks safely.
- A lightning storm is close. If you are in a tree when a lightning storm appears imminent, descend as quickly and safely as possible.
- A rainstorm is imminent. Wet branches are slippery. A wet rope may not be as strong as a dry one.
- A powerline is close enough to the tree that you, your equipment, or the tree branches could come in contact with the powerline. Consider any tree suspect if a powerline is anywhere in the vicinity. DO NOT climb any tree that is closer than 10 feet from energized electrical conductors.

2.3.2 Tree Hazards

Check every tree thoroughly before the climb. Both team members should walk around the tree and assess it for potential hazards. Many hazards can be compensated for easily, allowing the tree to be climbed safely. Other trees have severe hazards that preclude them from being climbed unless a special need exists, the climber is properly trained and equipped, and any hazards are mitigated. When climbing any tree, if you encounter a hazard that cannot be mitigated, descend immediately.

The following hazards may prevent a tree from being climbed, if it is not possible to compensate for them.

Rain-, ice-, or snow-covered branches. These branches pose slipping hazards that may affect climbing performance. Climbers may need to use a safety line or lanyard for added safety.

Moss and lichen. Moss and lichen create a slippery climbing surface. This hazard is especially prevalent in the Northwest. Climbers may need to use a safety line or lanyard for added safety.

Cold, brittle limbs. Use the same precautions you would use with any brittle limbs. If the temperature is too low to climb safely, then you should not be climbing.

Tree species with brittle limbs. Test limbs for soundness before using them for support. Climbers may need to use a safety line or lanyard for added safety.

Small-diameter boles and limbs. Keep hands and feet as close to the bole as possible. When climbing above the 4-inch diameter point in conifers, a safety line shall be used. A safety line may be used earlier in the climb for added safety.

Steeply sloping limbs. Always keep your hands and feet as close to the bole as possible. Wedge them close to the bole when you are using sloping limbs for support. If your hands or feet continually slip, consider climbing with your lanyard attached at all times or use a safety line for a belayed ascent. Exercise caution on trees with branches that slope upward. To avoid getting your feet stuck, do not use them for support. If these branches cannot be avoided, consider using tree steps or using webbing slings for steps.

Damaged limbs. Never use damaged limbs to support your weight.

Branch stubs or dead branches. Never use branch stubs or dead branches for support. Remove dead branches while ascending the tree if there is a chance they might be used inadvertently while descending.

Abnormally large amounts of branch mortality.

These conditions may indicate unsafe limbs and hidden rot. This is mainly a problem in conifers.

Weak branch unions. Weak branch unions are places where branches are not strongly attached to the tree. A weak union occurs when two or more branches of similar size grow so closely together that bark grows between the branches, inside the union. This is usually a problem with branches that are growing upright. The ingrown bark does not have the strength of wood. The union is much weaker than one that has more wood. The included bark may also act as a wedge and force the branch union to separate. Elm and maple, which have a tendency to form upright branches, often produce weak branch unions. Weak branch unions also form after a tree or branch is tipped or topped (when the main stem or a large branch is cut at a right angle to the direction of growth, leaving a large branch stub). The stub inevitably decays, providing very poor support for new epicormic branches that usually develop along the cut branch.

Poor tree architecture. Poor architecture is a growth pattern that indicates weakness or structural imbalance. Trees with strange shapes are interesting to look at, but may be structurally defective. Poor architecture often arises after many years of damage from storms, unusual growing conditions, improper pruning, topping, and other damage. A leaning tree may or may not be a hazard. An arborist knowledgeable about that tree species should examine leaning trees that might be a hazard.

Forked boles and spiked top. Unless the tree species naturally forks, do not climb above a forked bole. Treat any fork with suspicion, because the fork is potentially a weak point. Never climb into a dead or spiked top. Forks sometimes indicate an old, broken top. Frequently, they are associated with wood decay, which further weakens the area, making it unsafe for climbing. Most hardwood trees fork naturally, so a forked hardwood tree would not cause as much concern as a forked conifer.

Cankers. A canker is a localized area on the stem or branch of a tree, where the bark is sunken or missing. Wounding or disease causes cankers. Stems are more likely to break near the canker. A tree with a canker that encompasses more than half of the tree's circumference may be hazardous even if exposed wood appears sound.

Cracks. Deep splits through the bark that extend into the wood of the tree are primarily a problem in deciduous trees. Cracks are extremely hazardous, because they indicate that the tree is failing. These trees should be evaluated by a person familiar with the species and climbed by certified climbers who

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are properly trained and equipped for the hazards associated with the job.

Decay. A decaying tree can be prone to failure. Decay is primarily a problem in deciduous trees. The presence of decay by itself does not indicate that the tree is hazardous. Advanced decay (wood that is soft, punky, or crumbly, or a cavity where wood is missing) can create a serious hazard. Signs of fungal activity, including mushrooms, conks, and brackets growing on root flares, stems, or branches indicate advanced decay. A tree usually decays from the inside out, eventually forming a cavity. Sound wood is added to the outside of the tree as it grows. Trees with sound outer wood shells may be relatively safe, but this depends on the ratio of sound to decayed wood and other defects that might be present. If decay is evident and you have doubts about the tree, avoid it. Arborists are best qualified to evaluate the safety of a decaying tree.

Root problems. Trees with root problems may fall without warning for any number of reasons, especially when the tree's leaves grow in summer, increasing the weight the tree must support. Besides decay, roots may have a number of other problems. They may have been severed; they may have been paved over; they may have been harmed when the soil grade was raised or lowered; or a car may have driven over or parked on top of them. Mounded soil near the base of the tree (which may indicate that the tree is unstable), twigs that have died back, and leaves that are offcolor or smaller than normal often are symptoms associated with root problems. Because most defective roots are underground and out of sight, aboveground symptoms may serve as the best warning.

Indications of root, butt, or bole rot. In conifers, the soundness of any tree with rot cannot be trusted. Indicators of rot include fruiting bodies of decay fungi, exposed wood that is decaying, and other indicators of internal wood decay. Wood is generally a strong material, but its strength is greatly reduced by decay. Some decay is obvious (for example, rotten wood in an exposed scar), but other decay may be hidden (for example, internal wood decay in a forked top).

Loose bark. Loose bark may peel off when grabbed for support or when spurs are used. In dead conifers, large sections of bark may break loose and fall, injuring a climber or damaging equipment. Certified climbers who are properly trained and equipped for the hazards associated with the job should do critical work in such trees.

Dead wood. Dead trees and large, dead branches are unpredictable and may fall at any time. Dead wood is often dry and brittle and cannot bend as a living tree or branch does. Dead branches or treetops that

are already broken off ("hangers" or "widowmakers") are especially hazardous. Certified climbers who are properly trained and equipped for the hazards associated with the job should do critical work in such trees.

Multiple defects. Recognizing multiple defects in a tree is critical when evaluating the tree's potential to fail. Multiple defects that are touching or close to one another should be examined carefully. The combined potential of multiple defects can far exceed the sum of the individual hazards considered separately. If more than one defect occurs on a main stem, you should assume that the tree is potentially hazardous.

Large portions of other trees or snags lodged in the crown. Trees or snags lodged in the crown of another tree may move or fall, striking the climber or pinning the climber in a tree. Tree climbing to remove these hazards, or to perform critical work in the tree, should be done by certified climbers who are properly trained and equipped for the hazards associated with the job.

Bee, hornet, or wasp colonies. Insect colonies may be in trees adjacent to the one to be climbed, or in trees nearby. Often colonies cannot be seen from the ground. When you are climbing, always let your ground person know when you spot a colony. If you cannot descend immediately and you are being attacked, secure yourself to the tree, cover your face, and don a bee hood if one is available. A can of bee and wasp spray that will stun bees, wasps, and hornets should be carried during high-risk seasons. Climbers allergic to insect stings should have the appropriate medication with them. The climbing team's first-aid kit should include an insect-sting kit, which may have to be purchased separately. Climbing to monitor or remove insect colonies should be performed only by certified climbers who are properly trained and equipped for the hazards associated with the job.

Animals in the tree. Even small chipmunks can cause enough commotion to startle a climber and create a hazardous situation. It is best to return to the tree at a later date and climb it when the animal is not present or to designate the tree as unsafe to climb without special training and precautions. Tree climbing to monitor animals, or for other animal-related activities, should be done by certified climbers who are familiar with the behavior of the animals being monitored, are properly equipped for the job, and are properly trained in the methods necessary to minimize and mitigate the associated hazards.

Large birds nesting in the tree. Be cautious of birds nesting in the tree that is being climbed or in nearby trees. Even small nesting birds can create hazardous

situations when they are threatened. If you encounter a large bird's nest, cancel the planned climbing activities for that tree and the surrounding trees. Climbing to monitor birds or their nests should be performed only by certified climbers who are properly equipped for the job and are properly trained in the methods necessary to minimize and mitigate the associated hazards.

Hazardous situations should be avoided as much as possible, unless a specific need for climbing exists. A thorough tree hazard assessment is crucial for determining the extent of the hazard and the climber's ability to deal with it. Although trainee climbers can successfully compensate for many hazards, as the severity of the hazard increases so does the level of experience required. The type or severity of a hazard may warrant additional training, specialized equipment, or outside expertise.

When climbing, if you discover a hazard that was not spotted from the ground, or that appears to be more hazardous than you originally thought, descend immediately unless the hazard can be mitigated.

2.3.2.1 Hazards Occurring in all Types of Trees

1. *Bee, hornet, or wasp colonies.* Often colonies cannot be seen from the ground. When you are climbing, always let the ground person know when you spot a colony. Descend immediately. If this is not possible, and you are being attacked, secure yourself to the tree, cover your face, and don a bee hood, if one is available. A can of bee and wasp spray that will stun bees, wasps, and hornets should be carried during high-risk seasons. Climbers allergic to insect stings should have appropriate prescription medication with them. The climbing team's first-aid kit should include an insect-sting kit, which may need to be purchased separately.
2. *Animals that may be brought to bay by the climber.* Even small chipmunks can cause enough commotion to startle a climber and create a hazardous situation. It is best to return to the tree at a later date and climb it when the animal is not present or to designate the tree as unsafe to climb. Tree climbing for the purposes of animal monitoring should be done by certified climbers who are familiar with the behavior of the animals being monitored and are able to minimize or mitigate any associated hazard.
3. *Rain-, ice-, or snow-covered branches.* Such branches present slipping hazards that may affect climbing performance.
4. *Large portions of other trees or snags lodged in the crown.* These trees have the potential for striking the climber or pinning the climber in a tree.
5. *Loose bark.* Loose bark may peel off when grabbed for support or when spurs are used. In dead conifers, large sections of bark may break loose and fall, injuring the climber or damaging equipment.

6. *Moss and lichen.* Moss and lichen create a slippery climbing surface. This hazard is especially prevalent in the Northwest.
7. *Dead wood.* Dead trees and large dead branches must be avoided. They are unpredictable and can break and fall at any time. Dead wood is often dry and brittle and cannot bend in the wind like a living tree or branch. Dead branches and treetops that are already broken off ("hangers" or "widow makers") are especially hazardous.

2.3.2.2 Hazards Occurring Primarily in Deciduous Trees

1. *Cracks.* A crack is a deep split through the bark, extending into the wood of the tree. Cracks are extremely hazardous because they indicate that the tree is failing.
2. *Weak branch unions.* Weak branch unions can occur where branches are not strongly attached to the tree. They form when two or more similar-sized upright branches grow so closely together that bark grows between the branches, inside the union. This ingrown bark does not have the structural strength of wood, which results in a much weaker union. The ingrown bark may also act as a wedge and force the branch union to branches, such as elm and maple, often produce weak branch unions. Weak branch unions also form after a tree or branch is tipped or topped (when the main stem or a large branch is cut at a right angle to the direction of growth, leaving a large branch stub). The stub inevitably decays, providing very poor support for new branches ("epicormic" branches) that usually develop along the cut branch.
3. *Decay.* Decaying trees can be prone to failure, but the presence of decay, by itself, does not indicate that the tree is hazardous. Advanced decay (wood that is soft, punky, or crumbly, or a cavity where the wood is missing) can create a serious hazard. Evidence of fungal activity, including mushrooms, conks, and brackets growing on root flares, stems, or branches, are indicators of advanced decay. A tree usually decays from the inside out, eventually forming a cavity, but sound wood is also added to the outside of the tree as it grows. Trees with sound outer wood shells may be relatively safe, but this depends on the ratio of sound to decayed wood and other defects that might be present. If decay is evident and you have doubts about the tree, avoid it. Arborists are best qualified to evaluate the safety of a decaying tree.
4. *Cankers.* A canker is a localized area on the stem or branch of a tree where the bark is sunken or missing.

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Cankers are caused by wounding or disease. The presence of a canker increases the chance of the stem breaking near the canker. A tree with a canker that encompasses more than half of the tree's circumference may be hazardous even if the exposed wood appears sound.

5. *Root problems.* Trees with root problems may fall without warning. Root problems can be caused by many things, such as severing or paving over roots, raising or lowering the soil grade near the tree, parking or driving vehicles over the roots, and extensive root decay. Soil mounding, twig dieback, dead wood in the crown, and leaves that are off-color or smaller than normal are symptoms often associated with root problems. Because most defective roots are underground, above ground symptoms may serve as the best warning.
6. *Poor tree architecture.* Poor architecture is a growth pattern that indicates weakness or structural imbalance. Trees with strange shapes are interesting to look at, but may be structurally defective. Poor architecture often arises after many years of damage from storms, unusual growing conditions, improper pruning or topping, or other damage. A leaning tree may be a hazard.

Because some leaning trees are hazardous, any leaning tree of concern should be examined by an arborist knowledgeable with that species of tree.

7. *Multiple defects.* Recognizing multiple defects in a tree is critical when evaluating the tree's potential to fail. Multiple defects that are touching or close to one another should be carefully examined. If more than one defect occurs on a tree's main stem, you should assume that the tree is potentially hazardous.

2.3.2.3 Hazards Occurring Primarily in Coniferous Trees

1. *Indications of root, butt, or bole rot.* The soundness of any tree with rot cannot be trusted. This includes fruiting bodies of decay fungi, exposed wood decay, or other indicators of internal wood decay. Wood is generally a strong material, but its strength is greatly reduced by decay. Some decay is obvious (for example, rotten wood in an exposed scar), but some decay is hidden (for example, internal wood decay in a forked top).
2. *Abnormally large amounts of branch mortality.* This may indicate unsafe limbs and hidden rot.