Changes to the National Tree Climbing Field Guide adopted by the National Tree Climbing Technical Advisory Group and approved by the Deputy Program Manager, 4/17 2003.

KEY: highlighted turquoise = delete; red font = add; dark yellow font = note
(Changes are referenced by page number in Guide and, when appropriate, (sub)section number. Some portions of existing text may be included to enable locating additions or deletions)

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2.4 Climbing Trees With Hazards……8

Page iv
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Page 2
Carabiner
(Biners, Locking Carabiners**)**
An oblong metal ring with a spring-loaded gate on one side used for various purposes in climbing, such as attaching equipment to the climber or securing the climber to a rappel system. Carabiners are normally produced from bar stock that is formed into the desired shape. This Guide refers to locking carabiners when the term is used . Locking carabiners come in two types: screw-lock and automatic lock.Carabiners used in life support applications shall be the self-closing, positive locking type.

Climbing Line.
A rope used in tree climbing that may be used for ascending into a tree, descending from a tree, and/or working aloft in a tree.

Page 3
Secured.
When the climber is safeguarded from unintended movement utilizing a climbing system that is attached to the climber and connected to the tree. Examples of being secured include, but are not limited to: (1) when tied in (2) when using a lanyard (3) when on belay (4) when ascending a climbing line using the footlock technique while utilizing a Prusik loop or ascenders.

Snap Catch
(Rope Snap, Snap Link, Snap Hook)
A metal device with a ring on one end that usually attaches permanently to a rope or cable The other end has a spring-loaded, locking gate. As opposed to a carabiner, the gate on a snap link
does not lock into the body of the snap link and does not offer any additional strength when closed. Snap catches shall be the double locking type requiring two actions to unlock and open. Snap catches shall be the self closing, locking type.

Page 4
Tree Climbing Work.
All work associated with tree climbing and working aloft in trees.
Any task performed in or on a tree where access is accomplished by means of free climbing, friction knots or mechanical ascenders, climbing spurs, bole gripping systems, permanently or temporarily mounted steps, or stacked sectional ladders.

Tree-Crotch Lanyard.
(Cambium Saver Lanyard, Friction Saver)
A piece of rope or webbing designed specifically for rigging a rappel rope in a tree to reduce abrasion to the rappel rope and the tree. It is designed with an O-ring at one end and a snap catch or small-diameter ring at the other end. A double-rope rappel can be rigged without the rappel rope contacting the tree bole, and the rappel rope and tree-crotch lanyard can be retrieved from the ground. The tree-crotch lanyard should not be used with the Prusik rappel system (see Rappel Rope).

2.1 Basic Tree Climbing Equipment
3 C. Eye protection shall be worn. especially when cutting or pruning trees.

2.3 Checking for Hazards
(Replace entire section 2.3 and 2.4 with the following)
Any number of hazards, depending on the degree of severity may prevent a tree from being climbed. It is of the utmost importance that the climbing team performs a thorough tree hazard assessment before any tree is climbed. It is always important to remember that 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, it may be necessary to seek additional help from specialists and/or additional training before any work is performed.

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.

1. 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 tree top work first to take advantage of conditions before the winds increase.

2. It is not fully daylight. This 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.

3. Air temperature is low enough to create an unsafe condition, in your judgment. Be particularly aware of cold temperatures. Cold impairs dexterity, especially in the fingers, which can jeopardize your ability to accomplish tasks safely.

4. A lightning storm is close. If you are in a tree when a lighting storm appears imminent, descend as quickly and safely as possible.

5. A rainstorm is imminent. Wet branches are slippery. A wet rope may not be as strong as a dry one.

6. 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 less 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 associated with trees to be climbed can easily be compensated for and the tree can be safely climbed. 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 they cannot be compensated for and the tree safely climbed.

1. *Rain-, ice-, or snow-covered branches.* These branches pose slipping hazards that may affect climbing performance. It may be necessary to use a safety line or lanyard for added safety.

2. *Moss and lichen.* Moss and lichen create a slippery climbing surface. This hazard is especially prevalent in the Northwest. It may be necessary to use a safety line or lanyard for added safety.

3. *Brittle limbs caused by low temperatures.* 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.

4. *Tree species with brittle limbs.* Test limbs for soundness before using them for support. It may be necessary to use a safety line or lanyard for added safety.

5. *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.

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

7. *Damaged limbs.* Never use damaged limbs to support your weight. Judge whether the damage has reduced branch strength to an unsafe level.

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

9. *Abnormally large amounts of branch mortality*. Mainly a problem in conifers, this may indicate unsafe limbs and hidden rot.

10. *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 similar-sized, usually 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, and the union is much weaker than one that does not have included bark. The included bark may also act as a wedge and force the branch union to separate. Elm and maple, with 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 branches ("epicormic" branches) that usually develop along the cut branch.

11. *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 be a hazard. Because not all leaning trees are hazardous, an arborist knowledgeable with that species of tree should examine those that cause concern.

12. *Forked boles and spiked top.* Unless the tree species naturally forks, such as most hardwoods, do not climb above a forked bole. Treat any fork with suspicion, because this is a tree's potentially weak point. Never climb into a dead or spiked top. Forks sometimes indicate an old broken top and frequently, but not always, have associated wood decay. This represents a weak point because of wood decay and is unsafe for climbing.

13. *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. 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 exposed wood appears sound.

14. *Cracks*. Primarily a problem in deciduous trees, 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. These trees should be evaluated by a person familiar with the species and climbed by certified climbers that are properly trained and equipped for the hazards associated with the job.

15. *Decay.* Primarily in deciduous trees, a decaying tree 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 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.

16. *Root problems.* Trees with root problems may fall without warning in summer when burdened only with the weight of the tree's leaves. There are many kinds of root problems to consider, for example, severing or paving-over roots; raising or lowering the soil grade near the tree; parking or driving vehicles over the roots; or extensive root decay. Soil mounding, twig dieback, dead wood in the crown, and off-color or smaller than normal leaves are symptoms often associated with root problems. Because most defective roots are underground and out of sight, aboveground symptoms may serve as the best warning.

17. *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 decay, 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 some decay is hidden (for example, internal wood decay in a forked top).

18. *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 that are properly trained and equipped for the hazards associated with the job should do critical work in such trees.

19. *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 in the wind like a living tree or branch. Dead branches or treetops that are already broken off ("hangers" or "widowmakers") are especially hazardous. Certified climbers that are properly trained and equipped for the hazards associated with the job should do critical work in such trees.

20. *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. Remember that the combined hazardous 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.

21. *Large portions of other trees or snags lodged in the crown.* These trees or snags have the potential for striking the climber or pinning the climber in a tree. Tree climbing for the purpose of removing these hazards, or to perform critical work in the tree, should be done by certified climbers that are properly trained and equipped for the hazards associated with the job.

22. *Bee, hornet, or wasp colonies.* The colonies may be in trees adjacent to the one to be climbed, where climbing may disturb the colony. Often colonies cannot be seen from the ground. When you are climbing, always let your 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 the appropriate medication with them. The climbing team's first aid kit should include an insect-sting kit, which may need to be purchased separately. Certified climbers that are properly trained and equipped for the hazards associated with the job should do tree climbing for the purpose of monitoring or removing the colony.

23. *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 without special training and precautions. Tree climbing for the purpose of animal monitoring, or 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.

24. *Large birds nesting in the tree.* Be cautious of birds nesting in adjacent trees that may exhibit aggressive behavior. Even small nesting birds can create hazardous situations when they are threatened. If you encounter a large bird's nest, you should cancel the planned climbing activities for that tree and the surrounding trees. Where the presence of the bird or the nest is the reason for the climb, only certified climbers that are properly equipped for the job and are properly trained in the methods necessary to minimize and mitigate the associated hazards should perform the work.

As a rule, 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, and/or outside expertise.

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

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2.4 Climbing Trees With Hazards

Page 10
3.1.2
2. Polyolefin. Ropes of polypropylene and polyethylene melt at 310 °F, but may begin to soften and weaken at 100 °F. These temperatures can be easily reached or exceeded when the ropes are subjected to abrasion and friction. Use these ropes only for haul lines or other uses that do not support a climber ropes made exclusively of these materials, only for haul lines or other uses that do not provide life support to the climber.

Page 11
3.1.3
3. Braided construction. Many types of braided rope are available. These ropes are gaining popularity among tree climbers because of their excellent knot holding and handling characteristics. Generally, braided ropes are softer and more flexible than kernmantle or laid ropes. However, the external fibers are susceptible to snagging, and the rope usually has a lower breaking strength compared with kernmantle or laid ropes of similar diameter. Avoid braided ropes made with polyolefin, which softens and weakens at low temperatures.

Page 12
3.2 Knots
Climbers should know a few specific knots and their proper use, rather than a myriad of knots that will confuse them when it is time to use one. There are many knots useful in tree climbing work, but only a few task-specific knots are necessary for any given climbing technique. Always check and test every knot you tie and, when practical, secure it with an overhand knot or other suitable safety knot. Practice knot tying at frequent intervals so correct tying becomes automatic. Knots used for tree climbing include:
Standard Knots Optional Knots
• Figure-eight knots • Bowline
• Friction knot (Prusik) • Clove hitch
• Becket hitch • Water knot
• Grapevine knot
• Blake's hitch
• Buntline Hitch
• Anchor Hitch
• Double Fisherman's Loop

page 14
Figure 3c—Figure eight on a bight. (remove the lower drawing of the knot and circle with line through it) Caution: Tying this knot with the standing part taking the short radii of the first bend weakens the knot.

Page 15
Figure 3g—Blake's hitch fully tied. (Bowline knot on snap catch)
(Need to add a figure-8 stopper knot on tail of Blake's hitch in Figure 3g).

page 16
3.2.4 Specialty Knot
Becket Hitch. The Becket hitch is a specialty knot that is used only with steel-core nylon rope when attaching the rope to the D-ring of a climbing belt or safety harness. (Figure 3h).

3.2.5 Optional Knots Other Useful Knots
Other useful knots for tree climbing include the bowline, clove hitch, water knot, and grapevine, buntline hitch, anchor hitch and double fisherman's loop. The selection of these knots, along with the standard knots, as with other knots referenced, is based on their utility and safety.

Figure 3i – Bowline knot. Add Bowline knot to lower left figure; Secured with overhand tie-off to lower right figure.

(following *Grapevine knot*)
Buntline Hitch. The buntline hitch is used to attach a climbing line or lanyard to a life support device such as a carabiner or snap hook. Dress and set for proper function.
Anchor Hitch. Use the anchor hitch in similar applications as the buntline; to secure the climbing line to a carabiner or snap hook. Dress and set for proper function.
Double Fisherman's Loop. Also used as an end-line attachment knot to a carabiner or snap hook. The buntline hitch, anchor hitch and double fisherman's loop all snug down, capturing the attachment device and preventing unwanted movement at the attachment point. Dress and set for proper function.

Page 17
Figure 3q – Buntline Hiich (insert DSC07812.JPG and DSC07813.JPG)
Figure 3r – Anchor Hitch (insert DSC07818.JPG and DSC07819.JPG)
Figure 3s – Double Fisherman's Loop (insert DSC07820.JPG AND DSC07821.JPG)

Page 19
Figure 3q **–** 5,000+ 5,400+ pound acceptable; 4,800+ 5,400+ pound acceptable

Page 21
4.1.2 Lanyards
Lanyards are adjustable lengths of rope or webbing that secure the climber to the tree, freeing the hands. While in a work position in a tree or when stopping to do anything with your hands, pass a lanyard around the tree bole or appropriate limb, and firmly attach both ends to your climbing belt or safety harness.

Page 22
4.1.2.1 (4A) replace entire paragraph with:
Steel cable lanyards (no rope sheath around cable) recommended for tree climbing work include those that come with the Swiss Tree Gripper Set, and those used as a back-up lanyard when using a chain saw or other cutting tool.

Page 24
4.1.3 Carabiners and Screw Links (3rd paragraph)
Carabiners used in tree climbing applications should have a D-shape or modified D-shape. All carabiners used for life safety shall have a locking gate. for life support applications shall be the self-closing, positive locking type with a minimum tensile strength of 5,000 pounds. Several types of steel and aluminum carabiners meet this requirement.

(6th paragraph)
…Never place a load on the gate of a carabiner. For screwlock carabiners (which can only be used in non-life support applications), don't overtighten the locking mechanism or tighten it when the carabiner is under load; this may cause it to jam during use.

Figure 4a—Carabiner
[insert DSC07810.JPG] (replace Figure 4a with DSC07811.JPG and identify carabiner parts as in existing Figure 4a)
(Latch, Locking sleeve, Gate, Hinge pin, Minor axis, Spine, Major axis)

Page 26
4.2.2 Four-Inch Tie-In System (delete the first paragraph and replace with the following)
A 4-inch tie-in system is a belayed safety line system that is required when climbing and working above the 4-inch bole diameter level of the tree and may be either self-belayed or ground belayed. The belay systems allow the climber to work above the 4-inch bole diameter level in relative safety. Both self-belay and ground-belay rigging equipment is relatively inexpensive and easily replaced when worn or damaged, but may be time consuming to set up and take down. The self-belayed system does not require a ground person to operate it, thereby freeing the ground person to assist the climber in other ways. Both belay systems can reduce the climbers' ability to descend quickly in an emergency.

There are several ways to set up a self-belay system, but they all have these requirements. Both belayed climbing systems have these requirements:
2. Protection (rigging points) is installed at least every 3 feet along the bole to limit falls to no more than 6 feet. Above the 4-inch bole diameter level, protection (rigging points) is installed at least every 3 feet along

the bole to limit falls to no more than 6 feet.
3. Self-belay systems have one end of the safety line secured to the tree with the other end secured to the climber **AT ALL TIMES**. The belay system shall have one end of the safety line secured to the tree or the belay anchor, with the other end secured to the climber **AT ALL TIMES** that the climber is at or above the 4-inch bole diameter level.

The construction and operation of the four two self-belay systems are as follows:

4.2.2.1 One-Piece Prusik System (delete entire section)

Figure 4c—One-piece Prusik System 4-inch Tie-In Anchor System (the insert in Figure 4c with the "> 4-inch diameter at tie-in point" note, becomes Figure 4c; that is, eliminate the figure of the one-piece Prusik system. The figure also needs to be corrected to show end-loading, not side-loading of the carabiners)

Page 27
Figure 4d—A sling wrapped around a bole. (replace Figure 4d with DSC07826.JPG; identify below image as Basket Hitch; and DSC7824.JPG; identify below image as Girth Hitch)
(Add following NOTE below Figure 4d):
NOTE: A girth hitch will reduce sling strength. For climbing applications where a sling provides an artifical foot-hold for work positioning, and for climbing line redirects where potential fall factors are low, the use of the girth hitch is acceptable. Use the basket hitch for life support anchors and protection points in ground-belay and self-belayed climbing applications where the climber may at times be above the highest installed protection point.

4.2.2.2 1 Self-Belayed Two-Piece Prusik System

page 28 2G
• Wrapping a sling (Figure 4d) around the bole above a branch whorl and using a carabiner to attach it to the safety line below the Prusik knot. Allow sufficient slack in the sling to avoid side-loading the carabiner. The safety line should run through the carabiner, NOT between the tree and the sling.

4.2.2.3 Carabiner Fixed-Distance System (delete this entire section, including Figure 4f)

page 29
4.2.2.4 2 Ground-Belay System (2C)
Protection to the climber is provided by wrapping a sling (safety strap) around the bole above a branch whorl and attaching the sling to the safety line with a carabiner. Allow sufficient slack in the sling to avoid side-loading of the carabiner. The safety line should run through the carabiner, not between the tree and the sling.

Figure 4f—Carabiner fixed-distance system (delete figure – all remaining figures in Section 4 will need to be re-lettered)

Page 30
4.2.2.5 3 Care and Cleaning of 4-Inch Tie-In Systems

4.2.3 Belayed Climbing System
…….above the 4-inch bole diameter (see section 4.2.2.4 2). The belay rope must be a dynamic rope to……

4.2.3.1. Anchors
2…... Figure 4d illustrates several methods of securing a sling. The anchor material must meet the 5,400-pound breaking strength requirement and should NOT be configured into a girth hitch (figure 4h), which could create dangerous stresses on the sling.

Figure 4gf—Belayed climbing system. (correct figure to show end-loading, not side-loading of the carabiners).

Page 31
Figure 4hg—Precautions for using a girth hitch with a belay anchor Angle vs. Load Caution (remove top 2 drawings of girth hitches and "Girth hitch caution")

Figure 4ih—Münter hitch.

Figure 4ji—Using a belay plate.
Figure 4kj—Using an etrier.

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4.5 Using Chain Saws in Trees (replace the entire section 4.5 with the following)

4.5.1 Determining Whether a Chain Saw is Needed

In addition to the normal risks of personal injury from a chain saw, a climber has the additional risk of severing climbing lines or lanyards. Because of this danger, any use of chain saws in trees must be thoroughly justified and shall be done with the smallest saw that can efficiently do the job.

4.5.2 Chain Saw Endorsement Categories

1. Each of the following categories requires a separate endorsement (i.e. certification), in addition to the required sawyer certification necessary for each.
   EC-1. Cavity creation (including RCW or other inserts)
   EC-2. Pruning and/or limbing in hardwoods (includes basic limb lowering)
   EC-3. Pruning and/or limbing in conifers (includes basic limb lowering)
   EC-4. Advanced rigging and heavy wood removal (topping/ tree removal)
2. Specific endorsements are valid for a period of 3 years, unless revoked earlier.

4.5.21 Prerequisites for chain saw **users**

1. Only those individuals certified as a Tree Climber or Tree Climbing Instructor will be eligible to obtain a Chainsaw Endorsement.
2. Endorsement categories EC-1, EC-2 and EC-3 require a minimum "B" sawyer certification.
3. Endorsement category EC-4 requires the following:
   a. Minimum "C" sawyer certification.
   b. Hazard tree assessment training.
   c. Certification from a nationally recognized Arborist organization [see FSH 6709.12-2001-2, Section 18.3(4)]

4.5.22 Prerequisites for chain saw **instructors**

1. Instructors for all endorsement categories (EC-1,2,3,4) must hold a valid Tree Climbing Instructor certificate, and hold a valid "C" sawyer certification.
2. In addition, in order to train individuals in endorsement category EC-4, Instructors must obtain relevant training and certification from a nationally recognized Arborist organization. [see FSH 6709.12-2001-2, Section 18.3(4)]

4.5.3 Equipment

1. Chain saws shall be clean and in good operating condition with the following minimum safety features: chain brake, chain catch, spark arrestor, and throttle lockout. A low-kickback chain is recommended, and should be used.

2. The following Proper Personal Protective Equipment shall be worn while operating a chain saw in the tree.
   a. Eye protection
   b. Hearing protection
   c. Climbing helmet
   d. Gloves
   e. Boots made of heavy leather or other cut resistant material
   f. Leg protection- because the leg straps of the standard Forest Service chain saw chaps could get hung on branch stubs while climbing, chain saw protective pants or protective inserts for the legs are acceptable alternatives. All chainsaw protective garments shall meet the intent of Forest Service Specification 6170-4F.

4.5.4 Working in the Tree

1. The climber shall have secure footing when starting the chain saw and the chain brake shall be engaged.
2. While a climber is working in a tree, the chain saw shall be tethered to the tree or to the climber at all times to prevent it from falling. Chain saws weighing more than 15 pounds service weight shall be supported by a separate line not attached to the climber. Breakaway chain saw lanyards are commercially available for saws weighing 15 pounds or less and will break at 200 to 250 pounds of force when snagged by a falling branch.

3. When using a chain saw in a tree, the climber shall be secured to the tree with a minimum of two systems. One of the systems shall be cut resistant (steel-core lanyard or chain); the other system should be an attached safety, climbing, or rappel line. Care should be taken to keep slack out of lanyards and/or the climbing system, and to keep all lines clear of falling limbs or tops.
4. When topping or trimming a large section of a tree, or in tree species that readily "barber chair", a securing system (log chain, ratchet strap, etc.) should be used around the bole of the tree just above, and below where the cut is to be made.
5. The chain brake shall be engaged and the operator's hand shall be off the throttle while the climber is moving between work locations in the tree. The saw need not be stopped between cuts during consecutive cutting operations where there is secure footing. The engine shall be stopped when the climber makes long moves in a tree (such as when the climber has to release the lanyard to move).
6. Climber shall maintain a firm grip on the saw with both hands when sawing. Keep the thumb encircling both handles to avoid losing control in the event of kickback.
7. Care shall be taken to keep ropes, lanyards and your body, positioned out of the cutting or kickback zone - especially when making plunge cuts.
8. Climbers shall always be fully aware of cutting zone, and shall never make "blind cuts" where the saw can come in contact with the climbing line or work-positioning lanyard.
9. When carrying a rappel line and a chain saw up a tree, climbers shall attach the saw on the opposite side of their belt from the rappel line to avoid damaging the rope.
10. When repositioning the saw, or when contact may be made with a lanyard or climbing line, the chain brake shall be engaged. NEVER cut across a lanyard or rope.
11. See FSH 6709.11, Health and Safety Code Handbook, Section 22.48, Chain Saw Operations for related information.

Page 50
Figure 5k – The Hip Thrust Method (replace with following figure)

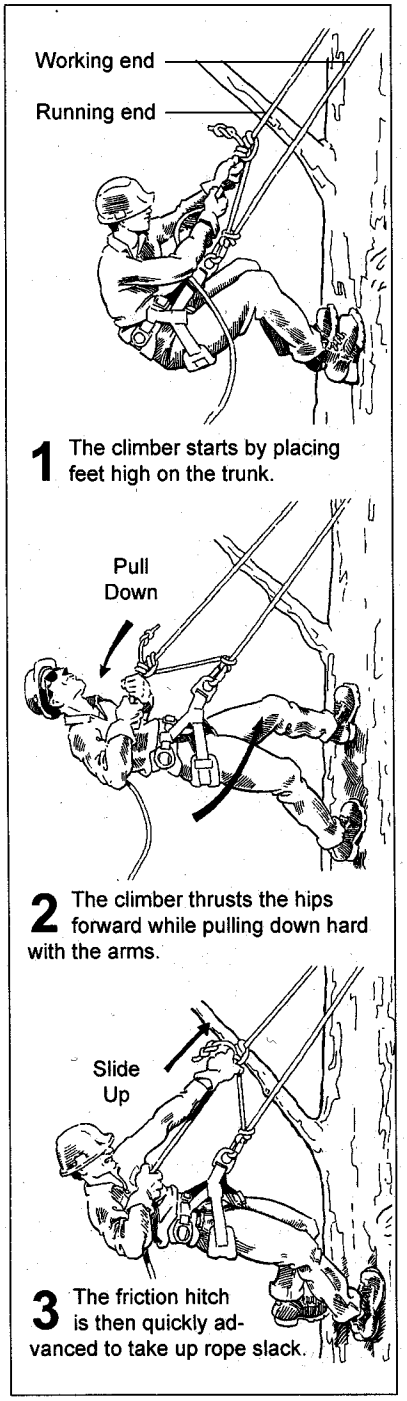

Illustration from *The Tree Climber's Companion*, 2nd Edition, by Jeff Jepson; used by permission.

Page 51
Figure 5l – The secured footlock method (replace with the following figure)

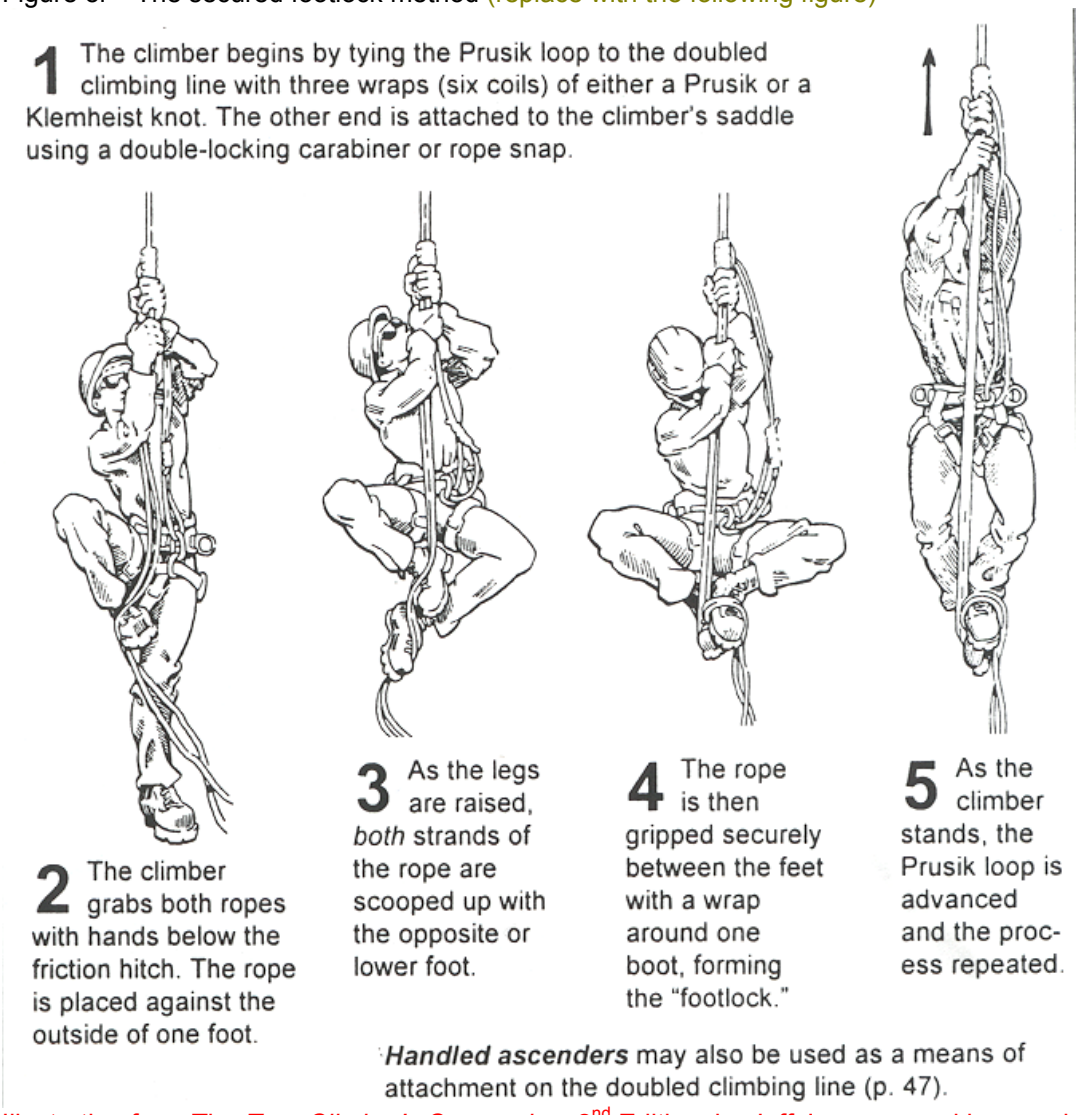

Illustration from The *Tree Climber's Companion*, 2nd Edition, by Jeff Jepson; used by permission

6.3 Figure-Eight Descenders

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Use the larger figure-eight descenders with "ears" for tree climbing rescue applications (figure 6c).

6.3.1 Advantages of Figure-Eight Descenders

• Widely used. Most climbers are familiar with their use.

• Rescue-8 style with top-mounted ears handles doubled rope applications well

• Recreational-8 style can be utilized in secured footlock climbing to allow safe descent capability.

• Rescue-8 stlye with side-mounted ears offers ability to vary friction while in use. Works especially well with single ropes.

6.3.2 Disadvantages of Figure-Eight Descenders

• Provide limited variations for adjusting friction.

• With the exception of the Rescue-8 style with side-mounted ears, friction cannot be varied significantly while under load.

• With the exception of the Rescue-8 style with side-mounted ears, lockoff procedures can be somewhat difficult.

• Friction cannot be varied significantly while under load.
• May not provide an appropriate amount of friction with some ropes or for some uses.
• Can twist and kink some types of ropes.
• Must be detached from the harness during rigging.
• The exposed friction mechanism can entrap loose clothing or long hair.
• Care must be exercised to avoid over-heating smaller units such as the recreational-8 style.
• Rescue-8 style with side-mounted ears may be awkward to operate unless mounted with ears oriented toward the rappelers' braking hand.

Figure 6c – Figure-8 Descenders. (replace figure with the following)

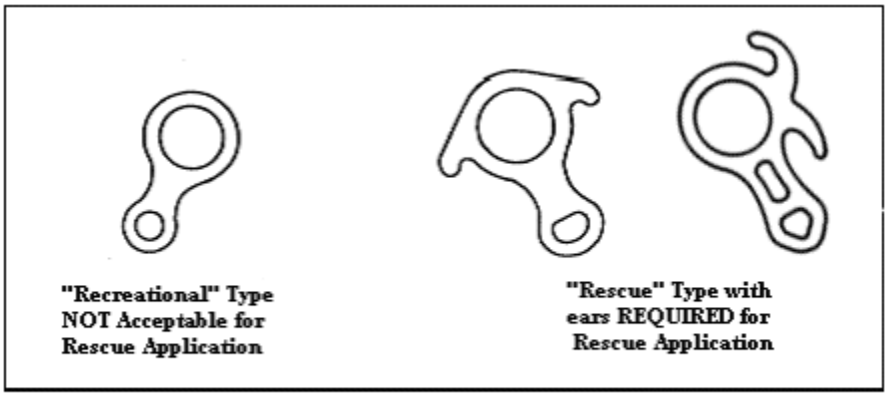

Figure 6c—Figure-eight descenders.

6.3.3 Procedures for Using Figure-Eight Descenders
page 62
3D. Wrapping the rope over the top side-mounted ear.
4E. Unwrapping the rope from over the top side-mounted ear.
5B. …pass it between the standing part of the rope and the top of the figure-eight descender. When using the Rescue-8 with side-mounted ears style descender, wrap one complete turn around both side-mounted ears prior to passing the running part of the rope between the standing part of the rope and the top of the figure-eight descender. This wrap secures the device, preventing loss of braking action while completing lockoff procedures.
5C….as you bring the running part of the rope up toward the figure-eight descender. When using the Rescue-8 with side-mounted ears style descender, if the running part of the rope is fully wrapped around both side-mounted ears, this step occurs in a controlled manner. No reduction in braking action occurs as you bring the running part of the rope up toward the descender.
5G…There will be a slightly audible "pop" and a slight bump as the rope unlocks from the rappel device. When using the Rescue-8 with side-mounted ears style descender, control of braking action is improved by the full wrap around both side-mounted ears. Gradual reduction of friction is attained by gradual removal of this wrap after pulling the rope back into the rappel position.

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6.5 Prusik System
The Prusik system is widely used by arborists and can be used effectively in tree improvement work. Make sure that the Prusik knot will work properly on a new rope. Always break in a new rope before use by

running the rope through the Prusik knot until the knot grabs when under tension.
NOTE: The Prusik system is the only system that REQUIRES the rope to be looped around the tree. The system uses the friction of the rope against the tree to operate properly. Never attempt to use a tree-crotch lanyard with the Prusik rappel system.

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Figure 6o—Rigging the Prusik system—standard method. (replace figure with the following)

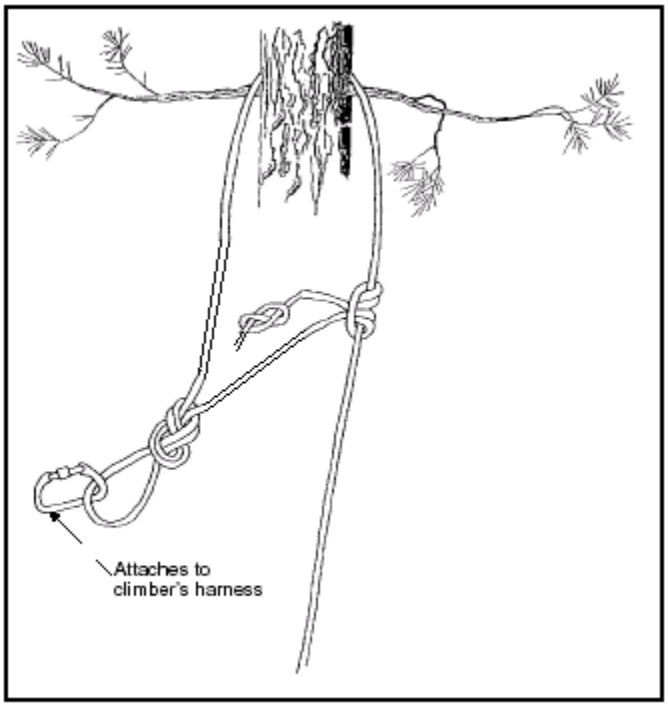

Figure 6o—Rigging the Prusik system—standard method.

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7.1.1 Recommended Items for the Rescue Pack
14. A rope suitable for rescue (if not included with basic climbing equipment (See Section 2.1)

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All equipment used for climber support shall have a minimum breaking strength of 5,400 pounds. meet or exceed, ANSI standards for breaking strength. This requirement is consistent with search and rescue requirements for a 15:1 safety margin. Haul lines should be capable of supporting items being hauled into the tree and lowered from the tree without exceeding their working-load limits.

8.1 Carabiners and Screw Links
Carabiners shall be the locking D-type. Both carabiners and screw links shall have a minimum breaking strength of 5,400 pounds. Carabiners used in life support applications shall be of the self-closing positive-locking type, and along with screw links, shall have a minimum tensile strength of 5,000 pounds. Standard one-quarter-turn, twistlock carabiners do not have a positive-locking mechanism and shall not be used in life support applications.

8.5 Webbing

It is acceptable to use webbing with less strength if the safety strap or sling is constructed to form a finished product with at least a 5,400-pound minimum breaking strength (figure 3a q).

8.6 Miscellaneous Hardware **(replace existing text with the following)**

Other miscellaneous hardware used for life support in tree climbing work shall have a minimum breaking strength of 5,000 pounds, thereby meeting or exceeding ANSI standards.

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Climbing Equipment Manufacturers and Distributors (add the following manufacturer in the format currently in the Guide)

New Tribe
5517 Riverbanks Rd.
Grants Pass, OR 97527
Phone: 866-223-3371

Harnesses, lanyards, ropes, carabiners, rappelling devices, ascenders, miscellaneous recreational climbing equipment.

Inside Back Cover 5th paragraph

For additional technical information, contact Dennis Davis at the address above.

For information regarding this publication, contact Dennis Davis at the address above.