



## PCTA Trail Skills College Curriculum Instructor Planning Guide



# Course 103. Basic Saw Crew Training

Are you interested in helping certified sawyers to clear trails, but don't have much experience working with or around saws? Regardless if you aim to become a certified sawyer yourself, learning to be a safety-conscience saw crew member is an important place to start. This class provides field experience with crosscut saws and axes, but most of the principles are also applicable to chainsaws. Therefore, this class is the place to start, no matter what trail clearing tools you expect to use in the future. The session begins with an introduction to crosscut saws and axes of various types, and how they work. It then covers their safe and effective use, including a review of trail clearing specifications, safety equipment, the forces of tension and bind, and the practice of situational awareness. This class is an introduction; it does NOT provide saw certification, which is required for those who wish to be lead sawyers.

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### STUDENT SKILL OUTCOMES:

- “Trail Eyes” to see the PCT trail corridor and clearing limits
- Safe use of crosscut saws and axes, including commitment to PPE
- Effective sawing and chopping skills that maximize efficiency
- A commitment to saw and axe Safety Awareness, specifically situational awareness

### KEY TERMS:

Trail Corridor, Clearing Limits, Blow Down, Log Out, Kerf, Cutters, Rakers, Bucking, Underbucking, Situational Awareness, Go/No Go

### TRAIL MAXIMS:

“Keep the saw out of the dirt, out of the dirt, out of the dirt.” “Treat your saw well and it will sing for you; treat it poorly and it will be your misery whip.” “Listen carefully to the saw, log, and your fellow sawyer—they are the best teachers.”

### TOOLS NEEDED PER 8 STUDENTS:

crosscut saws (2-3), plastic wedges (4-6), handsaw (2), axes (4), sledge hammer (1-2), pulaskis (2), underbucker, if available, flagging tape or pin flags, measuring tape.

### WORK SITE REQUIREMENTS:

One mile of trail, ideally near the trailhead, that includes a wide variety of logs to cut. A mix of green, dead, on the ground, suspended, multiples, large & small diameter, etc. is needed to demonstrate the range of techniques. Ideally something scary to walk away from.

### KEY CONCEPTS:

- 1) Safety Documents and Concerns:
  - Personal Protective Equipment (PPE), Job Hazard Analysis (JHA)/ Tailgate Safety Session (TSS), Emergency Action Plan (EAP)
- 2) Trail Crew Leave No Trace: Have a positive impact on the land through trail work and be sensitive to off trail and camping impacts.
- 3) Proper/ Improper Tool Care and Use:
  - Hand saw, Pulaski, axe, sledge hammer, wedge, crosscut saw
- 4) Develop “Trail Eyes”:
  - Visualize trail corridor large enough for delivery truck to pass through
  - Standard clearing limits:
    - 3' wide up to knee height, 8' wide up to 10' height
    - Typical alterations for wet/ dry conditions
- 5) Crosscut Saw Information:
  - Situational Awareness
  - Recognize and safely remove spring poles, assess overhead hazards, escape routes
  - Tension, Compression, and Side Binds
    - Sawing process:
      - Designate a lead sawyer and assign duties
      - Decide location of cut and remove limbs/ bark from cutting area
      - Smooth pulling strokes with good communication between sawyers
  - Techniques to avoid pinching > Compound cuts, cross or top wedge, underbucking, lever poles
  - Remove any logs obstructing flow of outfall ditches
- 6) Report work promptly

## BACKGROUND

 **Safety Awareness:** During the Tailgate Safety Session discuss at minimum the following **log out** dangers: overhead hazards, spring poles, sharp saws and axes, back strain. Here are links to JHA's for crosscut and chain saw work: [www.pcta.org/pdf/JHA\\_PCTA\\_Crosscut.pdf](http://www.pcta.org/pdf/JHA_PCTA_Crosscut.pdf) and [www.pcta.org/pdf/JHA\\_PCTA\\_Chainsaws.pdf](http://www.pcta.org/pdf/JHA_PCTA_Chainsaws.pdf)

Insist that students develop a keen awareness of overhead hazards such as **widow makers**, especially common in the vicinity of **blow down** that have left limbs hanging above. Make sure that before they start work on any task they first look up, and then examine how the wind or their work on the ground might bring something deadly down from above. This of course applies to all trail work and even to setting up camp, especially tents. Many people have died or been severely injured by widow makers.

Next, clear a safe work area free of tripping hazards and identify cleared escape routes.

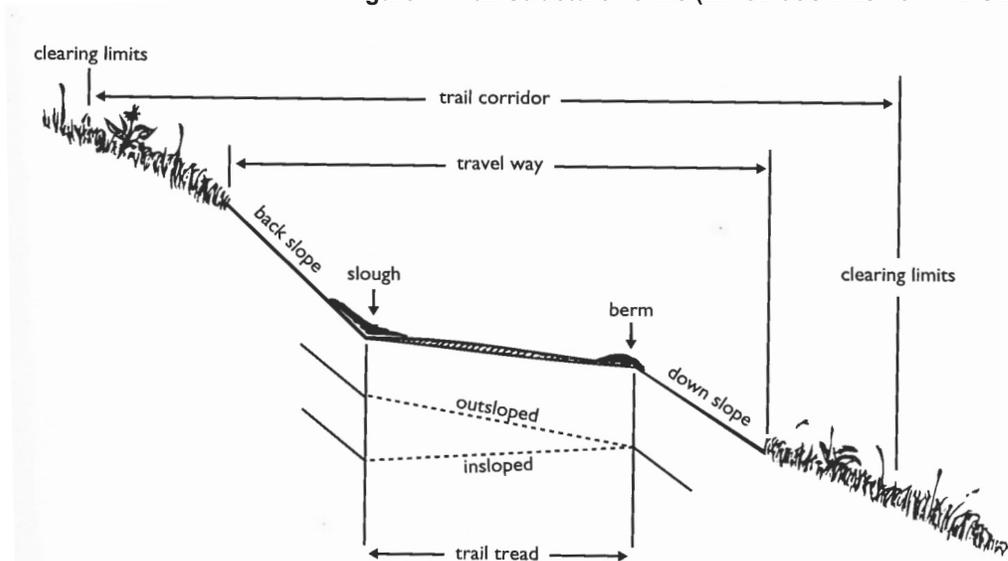
As you work with students, discuss other log out hazards, most of which fall under the heading of **Situational Awareness**. The following link provides an excellent review of the many critical hazards to consider when working with crosscuts and chain saws. ([www.fhwa.dot.gov/environment/fspubs/04232822/page16.htm#sit](http://www.fhwa.dot.gov/environment/fspubs/04232822/page16.htm#sit))

Be sure you are familiar with all of them and can impart awareness of them when approaching logs to chop or saw.

### Trail Eyes:

Students must learn to see the PCT **Trail Corridor** stretching out ahead as a long tunnel, large enough to accommodate a string of loaded **Packstock**. If they have not been around **Pack Strings** it is difficult to understand just how much of logs need to be removed. One long-time crew leader encourages new trail workers to imagine trail corridors large enough for a delivery truck to pass through, since the the dimensions of a such a truck are about 8'x10'.

Figure 1. Trail Structure Terms (IMAGE COURTESY OF THE SCA)



**Trail Crew Leave No Trace:** Students may protest, 'Our job is to leave a trace.' It's true that trail work has an impact on the land... but the work that is completed is meant to reduce overall impacts on the land. There are ways to bring Leave No Trace ethics into all the work completed on the trail, including how we go about completing projects, where we choose to camp and take breaks, and how the crew behaves in relation to other visitors and wildlife. It is important that we foster a Leave No Trace ethic since we are a model for other public land users and are in the position to influence other's behavior.

- Be respectful of other visitors: minimize visual impacts, hide brush whenever possible, store tools and take breaks off the trail, and never leave stubs (AKA staubs, pungy sticks) when brushing.
- Travel and take breaks on durable surfaces: keep off trail disturbance to a minimum

- Dispose of waste properly: pack out garbage you find or create, and dispose human & pet waste properly.

**Quality Work:** When logging out on the PCT clear blow down to the following **Clearing Limits:** 3' wide up to 24" (knee height), 8' wide from 24" up to 10'. Below the knee, leave enough obstacles close-in to prevent tread widening beyond 3' width and block OHV incursions. Show students that their arm span, finger tip to finger tip, is equal to their height and thus allows them to calculate eight feet easily by adding whatever amount is needed beyond their finger tips. Similarly, holding a tool outstretched overhead can allow an approximation of ten feet. Most knees are about 24" high and three feet can be estimated using a pulaski or half an arm span.

Additional clearing width may be needed to safely accommodate pack strings on steep side slopes and sharp corners where horses tied together need extra room. Also, if severe blow down has stacked logs many feet high, it is a good idea to widen clearing limits so that as the logs settle over years they don't slip into the trail corridor. The same goes for logs uphill of the trail on steep side slopes. Such logs might slide into the trail corridor over time, especially in areas with significant snow pack.

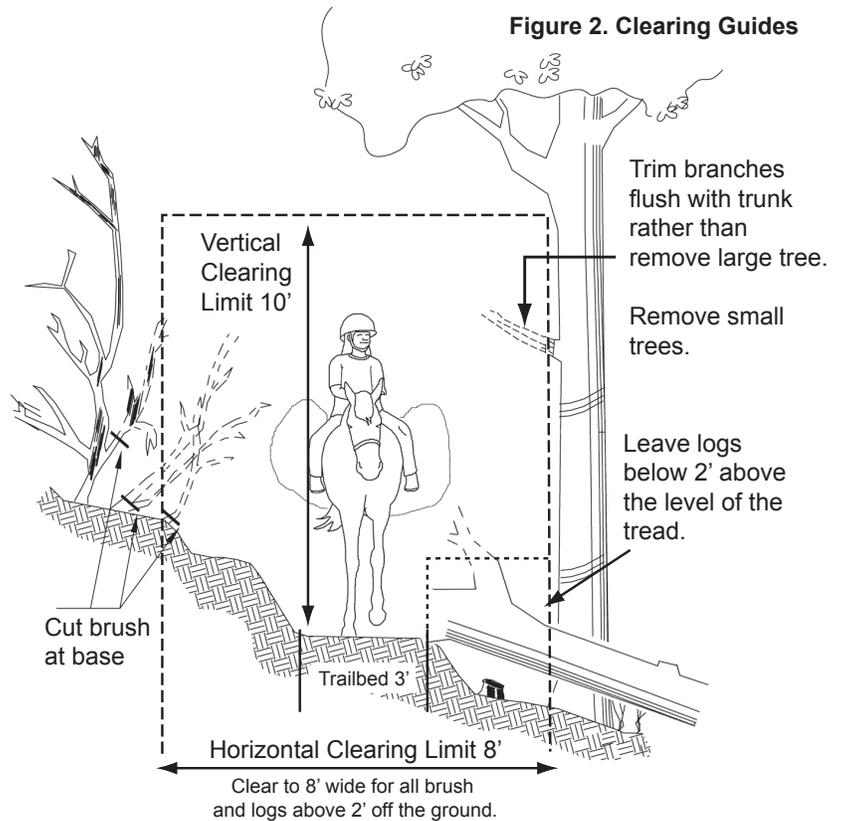
Stress that while clearing trail it is essential to remove any fallen logs that obstruct outfall ditches. The drainage crew that follows will not have a saw or time to cut logs. If such logs are left, they will clog the drainage causing erosion in the trail. This is one of the most overlooked tasks by log out crews because they are so focused on the trail and fail to see drainages blocked by logs.

👁️ Finally, require that students assess the clearing limits of logs cut in previous years and cut again any that are more than six inches inside. On tight corners and steep side slopes the tolerance should be zero.

**Axe Chopping:** Emphasize a solid but relaxed wide stance. Before chopping limbs and small logs, announce "swinging" and check to be sure no one is around you before swinging the axe.

For safety, chop limbs standing on the far side of the log. If chopping through a log, cut a 45 degree opening two times the diameter of the log.

**Figure 2. Clearing Guides**



*\* These are general trail-wide clearing guidelines. Please work with your local land manager to determine if different guidelines are used in your local area.*

**Figure 3. Limbing (IMAGE COURTESY OF THE SCA)**



**Crosscut Sawing:** Where you plan to cut, use an axe to remove any thick bark that may hold windblown grit that would dull the saw. Designate a lead sawyer, usually the person in the more secure and comfortable (uphill) position. Set the middle of the saw on the log and agree who will pull first, starting with short strokes to get a kerf established—an extra hand can help with this. Use a broad comfortable stance beside the saw that allows you to use a rocking motion of your whole body along with the arms to pull the saw. If you just use your arms, you will tire rapidly. Never stand or sit such that the saw blade is drawn over your leg! 🚚

Use long smooth strokes, only pulling. Never jerk the saw back from your partner's hands, nor pull their hands into the log. Seek a gentle steady rhythm. After a few minutes of sawing, rest and ask your partner if there is anything that you can do to make the work more comfortable and effective for them. Courteous COMMUNICATION between sawyers is key.

Discuss binds.

Figure 4. Chopping through logs (top) and using an ax for limbing (bottom). (IMAGE COURTESY OF THE USFS)

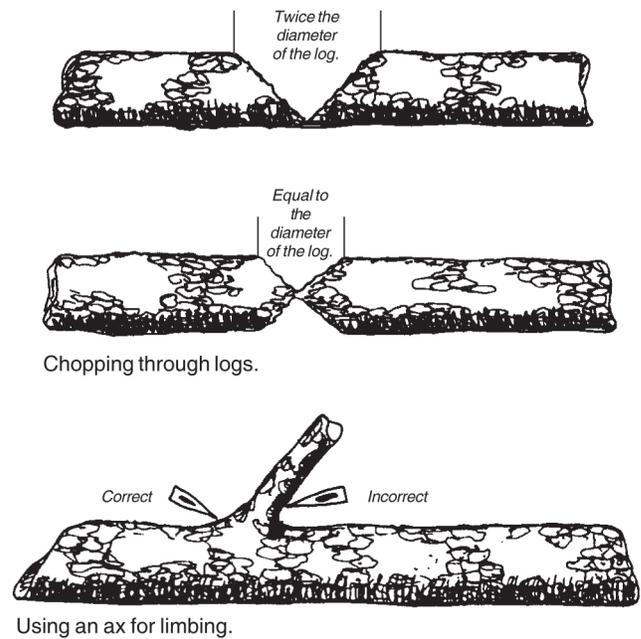
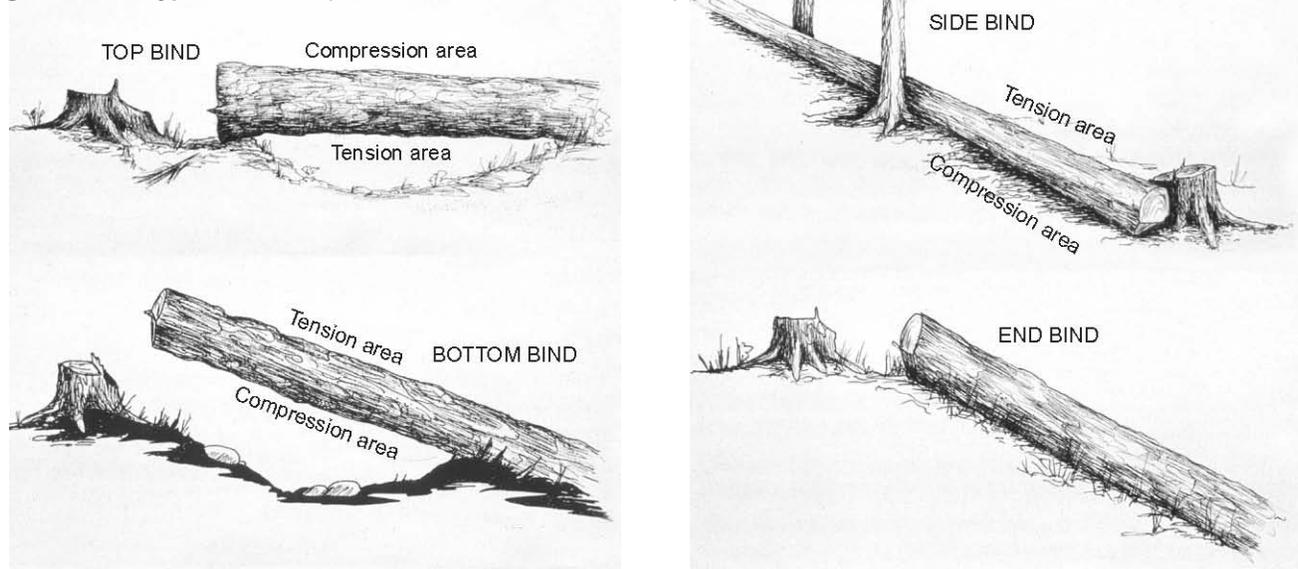


Figure 5. Four types of binds. (IMAGE COURTESY OF THE USFS)



Try various techniques to avoid pinching the saw in a top bound log: top wedge, place a log or rock under log, use a lever pole, underbuck, cross wedge with axe to prevent twisting, and of course practice using wedges. Demonstrate angled (compound) cuts to let large chunks roll out, using a pivot log to easily change their direction. If only one cut, slide log, if possible, but keep tread narrow. Always carry and use plenty wedges (never less than three); you really don't want a stuck saw 10 miles from the trailhead. In areas that have pitchy logs, carry a bio-degradable solvent (such as citrisolv) to prevent gumming the saw.

Above all listen to the log as you cut and adjust plans accordingly. Cracking and popping indicate dangerous energy in the log that can kill an unsuspecting sawyer.

Review pages 34-45 in *Saws that Sing* to be sure you are up on all the bucking techniques for various binds. ([www.fhwa.dot.gov/environment/fspubs/04232822/index.htm](http://www.fhwa.dot.gov/environment/fspubs/04232822/index.htm))

## TEACHING TIPS & TECHNIQUES

We suggest keeping the group together to discuss Key Concepts 1-5, and possibly through item 8, if you wish. If not, cover items 6-8 in both groups to provide extra emphasis. Afterwards, divide the group to separate chopping and sawing instruction. It will be most efficient if all those who are new or inexperienced at chopping stay together, so already skilled choppers are not held back. Switch when half the time is up, or perhaps give the group new to chopping extra time.

**Tool Care:** Describe how a crosscut saw cuts and the many steps needed to sharpen it, just once a year. Hopefully this will help students understand why saws **MUST** be kept razor sharp all summer long. Protect saws with guards, store them clean, and never let them contact dirt. "Keep saws out of the dirt, out of the dirt, out of the dirt." "Treat your saw well and it will sing for you all summer long; treat it poorly and it will be your misery whip."

Never lay an unsheathed saw on the ground where it can be accidentally stepped on. Lay it over a log with the teeth pointing away from the work site or lean it securely against a tree away from people, again with the teeth pointing away. Unless you can see the next log to cut just down the trail, put the saw back in its sheath for transport.

**Trail Eyes:** A new trail worker usually has difficulty seeing the trail corridor and noticing when blow down is inside the clearing limits. It is very common to see such a person walk past logs well inside trail clearing limits. One way to help students develop trail corridor eyes is to give each person 10-20 feet of flagging tape (or several pin flags) and assign them each a section of trail to flag blow

Figure 6. Three basic cuts. (IMAGE COURTESY OF THE USFS)

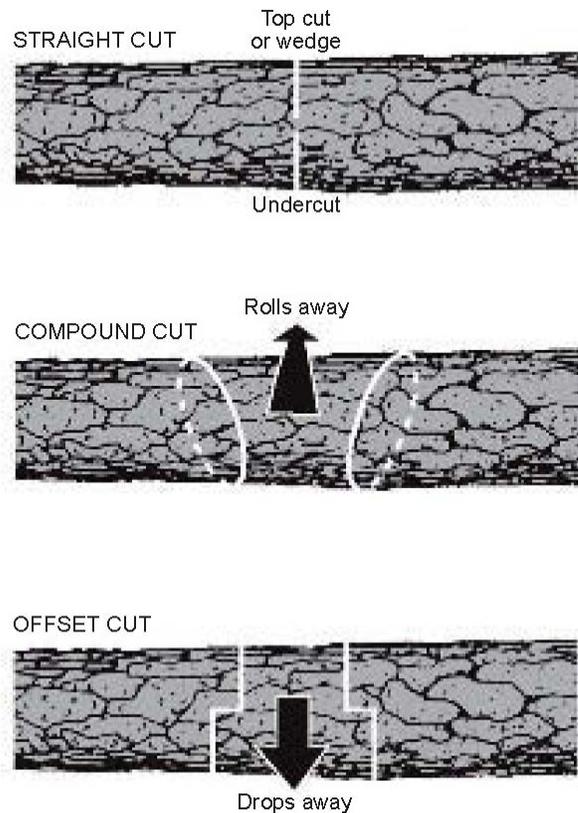
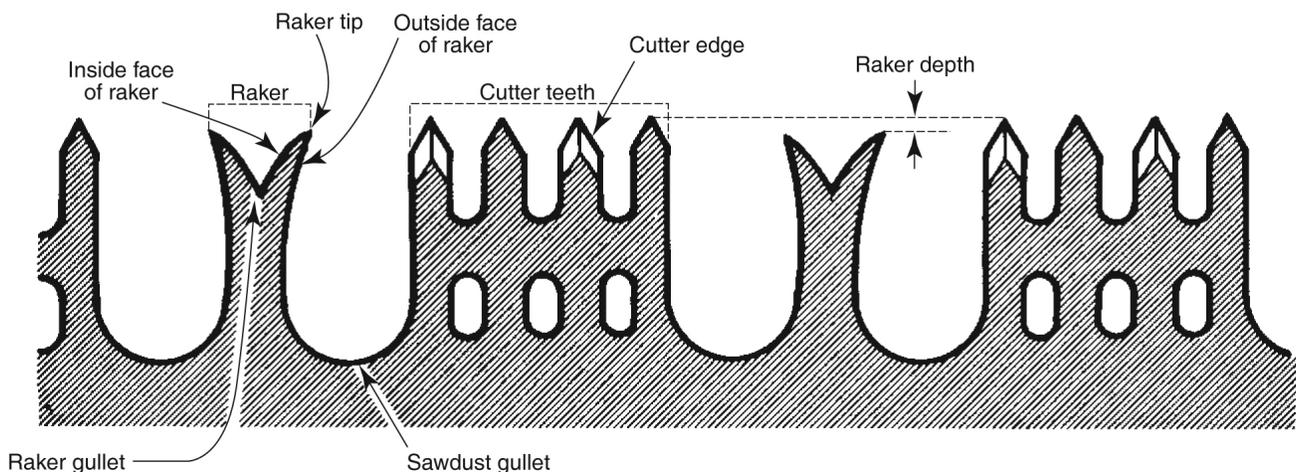


Figure 7. Parts of a crosscut saw. (IMAGE COURTESY OF THE USFS)



down that needs cutting. Encourage students to walk along trails with their arms outstretched to notice if logs are inside the clearing limits. Also ask them to flag previously cut logs that are still inside the clearing limits and also logs fallen across drainages. Instruct them to flag where they propose to make cuts. Carry some flags of your own of a different color and place them in the vicinity of logs they have missed.

Review their decisions as a group with each student explaining their choices. Take opportunities to discuss the finer points of evaluating where and how cuts should be made. Remind them to always consider two conflicting things when deciding where to make cuts: 1) the damage OHVs and horses can do if the trail is too wide; and 2) the disastrous pack string wrecks that can result if log out is too narrow, especially when they are carrying awkward tool loads to support trail crews. They need always to keep these two things in their mind's trail eye to stay motivated to make proper log out choices.

Finally have them remove the flagging. If you plan to use the same section again for flagging, obviously do not cut the logs. If not, have them go ahead and make the cuts.



**Safety Awareness:** If complex blow down is encountered, such as several logs stacked, or trees suspended over the trail, ask several students to survey the situation from one end of the trees to the other. Have them report back what they found and discuss the location and sequence of cuts to mitigate hazards.

Utilize **Go/No Go** analysis to determine if the work is beyond their safe skill level. Stress that many blow downs should be left to professionals because of hazards. Knowing when to walk away is the most important skill. David Michael, author of *Saws that Sing*, puts it, "Never attempt any action that is above your ability or if you are unsure of the probable outcome."

With high aptitude students you might choose to cut complex trees under your close supervision, but more likely simply demonstrate walking away. If you do make the cuts, stress that until they are certified, students should not try this at home. They'll need to work with other certified sawyers before they are ready for certification.

Refer curious students to the situational awareness link: [www.fhwa.dot.gov/environment/fspubs/04232822/page16.htm#sit](http://www.fhwa.dot.gov/environment/fspubs/04232822/page16.htm#sit)

**Quality Work:** Ideally, introduce crosscut sawing on static logs without binds, so

Figure 8. A protective sheath for a crosscut saw can be made of split fire hose. (IMAGE COURTESY OF THE SCA)

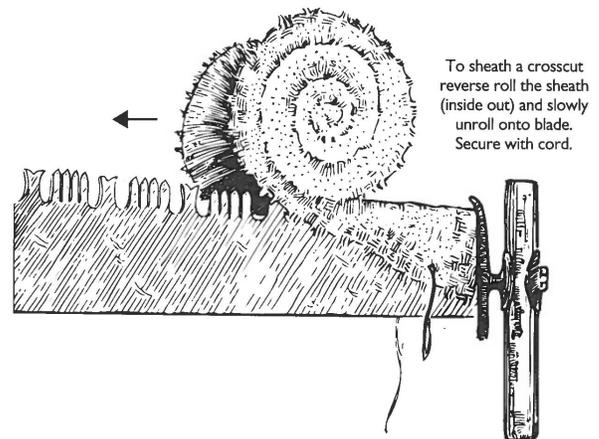
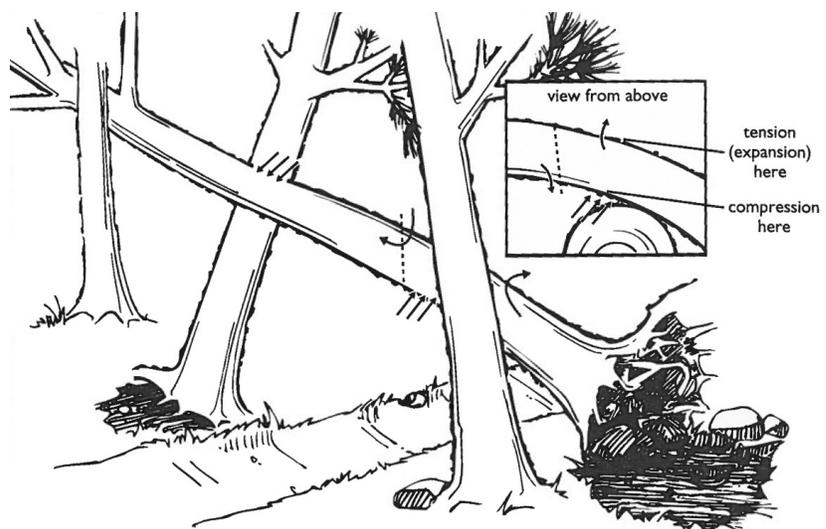


Figure 9. Interlacing. (IMAGE COURTESY OF THE SCA)



that students can focus on simple sawing technique. Only later introduce binds and techniques for mitigating them. For most basic log out tasks simply demonstrate techniques and then let students practice, critiquing as necessary. Then practice, practice, practice. Make sure that at least half the session is spent with students doing work. They need to learn with their brains and bodies.

If someone has never used an axe, have them first practice their swing with a sledge hammer either on the ground (seriously!) or aiming for a spot marked on a log. Only when they have a smooth swing, give them an axe, but have them use easy swings first to prevent glancing blows. Practice, practice, practice, with a little coaching now and then.

General Principles: For all tasks, demonstrate the proper stance and technique for each tool to minimize body strain. To reduce back strain bend the knees, have a powerful core, keep legs well apart, and use a rocking motion that uses the whole body.

Spring Poles: If you do not find a good spring pole on the section of trail you are working, carefully create one using a log to hold down a large sapling. Then demonstrate the proper way to release the tension safely. If it is reasonable to do so, set up several for others to try.

Reporting: Have students demonstrate how they would report any large logs or other problems encountered on the trail that they are not able to remedy.

Be sure that by the end of the class that all students have demonstrated the “Student Skill Outcomes” listed above.

## TRAIL FUN

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For a fun wrap-up do a fast-paced “Jeopardy”-style quiz based on the KEY CONCEPTS.

## REFERENCES

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*An Ax to Grind: a practical ax manual.* 1999. Bernie Weisgerber. USDA Forest Service. [www.fhwa.dot.gov/environment/fspubs/99232823/toc.htm](http://www.fhwa.dot.gov/environment/fspubs/99232823/toc.htm)

*Hand Tools for Trail Work.* 2005. USDA Forest Service. Includes material on tools for sawing and chopping. [www.fhwa.dot.gov/environment/fspubs/05232810/toc.htm](http://www.fhwa.dot.gov/environment/fspubs/05232810/toc.htm)

*Lightly on the Land: The SCA Trail Building and Maintenance Manual.* 2005. Robert Birkby. The Student Conservation Association and Mountaineers Books. Especially chapters 6,7, and 14.

*Saws that Sing.* 2007. David Michael. USDA Forest Service. [www.fhwa.dot.gov/environment/fspubs/04232822/index.htm](http://www.fhwa.dot.gov/environment/fspubs/04232822/index.htm) Excellent resource on crosscut saws.



## PCTA Trail Skills College Curriculum Field Reference



# Course 103. Basic Saw Crew Training

### STUDENT SKILL OUTCOMES:

- “Trail Eyes” to see the PCT trail corridor and clearing limits
- Safe use of crosscut saws and axes, including commitment to PPE
- Effective sawing and chopping skills that maximize efficiency
- A commitment to saw and axe Safety Awareness, specifically situational awareness

### KEY TERMS:

**Blow Down:** (aka **wind fall**) any trees fallen across a trail, though usually the result of high winds, most commonly in the winter storm season.

**Clearing Limits:** (aka **clearing specifications, trail specs**) exactly how wide and how high to cut tree limbs, shrubs, blow down and tree saplings to open the trail corridor for users. For the PCT, from the ground to 24” high, cut an opening 3’ wide. From 24” to 10’ cut an opening 8’ wide. This large corridor allows from some vegetation regrowth before packstock are obstructed. Other kinds of trails have different specifications.

**Design Parameters:** Specific guidelines for the design and construction of trails that are based on the intended users, trail class and difficulty level of the trail. See [http://www.fs.fed.us/recreation/Chapter\\_20.pdf](http://www.fs.fed.us/recreation/Chapter_20.pdf) (especially p. 16-19)

**Go/No Go:** analysis to determine if trail workers should proceed with a task or walk away to insure their safety. Crew leaders sometimes exercise such judgement for a group, but it is essential that every trail worker develop these critical thinking skills for times when they work on their own. Such analysis evaluates all the hazards present and balances them against the skills they have. For a decision to proceed, a trail worker should be able to predict with a high confidence level, exactly what will happen during the task (such as which way logs will move in a series of cuts in a pile up). If they are unable to predict the outcome with confidence they should walk away. The most important thing every trail worker needs to know is that it is totally OK, and they show the

very best judgement, when they walk away from danger without completing a task. Of course, it is essential to report the need for a more skilled crew to complete the hazardous work.

**Kerf:** the opening in a log cut by a saw. A wedge is often placed behind the saw to prevent the kerf from closing and pinching the blade.

**Log Out:** trail work removing blow down; usually in the spring to open the trail for high use season. In Wilderness areas the work is done with hand tools such as crosscut saws; while elsewhere it is usually done with chain saws.

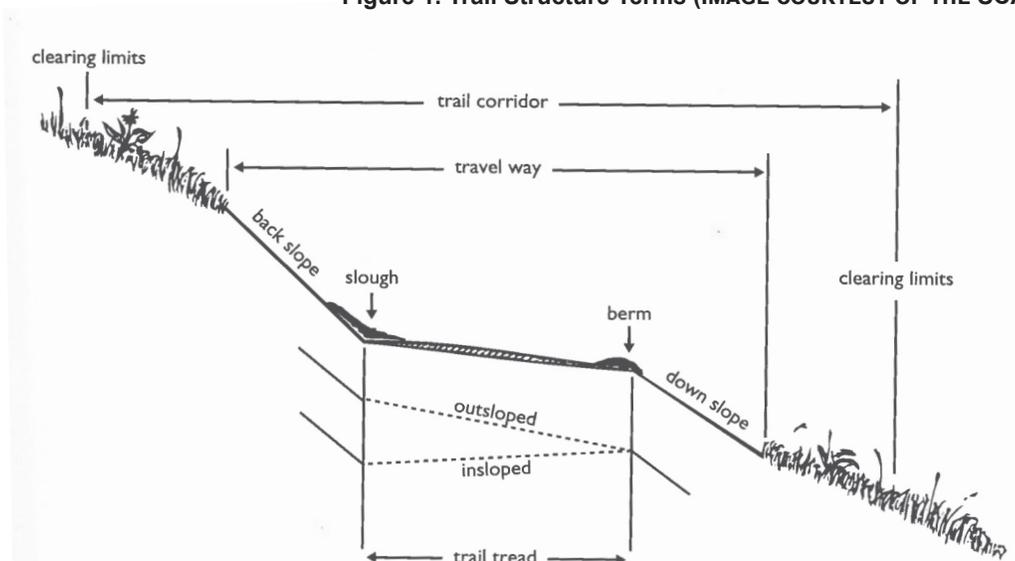
**Situational Awareness:** a subset of Safety Awareness that refers to safety concerns specific to crosscut and chain saws. <http://www.fhwa.dot.gov/environment/fspubs/04232822/page16.htm#sit>

**Trail Corridor:** (aka **travel corridor** or **trail prism**) best thought of as a tunnel through the woods, it includes all the elements of a trail affected by construction and maintenance workers including the excavated back-slope and tread, and the entire area within the clearing limits.

### KEY CONCEPTS:

- 1) Safety Documents and Concerns:
  - Personal Protective Equipment (PPE), Job Hazard Analysis (JHA)/ Tailgate Safety Session (TSS), Emergency Action Plan (EAP)
- 2) Trail Crew Leave No Trace: Have a positive impact on the land through trail work and be sensitive to off trail and camping impacts.
- 3) Proper/ Improper Tool Care and Use:
  - Hand saw, Pulaski, axe, sledge hammer, wedge, crosscut saw
- 4) Develop “Trail Eyes”:
  - Visualize trail corridor large enough for delivery truck to pass through
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    - Typical alterations for wet/ dry conditions
- 5) Crosscut Saw Information:

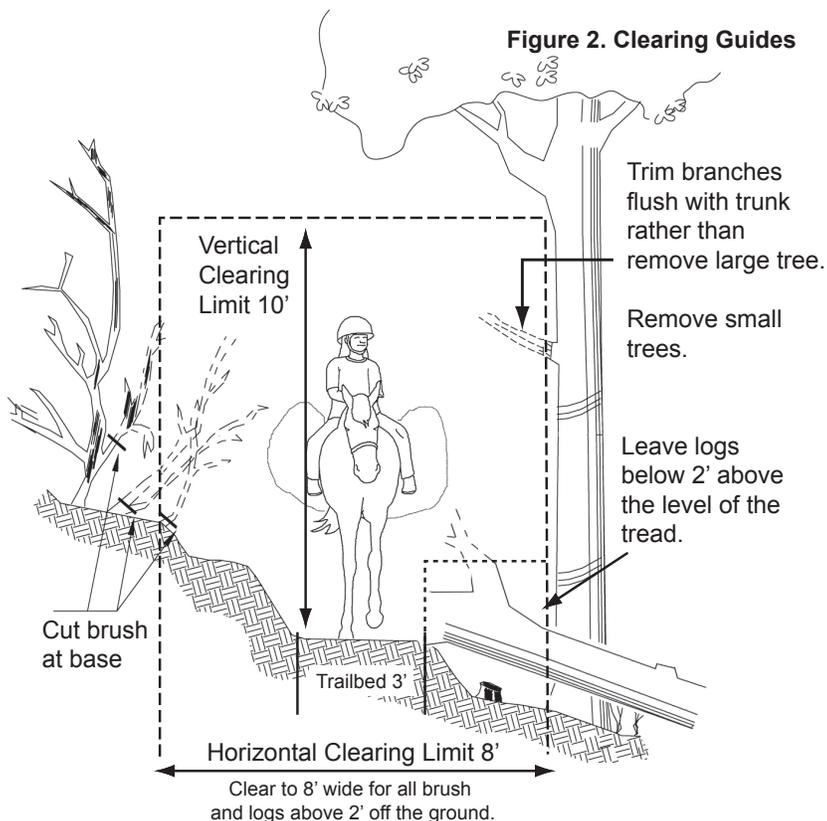
Figure 1. Trail Structure Terms (IMAGE COURTESY OF THE SCA)



- Situational Awareness
- Recognize and safely remove spring poles, assess overhead hazards, escape routes
- Tension, Compression, and Side Binds
  - Sawing process:
    - Designate a lead sawyer and assign duties
    - Decide location of cut and remove limbs/ bark from cutting area
    - Smooth pulling strokes with good communication between sawyers
- Techniques to avoid pinching
  - > Compound cuts, cross or top wedge, underbucking, lever poles
- Remove any logs obstructing flow of outfall ditches

6) Report work promptly

Figure 2. Clearing Guides

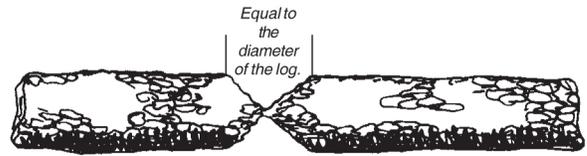
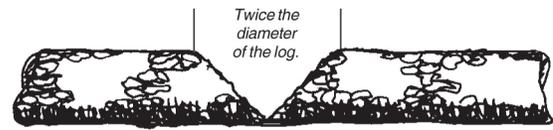


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Figure 3. Limbing (IMAGE COURTESY OF THE SCA)



Figure 4. Chopping through logs (top) and using an ax for limbing (bottom). (IMAGE COURTESY OF THE USFS)



Chopping through logs.



Using an ax for limbing.

Figure 5. Four types of binds. (IMAGE COURTESY OF THE USFS)

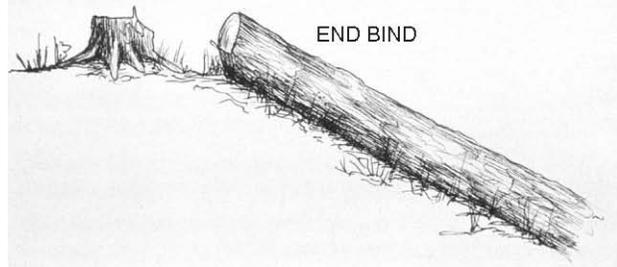
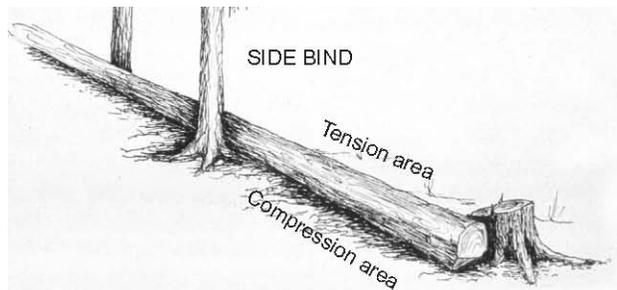
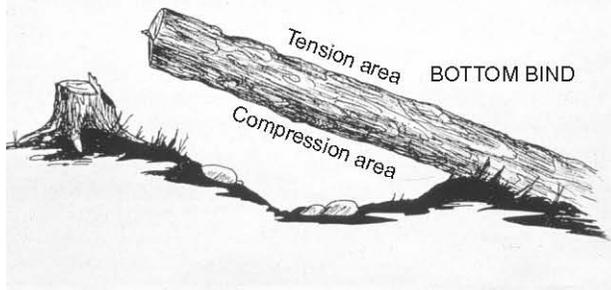
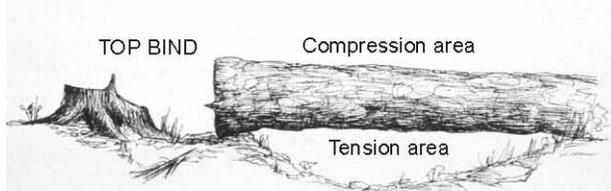


Figure 8. Three basic cuts. (IMAGE COURTESY OF THE USFS)

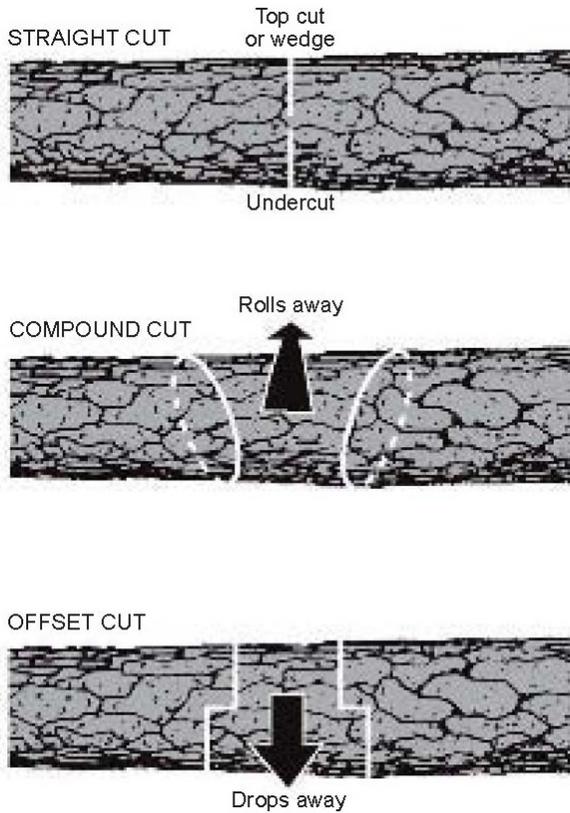


Figure 10. A protective sheath for a crosscut saw can be made of split fire hose. (IMAGE COURTESY OF THE SCA)

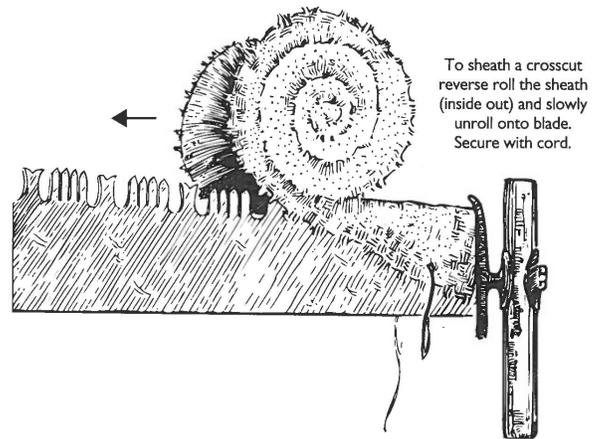


Figure 11. Interlacing. (IMAGE COURTESY OF THE SCA)

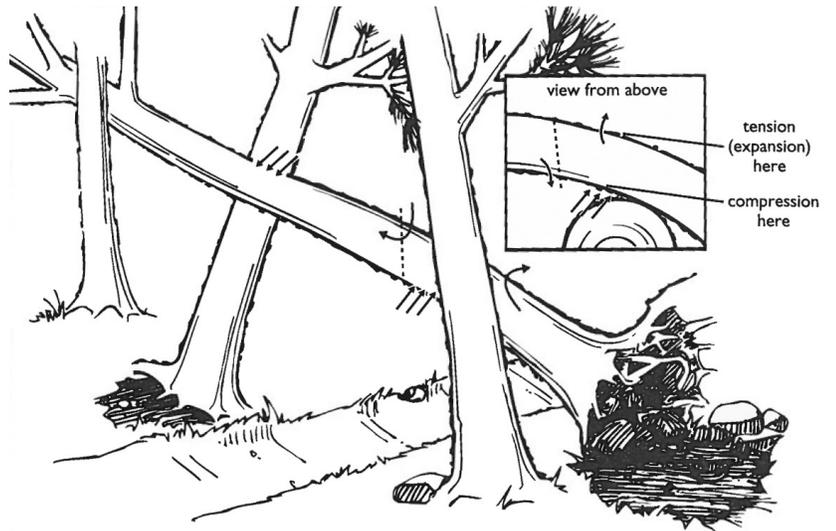


Figure 9. Parts of a crosscut saw. (IMAGE COURTESY OF THE USFS)

