

# USDA Forest Service National Sawyer Training: Developing Thinking Sawyers



## Student Guide: Prework

**USDA Forest Service National Sawyer Training**  
**Developing Thinking Sawyers**  
Module 3.1: Crosscut Saw Basics

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## Module 3.1: Crosscut Saw Basics

### Overview

Module 3.1 covers the basics of crosscut saws, how to care for them, and how to use them. This prework packet will introduce you to crosscut saws, their history, transportation, and maintenance.

### Prework Topics

- Saw history
- Saw grinds
- Transportation
- Maintenance

### Objectives

When you complete the full module during training, you will be able to:

- Explain why agencies use crosscut saws on federally designated wilderness areas.
- Describe the different types of saw grinds.
- Explain the different parts of a crosscut saw and how they function together.
- Describe the best saw transportation methods.
- Describe basic care and maintenance for crosscut saws.
- Describe how a crosscut saw cuts (removes wood).
- Explain the arc of the saw.
- Identify accompanying tools to a crosscut saw and describe their purposes.

### Introduction

#### History

While human progress and expansion accelerated across the west (both on and off Federal lands), there was also the recognition for a need to preserve and protect some landscapes from development and human influences. As early as 1910 to 1920, several agency advocates, including Arthur Carhart, Aldo Leopold, and Bob Marshall, began work to designate areas as wilderness on National Forest System lands.

After eight years and 66 revisions, Congress passed the Wilderness Act in 1964. The act created the National Preservation System, setting aside landscapes and protecting them from development. The act limited the types of human influences that can occur within congressionally designated wilderness areas.

The Wilderness Act legally mandates that we preserve the wilderness character of the landscape. Employees and partners of the agency who seek to understand why agency land

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managers are legally required to use traditional tools like the crosscut saw should review the Wilderness Act of 1964. The basis for traditional tools is rooted in section 4 (c) of the act:

*“...no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.”* (Code of Federal Regulations, 1964).

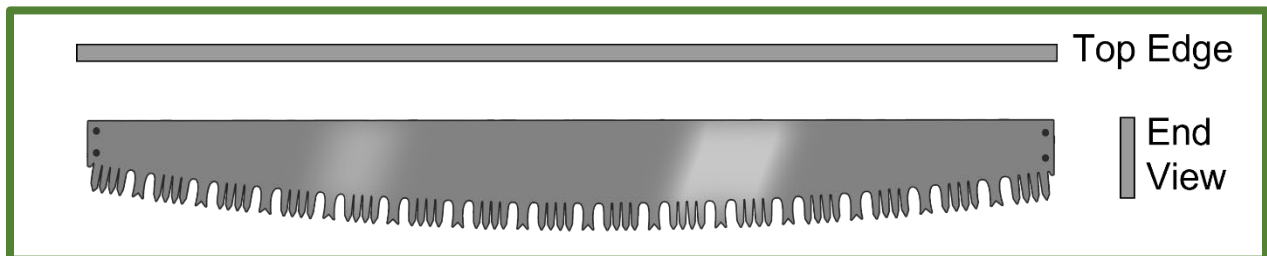
Today, there are 803 wilderness areas (111,687,310 acres) in 44 states and Puerto Rico. The Forest Service manages 448 of these wilderness areas—more than 36 million acres established under the Wilderness Act of 1964. If you are instructing or taking this class, you likely have management duties or on-the-ground responsibilities for a designated wilderness area.

### Saw Grinds

Saw manufacturers ground the sides of vintage saws in three different ways—flat, straight taper, and crescent taper. Each method affects the thickness of the saw in a particular way and has major implications for the overall quality of the saw.

#### Flat

Sawyers consider flat-ground saws (figure 3.1.1) the least desirable. The main disadvantage is that the saw rubs against the wood on either side of the kerf because of its thickness. It also takes more set—the cutter tooth's offset from the plane of the saw—to enable the saw to clear the kerf. For flat-ground saws, the kerf must be wider and therefore requires more energy to use.



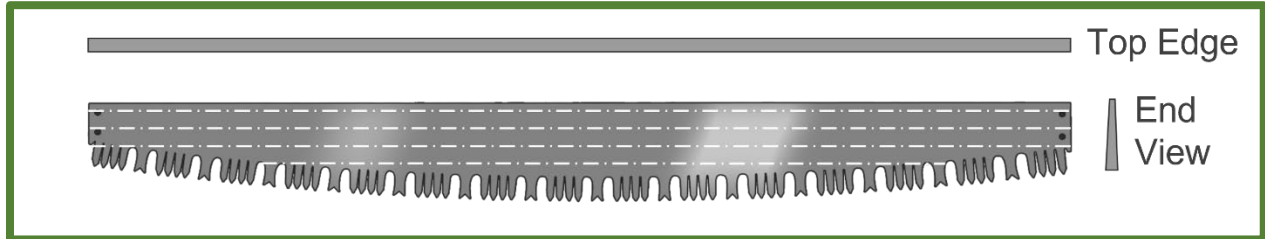
**Figure 3.1.1—Flat-ground saw.**

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### Straight Taper

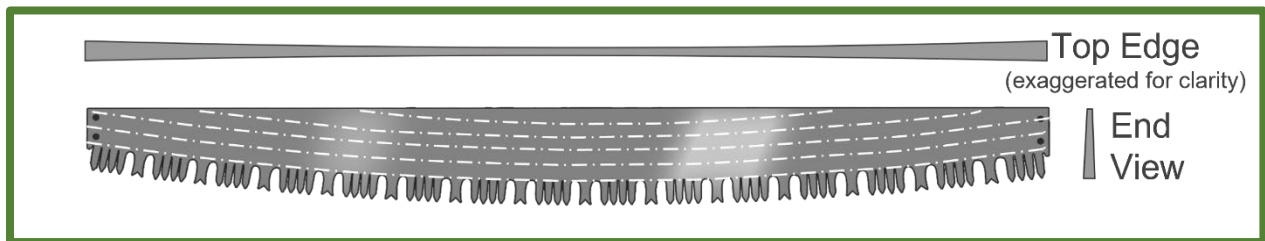
The teeth of straight-taper-ground saws (figure 3.1.2) are thicker near the center of the saw than along either end. Straight-taper-ground saws require less set than flat-ground saws and pull through the kerf with less friction.



**Figure 3.1.2—Straight-taper-ground saw.**

### Crescent Taper

The difference between the straight taper and crescent taper (figure 3.1.3) is that the lines of equal thickness for the straight-taper-ground saw are straight, and those for the crescent-taper-ground saw are concentric to the arc of the saw. This means that the teeth of the crescent-taper-ground-saw are all the same thickness, whereas the teeth of the straight-taper-ground saw are thicker toward the center of the saw.



**Figure 3.1.3—Crescent-taper-ground saw.**

Crescent-taper-ground saws are no longer in production. These saws provide the maximum cutting efficiency with the least amount of human effort. These saws are the pinnacle of ergonomic design. While you should properly care for all the saws in your organization's tool cache, you should care for these saws above all others.

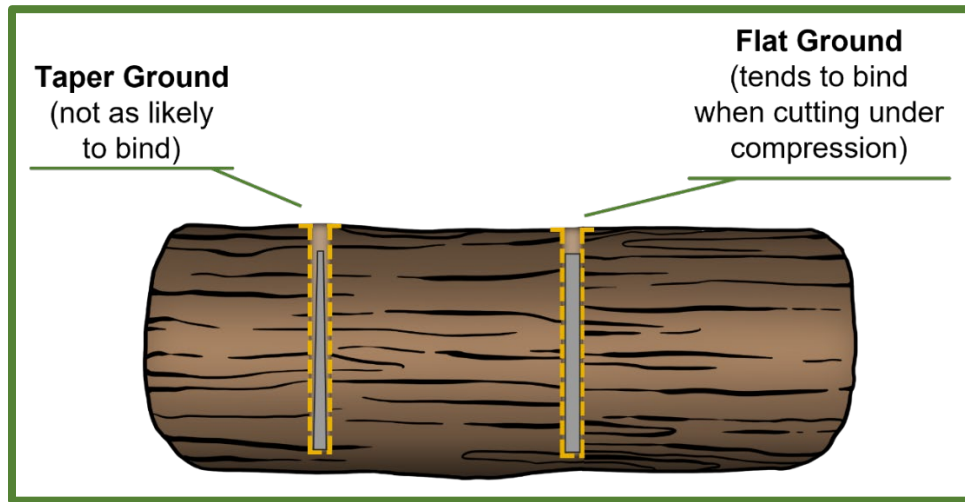
Saw manufacturing companies called crescent-taper-ground saws by many different names: crescent ground (Simonds), improved ground (Disston), and segment ground (Atkins). Other names included precision ground and arc ground.

The thinnest part of a crescent-taper-ground saw is at the back center, which is often four or five gauges thinner than the teeth. If you hold one of these saws and sight down its back, you can see the taper. You can **feel** the change in thickness. Crescent-taper-ground saws offer the most clearance in the kerf of any of the grinds (figure 3.1.4). These saws have the least friction resistance in the kerf and require the least amount of set, allowing the narrowest kerf.



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**Figure 3.1.4—Taper depictions.**

## Transportation

Saws are difficult to transport because they are long and flexible. You must handle them in a manner that will not damage the saw. Always cover saws with a sheath when transporting them and take care to avoid damage to equipment and property or injury to people or livestock.

You can bend a vintage saw to make it easier for hikers or pack stock to carry; however, do not bend a vintage saw that has a kink or nick. Modern crosscut saws are made from softer metal, and therefore you should not bend them. The softer metal will hold the bend and will require a filer to straighten the saw before you use it again.

Saws may need several types of protection because crews may transport them on foot; or by boat, plane, helicopter, truck, dog sled, or pack stock; or even drop them by parachute during different legs of a journey.

## Boats

Crews may carry crosscut saws by boat, particularly in Alaska. When a saw is carried as general cargo in large boats, you should sandwich the saw between plywood and lay it flat, if possible. On many boats, the saw may be kept out of the way if it is stored along the gunwales.

In open skiffs, where space limitations preclude using a rigid plywood sheath, remove the saw handles and place the saw on top of other cargo with only the teeth sheathed. These boats can take on a lot of spray from the salty ocean water, which causes rust. Once the saw is on land, remove the sheath and rinse off any salt with fresh water.

When transporting a saw by canoe or kayak, remove its handles and place it in a rubber-lined hose sheath. Secure the saw by tying parachute cord through the handle holes and then tying it to the canoe or kayak. In kayaks, it is best to secure the saw to the bow, where you can see the saw. In canoes, carry saws in the center on the floor.

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### Aircraft

In small aircraft, firehose sheaths provide the most flexibility and allow the saw to fit in tight quarters (figure 3.1.5). Cargo and passengers must be separated in small aircraft (typically with a nylon net). Therefore, the sheathed saw can sometimes lie flat; other times you may need to bend the saw into a loop. When you bend a saw, the handles are normally left on and tied together. However, in small aircraft, the handles often get in the way. To avoid this, remove the handles, bend the saw into a loop, and secure the ends of the saw with wire through the handle holes.

When carrying saws aboard helicopters, crewmembers must exercise great care to ensure the saws do not stick up into the helicopter rotor. Saws can also be transported in external sling loads—cargo nets, bags, or slings—on helicopters. If other pieces of rigid cargo are long like a crosscut saw, you can sandwich the saw in plywood and secure it to the long, rigid cargo.



**Figure 3.1.5—Sheathed saw on tarmac.**

**NOTE:**

You should avoid bending saws into a loop as much as possible. If a saw has unseen damage, the added stress of looping for transportation may break the saw. In addition to the potential loss of a vintage saw, this technique poses a hazard to the saw packer as well, should the saw suddenly break.

Tying saws in a loop makes them prone to damage or breakage. Bending the saw around a solid object is better than bending it around a soft object, such as a duffel bag. One way to reduce breakage is to bend the saw around a box. Place the box in the middle of the sling bag with the saw ends down. Stack other materials around the saw but avoid stacking a box on top that could shift and apply pressure to the bend. The saw should be relatively safe unless the load tips over on landing. Parachutes are often used to deliver saws for firefighting. However, the bent saw is exposed during the landing and good vintage saws are occasionally broken.

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#### Vehicles

When transporting crosscut saws in a pickup truck, lay the sheathed saw flat on the bed of the truck, preferably on a truck bed liner rather than on the steel bed. Don't place heavy tools on top of the saw. Do not carry saws in the passenger compartment of a vehicle.

#### Packstock

Be extra careful when carrying a crosscut saw on packstock (figure 3.1.6). Select the gentlest animal to carry the saw. Put that animal in the lead where you can easily see the saw. Leave the handles attached to a two-person saw. The heads of the rivet attachment pins should face up, not down, so the pins will not slide out and cause the handles to fall off. Check the tightness on the handle wingnuts as you check your cinches and cover both sides of the pins with strips of duct tape to further ensure the pins will not slide out. Sheathe the saw with a piece of firehose.



**Figure 3.1.6—Crosscut saw on a pack animal.**

Some packers wrap the saw in a separate mantle (canvas cover used to wrap loads) with the handles secure and exposed. Bend the saw and place it over the animal. Some pack the saw with the teeth facing the rear of the animal to minimize the likelihood of injury if the sheath falls off. Others pack the saw with the longest end of the handles pointing to the back, where they are less likely to get caught on trailside branches. Go with what works best for you, considering the trail conditions you will be facing. Tie the saw handles down to the latigo or cinch ring. Also tie the center of the bowed saw with a rope that goes to the front sawbuck or the D-ring of a decker saddle. It is important to secure the bowed saw to the packsaddle and not just to the load. With the saw fastened on top, it is more likely the saw will stay on top of the animal and not fall to the side if the rope on either side becomes untied.

Finish the packing job by using the cinch lash to tie the saw to the rest of the load. That way, the saw is double tied and unlikely to come loose.

Packers can transport one-person saws on riding stock in a leather or canvas sheath (like a rifle scabbard). A piece of hardwood inside the sheath protects the sheath from the teeth of the saw. Position the sheath so the saw will be pulled away from the animal's head when removing the saw from the sheath.

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Some packers prefer a fully enclosed sheath (figure 3.1.7) made of  $\frac{3}{16}$ -inch high-density polyethylene (HDPE). This style of sheath attaches to the D-rings of a decker or onto a sawbuck saddle, and the packer places loads over it. This enables the packer to remove the saw with less effort than a saw that has been bowed over the top of an animal and tied on.



**Figure 3.1.7—Crosscut saw in rigid sheath with exposed handles.**

### Hikers

Place a sheath on saws when you are hiking to the jobsite (figure 3.1.8). The person carrying the saw should be the last person in line; if the person carrying the saw stops for any reason, a person hiking behind them could accidentally walk into the back of the saw.

Remove the rear handle on two-person saws. If the handle is left on, it can snag on branches. The weight of the handle weight also accentuates the bouncing motion of the saw.

Crews that prefer the ridged, U-channel lattice cap sheath often place the saw through the shoulder strap on their backpack when transporting the saw. This makes the saw easier to transport as the hiker does not have to fully support the weight of the saw.

At the jobsite, you can carry the unsheathed saw on your shoulder with the teeth facing outward or in both hands with the teeth facing away. Avoid carrying the saw with the teeth pointing inward. Carry the saw on your downhill shoulder so you can throw it off if you slip or fall.



**Figure 3.1.8—Hiker with crosscut saw in sheath and rear handle removed.**

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#### Maintenance

A properly maintained crosscut saw is straight and sharp. The opposing cutting teeth are offset to the exact same degree, and the rakers are all precisely set slightly lower than the cutting teeth. These settings are measured to 1,000<sup>th</sup> of an inch and must match exactly from tooth to tooth, and raker to raker.

Field maintenance is generally limited to not damaging the saw and keeping the saw clean and rust free. At the end of the day, wipe off the saw to remove dirt, grime, and wood pitch. Depending on the wood you have been cutting, you may be able to wipe off the saw with just a dry rag or you may need a solvent. Traditionally, sawyers used kerosene to clean and oil a crosscut saw. Today, WD-40 or a citrus-based cleaner are more readily available. If using citrus-based cleaner to remove pitch, be sure to clean the all the citrus-based oil off the saw; the acidic nature of these products can cause rust.

If you have been cutting in wet conditions, be sure to wipe your saw dry and coat it with a light oil or WD-40. Do not use a cooking oil, such as canola, which can polymerize to a hard finish. Then the saw is in use, this hard finish heats up and becomes gummy, adding friction to the cutting operation.

Use a razor scraper, fine-grit sandpaper, a pumice grill block stone, or an ax stone to remove rust on saws. Never use a dry stone on a saw; this will scratch the surface. Water is often a suitable lubricant for your pumice or ax stone. If there is pitch and rust, you may need to use a solvent instead of water. Do not apply pressure on the cutting teeth themselves as this can remove some of the tooth's set, changing its cutting characteristics.

When the saw is not in use, place it in a safe location to protect it from damage and to prevent injuring anyone. Sheath an unused saw or place it on the ground parallel to a downed log with the teeth pointing towards the log.

For long-term or end-of-season storage, clean the saw and coat it with a lubricating oil. Hang the crosscut saw, unsheathed, in a safe location. Sheaths (especially rubber-lined firehose) can attract and trap moisture against the teeth and body of the saw, which can cause rust.

#### Troubleshooting

If your saw is not cutting smoothly, it could be because a single tooth or raker is not set the same as all the others or your saw is not filed properly for the type of wood you are cutting.

Another common problem is a bend or kink in the body of the saw itself. Any type of bend or bow in the saw will drag in the kerf, causing friction like what the sawyer might experience when cutting wood under compression.

Filing and straightening crosscut saws is not a field maintenance operation. Filing is a fine art and only someone with specialized training should file or straighten a crosscut saw.

The amount of maintenance your saw requires depends entirely on how well you take care of your saw while in the field. A damaged saw requires shop maintenance—not field maintenance.

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Crosscut saws are finely tuned instruments; they are a traditional tool, not a primitive one! If you treat your saws well, it is possible to spend a lifetime in the woods using them and not a single day running a misery whip.

### Summary

In this prework packet, you learned about crosscut saws, their history, transportation, and maintenance.

This knowledge will aid in learning the material presented in Module 3.1 of the “Developing Thinking Sawyers” course.



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