

# USDA Forest Service National Sawyer Training: Developing Thinking Sawyers



## Student Guide: Prework

**USDA Forest Service National Sawyer Training:**  
**Developing Thinking Sawyers**  
Module 1: Introduction to Saw Operations

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## About this Course

You are participating as a student in the U.S. Department of Agriculture (USDA), Forest Service, National Sawyer Training program. This course, “Developing Thinking Sawyers,” is intended for employees and volunteers who apply for certification as a sawyer. The use of saws on National Forest System (NFS) lands is prohibited unless an individual is trained, evaluated by a qualified sawyer evaluator, and has received a national sawyer certification card.

This module-based training focuses on **developing a thinking sawyer** and emphasizes risk management, human factors, and sawyer safety. The evaluation process may be separate from this training to allow sawyers time to practice their skills under the supervision of an approved sawyer instructor. Completing the training program does not guarantee certification.

## Course Outline

These training materials are intended for Forest Service employees, agency volunteers, cooperators, and training consultants who use chain saws or crosscut saws on NFS lands. The materials provide operational information for the safe and efficient use of chain saws or crosscut saws and companion tools.

For the purposes of this training, the terms **saw** or **saw program** refer to both chain saws and crosscut saws, unless otherwise specified.

### □ **Module 1: Introduction to Saw Operations**

The “Introduction to Saw Operations” module covers National Saw Program policy and legal requirements, sawyer safety, situational awareness, identification of risk, risk management, and developing a standardized OHLEC (objective, hazards, leans/binds, escape path, cut plan) size-up process.

### □ **Module 2: Chain Saws**

The “Chain Saw” module contains three sections: “Chain Saw Basics,” “Bucking and Limbing,” and “Felling.” The section(s) you require will depend on the certification level you pursue.

### □ **Module 3: Crosscut Saws**

The “Crosscut Saw” module contains three sections: “Crosscut Saw Basics,” “Bucking and Limbing,” and “Felling.” The section(s) you require will depend on the certification level you pursue.

### □ **Module 4: Ax Basics, Maintenance, and Use**

The “Ax Basics, Maintenance, and Use” module covers ax basics, maintenance, safety, and use.

## □ Module 5: Fireline Operations

The “Fireline Operations” module covers fireline safety, the sawyer/swamper team, cutting area control, saw team tasks and tactics, and terminology.

## □ Module 6: Wedges

The “Wedges” module covers wedge design and the mechanical advantage wedges provide, various wedge types, proper wedge placement and use, and how to calculate the amount of lift using tree diameter and height.

## □ Module 7: Hung-up Trees

The “Hung-up Trees” module defines the term “hung-up trees” and identifies the hazards associated with them, discusses avoiding hung-up trees, explains the OHLEC process for them, and provides techniques for mitigating or removing them.

## Purpose of Course

The USDA Forest Service “National Sawyer Training: Developing Thinking Sawyers” course outlines and describes the operational procedures for the use of saws by Forest Service employees, volunteers, and cooperators. These operational procedures are considered best practices that are designed to protect sawyers from accidental injury or death during saw operations.

All sawyers must be trained, evaluated, and certified through an approved training program and at a minimum been found to meet the intent of FSM 2358.03—Policy. To engage in sawing activities, sawyers must acquire and maintain a USDA Forest Service national sawyer certification card and first aid/cardiopulmonary resuscitation (CPR) certification. This national sawyer certification card has a 3-year expiration date and can be subject to review at any time before it expires.

## Course Goal

The “Developing Thinking Sawyers” course is designed to provide employees, volunteers, and cooperators who are basic to intermediate chain saw and crosscut saw users with the technical knowledge to use these tools safely and effectively.

At the completion of training, a qualified sawyer evaluator will conduct a field evaluation to determine whether a student demonstrates safe saw handling skills and a basic knowledge of course content. The field evaluation will identify the level of certification at which each student is authorized to perform saw work based on the student’s ability to apply learned knowledge and skill in front of an approved sawyer evaluator.

## Sawyer Certification Preparation

Use the checklist in table 1.0.1 to ensure you complete everything you need to successfully become a certified sawyer.

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**Table 1.0.1—Certification checklist**

	Prior to Certification
	Be at least 18 years old to operate a chain saw, 16 years old to operate a crosscut saw.
	Receive first aid training and have current certification in cardiopulmonary resuscitation (CPR).
	Complete an approved, nationally recognized sawyer training curriculum (NRSTC) from an authorized instructor.
	Successfully complete a field evaluation.
	Possess a national sawyer certification card signed by an authorized certifying official.



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## Module 1: Introduction to Saw Operations

Welcome to the USDA Forest Service “National Sawyer Training: Developing Thinking Sawyers” course. This course will begin or continue your journey to becoming a “thinking sawyer.” This course is designed to provide the technical knowledge and skills that you need to safely use chain saws and/or crosscut saws and their associated tools.

### Introduction

This training course outlines and describes the operational procedures for the use of saws by Forest Service employees, volunteers, and cooperators. These operational procedures are considered best practices that are designed to protect sawyers from accidental injury or death during saw operations.

All sawyers must be trained, evaluated, and certified through an approved training program, in accordance with FSM 2358. To engage in sawing activities, sawyers must acquire and maintain a USDA Forest Service national sawyer certification card and first aid/cardiopulmonary resuscitation (CPR) certification. The national sawyer certification card has a 3-year expiration date and can be subject to review at any time before it expires.

### Pework Topics

The prework packet covers:

- Policy and regulations
- Safety
- Personal protective equipment
- OHLEC: The five-step size-up process

### Objectives

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

- Recall the guiding documents associated with the Forest Service National Saw Program and its policies.
- Recognize the levels of sawyer certification.
- List the two key safety concepts.
- Identify the required personal protective equipment (PPE) and its proper fit for both nonfire and fire use.
- Identify and discuss how human factors affect sawyer operations.
- Identify and discuss components of the objective, hazards, leans/binds, escape route, cut plan (OHLEC) size-up process.
- Discuss operational complexity and its relationship to a sawyer’s knowledge and skill.

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#### Policy and Regulations

As a Forest Service sawyer, you must be aware that there are laws and standards that you must meet before you operate a chain saw or crosscut saw. Forest Service policy is made up of two main components—overarching Federal regulation and program policy.

#### Overarching Federal Regulations

The Occupational Safety and Health Act of 1970 is a United States law (Public Law 91-596) that enforces workplace standards to ensure that employees are protected from hazards that may compromise their safety and health.

The USDA Forest Service National Sawyer Training course falls within the regulatory authority of the Occupational Safety and Health Administration (OSHA), under 29 Code of Federal Regulations (CFR) 1910.266—Logging Operations.

#### Program Policy

Forest Service Manual (FSM) 2358—Saw Program addresses program requirements and applies to all employees, volunteers, training consultants, and cooperators who use chain saws and/or crosscut saws on NFS lands. It does not apply to other Federal, State, Tribal or local government agencies, contractors, or those working under interagency fire management cooperative agreements. FSM 2358 defines administrative responsibilities for the program as well as sawyer responsibilities and requirements for safety, training, and proficiency evaluation and reevaluation.

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**Sawyer Certifications**

Each qualification requires a specific set of modules. The modules you complete will depend on your qualification goals. Refer to table 1.0.2 to determine which modules you require.

**Required Modules**

**Table 1.0.2—Courses required for certification**

<b>Required module</b>	<b>Chain saw bucking</b>	<b>Chain saw felling</b>	<b>Crosscut saw bucking</b>	<b>Crosscut saw felling</b>	<b>Fireline qualified (S-212 equivalent)</b>
1	X	X	X	X	X
2.1	X	X			X
2.2	X	X			X
2.3		X			X
3.1			X	X	
3.2			X	X	
3.3				X	
4.0			X	X	
5.0					X
6.0					
7.0	X	X	X	X	X

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## Safety

Safety is a critical concern in chain saw and crosscut saw operations. It should be a part of every plan you prepare and every action you take (figure 1.0.1). Careful study and practice of saw operations will improve your abilities and help you to identify your limitations. Sawyers are obligated to say "no" and to walk away from any situation they determine to be an unacceptable risk.

Sawyer safety comes down to two key concepts: risk management and proper use and fit of PPE.



Figure 1.0.1—Sawyers doing a stump analysis.

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#### Personal Protective Equipment

It is important to understand that PPE has limitations. Though it will help reduce injuries in the event of a mishap, you should never view PPE as an alternative to employing good safety practices. The Forest Service requires all sawyers to wear the appropriate PPE outlined in FSM 2358.06—Qualifications (tables 1.0.3 and 1.0.4).

**Table 1.0.3—Nonfire personal protective equipment (PPE) requirements (ANSI = American National Standards Institute, OSHA = Occupational Safety and Health Administration, dB = decibels)**

PPE	Chain saw operations	Crosscut saw operations
<b>Head protection</b>	A helmet that meets American ANSI Z89.1	Same as chain saw
<b>Eye protection</b>	ANSI Z87.1 safety glasses or equivalent: mesh bug-eye type or mesh face shield (OSHA Note: 910.266(d)(1)(vii)(B))	Same as chain saw
<b>Hearing protection</b>	Hearing protection (85 decibels and above)	None required
<b>Hand protection</b>	Chain saw mitts or gloves appropriate for the weather conditions	Gloves appropriate for the weather conditions
<b>Shirt</b>	Long sleeves required	Long sleeves optional
<b>Pants</b>	Loose-fitting without a solid hem or with a hem you can tuck into your boots	Same as chain saw
<b>Leg protection</b>	Chaps or cut-resistant pants that overlap your boots by at least 2 inches	None required
<b>Foot protection/boots</b>	Cut-resistant, laced boots that provide ankle support and have nonskid soles	Boots that provide ankle support and have nonskid soles

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**Table 1.0.4— Fire personal protective equipment (PPE) requirements (NFPA = National Fire Protection Association, ANSI = American National Standards Institute)**

<b>PPE</b>	<b>Chain saw operations</b>	<b>Crosscut saw operations</b>
<b>Head protection</b>	A helmet that meets NFPA 1977	Same as chain saw
<b>Eye protection</b>	ANSI Z87.1 safety glasses or equivalent (mesh bug-eye type)	Same as chain saw
<b>Hearing protection</b>	Hearing protection required for gasoline-powered chain saw use	None required
<b>Hand protection</b>	Leather gloves	Same as chain saw
<b>Shirt</b>	Flame-resistant, long-sleeved shirt	Same as chain saw
<b>Pants</b>	Flame-resistant, long pants	Same as chain saw
<b>Leg protection</b>	Chaps that meet the requirements of Forest Service Specification 6170–4 and overlap your boots by at least 2 inches	None required
<b>Boots</b>	Cut-resistant or leather, laced, 8-inch-high boots that provide ankle support and have nonskid soles	Same as chain saw

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### Ensure Proper Fit

Before performing any work, project, or activity that requires PPE, employees must demonstrate an understanding of its proper use and how to wear it. Accidents and injuries may result from misusing or failing to use required PPE. PPE should be clean and in good condition and should fit each individual sawyer properly (figure 1.0.2). Refer to the instructions included with the PPE for information about inspecting the equipment, fitting it properly, and cleaning it.

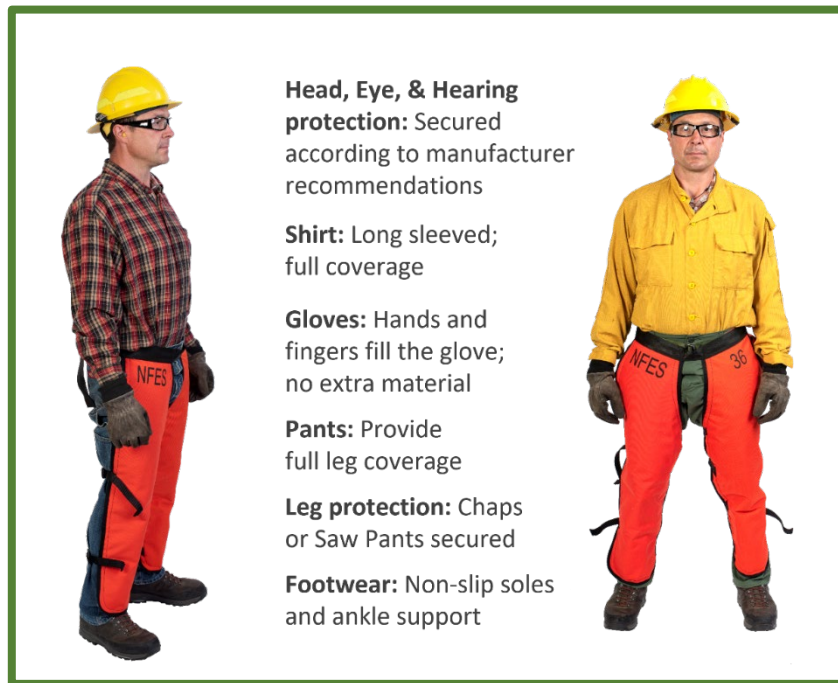


Figure 1.0.2—Ensure that personal protective equipment fits properly.

### PPE guidelines:



**Head protection:** All helmets should be designed to provide protection from impact and penetration hazards from falling objects. Inspect shells for dents, cracks, signs of penetration, or any other damage that might compromise protection. Also inspect suspension systems, headbands, sweatbands, and any accessories daily.



**Eye and face protection:** All employees require appropriate protection (including side protection) when they are exposed to eye or face hazards, such as flying particles.



**Hearing protection:** To comply with 29 CFR 1910.95—Occupational Noise Exposure, employees must wear ear plugs, earmuffs, or both when working with equipment louder than 85 decibels.

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**Hand protection:** Ensure that hand protection is appropriate for the weather conditions. Fireline work requires leather gloves.



**Shirt:** Long-sleeved shirts are recommended for all saw operations. Fireline work requires flame-resistant shirts for both chain saw and crosscut saw operations.



**Pants:** Pants are required for all sawyer operations. Pants should fit comfortably but not be too loose. Fire line work requires flame-resistant pants.



**Leg protection:** You must properly adjust chain saw chaps/pants and wear them snug to keep them positioned correctly on your legs. Chaps should provide coverage 2 inches below your boot tops. Proper fit and length maximize protection.



**Boots:** Chain saw use requires cut-resistant or leather boots with nonskid soles and adequate ankle support.



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### First Aid Kit

Subsection 29 CFR 1910.266(d)(2)(i)—Logging Operations mandates a first aid kit in each employee transport vehicle and at each worksite where employees are cutting trees (e.g., felling, bucking, limbing) (figure 1.0.3). The number of first aid kits and the content of each kit must reflect the degree of isolation, the number of employees, and the hazards reasonably anticipated at the worksite.



Figure 1.0.3—First aid kit.

At a minimum (for small sites with two to three employees), each kit must contain:

- Gauze pads at least 4 by 4 inches
- Two large gauze pads at least 8 by 10 inches
- A box of adhesive bandages (Band-Aids)
- One gauze bandage roll at least 2 inches wide
- Two triangular bandages
- Wound-cleaning agent, such as sealed, moistened towelettes
- One blanket
- Scissors
- Tweezers
- Adhesive tape
- Latex gloves
- Resuscitation equipment, such as a resuscitation bag, airway, or pocket mask
- Two elastic wraps
- Splint
- Directions for requesting emergency assistance

Other recommended items:

- Tourniquet
- Clotting agent
- Trauma dressing

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## OHLEC: The Five-Step Size-up

OHLEC is a systematic, five-step, size-up process during which you identify an **objective**, consider **hazards** related to the objective, determine **leans or binds** relative to the objective, develop an **escape plan**, and develop a **cut plan**. At any point during the process, your analysis may reveal conditions that cause you to reevaluate or change the objective. When the objective changes, you restart the process because a new objective may present different hazards and leans or binds, consequently requiring a different escape plan or cut plan.

### OHLEC: Objective

The objective is a statement about the purpose of the operation; it conveys what you intend to do (figure 1.0.4). When analyzing the objective, determine where you want the cut piece to end up:

- If felling, identify the intended lay of the tree.
- If bucking, plan where you want the bucked log or round to land.
- If limbing, determine the sequence for cutting large branches and directing their fall.
- If brushing, particularly in thick brush, plan how you will remove the brush after you cut it.



**Figure 1.0.4—A large, bucked log.**

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### OHLEC: Hazards

When implementing the OHLEC process during saw operations, identified hazards directly relate to the selected objective (i.e., where you will place the bucked log or where the tree will fall [lay] when cut). Although many hazardous conditions exist in the natural environment (figure 1.0.5.), this step in the OHLEC size-up process focuses only on those hazards that directly relate to achieving the objective of the cutting operation.

Consider the following when identifying hazards:

- What is overhead (fire, rotten top, widow makers, and loose bark)?
- What is inside the wood you are cutting (fire, rot and hinge wood integrity, hollow, bar/saw length compared to diameter, bees, or poisonous plants)?
- Are there buildings, equipment, or other trees you do not want to damage?
- Are there any hazards associated with cutting area control?



Figure 1.0.5—Hazards.

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### OHLEC: Leans/Binds

You assess leans or binds to determine the type and sequence of cuts needed (figure 1.0.6). When felling, you assess the lean by the tilt of a tree away from its vertical position. In bucking, you identify and assess the binds based on the orientation of the log. Compression and tension are the two major components of a bind. Identifying the bind will help you determine your technique and procedure for bucking:



Figure 1.0.6—Determining lean.

- Project the fall based on the lean.
- Predict binds based on bearing points and the lay of the log.
- Determine the reactionary forces to expect when you cut the log.

### OHLEC: Escape Plan

An escape plan has a minimum of two escape paths (identified as “primary” and “secondary”). To ensure your safety, you must clear both paths (to a reasonable degree) of obstructions.

Escape paths are predetermined paths where you can escape once you commit the tree to fall or buck the log.

### OHLEC: Cut Plan

The cut plan is the last stage of the OHLEC size-up process and determines the type and sequence of cuts that will ultimately guide the tree or log segment into the intended lay (figure 1.0.7). The cut plan accounts for the objective, hazards, leans/binds, and escape plan. It is the final step in the OHLEC size-up process, and it ties the plan together.

If the cut plan requires the use of wedges, you must develop a wedging plan before initiating the cut.

The wedging plan, if needed, should include:



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- Number, kind, and size of wedges needed
- Sequence for setting wedges



**Figure 1.0.7—Sawyers following a cut plan.**

### Summary

In this prework packet, you learned about policies and regulations related to the safe use of saws and the proper use of PPE. You were also introduced to the OHLEC five-step size-up process. This introductory information will provide background for you as you begin learning the material presented in module 1 of the “Developing Thinking Sawyers” course.

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