USDA Forest Service
National Sawyer Training:
Developing Thinking Sawyers

INTRODUCTION TO SAW OPERATIONS

MODULE 1

Instructors Guide
This page intentionally left blank.
Table of Contents

About This Course .................................................................................................................................. vi
Course Outline ...................................................................................................................................... vi
Purpose of Course ............................................................................................................................. vii
Course Goal ......................................................................................................................................... vii

About this Instructors Guide ............................................................................................................... vii
Instructors Checklist ............................................................................................................................ viii

Module 1: Introduction to Saw Operations .............................................................................................. 1
Welcome and Introduction .................................................................................................................... 1

Introduction ........................................................................................................................................... 1
  Introductions ..................................................................................................................................... 1
  Housekeeping ..................................................................................................................................... 2
  Why This Training is Important ........................................................................................................ 2

Course Outline ...................................................................................................................................... 3
Module Objectives ................................................................................................................................. 3
Prework Review .................................................................................................................................... 4

Safety ..................................................................................................................................................... 5
  Personal Protective Equipment: Nonfire ............................................................................................. 5
  Personal Protective Equipment: Fire ................................................................................................... 7
  Ensure Proper Fit ............................................................................................................................... 8
  First Aid Kit ..................................................................................................................................... 10

Work Area Safety .................................................................................................................................. 11
  Video: Tree Hazards and Target Avoidance ..................................................................................... 11
  A Systematic Approach to Work Area Safety .................................................................................. 11
  The Outside-In Approach ................................................................................................................ 12
  The Big Picture ................................................................................................................................ 12

Human Factors ..................................................................................................................................... 14
  What are Human Factors? ................................................................................................................ 14
  Developing Thinking Sawyers ......................................................................................................... 14
  Video: Human Factors and the Thinking Sawyer ......................................................................... 15
This page intentionally left blank.
About This Course

As an instructor, you will help train U.S. Department of Agriculture (USDA), Forest Service employees and volunteers who have applied 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 this 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 paths, cut plan) size-up process.

- **Module 2: Chain Saws**
  The “Chain Saws” module contains three sections: “Chain Saw Basics,” “Bucking and Limbing,” and “Felling.” The section(s) the students require will depend on the certification level they pursue.

- **Module 3: Crosscut Saws**
  The “Crosscut Saws” module contains three sections: “Crosscut Saw Basics,” “Bucking and Limbing,” and “Felling.” The section(s) the students require will depend on the certification level they 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, 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.

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.

About this Instructors Guide

This instructors guide is designed to be used in conjunction with PowerPoints, hands-on classroom activities, group discussion, and the “Developing Thinking Sawyers Student Guide.”
Instructors Checklist

Use the checklists in tables 1.0.1 through 1.0.5 to ensure you have everything you need to successfully facilitate this course. Add any items you may need for your course preparations in the blank lines provided.

*Table 1.0.1—About 4 weeks before training*

<table>
<thead>
<tr>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the classroom and field locations and take steps to receive necessary approvals from the local unit.</td>
</tr>
<tr>
<td>Perform a site visit to identify cutting opportunities, saw station locations, complexity opportunities, and number and type of trees/logs available.</td>
</tr>
<tr>
<td>Prepare training invitations.</td>
</tr>
<tr>
<td>Study class materials. You should be familiar with and comfortable explaining the content of all materials of the course, including the:</td>
</tr>
<tr>
<td>- Instructors guide</td>
</tr>
<tr>
<td>- PowerPoint</td>
</tr>
<tr>
<td>- Student guide: prework</td>
</tr>
<tr>
<td>- Student guide: classroom</td>
</tr>
<tr>
<td>- Activities and videos included in each module</td>
</tr>
<tr>
<td>- Field exercises</td>
</tr>
<tr>
<td>If time allows, practice answering student questions with another instructor.</td>
</tr>
</tbody>
</table>
### Table 1.0.2—About 2 weeks before training

<table>
<thead>
<tr>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finalize the attendee list and send out course prework. Follow up and confirm the list of registered participants and provide location information, course details, expectations, and required equipment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ideal ratio for field stations is no more than four students to one instructor. Plan how to handle a larger class size if this ratio is not possible. For example, identify instructors or additional support needs when possible.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit the field location to begin building field stations and to ensure/verify conditions on the ground (i.e., available work, number of trees, student-to-instructor ratio, altered conditions).</td>
</tr>
</tbody>
</table>

### Table 1.0.3—About 1 week before training

<table>
<thead>
<tr>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirm final details at the site, including logistics, requesting a projector and screen, a white board or flipchart, and pens and erasers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print necessary materials for the session. Make copies as necessary or contact the site to have copies ready and available.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare a sign-in sheet and populate it with participants’ names, the module title, and your name.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send a reminder email to participants.</td>
</tr>
</tbody>
</table>
Preparation

Prepare name tents for each participant.

Table 1.0.4—Day of class

Before class

Have the sign-in sheet out on a table with a pen to pass around to participants as they sit at tables.

Set up your area with:

- This instructors guide
- All items on the materials list for this module

Set up the computer, projector, and screen. Display the first slide of the PowerPoint module.

Write “Welcome!” in large letters on the whiteboard or flipchart and include your name below it.

Ensure each participant's seat has:

- One copy of “Developing Thinking Sawyers Student Guide: Classroom”

Optional items:

- One name tag and one name tent
- One pen and one pad of paper (unless you instructed participants to bring their own)
- One black marker and one highlighter for every participant (so they can print their names on their name tags, name tents and highlight items in their student guide).
Table 1.0.5: After class

<table>
<thead>
<tr>
<th>After class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submit sign-in sheets to the appropriate person, if required.</td>
</tr>
<tr>
<td>Submit post-class evaluations to the regional Saw Program manager.</td>
</tr>
</tbody>
</table>
Module 1: Introduction to Saw Operations

<table>
<thead>
<tr>
<th>Slide/action</th>
<th>Content</th>
</tr>
</thead>
</table>
| **Welcome and Introduction** | **Time:** 160 minutes  
**Note:** Do not read the slides to the students; speak in a conversational tone and use the slides to actively engage the students in a two-way conversation. Add the occasional brief story or anecdote from your experience to illustrate key concepts.  
**DISPLAY FIRST SLIDE**  
**Slide 1: Introduction**  
**Introduction**  
**Say:**  
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.  
**Remind** students which module you are teaching today (chain saws, crosscut saws, fireline, etc.).  
**Transition:**  
During this class, we will work together to complete activities that reinforce what we learn. Let’s take this opportunity to go around the room, introduce ourselves, and get to know each other a little.  
**DISPLAY NEXT SLIDE**  
**Slide 2: Introductions**  
**Introductions**  
**Say:**  
My name is ___________. (Briefly introduce yourself and provide a little information about your experience as a sawyer.)  
**Ask:**  
Each participant to tell the class:
USDA Forest Service National Sawyer Training:
Developing Thinking Sawyers
Module 1: Introduction to Saw Operations

Slide/action | Content
---|---
• Their name
• Why they are taking the class
• Previous experience related to the Forest Service or as a sawyer

Transition:
There are a few housekeeping items to discuss before we begin.

**Slide 3: Housekeeping**

Housekeeping

**INSTRUCTOR NOTE:**
Inform students about your cell phone policy and participation expectations, give an overview of the schedule, and provide the locations of the restrooms and emergency exits.

**Slide 4: Why This Training is Important**

**Why This Training is Important**

**Say:**
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, 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. This national sawyer certification card has a 3-year expiration date and can be subject to review at any time before it expires.

Transition:
Next, we will discuss what we will cover in this course.

**DISPLAY NEXT SLIDE**
### Slide 5: Course Outline

#### Course Outline

**Say:**

The course contains seven modules. Module 1 applies to all sawyers. As discussed in the prework, you only have to take the modules required for your desired qualification.

**INSTRUCTOR NOTE:**

Refer the students to the agendas available in appendix A for the qualification path you are teaching today. Take a minute to point each student to the right agenda for their course.

#### Transition:

The topic covered in this first module (module 1) is an introduction to saw operations where we focus on sawyer personal protective equipment (PPE), identifying risk, risk management, and developing the objective, hazards, leans/binds, escape routes, cut plan (OHLEC) process.

### Slide 6: Module Objectives

#### Module Objectives

**REVIEW**

Review the objectives listed on the slide.

**DISPLAY NEXT SLIDE**
<table>
<thead>
<tr>
<th>Slide/action</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slide 7: Prework Review</td>
<td>Prework Review</td>
</tr>
<tr>
<td>REVIEW</td>
<td>Review the topics covered in the prework packet.</td>
</tr>
<tr>
<td>Say:</td>
<td>We will cover some of these topics again here in the classroom because they are important for safety or have more details you need to know. The rest we will review now.</td>
</tr>
<tr>
<td>INSTRUCTOR NOTE:</td>
<td>Allow students a few moments to answer the questions in the student guide, then discuss the answers. Confirm the correct answers and discuss any misconceptions.</td>
</tr>
<tr>
<td>Review Questions</td>
<td></td>
</tr>
<tr>
<td>Q: Where can you find information about individual responsibilities in the National Saw Program?</td>
<td>A: FSM 2358.06, Exhibit 02—Sawyer Responsibilities and Limitations and Training, Knowledge, and Skill Requirements.</td>
</tr>
<tr>
<td>Q: What are the two key safety concepts?</td>
<td>A: Risk management and proper use and fit of PPE.</td>
</tr>
<tr>
<td>Q: Where can you find information about required PPE?</td>
<td>A: FSM 2358.07c—Personal Protective Equipment.</td>
</tr>
<tr>
<td>Transition:</td>
<td>Your safety, the safety of your coworkers, and the safety of the public are of the utmost importance.</td>
</tr>
<tr>
<td>DISPLAY NEXT SLIDE</td>
<td></td>
</tr>
</tbody>
</table>
Safety

Say:
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. 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.

Transition:
PPE is a requirement that OSHA instituted to help protect sawyers from injury. The type of PPE a sawyer requires depends on the type of saw used and whether the sawyer is in a fire environment.

Personal Protective Equipment: Nonfire

Say:
PPE is designed to protect you from injury in the event of a mishap. All sawyers are required to wear the appropriate PPE outlined in FSM 2358.06—Qualifications.

Instructor Note:
If you are only teaching fireline sawyers, advance to “Fireline PPE” (slide 10).

Discussion
Encourage open discussion about the PPE. Hold up each piece and explain any nuances about it. Discuss proper fit (helmet), the different types of PPE you can wear, and what you use each type for (eye protection, hearing protection, gloves, etc.).
INSTRUCTOR NOTE:
Refer to the manufacturer’s instructions for the PPE you are demonstrating. Point out the asterisk on the slide and refer students to table 1.0.2 in the student guide, which describes the differences between chain saw and crosscut saw PPE.

Head protection

- Chain saw: a helmet that meets American National Standards Institute (ANSI) Z89.1
- Crosscut saw: same as chain saw

Eye protection

- Chain saw: ANSI Z87.1 safety glasses or equivalent: mesh bug-eye type or mesh face shield (OSHA Note: 1910.266(d)(1)(vii)(B))
- Crosscut saw: same as chain saw

Hearing protection

- Chain saw: hearing protection (85 decibels and above)
- Crosscut saw: none required

Hand protection

- Chain saw: chain saw mitts or gloves appropriate for the weather conditions
- Crosscut saw: gloves appropriate for the weather conditions

Shirt

- Chain saw: long sleeves required
- Crosscut saw: long sleeves optional

Pants

- Chain saw: loose-fitting without a solid hem or with a hem you can tuck into your boots
- Crosscut saw: same as chain saw

Leg protection

- Chain saw: chaps or cut-resistant pants that overlap your boots by at least 2 inches
- Crosscut saw: None required

Foot protection/boots
Slide 10: Personal Protective Equipment: Fire

Personal Protective Equipment: Fire

Say:
When operating a saw in a fire environment, sawyer PPE requirements differ from those used in a nonfire environment. Sawyers on the fireline must wear all PPE required by the “Interagency Standards for Fire and Fire Aviation Operations (Redbook), Chapter 7—Safety and Risk Management.”

Head protection
- Chain saw: a helmet that meets National Fire Protection Association (NFPA) 1977
- Crosscut saw: same as chain saw

Eye protection
- Chain saw: ANSI Z87.1 safety glasses or equivalent (mesh bug-eye type)
- Crosscut saw: same as chain saw

Hearing protection
- Chain saw: hearing protection required for gasoline-powered chain saw use
- Crosscut saw: none required

Hand protection
- Chain saw: leather gloves
- Crosscut saw: same as chain saw

Shirt
- Chain saw: flame-resistant, long-sleeved shirt
- Crosscut saw: same as chain saw

Pants
- Chain saw: flame-resistant, long pants
- Crosscut saw: same as chain saw
Leg protection
- Chain saw: chaps that meet the requirements of Forest Service Specification 6170-4 and overlap your boots by at least 2 inches
- Crosscut saw: none required

Foot protection/boots
- Chain saw: cut-resistant or leather, laced, 8-inch-high boots that provide ankle support and have nonskid soles
- Crosscut saw: same as chain saw

Transition:
Before performing any work, project, or activity that requires PPE, sawyers must demonstrate an understanding of its proper use and how to wear it.

Ensure Proper Fit
Say:
PPE must fit the individual sawyer properly and be clean and in good condition. Accidents and injuries may result from failing to use or from misusing required PPE.

PPE guidelines
- **Head protection**: All helmets should be designed to provide protection from impact and penetration hazards from falling objects. Inspect shells daily 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.
<table>
<thead>
<tr>
<th>Slide/action</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hand protection:</td>
<td>Ensure that hand protection is appropriate for the weather conditions. Fireline work requires leather gloves.</td>
</tr>
<tr>
<td>• Shirt:</td>
<td>Long-sleeved shirts are recommended for all saw operations. Fireline work requires flame-resistant shirts for both chain saw and crosscut saw operations.</td>
</tr>
<tr>
<td>• Pants:</td>
<td>Pants are required for all sawyer operations. Pants should fit comfortably but not be too loose. Fireline work requires flame-resistant pants.</td>
</tr>
<tr>
<td>• Leg protection:</td>
<td>Sawyers must properly adjust chain saw chaps/pants and wear them snug to keep them positioned correctly on the legs. Chaps should provide coverage 2 inches below the boot tops. Proper fit and length maximize protection.</td>
</tr>
<tr>
<td>• Boots:</td>
<td>Chain saw use requires cut-resistant or leather boots with nonskid soles and adequate ankle support.</td>
</tr>
</tbody>
</table>

**Transition:**
Now that we have had a chance to review our PPE, let’s take a few minutes to talk about first aid kits.

**DISPLAY NEXT SLIDE**
First Aid Kit

Say:
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).

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. 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
- Scissors
- One blanket
- 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

Transition:
Hopefully, you will not need your first aid kit because you are careful, safe, and aware of your surroundings and situation.

DISPLAY NEXT SLIDE
Work Area Safety

Say:
When you enter the outdoors, you enter a dynamic environment. You can improve safety with intentional observations of the work area.

Transition:
The next video, “Tree Hazards and Target Avoidance,” is intended to help improve onsite awareness and work safety.

A Systematic Approach to Work Area Safety

Say:
A systematic approach to work area safety begins with some definitions:

- **Work area**: The area surrounding the specific cutting operation. The sawyer establishes the size of the work area based on the site conditions.

- **Cutting area**: The zone where the sawyer can cut you with the saw. A 360-degree radius around the sawyer at a distance equivalent to the sawyer’s arm length plus the length of the tool.

- **Work area controls**: Safety procedures established by the sawyer to identify potential hazards and to plan the cutting operation.
The Outside-In Approach

Say:
The “outside-in approach” is a systematic procedure to assess the conditions of the entire work area before engaging in the cutting operation. The goal is to observe the big picture first, starting with a wide-angle lens and then moving in, narrowing your focus to the point where you will make the cuts. Look up, down, and all around for potential hazards before moving slowly toward the center of the work area. Take your time. You can visualize the approach as a concentric circle with the big picture on the periphery, the work areas in the middle, and the cutting area at the center.

Next, we will review some examples of conditions within the “big picture,” “work area,” and “cutting area.”

The Big Picture

Say:
The big picture (known conditions upon arrival):

- **Overall project objectives.** (Note: This is different from the specific OHLEC objective.)
- **Predominant hazards:** standing dead trees, disease pockets, insect outbreaks, etc.
- **General surface hazards:** recent storm damage, mudslides, weather, dead and downed wood, etc.
- **General terrain:** flat ground, rolling hills, steep slopes, etc.
- **Proximity to infrastructure:** towns, road systems, powerline corridors, etc.
- **Use level or activity:** open to the public, work projects occurring, fire activity, etc.
### Slide 18: The Work Area

**The Work Area**

**Say:**

The work area (continued observation):

- **Observed hazards**: predominant tree lean, stand condition, wind/weather, visibility, etc.
- **Surface hazards**: loose rocks that make walking difficult, lots of stump holes, etc.
- **Terrain**: changes in slope; mostly flat, even ground; recent weather event, etc.
- **Infrastructure**: buildings, picnic tables, roads, trails, powerlines, etc.
- **People**: general public, work crews, fire personnel, etc.

### Slide 19: Cutting Area

**The Cutting Area**

**Say:**

The cutting area—OHLEC size-up process (observed conditions in cutting area)

- Objective of the saw operation
- **Observed hazards at the base of the tree**: broken branches, frost cracks, visible wood rot, fungi, etc.
- **Surface hazards in cutting area**: uneven ground, steep slope, poor footing, etc.
- **Cutting area terrain**: poor footing, slippery conditions, limited escape path, rocky, wet, brushy or bare.
- **Human Factors**
Human Factors

Say:
It is critical to understand how thoughts and memories apply to safety.

DISPLAY NEXT SLIDE

What are Human Factors?

Say:
When you are unaware of the thoughts and memories that drive your actions and decisions, your actions can have negative consequences that can create a safety hazard for you or others around you.

“Switchback” is a term used to define the thought struggle between the “fight or flight” response. This struggle can become a problem because you must manage it on the fly.

It is a natural response for your thoughts to race when you make mistakes in front of others. Adrenaline starts to flow, your heart rate increases, and you have increased reactivity and decreased awareness. This lowers your ability to take in and process information, reducing the quality of your decision making.

Transition:
In a few minutes we are going to watch a video that explains how human factors, such as thoughts and memories, can impact a sawyer, and how to develop a mental toughness that will help to enhance your safety. First, let’s define “mental toughness.”

DISPLAY NEXT SLIDE

Developing Thinking Sawyers

Say:
Mental toughness is becoming aware of and monitoring your thoughts so that you know where your attention is and what is driving your decision making at any time. It is understanding how memories can put you at risk through distraction or emotional
reactivity. In developing mental toughness, you learn to manage your memories and thinking to maximize cognitive function. Mental toughness requires that you understand what it means to stay in team and that you learn how to get back in team if you lose focus.

**Transition:**
The title of the video we are about to watch is “Human Factors and the Thinking Sawyer.”

**Video: Human Factors and the Thinking Sawyer**

**Transition:**
Be aware of your thoughts as we go through this next exercise.

**Video: How Thinking Sawyers Recover**

**Say:**
This next video is designed to give you tools to realize when you are not in team and what to do to get back in team.

**Transition:**
Our next topic is risk management.
Risk Management

Say:
Risk management is the deliberate action taken by an individual to manage risk by identifying hazards and threats and developing ways to mitigate and minimize the consequences. Risk management seeks to reduce risks to acceptable levels, knowing we will not be able to completely reduce all risks.

What is Risk Management?

Say:
Risk management is iterative, responsive to change, and intentional about process. It incorporates learning and feedback and explicitly addresses uncertainty. A goal of risk management is to develop sufficient proficiency in applying the process so that risk management itself becomes an automatic part of the decision-making process.

Transition:
It is important to remember that risk management is a continuous process during which you are always evaluating the sawing operation, including your mental state.
OHLEC: The Five-Step Size-Up

Say:
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 then 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 path or cut plan.

**Transition:**
Once you determine the objective of the cutting operation, relate all other steps in the OHLEC size-up process to this specific objective.
Slide 29: OHLEC: Hazards

Say:

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, 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, widowmakers, 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?

You must control the cutting area to eliminate hazards to others. You must consider other workers or bystanders, the public, access points, and steep slopes, and should pay special attention to the proximity of swamperers. The size of the area you must control depends on the operation.

Transition:

If there are no hazards that you cannot mitigate, it is time to go to the next step, which is to assess the leans or binds.

Display Next Slide
You assess leans or binds to determine the type and sequence of cuts needed. 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.

- 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.

**Transition:**

Hazards such as those we’ve discussed require you to develop an escape plan that is purposeful and resilient enough to position yourself in a safe area when the tree or log releases.
### Slide 31: OHLEC: Escape Plan

#### OHLEC: Escape Plan

**SAY:**

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 the tree begins to fall or the bucked log begins to move.

**Escape Paths**

With the desired felling direction in mind, determine escape paths and safety zones that lead diagonally away from the direction of the intended fall. Consider the side of the tree where you will make your final cut and select a path that will not take you directly behind the tree.

- Look for a large, solid tree or rock for protection.
- Prepare two escape paths in case you change your location on the final cut.
- Practice using the escape paths, making sure to clear any debris that could trip you.
- Re-examine the escape paths before you begin to cut, and ensure that your chosen paths will be the safest escape paths.

Your plans must be flexible enough to account for and adapt to the unexpected.

**Transition:**

Before you begin to cut, you must also develop a cut plan.

**DISPLAY NEXT SLIDE**
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 objective (or intended lay). The results of the cut plan will determine the ultimate complexity of the operation. Your evaluation of the complexity of the assignment must be thorough and honest in order to answer the question, “Should I cut this or not?”

The cut plan accounts for the objective, hazards, leans/binds, and escape plan. The cut plan is the final step in the OHLEC process and is how you tie the plan together.

- Develop the cut plan for the cutting operation.
- Determine the cutting sequence.
- Determine the type of cuts required.

If the cut plan requires the use of wedges, you must develop a wedging plan before initiating the cut. The wedging plan, if needed, will consider:

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

**Transition:**
Next, we’ll discuss how OHLEC allows you to assess operational complexity.
### Slide/action

#### Slide 33: Operational Complexity

**Say:**

Taking into consideration all the steps you analyzed during the OHLEC size-up process, you should conduct an honest assessment of the cutting operation to determine if you have the knowledge, skills, and qualification to manage the overall complexity of the operation.

Your evaluation of the complexity of the assignment must be thorough and honest in order to answer the question, “Should I cut this or not?”

**Display Next Slide**

#### Slide 34: Operational Complexity Chart

**Discuss**

Begin the discussion by explaining that the complexity of the cutting operation must be within a sawyer’s ability, skill, and qualification before they proceed. If at any point the cutting operation is too complex, the sawyer must either reassess the objective and develop another plan or walk away.

Ask students to read the “Low,” “Moderate,” and “High” columns. Discuss the topic of subjectivity but stress that each individual sawyer must ultimately be the one to decide to cut or not.

**Transition:**

So how do we put it all together?

**Display Next Slide**
### Slide 35: Putting It All Together

**Say:**

This module provided guidance on risk reduction, use of safety equipment, and the OHLEC size-up process. With safety being so critical, it is imperative that you constantly survey your surroundings and seek to reduce risk as much as you can. One of the ways to accomplish this is by using the OHLEC size-up process: objective, hazards, leans/binds, escape plan, and cut plan.

### Slide 36: Knowledge Check

**Knowledge Check**

Allow students 10 minutes to answer the questions in their student guides.

**Q:** What does OHLEC stand for?

**A:** Objective, hazards, leans or binds, escape plan, and cut plan

**Q:** What is the difference between an escape plan and an escape path?

**A:** An escape plan is the selection, practice, and re-examination of two escape paths, a primary and a secondary path, before you begin to cut.

### Slide 37: Summary

**Summary**

**Review**

Review the summary objectives listed on the slide.
### Slide 38: Questions

#### Questions

**Ask:**
Do you have any questions about this introductory material, including OHLEC?

**Answer appropriately**
This page intentionally left blank.