

**USDA Forest Service National Sawyer Training:
Developing Thinking Sawyers**

APPENDIX A: AGENDAS

Appendix A

**USDA Forest Service National Sawyer Training:
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APPENDIX A: LESSON PLANS

Agendas

Chain saw Bucking

Day One

Module	Lesson	Length	Time
Module 1: Introduction to Saw Operations	N/A	90 minutes	8:00 a.m.—9:30 a.m.
Break		15 minutes	9:45 a.m.—10:00 a.m.
Module 2: Chain Saws	2.1 Chain Saw Basics	75 minutes	10:00 a.m.—11:15 a.m.
Lunch			11:15 p.m.—12:15 p.m.
Module 2: Chain Saws	2.2 Chain Saw Brushing, Limbing, and Bucking	75 minutes	12:15 p.m.—1:30 p.m.
Break		15 minutes	1:30 p.m. – 1:45 p.m.
Module 7: Hung-Up Trees	N/A	45 minutes	1:45 p.m. – 2:30 p.m.

Chain Saw Felling

Day One

Module	Lesson	Length	Time
Module 1: Introduction to Saw Operations	N/A	90 minutes	8:00 a.m.—9:30 a.m.
Break		15 minutes	9:45 a.m.—10:00 a.m.
Module 2: Chain Saws	2.1 Chain Saw Basics	75 minutes	10:00 a.m.—11:15 a.m.
Lunch			11:15 p.m.—12:15 p.m.
Module 2: Chain Saws	2.2 Chain Saw Brushing, Limbing, and Bucking	75 minutes	12:15 p.m.—1:30 p.m.
Break		15 minutes	1:30 p.m. – 1:45 p.m.
Module 2: Chain Saw Directional Felling	2.3 Chain Saw Directional Felling	90 minutes	1:45 p.m. – 3:15 p.m.
Break		15 minutes	3:15 p.m. – 3:30 p.m.
Module 7: Hung-Up Trees	N/A	45 minutes	3:30 p.m. – 4:15 p.m.

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Crosscut Bucking

Day One

Module	Lesson	Length	Time
Module 1: Introduction to Saw Operations	N/A	90 minutes	8:00 a.m.—9:30 a.m.
Break		15 minutes	9:30 a.m.—9:45 a.m.
Module 3: Crosscut Saws	3.1 Crosscut Saw Basics	60 minutes	9:45 a.m.—10:45 a.m.
Module 3: Crosscut Saws	3.2 Crosscut Saw Limbing and Bucking	75 minutes	10:45 a.m.—12:00 p.m.
Lunch		60 minutes	12:00 p.m.—1:00 p.m.
Module 4: Ax Basics, Maintenance, and Use	N/A	60 minutes	1:00 p.m.—2:00 p.m.
Break		15 minutes	2:00 p.m. – 2:15 p.m.
Module 7: Hung-Up Trees	N/A	45 minutes	2:15 p.m. – 3:00 p.m.

Crosscut Felling

Day One

Module	Lesson	Length	Time
Module 1: Introduction to Saw Operations	N/A	90 minutes	8:00 a.m.—9:30 a.m.
Break		15 minutes	9:30 a.m.—9:45 a.m.
Module 3: Crosscut Saws	3.1 Crosscut Saw Basics	60 minutes	9:45 a.m.—10:45 a.m.
Module 3: Crosscut Saws	3.2 Crosscut Saw Limbing and Bucking	75 minutes	10:45 a.m.—12:00 p.m.
Lunch		60 minutes	12:00 p.m.—1:00 p.m.
Module 3: Crosscut Saws	3.3 Crosscut Saw Directional Felling	90 minutes	1:00 p.m. – 2:30 p.m.
Break		15 minutes	2:30 p.m. – 2:45 p.m.
Module 4: Ax Basics, Maintenance, and Use	N/A	60 minutes	2:45 p.m.—3:45 p.m.
Break		15 minutes	3:45 p.m. – 4:00 p.m.
Module 7: Hung-Up Trees	N/A	45 minutes	4:00 p.m. – 4:45 p.m.

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Fireline Qualified

Day One

Module	Lesson	Length	Time
Module 1: Introduction to Saw Operations	N/A	90 minutes	8:00 a.m.—9:30 a.m.
Break		15 minutes	9:45 a.m.—10:00 a.m.
Module 2: Chain Saws	2.1 Chain Saw Basics	75 minutes	10:00 a.m.—11:15 a.m.
Lunch			11:15 p.m.—12:15 p.m.
Module 2: Chain Saws	2.2 Chain Saw Brushing, Limbing, and Bucking	75 minutes	12:15 p.m.—1:30 p.m.
Break		15 minutes	1:30 p.m. – 1:45 p.m.
Module 2: Chain Saw Directional Felling	2.3 Chain Saw Directional Felling	90 minutes	1:45 p.m. – 3:15 p.m.
Break		15 minutes	3:15 p.m. – 3:30 p.m.
Module 5: Fireline Operations	N/A	45 minutes	3:30 p.m. – 4:15 p.m.
Module 7: Hung-Up Trees	N/A	45 minutes	4:15 p.m. – 5:00 p.m.

Module Delivery Time Estimates

Module	Lesson	Length
Module 1: Introduction to Saw Operations	N/A	90 minutes
Module 2: Chain Saws	2.1 Chain Saw Basics	75 minutes
Module 2: Chain Saws	2.2 Chain Saw Brushing, Limbing, and Bucking	75 minutes
Module 2: Chain Saw Directional Felling	2.3 Chain Saw Directional Felling	90 minutes
Module 3: Crosscut Saws	3.1 Crosscut Saw Basics	15 minutes
Module 3: Crosscut Saws	3.2 Crosscut Saw Limbing and Bucking	75 minutes
Module 3: Crosscut Saws	3.3 Crosscut Saw Directional Felling	90 minutes

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Module	Lesson	Length
Module 4: Ax Basics, Maintenance, and Use	N/A	60 minutes
Module 5: Fireline Operations	N/A	45 minutes
Module 6: Wedges	N/A	60 minutes
Module 7: Hung-Up Trees	N/A	45 minutes

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Lesson Plans

Module One: Introduction to Saw Operations

Audience: all

Objectives

Recognize the levels of sawyer certification.
(Prework)

List the three key, safety concepts. (Prework)

Recall the guiding documents associated with the National Saw Program and policies. (Prework and Classroom)

Identify and discuss components of the OHLEC size-up process. (Prework and Classroom)

Identify the required personal protective equipment (PPE) for both nonfire and fire use and the proper fit. (Classroom)

Identify and discuss how human factors affect sawyer operations. (Classroom)

Discuss operational complexity and its relationship to a sawyer's knowledge and skill. (Classroom)

Instructional method

Self-directed learning

Self-directed learning

Self-directed learning

Prework review

Lecture

Self-directed learning

Prework review

Lecture

Self-directed learning

Lecture

Lecture

Video and debrief: Human Factors

Video and debrief: How Thinking Sawyers Recover

Lecture

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Module Two: Chain Saws

Section One: Chain Saw Basics, Maintenance, and Operations

Audience: chain saw bucking, chain saw felling, fireline qualified

Objectives

List the guidelines for transporting a chain saw.
(Prework)

Identify the parts of a chain saw. (Prework and
Classroom)

Perform the five-point safety check. (Prework and
Classroom)

Discuss fueling safety procedures. (Prework and
Classroom)

Start a chain saw. (Prework and Classroom)

Describe reactive forces. (Classroom)

Instructional method

Self-directed learning

Self-directed learning

Prework review

Lecture

Chain saw activity

Demonstrate bar and chain
installation

Video and debrief: Chain Saw
Tension

Video: Chain Saw Sharpening

Demonstrate correct chain
tension

Self-directed learning

Prework review

Lecture

Demonstrate five-point safety
check

Demonstrate proper stance

Self-directed learning

Prework review

Lecture

Video: Three Starting
Procedures

Lecture

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Objectives

Instructional method

Demonstrate pushback

Demonstrate pull in

Demonstrate avoiding kick back

Section Two: Chain Saw Brushing, Limbing, and Bucking

Audience: chain saw bucking, chain saw felling, fireline qualified

Objectives

Instructional method

Describe brushing plans and techniques. (Prewrite and Classroom)

Self-directed learning

Prewrite review

Lecture

Describe limbing plans and techniques. (Prewrite and Classroom)

Self-directed learning

Lecture

Describe bucking plans and techniques. (Prewrite and Classroom)

Included above

Video: Brushing, Limbing, and Bucking

Discuss removing a spring pole. (Classroom)

Lecture

Video: Spring Poles

Section Three: Chain Saw Directional Felling

Audience: chain saw felling, fireline qualified

Objectives

Instructional method

Explain the good side/bad side of a tree. (Prewrite)

Self-directed learning

Explain directional felling. (Prewrite)

Self-directed learning

Identify the calculated lean of a tree. (Prewrite and Classroom)

Self-directed learning

Prewrite review

Lecture

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Objectives

State how you identify the objective of the felling operation. (Prewrite and Classroom)

Identify the natural lean of a tree. (Prewrite and Classroom)

Describe the OHLEC size-up process for directional felling. (Classroom)

Identify common hazards for directional felling. (Classroom)

Develop a cut plan. (Classroom)

Describe the importance of the escape plan. (Classroom)

Discuss the proper use of wedges. (Classroom)

Instructional method

Self-directed learning

Prewrite review

Lecture

Self-directed learning

Prewrite review

Lecture

Lecture

Video: OHLEC for Felling

Video: Hinges

Lecture

Lecture

Lecture

Lecture

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Module Three: Crosscut Saws

Section One: Crosscut Saw Basics

Audience: crosscut saw bucking, crosscut saw felling

Objectives

Explain why crosscuts are used in federally designated wilderness areas. (Pework)

Describe the different types of saw grinds. (Pework)

Describe the best saw transportation methods. (Pework)

Describe basic care and maintenance of crosscut saws. (Pework)

Explain the different parts of a crosscut saw and how they function together. (Classroom)

Describe how a crosscut saw removes wood. (Classroom)

Explain the arc of the saw. (Classroom)

Identify accompanying tools for a crosscut saw and describe their purpose. (Classroom)

Instructional method

Self-directed learning

Self-directed learning

Self-directed learning

Self-directed learning

Pework review

Lecture

Crosscut saw anatomy

Activity

Lecture

Video: How a Saw Cuts

Lecture

Video: Arc of the Saw

Lecture

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Section Two: Crosscut Saw Limbing and Bucking

Audience: crosscut saw bucking, crosscut saw felling

Objectives

Explain the importance of saw team communication. (Pework)

Identify the different types of binds. (Pework)

Define brushing and limbing. (Pework)

Identify proper limbing techniques. (Classroom)

Describe the bucking plan and techniques. (Classroom)

Instructional method

Self-directed learning

Self-directed learning

Self-directed learning

Pework review

Lecture

Lecture

Video: OHLEC for Crosscut Bucking

Section Three: Crosscut Saw Directional Felling

Audience: crosscut saw felling

Objectives

Describe directional felling. (Pework)

Describe the good side/bad side of a tree. (Pework)

Define the lean of a tree. (Pework)

Calculate the lean of a tree. (Classroom)

Describe the OHLEC size-up process for directional felling. (Classroom)

Develop and implement a cut plan as part of a team. (Classroom)

Instructional method

Self-directed learning

Self-directed learning

Self-directed learning

Pework review

Lecture

Lecture

Video: OHLEC for Crosscut Felling

Lecture

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Objectives

Instructional method

Explain the proper use of wedges. (Classroom)

Video: Hinges

Lecture

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Module Four: Ax Basics, Maintenance, and Use

Audience: chain saw bucking (recommended), chain saw felling (recommended), crosscut saw bucking, crosscut saw felling, fireline qualified (recommended)

Objectives

- Describe how an ax works. (Prework)
- Point out the parts of an ax. (Prework)
- Describe the importance of the 45-degree angle. (Prework)
- Select appropriate PPE when using an ax. (Classroom)
- Describe a chopping plan. (Classroom)
- Demonstrate proper chopping techniques. (Classroom)

Instructional method

- Self-directed learning
- Self-directed learning
- Self-directed learning
- Prework review
- Lecture
- Lecture
- Lecture
- Video: Overhead Chop
- Video: Over the Shoulder Chop
- Video: Limbing With an Ax
- Lecture

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Module Five: Fireline Operations

Audience: fireline qualified

Objectives

Identify fireline safety considerations. (Classroom)

Explain sawyer and swamper team responsibilities.
(Classroom)

Describe cutting area control. (Classroom)

Explain saw team tasks and tactics. (Classroom)

List the common tactics for material removal.
(Classroom)

Instructional method

Lecture

Lecture

Lecture

Progressive animation

Leapfrogging animation

Lecture

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Module Six: Wedges

Audience: chain saw bucking (optional), chain saw felling, crosscut saw bucking (optional), crosscut felling, fireline qualified

Objectives

Describe and discuss how wedges work. (Classroom)

Describe the different types of wedges. (Classroom)

Explain the different wedge uses. (Classroom)

Explain how sawyers use wedges in felling operations. (Classroom)

Calculate the number of segments in a tree. (Classroom)

Instructional method

Lecture

Lecture

Lecture

Lecture

Activity One: Determine Lift

Lecture

Activity Two: Calculating Segments

Activity Three: Develop a Wedging Plan to Overcome Back Lean

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Module Seven: Hung-Up Trees

Audience: chain saw bucking, chain saw felling, crosscut saw bucking, crosscut saw felling, fireline qualified

Objectives

Define the term hung-up tree. (Classroom)

Identify the complexities of the OHLEC five-step process for removing hung-up trees. (Classroom)

Determine if you can avoid a hung-up tree or need to remove it. (Classroom)

Describe hung-up tree removal techniques. (Classroom)

Describe the use of companion tools for removing hung-up trees. (Classroom)

Instructional Method

Lecture

Lecture

Lecture

Lecture

Lecture

Appendix B

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APPENDIX B: INSTRUCTOR EVALUATION FORM

Presenter's name: _____ Course date: _____

Course name: _____ Course location: _____

Presentation Evaluation Sheet

Use the following scale to rate your instructor.

1= Poor job 2= Adequately met criteria 3= Excellent job N/A= Not evaluated in area

Evaluation item	Low	High	Comments (requested for ratings of "1")
	PRESENTATION		
Gained the attention of the class	1	2 3	
Related information to your specific needs	1	2 3	
Came prepared for class with all necessary materials	1	2 3	
Presented main points clearly and effectively	1	2 3	
Fostered an engaging atmosphere that encouraged participation	1	2 3	
Was available during activities and videos for questions and guidance	1	2 3	
SUBTOTAL-SECTION 1			
	KNOWLEDGE of Topic		
Displayed adequate knowledge of the topics presented	1	2 3	
Presented technically accurate content	1	2 3	
Defined unfamiliar technical terms	1	2 3	
Answered questions accurately	1	2 3	

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APPENDIX B: INSTRUCTOR EVALUATION FORM

Evaluation item	Low	High	Comments (requested for ratings of "1")	
Kept presentation on track/in logical order	1	2	3	
Provided personal examples that related to the content	1	2	3	
SUBTOTAL-SECTION 2				
	DELIVERY SKILLS			
Expressed enthusiasm for the material	1	2	3	
Expressed interest in helping students learn	1	2	3	
Provided constructive feedback	1	2	3	
Maintained regular eye contact	1	2	3	
Spoke clearly	1	2	3	
Provided prework materials ahead of time	1	2	3	
Provided and encouraged opportunities for class participation	1	2	3	
Respected students	1	2	3	
Kept presentations within time limits	1	2	3	
SUBTOTAL-SECTION 3				
	FIELD STATION			
Provided meaningful guidance on performance skills	1	2	3	
Thoroughly explained expectations and procedures for field station activities	1	2	3	

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APPENDIX B: INSTRUCTOR EVALUATION FORM

Evaluation item	Low	High	Comments (requested for ratings of "1")
Facilitated learning in the field station	1	2 3	
Maintained overall field station safety	1	2 3	
SUBTOTAL-SECTION 4			
TOTAL SCORE-SECTIONS 1-4			

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Appendix C

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Glossary

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ABC

Ax type—Boy's	Smallest type of ax, typically 2 pounds, with a handle that is 24 inches long.
Ax type—Double-bit	An ax with two chopping edges. Typically, one edge (keen edge) is reserved for chopping clear, green wood, while the other (stunt edge) is reserved for dirty or dead wood or wood with knots.
Ax type—Single-bit	An ax with one cutting edge with the opposite side (poll) used for pounding wedges or breaking dead limbs.
Backcut	The final cut that sets the back of the hinge and releases the tree from the stump.
Backcut—Boring	A backcut initiated by using a plunge or boring cut to set the back of the hinge, and then proceeding toward the back of the tree. The cut can either sever all the connecting fiber or the sawyer can leave a small amount to form a trigger, which can be severed once final clearance is assured.
Backcut—Conventional	A backcut started at the back of the tree that proceeds toward the front of the tree. The cut is stopped when the correct hinge width is achieved or the tree falls.
Backcut—Quarter-cut	A backcut that removes only a portion (one quarter) of the bole of the tree and sets the back of the hinge on the offside. This technique is used on trees which require a double cut or on side leaning trees when a supporting wedge is needed.
Backcut—Triangle	A special form of backcut used with crosscut saws or chain saws to help prevent barberchairs.
Barberchair	The vertical splitting of a tree along the length of the bole that sends the back slab backward.
Binds	Points of compression or tension present in a log resulting from objects that prevent the tree from lying flat on the ground or that create pressure on the side or ends of the log.
Blowdown	Trees that have been blown over by strong winds or by snow load. Areas of blowdown create hazardous conditions due to the many binds present, which may be difficult to observe.
Bole	The trunk of a tree.
Brushing	Severing small-diameter stems.
Bucking	Sawing longer logs or limbs into shorter lengths.

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Bypass cut (Dutchman)	A kerf that interferes with the smooth closing of the notch. Caused when one of the cuts is made too deep and extends beyond the endpoint of the other notch cut, also known as a "Dutchman."
Cat face	A hollowed-out portion or scar in the bole of a tree. Often caused by fire or rot.
Chain saw—Bar and chain system	Includes the guide bar, oilway, chain tensioner, saw chain, sprocket, and clutch.
Chain saw—Powerhead system	Includes the air filter, carburetor, fuel tank, fuel filter, spark arrester, spark plug, fan housing, flywheel fins, cylinder cooling fins, and decompression valve.
Chain saw—Safety system	Includes the chain brake, chain catcher, throttle interlock, antivibration system, and spark arrester.
Chain saw components—Bar studs	Along with the bar nuts, holds the guide bar in place.
Chain saw components—Bucking/bumper spikes	Used to help hold the saw steady against wood.
Chain saw components—Chain brake	Stops the chain's motion.
Chain saw components—Chain catcher	Prevents the chain from contacting the sawyer in the event of a broken or thrown chain.
Chain saw components—Chain sprocket	The toothed wheel that drives the saw chain.
Chain saw components—Choke	Used for starting a cold saw.

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Chain saw components— Clutch drum	Couples the engine to the chain sprocket when the operator accelerates the engine above idle speed.
Chain saw components— Cooling fins	Provides cooling to the motor cylinder.
Chain saw components— Decompression valve	Reduces pressure in the cylinder head to enable easier starting.
Chain saw components— Directional marks	Used for aiming the undercut and backcut. Also known as “gunning sights.”
Chain saw components— Flywheel cover	Covers the flywheel and holds the recoil starter.
Chain saw components— Muffler	Reduces exhaust noise.
Chain saw components— Oiler adjustment screw	Adjusts the amount of oil dispensed to the bar and chain.
Chain saw components— Tension adjustment screw	Moves the guide bar to maintain proper tension on the saw chain.
Chain saw components— Throttle interlock	Prevents throttle from engaging unless the interlock is depressed on the handle.

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Chain saw components— Throttle trigger	Controls the speed of the engine.
Chain tooth— Chisel angle	Separates the wood chip from the kerf.
Chain tooth— Cutting corner	Starts the cut in the wood fiber.
Chain tooth— Depth gauge (raker)	Regulates the thickness of the wood chip to be removed.
Chain tooth—Side plate	Does most of the cutting.
Chain tooth—Top plate	Starts the separation of the wood chip from the kerf.
Champion Tooth	Best suited for cutting medium and large timber diameters in hardwood species, and is popular in the hardwood regions of North America. It consists of two alternately set cutter teeth and an unset raker with a gullet between them. The champion tooth pattern increases cutting efficiency in hardwood by using fewer cutters to put more force on each cutting tooth. The broad, almond-shaped cutters also provide much greater stiffness and durability to each cutting tooth, lessening the chance of breakage during use. It works well even in the hardest dry or frozen wood.
Chocks or blocks	Pieces of wood used to stabilize logs.
Compression area	The portion of the log where the wood fibers are pushing together.
CPR	Cardiopulmonary resuscitation.
Crosscut saw anatomy—Cutter teeth	Two rows of cutting edges that score wood fibers on each side of the kerf.
Crosscut saw anatomy—Gullet	Rounded space that allows shavings to collect until the gullet clears the log.

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Crosscut saw anatomy—Raker	Tooth that chisels cut fiber and removes it from the log.
Crosscut saw anatomy—Saw arc	One segment of a 360-degree circle; determines the amount of lift a saw has over the length of the saw.
Crosscut saw grind—Crescent taper	Teeth are all the same thickness, but tapered in the arc of the saw.
Crosscut saw grind—Flat	Thickness of metal equal throughout the blade.
Crosscut saw grind—Straight taper	Thinner at the back than at the teeth.
Crosscut saw	The cutter tooth's offset from the plane of the saw.
Cut type—Compound	Two cut angles working together.
Cut type—Offset	Top cut and bottom cut placed in a log or limb so that the cuts do not match up exactly. Typically used when the binds cannot be easily determined and equipment is available to break the two pieces apart.
Cut type—Straight	Used in bucking situations with simple top or bottom bind when one bucking cut can be made.
Cutting area	The immediate area around where saw operations are being conducted. The zone where the sawyer can cut you with the saw. A 360-degree radius around a sawyer at a distance equivalent to the sawyer's arm length plus the length of the tool.

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DEF

DBH	Diameter at breast height.
Directional felling	The process of establishing a series of cuts to construct a hinge that guides the tree toward a specific objective.
Double cutting	Undercut with two cuts from opposite sides of the tree used when the diameter is greater than the chainsaw's bar length.
Face	The opening where chips are removed when an ax is used to chop a log.
Felling lever	A multitool made to replace wedges and provide lift during felling and to roll logs during bucking.
Fireline—Banking	Stacking of cut material on the side of the fireline opposite the fire edge.
Fireline—Chaining	Removing cut fuels by handing material from one person to the next person in a line.
Fireline—Keyholes	Openings cut into continuous fuels used to dispose of cut material.
Fireline—Throwing	Removing cut fuels by throwing them away from the fireline.
Fireline—Window	Natural openings in the fuels used as disposal sites for cut materials.
Free face	The severed cut created by an ax. Since the wood splits along the grain, a chopped free face will release chips of wood from the tree as the ax user chops the log.
Fruiting bodies	Fungi on the bole of a tree or log that could indicate rot.
FSM	Forest Service Manual.
FSSOG	Forest Service Saw Operations Guide.
Fuel geyser	The forceful expulsion of liquid and vapor fuel from a fuel tank.

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GHI

Gauge	Measurement of the thickness of the drive link.
Great American Tooth	The Great American Tooth pattern cuts slightly less aggressively than the M tooth, but still more aggressively than a Champion tooth. It is typically employed for medium and small diameter timber, in dry, medium to hard hardwood species. It is a type of combination tooth pattern consisting of one plain tooth between two opposing set combination teeth, separated by a “U” or slightly “V” shaped gullet. This pattern is preferable for cutting at an angle closer to 45 degrees to the fiber such as when needed for an exaggerated compound cut, which will be discussed in more detail later, or a sawn undercut because of its tendency to start more easily and hold an angle throughout the cutting process.
Grip hoist	A portable manual hoist with traversing wire rope; can handle heavier loads.
Guide bar— Standard tip	Bar tip has a roller sprocket for reduced friction and wear.
Guide bar— Lightweight	Bars with aluminum inserts to reduce weight.
Guide bar parts— Chain tensioner pin hole	Where chain tension pin is inserted.
Guide bar parts— Oil hole	Where chain oil from the oiler flows to the chain drivers along the guide bar groove.
Guide bar parts— Mounting slot	Where the guide bar mounting studs are inserted to hold the guide bar in place.
Guide bar parts— Guide bar rails	The tie strap of the chain; rides on top of the rails.
Guide bar parts— Guide bar groove	Where the chain drivers ride to guide the cutting teeth around the guide bar.
Guide bar parts— Sprocket tip	Toothed sprocket that guides the chain around the tip of the bar.
Gunning sights	Painted or embossed marks on the saw used to aim the tree into the objective.

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Hazard	A condition that presents a risk of harm or damage to a target.
HDPE	High-density polyethylene.
Helispot	The landing zone for a helicopter.
Hinge	Uncut fiber that guides the tree into the objective. The front is formed by the undercut and the back is formed by the backcut.
Hung-up tree	A tree that has fallen partially and has been impeded by another stationary object. Also called “lodged” or “trapped.”

JKL

JHA	Job hazard analysis.
Kerf	The space created as the saw chain or crosscut teeth sever fiber.
Lance Tooth (or Peg and Raker)	The most efficient cutting pattern for use in soft wood. It consists of groups of four alternately set cutters separated by an unset raker with gullets on each side. It is best suited for larger diameter green timber in soft wood species such as fir, spruce, and redwood. It was the standard pattern for felling and bucking timber in the American West. However, it loses efficiency when used in hard wood, due to the decreased stiffness of longer thin teeth, and can easily be misshapen, sometimes resulting in broken teeth.
Lazy strap	The first cut in a bottom bind situation. The depth of the kerf is minimal.
LCES	Lookout(s), communication(s), escape routes, and safety zones.
Leans	Attitude of the tree relative to vertical. The tree can have naturally weighted lean, or does it want to fall? Calculated lean is the front or back lean, and side to side lean is relative to the intended lay or objective. Lean is expressed in feet.
Leans— Calculated lean	The amount of front to back and/or side to side lean is expressed in feet relative to the objective.
Leans—Front to back	Determined by standing on either side of the tree 90 degrees opposite the objective.
Leans—Natural lean	Lean in a tree where gravity would take the tree if it were to fall over on its own.

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Leans—Side to side	Determined by standing in line with the objective, either in the intended lay or directly opposite the intended lay.
Lignin	Complex organic polymers that help construct the cell walls of wood and bark and that act as glue for wood fibers.
Limb lock	Cutting technique using bypass cuts to partially sever limbs. Used with limbs under significant compression/tension. Cut limbs can either be broken off manually or by machinery.
Limbing	Removing branches from the main stem/bole of a tree.
Log chains/ropes/pulleys/winches	Used to move or pull logs.

MNO

M Tooth	The M Tooth pattern cuts aggressively (requiring more force) and is historically best suited for cutting dry medium to hard hardwood species. Modern M Tooth variations work in many different species. This is the second generation of saw tooth patterns. Originally developed in Germany in the 14th century, it didn't find widespread use until the mid to late 19th century in North America. It consists of pairs of combination teeth separated by a "U" shaped gullet. The outer edges of the teeth (the legs of the M) are vertical and act like rakers. The inside edges of the M are filed to a bevel, making a point. This tooth pattern requires more effort to use than the champion tooth, but may be the best choice if medium to smaller diameter hardwoods are anticipated, or simply for cutting more quickly with a strong sawyer or saw team. It is used frequently in bucking saws and competitive hardwood racing saws.
Manty NFS	Canvas cover used to wrap loads in preparation for packing by pack stock. National Forest System.
NRSTC	Nationally recognized sawyer training curriculum.
OHLEC	Objective, hazards, leans/binds, escape plan, and cut plan.
OHLEC—Cut plan	Determines the type and sequence of cuts which will guide the tree or log into the objective.
OHLEC—Escape plan	Determine and clear an escape path and an alternate path.
OHLEC—Hazard	Any hazard that directly relates to achieving the objective.

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OHLEC— Leans/binds	Determination of types and extent of leans in a standing tree or the location and types of binds present in a log.
OHLEC— Objective	The purpose of the operation.
OSHA	Occupational Safety and Health Administration.

PQR

Peavey	Leveraging tool used to roll logs with a pivoting, hooked arm and a metal spike at one end.
Perforated Lance	A good all-around pattern for working in locations with medium and large diameter mixed timber where both softwood and hardwood species are encountered. It consists of groups of four alternately set cutters separated by an unset raker with gullets on each side. The opposing set pairs of lances bridged together gives increased tooth stiffness and forms the perforations that give the pattern its name. It works well for all but very hard and frozen wood. This is a common tooth pattern for felling saws.
Pitch	The distance between any three consecutive rivets divided by two.
Pivot points	Ground features that may cause a bucked log to swing or move unexpectedly.
Plain tooth (or, peg tooth)	This is the most basic tooth pattern and has been used for centuries. It consists of alternately set triangular teeth. Being simple, it is easy to manufacture and maintain, but lacks in performance when compared to other patterns. Generally, the teeth are smaller, relative to other tooth patterns, and are consequently used for small diameter timber in dry or very hard wood, or cuts needing a higher degree of precision. Having no rakers or gullets, this tooth pattern forces each tooth through cut shavings, grinding them into fine saw dust and consequently reducing its efficiency in long kerfs. If you find a plain tooth saw with large or very large teeth, it was most likely designed for a drop-saw pit or mill; an old form of hand, wind, livestock, or steam powered sawmill used to cut boards from logs, or for cutting ice, and has no utility for use with wood.
Plumbing	Technique used to determine the lean present in a standing tree.
PPE	Personal protective equipment.
RAW	Risk awareness worksheet.

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Reactive force— Kickback	The chain saw bar is violently forced up and back toward you in an uncontrolled arc. This can happen when the upper portion of the bar contacts a solid object or becomes pinched.
Reactive force— Pull-in	Energy is transferred to the sawyer as the chain pulls the saw forward, experienced when cutting with the bottom of the bar.
Reactive force— Pushback	Energy is transferred to the sawyer as the chain pushes the saw backward, experienced when cutting with the top of the bar.
Rope winch	A portable manual hoist with traversing nylon rope; can handle lighter loads.
RPM	Revolutions per minute.

STUV

SA	Situational awareness.
Saw chain— Cutter tooth	Does the cutting.
Saw chain—Drive link	Guides the chain around the bar and transfers rotational energy from the drive sprocket.
Saw chain—Rivet	Holds the parts of the chain together and allows them to rotate.
Saw chain—Tie strap	Links the cutter tooth to the drive link.
Saw team	A group of sawyers and swampers working together.
Schoolmarm	A tree with two or more trunks; a forked tree.
Skids	Small logs used to direct larger logs into a specific placement.
Slabbed out	Created when bucking top down on a log with bottom compression. A split will fracture along the grain as the cut nears completion.
Snag	Dead or dying trees.
Snipe	A small, sloping cut taken off the stump to make space for the bole of the tree to drop into.
Spring poles	Small trees or limbs that are bent over and under pressure.

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Stob	Tree with the top missing or broken off.
Strike zone	An area encompassing a 360-degree radius around a sawyer at a distance equivalent to the sawyer's arm length plus the length of the chain saw and bar.
Swamp out	Periodically remove cut debris.
Swamper	One or more people that work with a sawyer to help remove the cut material.
Target	Object of value that can be damaged, such as a person, building, or vehicle. Someone or something that can be impacted by a hazard.
Tension	The physical force that can result in a release of energy where the wood fibers pull apart.
Tongs	Used to move or carry logs.
Trigger	A strap of wood, wide enough to support the tree being felled, that is used to support the tree for a final check. Also referred to as a strap.
Undercut	The removal of the wedge section on the front part of the tree. Forms an opening notch in the bole for setting the front portion of the hinge.
Undercut— Conventional	Undercut made with a 45-degree opening with a sloping cut on the top.
Undercut— Humboldt	Undercut with a 45-degree opening with the sloping cut on the bottom.
Undercut—Open face	Undercut with a 70-degree or greater opening angle.
Undercut— Step/stumpshot	A step which is formed when the backcut is slightly above the apex of the notch. Used to prevent the tree from sliding backward off the stump. Only needed with a conventional and Humboldt undercut.
USDA	U. S. Department of Agriculture.
Vapor lock	Fuel overheats and vaporizes too quickly, causing excess gas bubbles in the carburetor that block normal fuel delivery.

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WXYZ

Wedge	Typically, a hard plastic tool used to manage compression during bucking and felling operations.
Wedge—Indicator	A wedge placed in the kerf of the backcut to help visually determine tree movement.
Wedge taper— Double	Isosceles triangle with two sides of equal length.
Wedge taper— Single	Right triangle with a 90-degree angle on the back plate.
Wedge taper— Triple	Right triangle from the tip and halfway to the base, where the taper increases dramatically.
Widowmaker	Limbs that are no longer attached and are hanging loose in the tree canopy.
Work Area	The area surrounding the specific cutting operation. The size of the work area will depend on the site conditions and is established by the sawyer.
Work Area Controls	Safety procedures established by the sawyer to identify potential hazards and plan the cutting operation.

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Required Modules

Required Modules

Module needed	Chain saw bucking	Chain saw felling	Crosscut saw bucking	Crosscut saw felling	Fireline qualified (S-212 Equivalent)
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

Number of Segments

Segment Length in Inches

	6	8	10	12	14	16	18	20	22	24	26	28	30
45	90	68	54	45	39	34	30	27	25	23	21	19	18
50	100	75	60	50	43	38	33	30	27	25	23	21	20
55	110	83	66	55	47	40	37	33	30	28	25	24	22
60	120	90	72	60	51	54	40	36	33	30	28	26	24
65	130	98	78	65	56	49	43	39	35	33	30	28	26
70	140	105	84	70	60	53	47	42	38	35	32	30	28
75	150	113	90	75	64	56	50	45	41	38	35	32	30
80	160	120	96	80	69	60	53	48	44	40	37	34	32
85	170	128	102	85	73	64	57	51	46	43	36	36	34
90	180	135	108	90	77	68	60	54	49	45	42	39	36
95	190	143	114	95	81	71	63	57	52	48	44	41	38
100	200	150	120	100	86	75	67	60	55	50	46	43	40
105	210	158	126	105	90	79	70	63	57	53	48	45	42
110	220	165	132	110	94	83	73	66	60	55	51	47	44
115	230	173	138	115	99	86	77	69	63	58	53	49	46
120	240	180	144	120	103	90	80	72	65	60	55	51	48

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Expected Movement

Tree Diameter in Inches

	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"
20	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1
25	4	3	2	2	2	2	1	1	1	1	1	1	1	1	1
30	5	3	3	2	2	2	2	2	1	1	1	1	1	1	1
35	5	4	3	3	2	2	2	2	2	2	1	1	1	1	1
45	7	5	4	4	3	3	3	2	2	2	2	2	2	2	1
50	8	6	5	4	4	3	3	3	2	2	2	2	2	2	2
55	9	6	5	4	4	3	3	3	3	2	2	2	2	2	2
60	9	7	6	5	4	4	3	3	3	3	2	2	2	2	2
65	10	7	6	5	5	4	4	3	3	3	3	2	2	2	2
70	11	8	7	6	5	4	4	4	3	3	3	3	2	2	2
75		9	7	6	5	5	4	4	4	3	3	3	3	3	2
80		9	8	6	6	5	5	4	4	3	3	3	3	3	3
85			8	7	6	5	5	4	4	4	3	3	3	3	3
90			9	7	6	6	5	5	4	4	4	3	3	3	3
95				8	7	6	5	5	4	4	4	4	3	3	3
100				8	7	6	6	5	5	4	4	4	4	3	3
105					7	7	6	5	5	5	4	4	4	4	3
110					8	7	6	6	5	5	4	4	4	4	3
115						7	7	6	5	5	5	4	4	4	4
120						8	7	6	6	5	5	5	4	4	4
125						8	7	6	6	5	5	5	4	4	4
130						8	7	7	6	6	5	5	5	4	4
135							8	7	6	6	5	5	5	5	4
140							8	7	7	6	6	5	5	5	4

Feet of expected movement toward objective using one wedge.

OHLEC Field Guide

Chainsaw Field Guide		Risk
Objective <ul style="list-style-type: none"> How do I get home safely? What needs to be done? What is your desired lay? What obstacles exist and are their values high? 	Fall tree to multiple lays	Low
	Bucking on flat ground	Low
	Fall tree within 45 degrees of specific lay	Moderate
	Fall tree within 5 degrees of specific lay	High
	No safe lay	STOP Reevaluate
Hazards <ul style="list-style-type: none"> Overhead hazards Other Tree hazards in cutting area Environmental Hazards Cutting area hazards Wood Hazards – rot, cracks, live, dead, fire weakened Human factor Hazards Hung-up or storm damaged 	Static Hazards	Low
	Dynamic Hazards	High
	No Escape from Hazards	STOP Reevaluate
	<30% Fiber at Hinge	STOP Reevaluate
	Base won't support stem if cut	STOP Reevaluate
Leans (Falling) <ul style="list-style-type: none"> Side to Side Front or Back Risk of barber chair? 	Side	
	< 3 feet	Low
	3 ft. -5 ft.	Moderate
	>5 ft.	High
	Head	
	<3 ft.	Low
	>3 ft.	Moderate
	Back	
	1-2" lift to overcome	Moderate
	>2" lift to overcome	High
Binds (Bucking) <ul style="list-style-type: none"> Top/Bottom Side to side End to end Combinations 	Binds	
	Known Low release of energy	Low
	Release of energy known but may require a series of cuts	Moderate
	High release of energy expected or unknown	High
Escape paths	Angle	
	Diagonal both clear	Low
	Only 1 escape path	Moderate
	Distance from Tree	
	15ft	Low
	10ft-15ft	Moderate
	Cover <10 ft	Moderate
No Escape Path	STOP Reevaluate	
Cutting Plan <ul style="list-style-type: none"> Hinge design (80/10) Undercut Backcut Sequence of cuts Type of bucking cut Slope steepness 	Undercut/Hinge	
	Single cut undercut	Low
	Sound Fiber	Low
	Compromised Fiber	Moderate
	Double cut undercut	Moderate
	Sequence of cuts	
	All from 1 side, escape to same side	Low
	Requires moving from side to side of tree.	Moderate
	Backcut	
	Single backcut	Low
	Double cut backcut	Moderate
	>Double cut	High
	Cutting plan does not meet objective and needs to be changed	STOP Reevaluate
Cutting plan does not meet sawyers ability and qualifications	STOP Reevaluate	

OHLEC Field Guide

Crosscut and Ax Field Guide		Risk
Objective <ul style="list-style-type: none"> How do I get home safely? What needs to be done? What is your desired lay? What obstacles exist and are their values high? 	Fall tree in any direction	Low
	Fall tree in specific lay	Moderate
	Bucking small trees, pieces can be easily lifted and moved.	Low
	Buck large bole with pre-plan of how to move piece	Moderate
	No safe lay	STOP Reevaluate
Hazards <ul style="list-style-type: none"> Overhead hazards Other Tree hazards in cutting area Environmental Hazards Cutting area hazards Wood Hazards – rot, cracks, live, dead, fire weakened Human Factor Hazards Hung-up or storm damaged 	0-2 Individual Hazards	Low
	3-5 Individual Hazards	Moderate
	>5 Individual Hazards	High
	No Escape from Hazards	STOP Reevaluate
	<30% Fiber at Hinge	STOP Reevaluate
	Base won't support stem if cut	STOP Reevaluate
Leans (Falling) <ul style="list-style-type: none"> Side to Side Front or Back Risk of barber chair? 	Side	
	< 3 feet	Low
	3 ft. -5 ft.	Moderate
	>5 ft.	High
	Head	
	<3 ft.	Low
	3ft-6ft	Moderate
	>6 ft.	High
	Back	
	<1" lift to overcome	Moderate
>1" lift to overcome	High	
Binds (Bucking) <ul style="list-style-type: none"> Top/Bottom Side to side End to end Combinations 	Binds	
	Known low release of energy	Low
	Release of energy known but may require a series of cuts	Moderate
	High release of energy expected or unknown	High
Escape paths	Angle	
	45 degree both clear	Low
	Only 1 escape path	High
	Distance	
	15ft	Low
	10ft-15ft	Moderate
	No Escape Path	STOP Reevaluate
Cutting Plan <ul style="list-style-type: none"> Hinge design (80/10) Undercut Backcut Type and sequence of cuts Wedging Plan Chopping 	Undercut/Hinge	
	Conventional undercut	Low
	Sound Fiber	Low
	Compromised fiber	Moderate
	Weak side vertical chopping	Moderate
	Undercut-other	High
	Backcut	
	Double sawyer	Low
	Single sawyer	Moderate
	Bucking	
	Double sawyer	Low
	Single sawyer - underbucking	Moderate
	Cutting height above shoulders	High
Wedging		
Cutting plan does not meet objective	STOP Reevaluate	
Cutting plan needs to be changed	STOP Reevaluate	

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OHLEC Complexity

		Complexity			
		LOW	MODERATE	HIGH	
O bjective	<ul style="list-style-type: none"> Options available to fell tree to multiple lays to meet objective 	<ul style="list-style-type: none"> Options available to fell tree within 45 degrees of intended lay to meet objective 	<ul style="list-style-type: none"> Tree must be felled within 5 degrees of intended lay to meet objective 	 <ul style="list-style-type: none"> No Safe Lay - STOP Reevaluate objective! 	
H azards	<ul style="list-style-type: none"> No hazards are present that will impact cutting operation 	<ul style="list-style-type: none"> Hazards are present but can be easily identified and understood 	<ul style="list-style-type: none"> Hazard(s) are present but may be mitigated by altering cut plan and technique. 	 <ul style="list-style-type: none"> No Escape from Hazards - STOP Reevaluate objective! 	
L eans	<ul style="list-style-type: none"> Less than 3 ft. of side lean Less than 3 ft. of head lean Back lean does not exist with intended lay Binds - Known low release of energy Leans or binds do not require wedging or sequence of cuts 	<ul style="list-style-type: none"> Three to five ft. of side lean Three to five ft. of head lean 1" of lift to overcome back lean required Leans or binds may require wedging 	<ul style="list-style-type: none"> Greater than 5 ft. of side lean Greater than 5 ft. of head lean One to two inches of lift required to overcome back lean Binds - High release of energy expected 	 <ul style="list-style-type: none"> More than 2" of lift required to overcome back lean - STOP Reevaluate objective! 	
E scape Plan	<ul style="list-style-type: none"> Escape path is clear Multiple escape paths - Easily accessed 	<ul style="list-style-type: none"> Access to escape path could be limited i.e., Only one escape path available 	<ul style="list-style-type: none"> Access of escape path(s) could be difficult and/or in steep terrain 	 <ul style="list-style-type: none"> No Escape Path - STOP Reevaluate objective! 	
C utting Plan	<ul style="list-style-type: none"> Single cut undercut Green or Sound Hinge Cuts can be made from 1 side of tree - escape to same side Single backcut 	<ul style="list-style-type: none"> Compromised Fiber Double Cut Undercut / Backcut Requires moving from side to side of tree 	<ul style="list-style-type: none"> Cut plan requires more than Double Cut Terrain makes cut plan implementation difficult Cut plan requires an elaborate sequence of cuts and wedging plan Tree fiber integrity has been significantly compromised i.e., rot, fire weakened etc. Hung-up or limb-locked trees 	 <ul style="list-style-type: none"> Cutting plan does not meet sawyers ability and qualifications - STOP Reevaluate objective! 	
Qualification Level	A	B	C		
<p><small>* The factors identified above are to be used as support when trying to determine the overall complexity of a cutting operation by going through each step of the OHLEC process. These different factors are not to be considered conclusive when determining complexity, but rather a tool that assists sawyers and instructors when trying to determine the complexity of a cutting operation and how it aligns with a sawyers experience, ability, and qualification level.</small></p>					

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