





Pacific Crest Trail Association



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Association

Saw Training For Volunteer Sawyers

Bucking Only

January 2018





Course Overview

- **Saw Safety Course**
 - ▶ For Trainee Saw Operators and Saw Operators
- **Saw Certification Training**
- **Bind Analysis and Cutting Sequence**
 - ▶ For Trainee Saw Operators and Saw Operators
- **Crosscut Saw Specific Training**
 - ▶ For Crosscut Trainee Saw Operators and Saw Operators
- **Chain Saw Specific Training**
 - ▶ For Chain Saw Trainee Saw Operators and Saw Operators





Memorandum of Understanding

2009 MOU page 13, item 1, PCTA shall:

“Provide chain and crosscut saw operator safety training, certification and recertification opportunities using PCTA affiliated instructor/certifiers and instructors to meet the needs of the PCTA volunteers and staff to the fullest extent possible.”

PCTA Saw Policy

● National Forest Service Saw Policy

- ▶ Adopted July 2016
- ▶ Allows Volunteer Groups to have their own saw programs
- ▶ PCTA saw program approved Feb 2018





Sawyer Certification Levels

- **A Sawyer – Bucking Only – Trainee Saw Operator**
 - ▶ Demonstrates skills to work at Low Level of Complexity
 - ▶ Must be supervised during all cutting projects

- **B Sawyer – Bucking Only – Saw Operator**
 - ▶ May work without supervision
 - ▶ Demonstrates skills to work at Moderate Level of Complexity
 - ▶ Supervises A Sawyers

- **C Sawyer – Bucking Only – Saw Operator**
 - ▶ May work without supervision
 - ▶ Demonstrates skills to work at High Level of Complexity
 - ▶ Supervises A Sawyers and B Sawyers
 - ▶ May be designated by the PCTA to Train and Evaluate A Sawyers and B Sawyers





Sawyer Certification Levels

- **Volunteer Saw Instructor**
 - ▶ C Sawyer, Designated by the PCTA to be a Saw Instructor
 - ▶ Trains and evaluates A Sawyers and B Sawyers
 - ▶ Reviews Saw Program Policy

- **Volunteer Saw Evaluator**
 - ▶ C Sawyer Evaluator, approved by the Forest Service Regional Saw Program Manager
 - *C Sawyer – Evaluators can certify C Sawyers – Bucking Only*

- **Volunteer Saw Instructor-in-Training**
 - ▶ B Sawyer or C Sawyer
 - ▶ Designated by the PCTA to be “In Training”
 - ▶ Assists in training events





Sawyer Cards

- **New Cards under new Forest Service Policy**
 - ▶ 3 year cards to be issued by PCTA (temporarily)
 - ▶ All levels, A Sawyer, B Sawyer and C Sawyer
- **New National Database**
 - ▶ Cards will be issued thru new National Database
 - ▶ PCTA Trail Operation's Director will Sign the Evaluations and submit to the Database
 - ▶ Database will be operational by April 2018





Saw Crew Leader

Each Saw Crew needs a Lead Sawyer

- **Must be B Sawyer or C Sawyer**
- **Often determined prior to project start**
- **Saw Crew Leader is Responsible for:**
 - ▶ Cutting Operation and Saw Crew Safety
 - ▶ Briefing Swampers on hazards of working around chainsaws, and risks of brushing and limbing (spring poles)
 - ▶ Ensures Swampers comply with working with PPE if inside the “blood circle” of running chainsaw
 - ▶ Correct equipment for the job, including PPE and First Aid Kit
 - ▶ Confirming with crew leader the EAP and TCP are completed
 - ▶ Assigning work to swampers and leading each cutting operation





Saw Crew Leader

- There may be 2 or 3 saw crews, on a trail project, each with a Saw Crew Leader
- Saw Crew Leaders work under the organization of the Trail Crew Leader
- Trail Crew Leader responsible for JHA, TCP and EAP
- Each Saw Crew requires their own EAP, when working as separate saw crews on the trail
- Each Saw Crew must have their own First Aid Kit





Supervision

- **Responsibilities of B Sawyers and C Sawyers**
 - ▶ Immediate Supervision of A Sawyers during all cutting operations
 - ▶ Ensures A Sawyers work within skill level and safely address hazards
 - ▶ C Sawyers may provide direct supervision to B Sawyers during highly complex cutting operations
 - ▶ Provides useful tips and reviews cutting operation to enhance the training experience
 - ▶ Keep Saw Crew Safe





Safety Requirements

Saw crew leaders must be sure that all of the following are covered before beginning a project:

1. **Personal Protective Equipment (PPE)**
2. **First Aid & CPR**
3. **Job Hazard Analysis (JHA)**
4. **Trailhead Communication Plan (TCP)**
5. **Emergency Action Plan (EAP)**





Personal Protective Equipment (PPE)

Crosscut (All equipment must meet USFS standards)

Hard Hat	Full brim or cap style
Eye Protection	Safety glasses or shield when chopping or driving wedges (ANSI z87.1)
Hearing Protection	Not Required
Long-sleeve Shirt	Required
Gloves	Slip-resistant, appropriate for the weather Cut-resistant, when filing & handling saw conditions
Trousers	Loose fitting
Boots	Heavy-duty, cut resistant or leather, laced, with non-skid soles and adequate ankle support
First Aid	OHSA-compliant kit, one with each saw crew

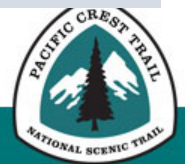




Personal Protective Equipment (PPE)

Chain saw (All equipment must meet USFS standards)

Hard Hat	Full brim or cap style
Eye Protection	Safety glasses, goggles or shield (ANSI z87.1)
Hearing Protection	Plugs or muffs
Long-sleeve Shirt	Required at all times
Gloves	Slip-resistant, appropriate for the weather conditions Cut-resistant, when filing
Trousers	Loose fitting
Boots	Heavy-duty, cut resistant or leather, 6 inch-high, laced, with nonskid soles and adequate ankle support
First Aid	OHSA-compliant kit, one with each saw crew
Chaps	Meets USFS or ASTM specifications, 2" Overlap at hem





Chain Saw Chaps

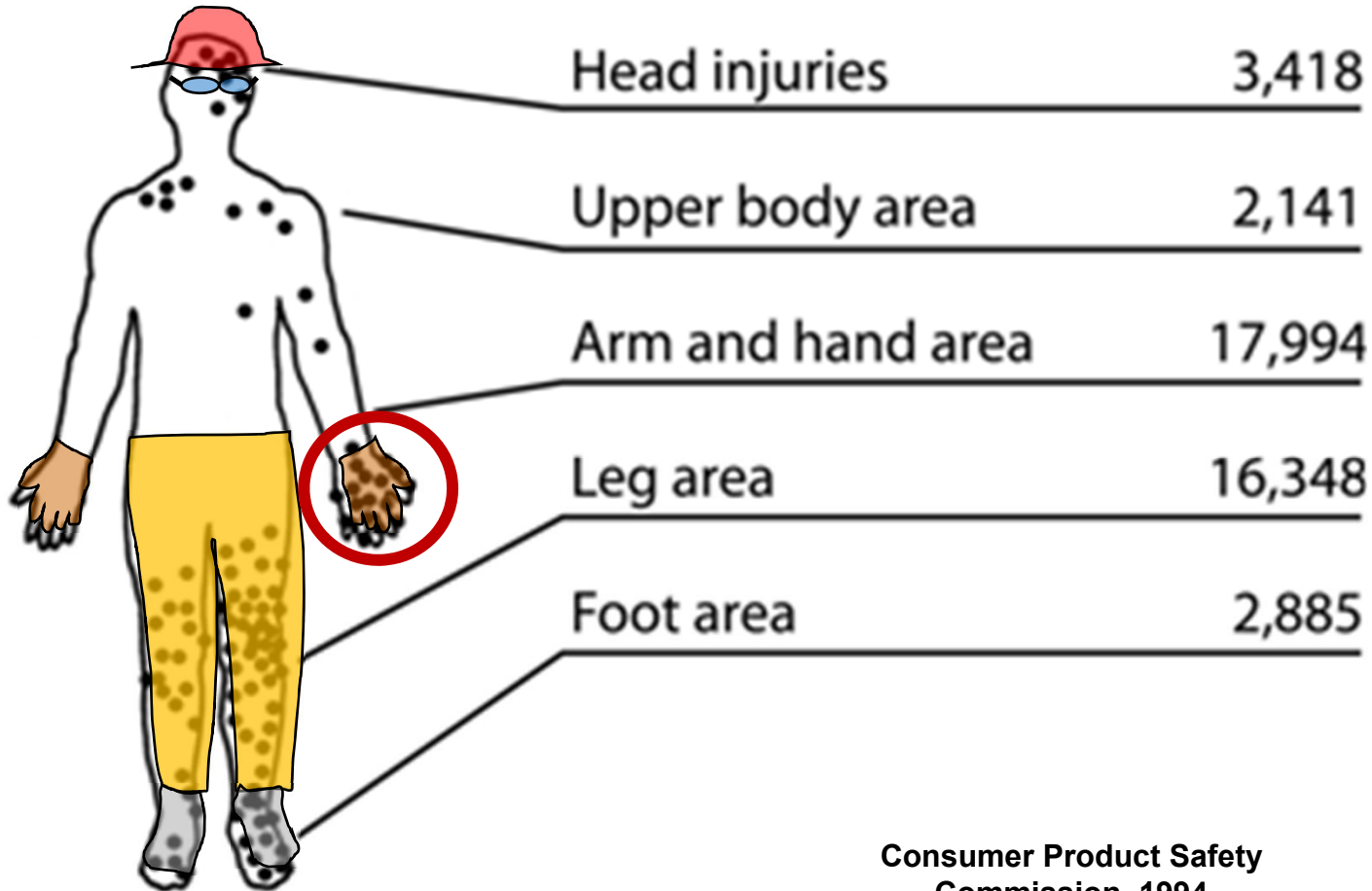


- ▶ Must overlap boots at least 2 inches
- ▶ Use only clean saw chaps (uncut and undamaged by oils and solvents)
- ▶ They must meet the current USFS or ASTM specifications





Chain Saw Injury Location & Frequency



Consumer Product Safety
Commission, 1994





First Aid Kit

- OSHA-compliant
- (1910.266 App A)
 - ▶ Two large gauze pads (at least 8 x 10 inches)
 - ▶ Two elastic wraps
- PCTA Injury Info Packet
- Each Saw Crew must have a First Aid Kit

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9863





Job Hazard Analysis (JHA)

www.pcta.org/volunteer/crew-leader-center

Scroll down to “Job Hazard Analysis (JHA)”

- May need one or more JHA’s for the work
- Check with your PCTA Regional Rep to confirm version
- Review and highlight the main points
- Note weather and other special conditions
- Everyone must sign the back page
- Mail with the PCTA Project Report to Sacramento





Safety Requirements Review

1. **PPE**
2. **First Aid & CPR**
3. **JHAs**
4. **Trailhead Communication Plan**
5. **Emergency Action Plan**





Sawyer Safety Procedures

1. Operational Safety

- ▶ Apply OHLEC Planning Logic to improve safety

2. OHLEC

Objective

Hazards/Obstacles

Leans/Binds

Escape Routes

Cut Plan





Sawyer Safety Procedures

1. Operational Safety

- ▶ Saw operations include, but are not limited to, bucking, brushing, limbing
- ▶ Sawyers have the obligation to say "NO" and walk away from any situation they determine to be an unacceptable risk
- ▶ Saw only if safe.





OHLEC - Objective

Develop an objective for the cutting operation

Note that the Objective is a very iterative process during a bucking operation

- **“Where do you want the cut piece when finished?”**
 - ▶ Determine cut piece track for log segments
 - ▶ Determine sequence and direction of limb removal
 - ▶ Determine how brush will be removed and disposed





OHLEC – Hazards and Obstacles

Develop a plan to identify the Hazards and obstacles in the cutting operation

- **Overhead – Widow Makers, Dead Trees, Leaners, Loose Bark, Snags**
- **Upslope & Downslope**
- **Both Sides of log**
- **Bearing Points**
- **Pivots**
- **Root Wads**
- **Spring Poles**
- **Limbs and Branches**
- **Rotten Wood**
- **Foreign Objects**
- **Bees and Poisonous Plants**
- **People and Animals**
- **Buildings, Property & Equipment**





OHLEC – Leans and Binds

- **Determine the binds in the log to be bucked, and in the limbing and brushing**
 - ▶ Predict binds based on bearing points and lie of log
 - ▶ Determine the binds in the Spring poles
 - ▶ Determine how the binds will change during the cutting operation
 - ▶ Determine the reactionary forces when the log is cut





OHLEC – Escape Routes

- Determine the “Good” and “Bad” side of the cutting operations
- Identify the escape route and safety quadrants, and safe zones for crew
 - ▶ Determine the safe area to work and clear the escape route if needed
 - ▶ Determine the safe area for the saw crew
 - ▶ Determine safety quadrant for each sawyer when double bucking





OHLEC – Cut Plan

- **Develop the cut plan for the cutting operation**
 - ▶ Determine the cutting sequence
 - ▶ Determine the type of cuts required
 - ▶ Determine what types of supports or prep will be required to move cut pieces
 - ▶ Communicate plan to saw crew
 - ▶ Assign tasks to the saw crew and swampers





Situational Awareness





Bucking: Go or No Go

Hazards

Overhead
Up slope
Down slope
Both sides
Pivots
Snags

Foreign objects on
or under logs?

Binds

Top
Bottom
Side
End
Multiple



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Do you have your safety gear on?

v. March 2019





Considerations

- People, property & traffic in work area
- Work party safety
- Good work area
- Good escape routes
- First cut locations
- Release spring poles
- Cut piece track
- Leave a secure work area

Yourself:

What is your gut intuition telling?
Does this cut make sense?

**You must safely address every item
on this list or WALK AWAY!**





People, Property and Traffic

- **Control of the Work Area**
 - ▶ Stopping traffic on the trail
 - ▶ Control of switchbacks below the work area
- **Considerations for Cut Piece Track**
 - ▶ Controlled release of cuts
 - ▶ Safe cut piece track downhill of work area





Work Party Safety

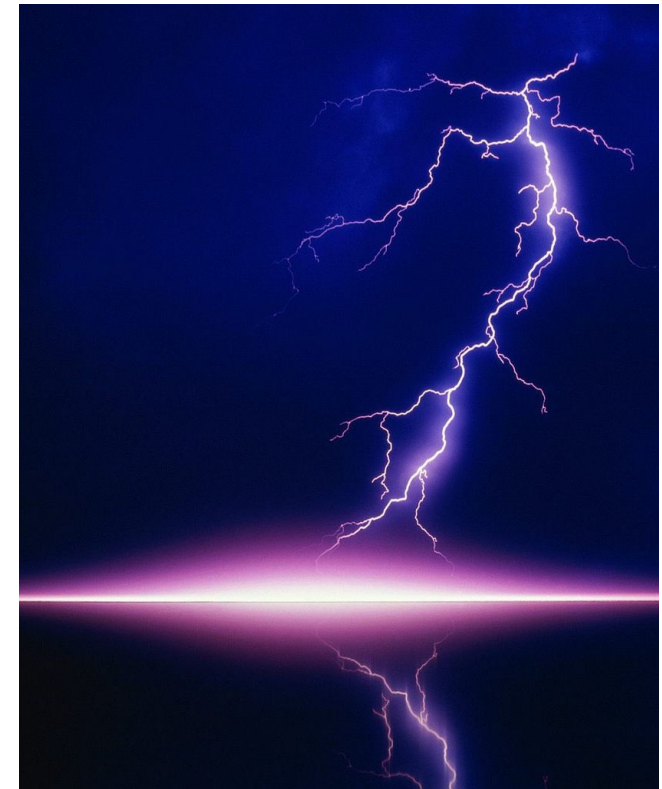
- **Can you Guarantee the Crew Safety?**
- **Environmental Conditions**
- **Crew Considerations**
 - ▶ Tired and Fatigued?
 - ▶ Thirsty, Hungry, Hot, Cold?
 - ▶ Ample Daylight?
 - ▶ Too Eager?
- **Safe Area for Crew during Cutting Operation?**





Environmental Conditions

- **Wind: Pinecones and small branches falling - 15 mph boogey**
- **Ice: NO GO on sloped work-site**
- **Rain: Is it too slippery?**
- **Heat: Will heat prevent completion of project?**
- **Light: Is there enough light to finish the project and clean up?**



Constantly reassess throughout the day



Situational Hazard Awareness

- Environmental conditions
- Overhead survey
- Ground survey
- Site prep
- Crew and equipment
- Cut analysis and plan





Overhead Hazard Survey

Look at all the standing timber to determine it's condition.

Check for:

- Snags
- Leaners
- Loose Bark
- Feeding holes
- Insect Activity
- Conks and Mushrooms
- Shelf or Bracket Fungi
- Sap Rot



Can the wind or your work cause these hazards to fall and harm you, your crew, hikers or equestrians?



Hazards: Snags



Can the cut piece travel where it could hit a snag?



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Hazards: Sap Rot Indicators





Ground Hazard Survey

**Walk the entire length
of the log**

Look for:

- ▶ Spring poles
- ▶ Bearing points
- ▶ Pivot points
- ▶ Root wad
- ▶ Up slope
- ▶ Down slope
- ▶ Both sides
- ▶ Foreign objects on or under log





Hazards: Spring Poles



2012.03.09 Wind River
Springpole - Winston Rall





Hazards: Spring Poles



(Wildland Fire Chain Saws, S-212 Video, National Wildfire Coordinating Group)





Hazards: Blow Downs



(Wildland Fire Chain Saws, S-212 Video, National Wildfire Coordinating Group)





Hazard Mitigation

- **Overhead Survey**
- **Ground Survey – walk the length of the log**
- **Identify spring poles and brush**
- **Establish bearing points, anchors and binds**
- **Determine cutting sequence to control release of energy**
- **Determine how the binds will change thru cutting sequence**
- **Determine movement of cut pieces**
- **Establish Safety Quadrants and safe areas for crew**
- **Announce Plan and Review if things change from plan**





Hazard Mitigation - Complexity

Hazard Ranking Guideline

Log Diameter	16" and under	24" and under	Above 24"
Side Bind	Mild	Moderate	Severe
Top/Bottom/End Bind	Mild	Moderate	Severe
Slope	Level	10%	Above 10%
Single Log	On Ground	3' above Ground	Over 3' in the air
Stacked Logs	On Ground	Suspended	On Slope
Other hazards	None	Pivots, Root Wads, not affected by cutting sequence	Root Wads, Pivots, other hazards





Safe Working Area

- **Establish Safe Quadrant (or Escape Route if needed)**
- **Stabilize Work Area for solid footing**
- **Prepare work site**
 - ▶ Remove hazards
 - ▶ Brush out and limb work area and escape route
 - ▶ Remove tripping hazards
- **Prepare Cut track routes**
- **Establish safe areas for crew**
- **Control traffic on the trail – especially switchbacks**
- **Secure area around root wad**





Site Preparation

- Remove branches
- Remove debris from tread
- Remove spring poles
- Remove bark (crosscut)
- Prep bucking location
- Support aids, if needed





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Site Preparation



Ensure stable footing – may need to create bench in slope



Site Preparation



Clear out underneath log



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Site Preparation - Support Aids



Use supports (rails) and mechanical leverage to move logs





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Site Preparation - Support Aids



Use mechanical leverage wisely – lift with legs

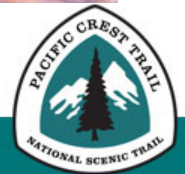




Site Preparation - Support Aids



Plan before you cut – how much do you need to cut?





Site Preparation - Support Aids



Plan before you cut - where to put the cut piece ?





Site Preparation - Support Aids



Proper planning allowed for 2 cuts to clear the entire log





Site Preparation - Support Aids



Support cut pieces and add rails to roll cut pieces off trail





Site Preparation - Support Aids



Build cribbing to support cut pieces or to change binds





Crew & Equipment Considerations

- Do you have the right crew for the job?
- Do you have the proper safety equipment?
- Do you have enough gear? The right gear?
- Do you have enough people to keep trail users clear of the work area?



Don't Start a Project Without the Right Stuff!





Cut Analysis & Plan

- **Bind Evaluation and Mitigation**
- **Action Plan**
 - ▶ Site preparation
 - ▶ Crew assignments
 - ▶ Crew communication
 - ▶ Cut sequence
 - ▶ Cut piece track
 - ▶ Cut design
 - ▶ Escape routes





Before the Saw Touches the Wood...

Bucking: Go or No Go

Hazards

Overhead
Up slope
Down slope
Both sides
Pivots
Snags

Foreign objects on
or under logs?

Binds

Top
Bottom
Side
End
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Situational Hazard Awareness

- Environmental conditions
- Overhead survey
- Ground survey
- Site prep
- Crew and equipment
- Cut analysis and plan





Bucking Only

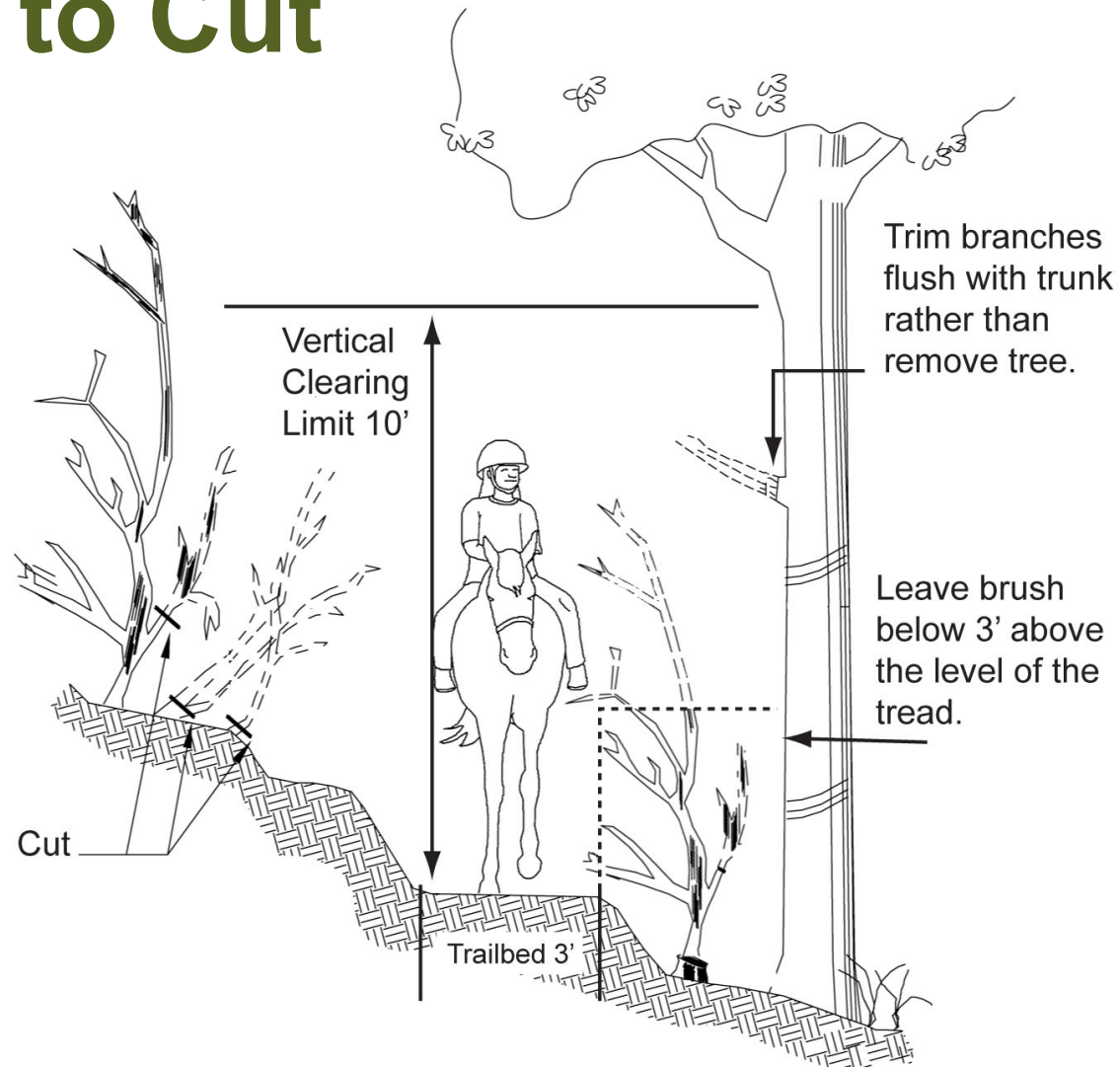


**Which one of these
would you or
should you cut?**





Where to Cut





Leaving the Project Site

- ✓ Is everything secure?
- ✓ Do you have all tools?
- ✓ Is the tread restored?
- ✓ Is the setting restored?

If there is any dangerous condition that you are unable to correct...





If it is a hazard to normal hiker or equestrian
safety...

Flag It!

Inform Land Manager As Soon As Possible

- ✓ Note location
- ✓ Condition details
- ✓ Equipment needed
- ✓ Forest condition
- ✓ Landscape conditions





Industrial Fire Precaution

Fire prevention requirement based on fire risks

- Fire Extinguisher (0.5 or 1lb) & Shovel/Combi Tool
- Higher Levels of restriction require cutting operations cease at prescribe time (often 1 pm)
- Watchman – may need to post watch after cutting is completed (1 hour to 3 hour watch)
- Highest fire danger can result in no chainsaw operations allowed – (consider use of crosscut saw)

Contact Land Manager for Local Requirements and information on where restrictions are posted





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Lessons Learned

Fuel Pressurization and Fuel Geysering

(Chainsaw Only)





Fuel Pressurization

- **Pressure in fuel tanks and fuel bottles**
 - ▶ Systems are not vented to relieve pressure
 - ▶ Fuel blends (summer and winter) behave differently, with winter fuels more volatile and higher risk if used in summer
 - ▶ Changes in environment (increased elevation and elevated temperatures) increases risk
- **Fuel in tanks and fuel bottles can become superheated**
- **Fuel will boil or geyser, when cap pressure is released**
- **High risk of sprayed fuel and highly flammable vapors exist leading to fires due to hot engine or muffler**
- **Remove any clothing or PPE soaked with fuel**





Fuel Pressurization

- **Vapor Lock is one symptom:**
 - ▶ Be aware of poor running saw, or poor starting saw, with ½ tank of fuel
 - ▶ Unstable engine speed, loss of power, or feels like running out of fuel
- **If Vapor Lock is suspected:**
 - ▶ Check fuel level without opening fuel cap (see thru tank)
 - ▶ Allow saw to cool at least 10 minutes before refueling

Training Video:

<https://www.youtube.com/watch?v=d8g2iCnGAYk>

2016 WFSTAR: Fireline Fuel Safety from [National Interagency Fire Center](#)





Fuel Pressurization & Geysering



Fuel Tank Pressurization
Fuel sprays out when cap released



Fuel Tank Geysering
Fuel boils as cap is released

<https://www.youtube.com/watch?v=d8g2iCnGAYk>

2016 WFSTAR: Fireline Fuel Safety from [National Interagency Fire Center](#)





Chain Saw Refueling

- **Pressure in fuel tanks and fuel bottles**
 - ▶ Allow time for saw to cool (at least 5 min) before refueling
 - ▶ Aim opening away from body
 - ▶ Open cap slowly to relieve pressure
 - ▶ Turn cap to unlock, but do not remove cap
 - *Stihl Locking Caps require only ¼ turn to remove*
 - *Allow pressure to vent, before removing cap*
 - *Full thread caps are easier to vent*
- **Do not Overfill fuel tank**
 - ▶ Leave enough room for air pocket and fill cap
- **Do not start saw within 10 feet of area of refueling**
- **Do not refuel within 20 feet of ignition sources**





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Lessons Learned

Review of 2014 Accidents

Lodgepole Bucking Injury Accident

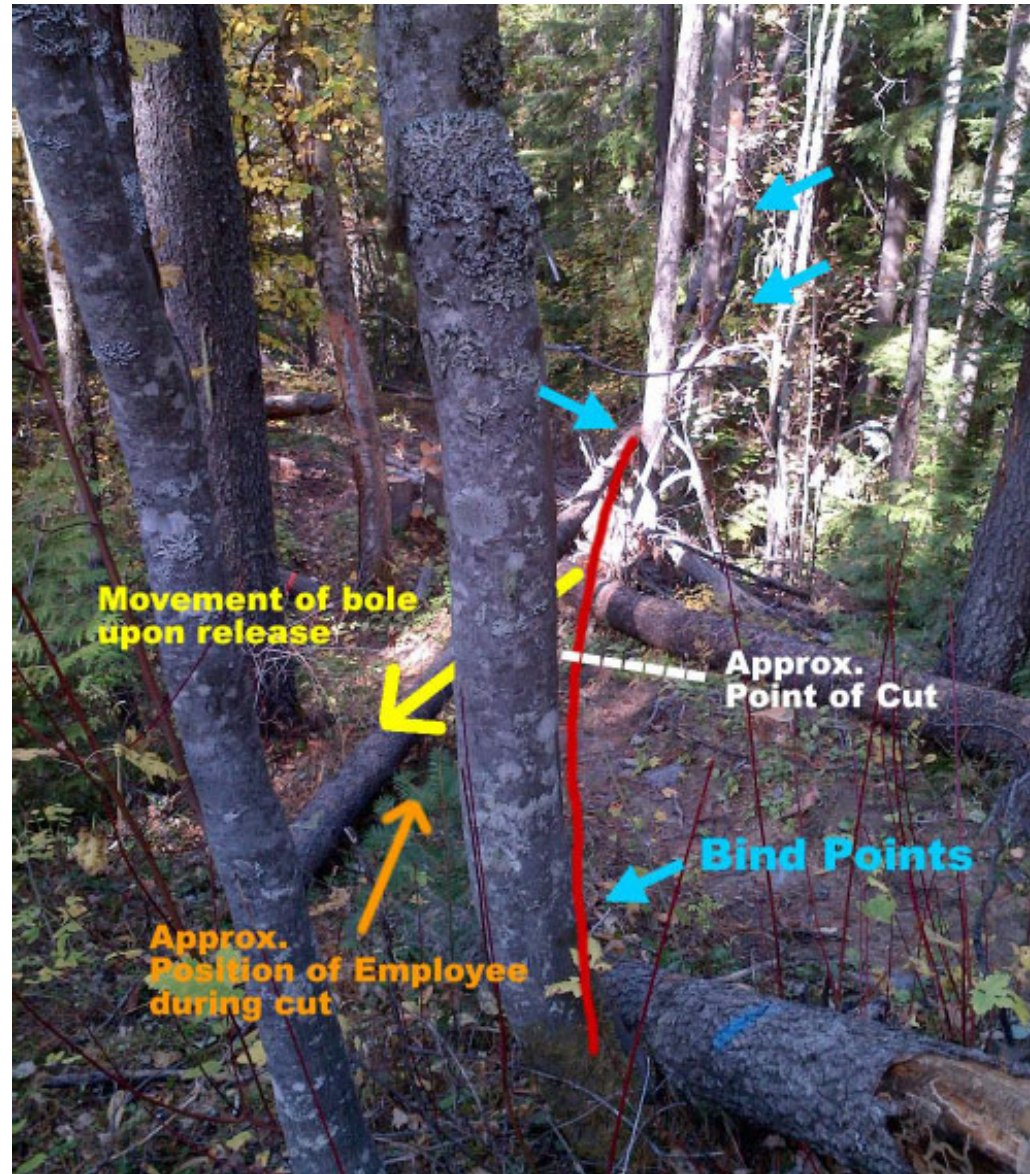




Lodgepole Bucking Injury

- Bucking injury associated with felling operation, but pertinent to our trail work
- C Sawyer had felled 8” lodgepole pine and then concentrated on felling 24” Western Larch
- Operations were late in the afternoon, after long day
- Sawyer didn’t evaluate the lodgepole and began bucking cuts without recognizing the lodgepole was under intense side bind
- Sawyer was standing in the wrong location and when the log released, the log impacted and broke his leg, throwing sawyer onto running saw







Lodgepole Bucking Injury

● Lessons Learned:

- ▶ The log was only 8" in diameter. **Small logs can injure and kill – Don't underestimate them!**
- ▶ Although there were two sawyers, they were working independently with no swampers and one first aid kit. **PCTA sawyers never work alone and requires each saw crew have a first aid kit!**
- ▶ Injured sawyer was an experienced "C" level feller-bucker. **This can happen to anyone!**
- ▶ If the full length of the log had been examined, the sidebind would have been obvious. **Never buck a log without performing a thorough size-up!**





Lodgepole Bucking Injury

● Lessons Learned:

- ▶ The accident occurred late in the shift.

Fatigue may have been an issue.

- ▶ In addition to the broken leg resulting from the springback, the sawyer experienced severe cuts on his left wrist and forearm and the chainsaw was still running.

Keep the left thumb firmly wrapped around the handle of the saw to ensure the chain brake is activated.

- ▶ Sawyer may have been “target-focused” on the larger tree and didn’t focus on the lodgepole and the hazards

Keep focused on the task at hand and always assess risks.





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Case Study Lessons Learned

Summary of relevant known incidents and
accidents





Course Review

- **Saw Program**
- **Safety Requirements**
- **Situational Awareness**
- **Case Study with Lessons Learned**





Break Time

