



Bind Analysis & Cut Sequence

For Trainee Saw Operators and Saw Operators

March 2016

Course Overview

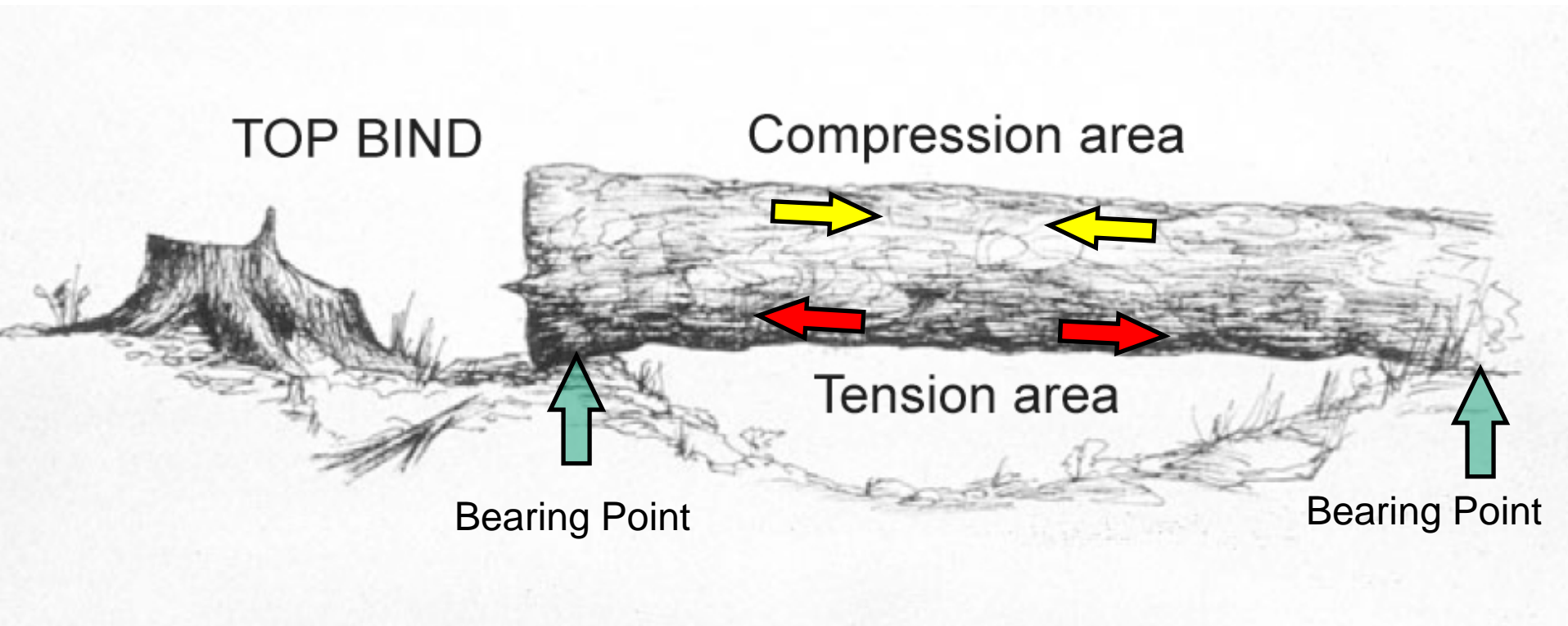
- Types of Binds
- Types of Cuts
- General Considerations
- Hazard Tree Scenario

Types of Binds

- Top bind
- Bottom bind
- Side bind
- End bind
- Complex bind



Top Bind



Top cut and finish from bottom – add pie cut if needed

Top Bind



Top cut and finish from bottom

Top Bind



Cut from Top and Wedge

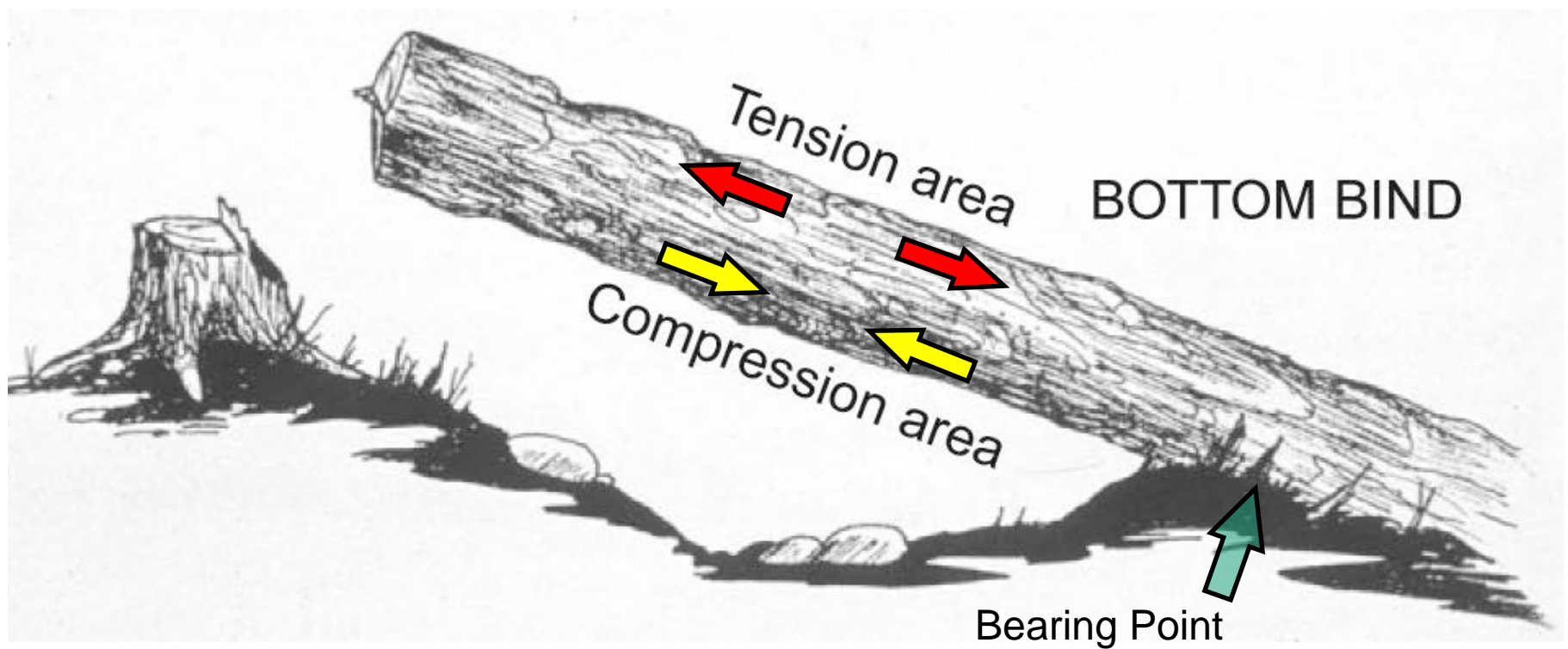


Top Bind

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



Bottom Bind



Underbuck – Then top cut – Be ready for lots of action

Bottom Bind



Cut at Bearing Point, when possible

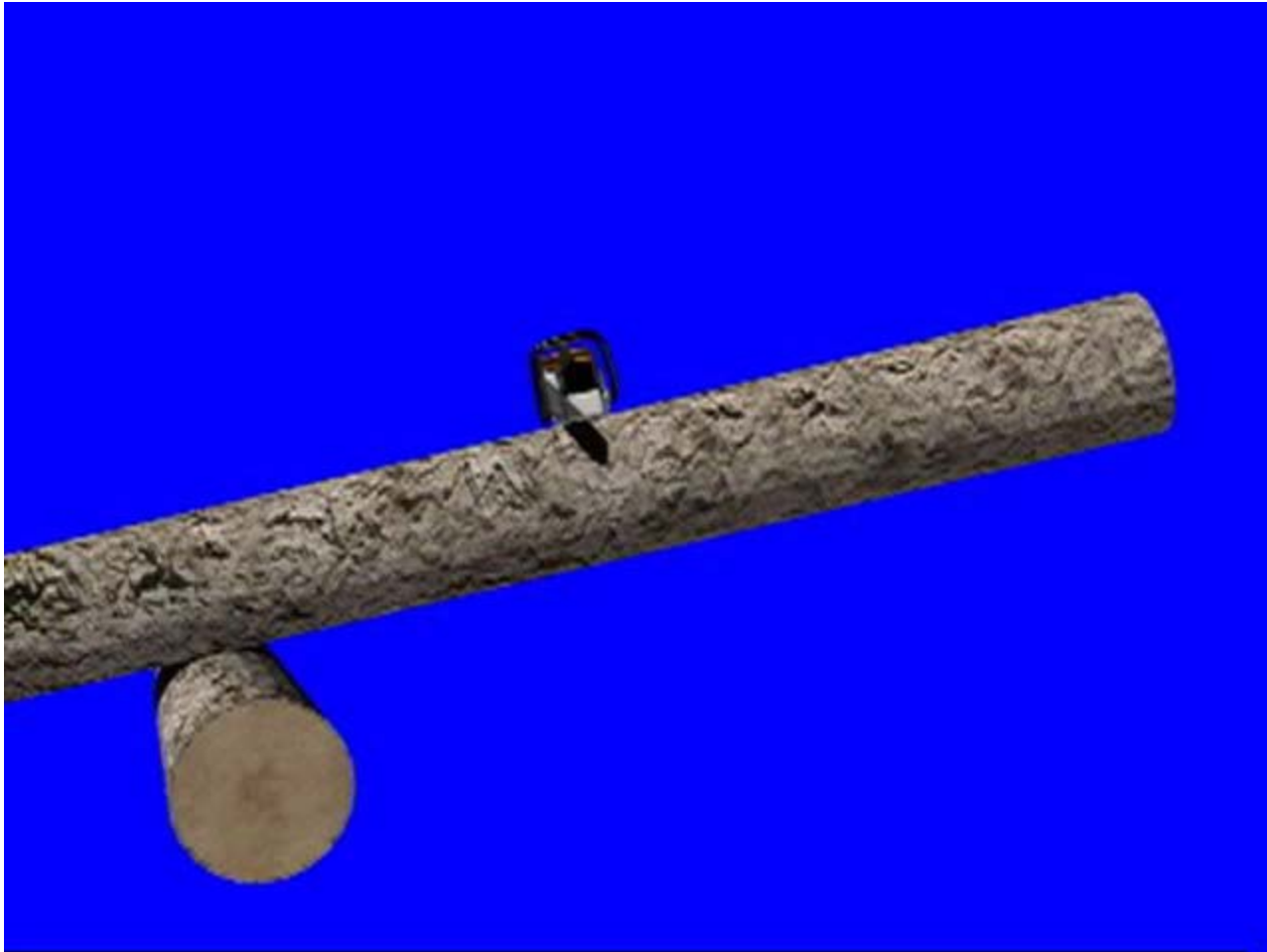
Bottom Bind



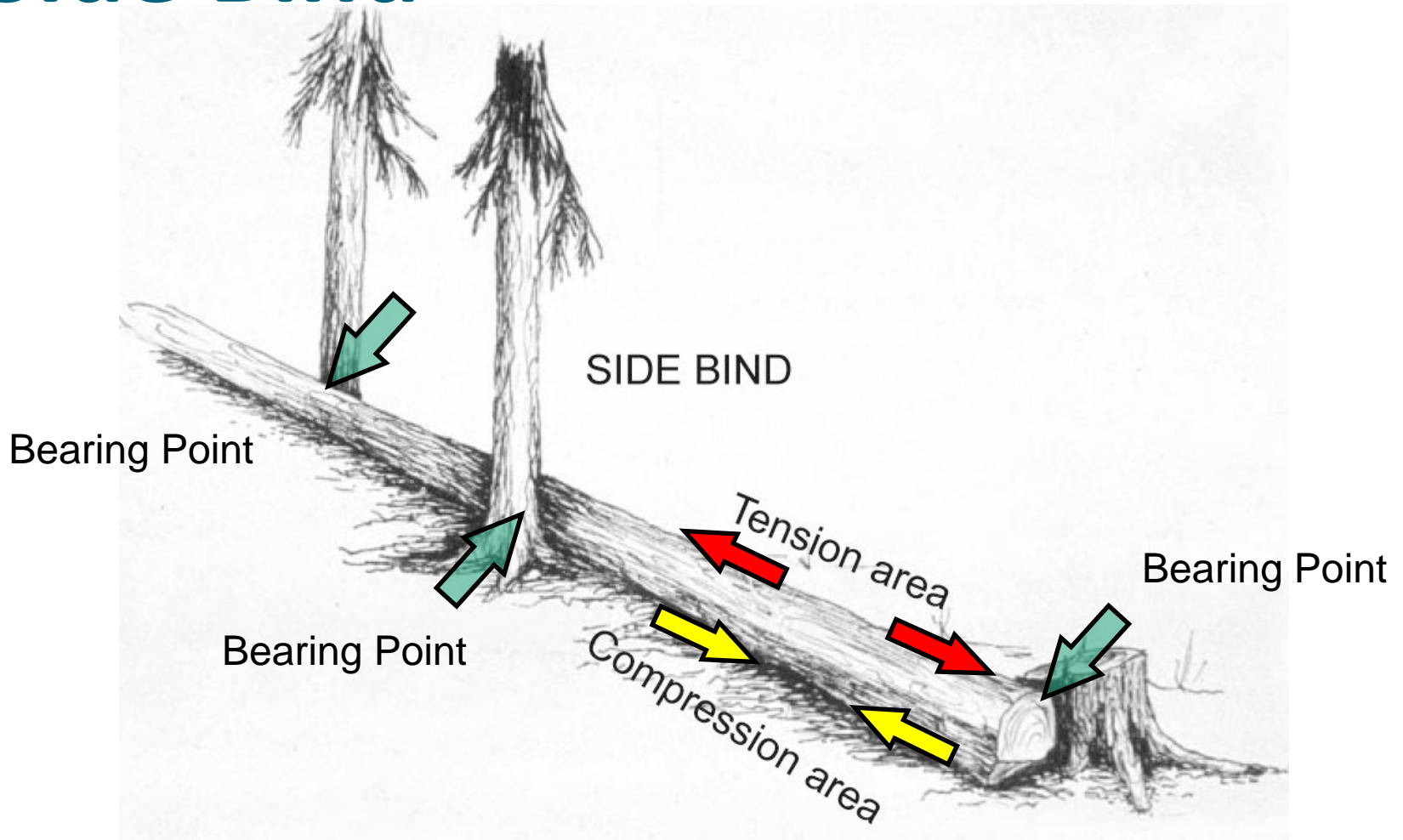
Watch kerf as it opens during release cut

Bottom Bind

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



Side Bind



Safely relieve bind on compression side

Side Bind

- Cut at the point of compression if possible
- This is an example of what not to do...

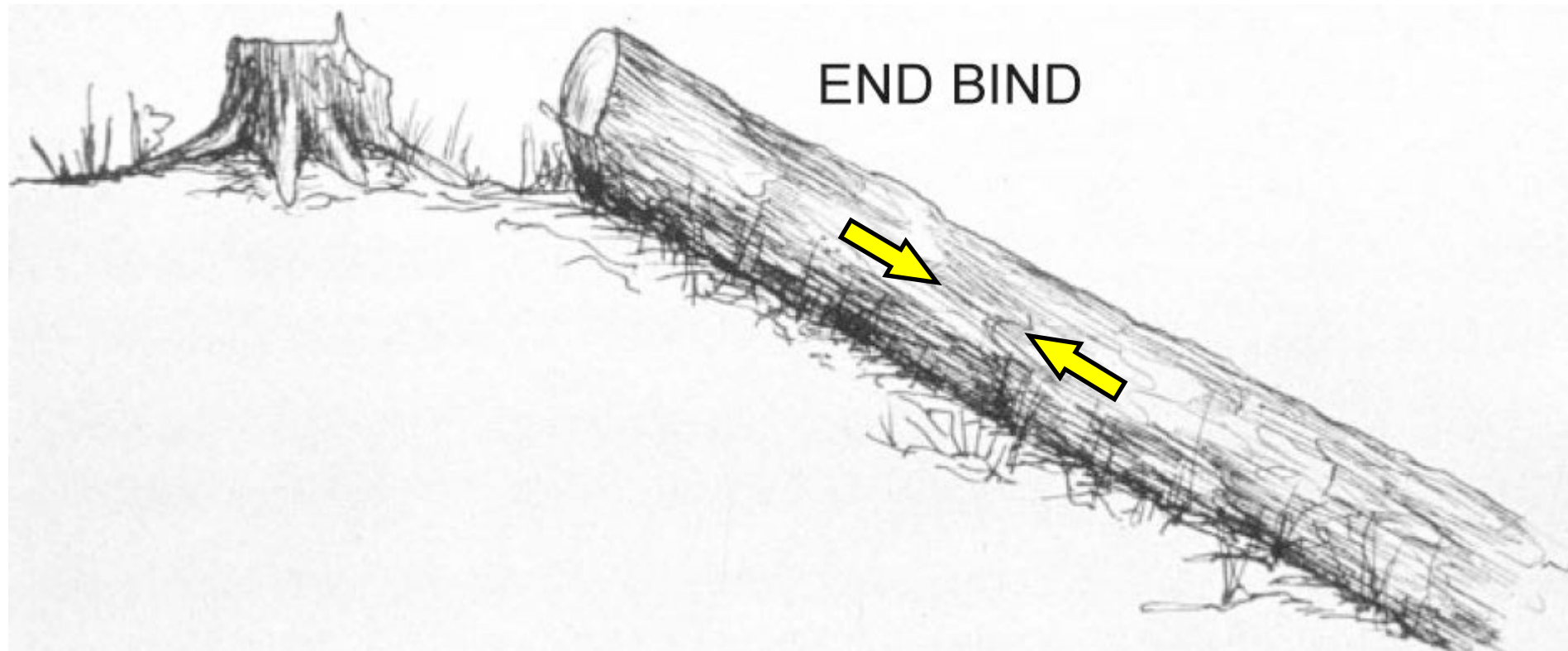


Side Bind

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



End Bind



Weight of log causes compressive forces - use wedges

End Bind

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



End Bind



Weight of log causes compressive forces - use wedges



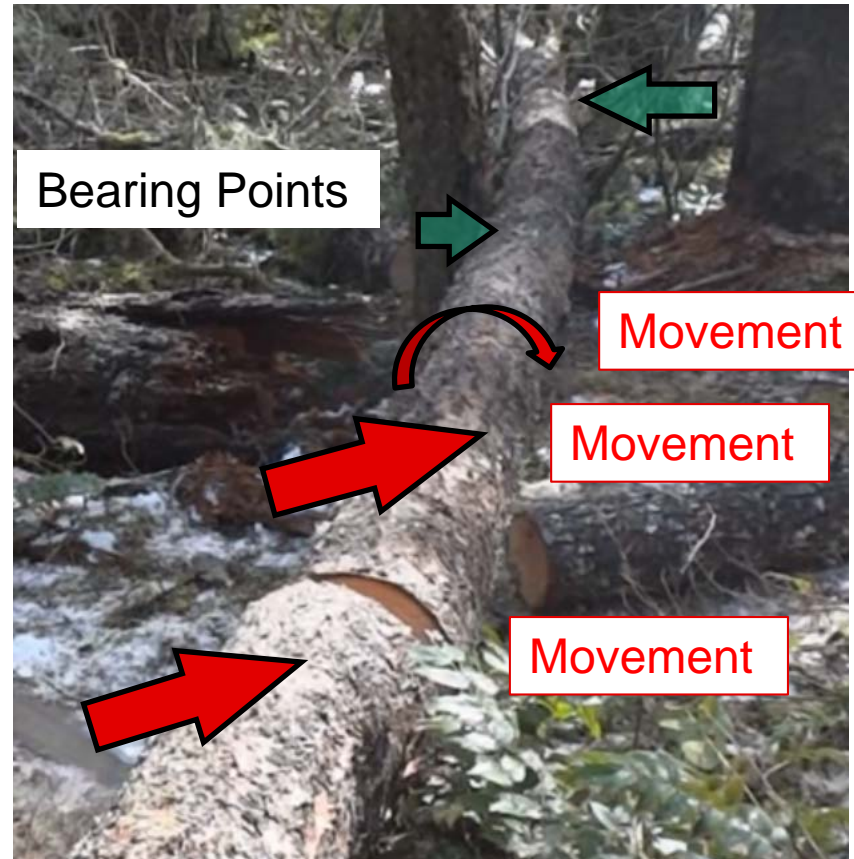
Complex Bind

- Complex binds are a combination of two or more binds
- Binds can move and change during the cutting process
 - Cutting log reduces weight in sections and changes bind
 - Moving bearing points changes binds
- Side binds usually transition to top or bottom bind as the side bind is relieved
 - Side bind forces add bearing points to the log
 - As side bind is relieved, bearing points change
- Complex binds also include twisting or torsional binds
- Constantly assess log thru the cutting sequence for changes in the binds

Complex Bind



Side Bind transitions to more bottom bind
Changes in bearing points
Torsional bind due to holding wood



Binds Review

- Top bind
- Bottom bind
- Side bind
- End bind
- Complex bind



Types of Cuts

Straight Cuts

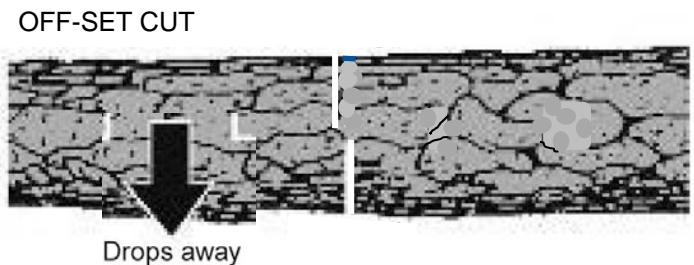
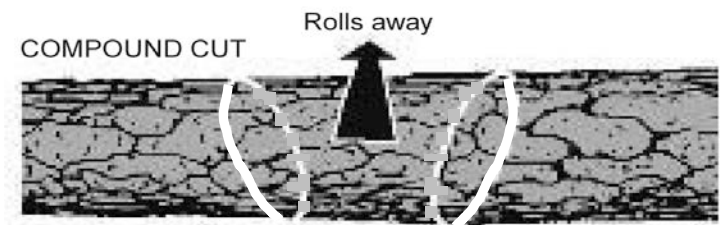
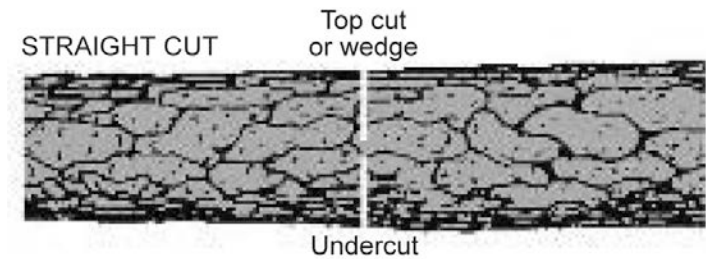
- Continuous top or bottom bind
- Small logs, low bind conditions
- Can be angled to allow clearance

Compound Cuts

- Large logs, hillside logs with end bind

Off-set Cut (Crosscut saw)

- Continuous top or bottom bind
- Straight Cut with offset to fixed end
- Best protection for crosscut saw

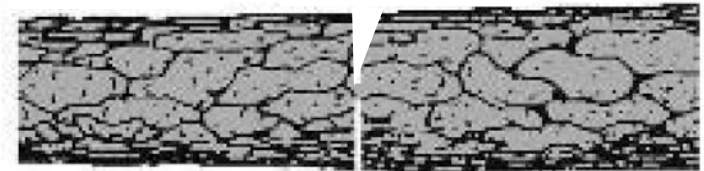


Types of Cuts

Pie Cut

- Use with all binds
- Use to allow for travel and control
- Useful with Chainsaw
- Rarely used with crosscut saw

PIE CUT

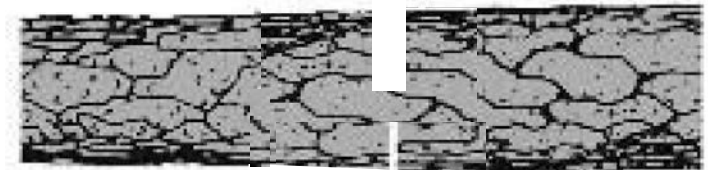


Release Cut

Double Cut

- Severe side bind, large rotten logs
- Logs with torsion, shattered log
- Clean out with Pulaski if needed
- Can be used to relieve side bind for crosscut saw

DOUBLE CUT

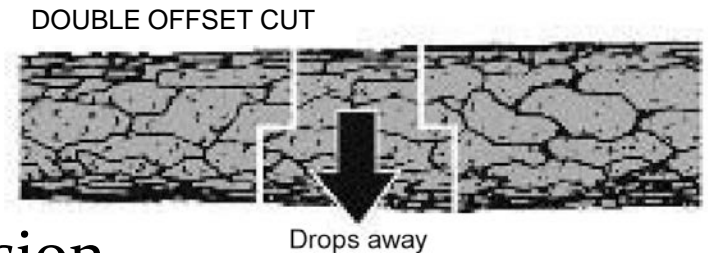


Release Cut

Types of Cuts

Double Off-set Cuts (Crosscut saw)

- Continuous top or bottom bind
- Best protection for crosscut saw
- Allows section to drop out
- Cut compression cuts first, then tension cuts



Straight Cut

- **Sequence:**
 - **Offside Cut:** Remove material on offside of log, when there is ample retaining holding wood
 - **Compression Cut:** Cut compression side as early as possible and add pie-shaped cut if needed to allow log to move and relieve bind – Don't go over $\frac{1}{3}$ of the diameter
 - **Bucking Side Cut:** Useful to remove additional holding wood on the side of the release cut for large logs (similar to offside cut). Cut from Compression to Tension.
 - **Tension (Release) Cut:** Remove holding wood cutting only on the tension side. Use wedge as back up for unexpected change in bind and for end bind.

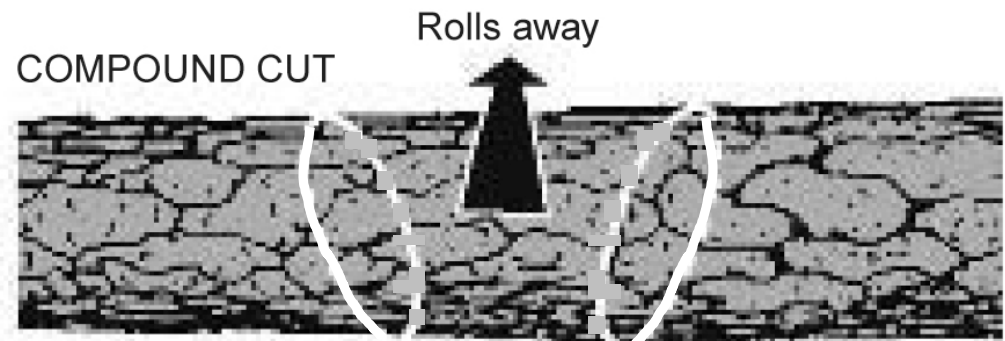


Straight Cut

- **Offside Cut and Bucking Side Cut:**
 - Not common with Crosscut sawing, but can be used to get more material removed when double bucking
 - Can reduce amount of holding wood to finish when single bucking
 - Useful when sawyers are at different heights,

Compound Cut

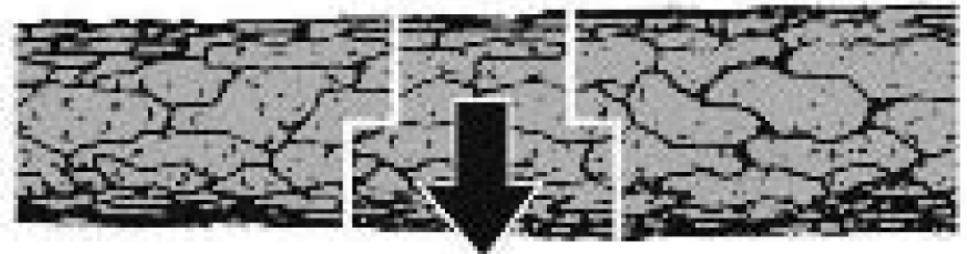
- Face the direction to roll out section and make a “V” with arms
- Angled cuts allow for clearance to roll out section
- Slight compound angle – Top angle expands outward and is tilted, to be wider on the top than bottom of log
- Straight cut through with wedges



Off-set Cut (Crosscut)

- **Compression:** Cut compression side
- **Tension Cut:**
 - Off-set top kerf approximately $\frac{1}{2}$ " from bottom kerf
 - Top kerf will be closer to center of trail relative to the bottom

OFFSET CUT



Drops away

Off-set Cut

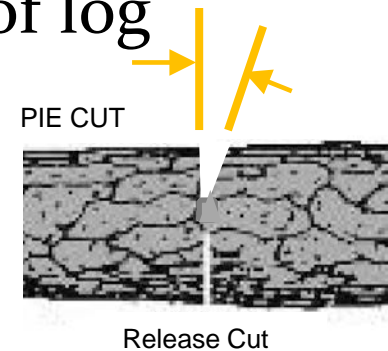
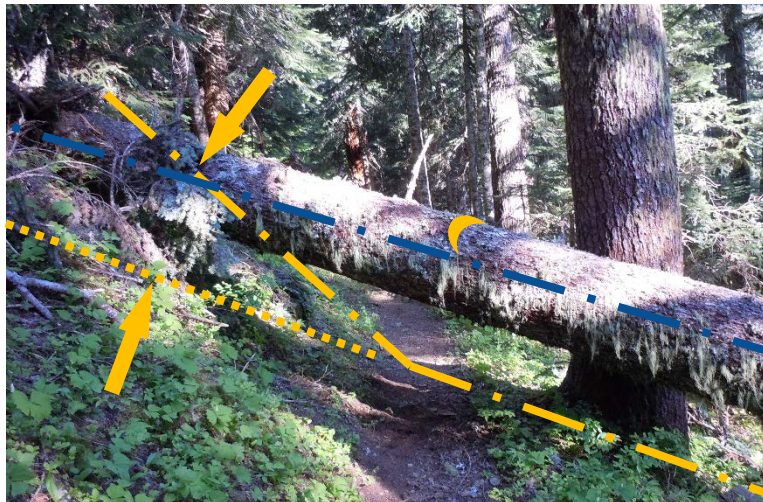
→ ← $\frac{1}{8}$ " to $\frac{1}{2}$ " Offset



Pie Cut

- Useful with heavy bind, to remove material to allow log to move and to control the movement of the log
- Angle of pie cut only needs to match the expected angle the log needs to change, usually 10-30°
- Don't cut deeper than 1/3 of the diameter of log

Max angle of pie cut



Initial log centerline

log centerline after pie cut and release cut



Double Cut

- Single buck from safe (compression) side to cut two parallel top kerfs, the width of a Pulaski
- When saw starts to bind, remove saw
- Using the Adze end of Pulaski remove wood fiber from between two kerfs
- Repeat until log severed, or bad wood is removed and normal cutting process can be used
- For chain saw, use tip of bar to minimize amount of bar in the wood, when cutting splintered wood

Plumb Cut

- Variation of the Straight Cut
- On steep slopes go above the back slope and make a plumb cut
- Used when log is angled and cut piece must drop

Trail Tread





What types of cuts would you use?









Types of Cuts Review

- Straight Cuts
- Compound Cuts
- Off-set Cut
- Pie Cut
- Double Cut
- Double Off-set Cut



Cutting Sequence

- Review Binds, Pivots, Supports, Bearing Points, etc.
- Determine safe areas to work
- Plan cuts to move from High Complexity to Low Complexity as the log is cut
- Don't be target focused – may need to start at end far from trail to safely mitigate hazards
- Use limbs or remaining mass of tree to help secure cut pieces, or remove as needed to reduce complexity
- Focus on cutting sequence to remove energy in log in the most controlled manner

Plan for Release Cut

- What side(s) of log will move?
- Is there room for the cut piece to release? Type of Cuts?
- Where will the cut piece travel?



Cutting Compression Side First



Wedge, Wedge, Wedge



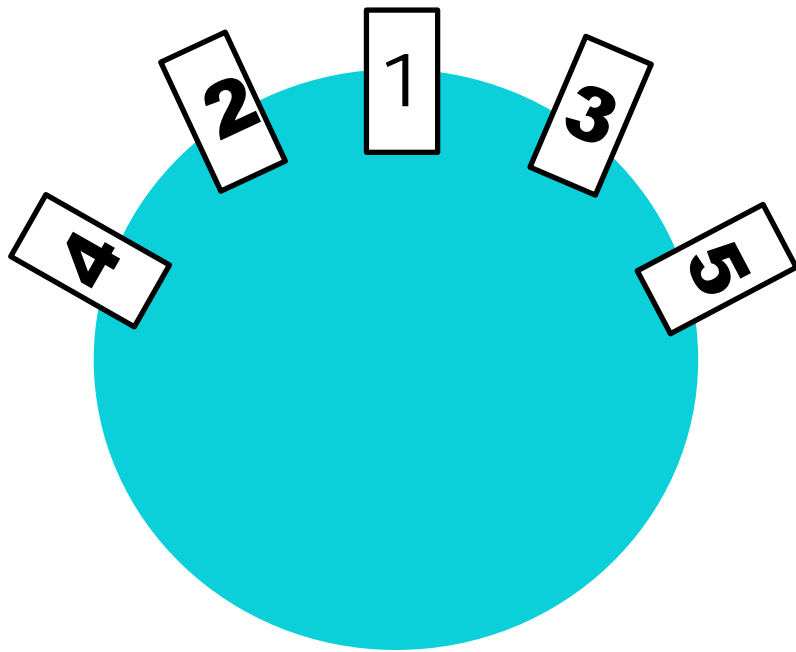
Get a wedge in as soon as the saw is fully in the log

Carry Lots of Wedges



Turn a top bind into a bottom bind with wedges

Wedge Placement



Examples have top compression – Axe used to prevent movement

Cut Piece Track

- Make sure everyone has safe escape route
- Secure switchbacks for trail users
- Plan for use of added supports to guide or move after cut (rails or pivots)
- Clear path and add supports BEFORE cutting begins





Hazard Awareness

- Overhead Survey – Look for snags and hanging limbs
- Ground Survey – Walk the length of the log
- Identify spring poles and brush, pivots and root wad
- Establish binds and bearing points
- Determine cutting sequence
- Determine how the binds will change thru cutting sequence
- Determine movement of cut pieces
- Establish Escape Routes and safe areas for crew
- Announce Plan and Review if things change from plan

Course Review

- Types of Binds
- Types of Cuts
- Cutting Sequence
- General Considerations



Hazard Tree Study

Warm Springs Indian Reservation

July 2012

Scenario

- High winds caused two trees to uproot and fall across the PCT.
- On their way down, they collided with the crown of a third tree, just a few feet from the trail, causing its trunk to shatter vertically and the tree to lean over the trail.
- The third tree did not fall because its crown became entangled in the crowns of two trees on the other side of the trail.

Proximity of Trees to Trail



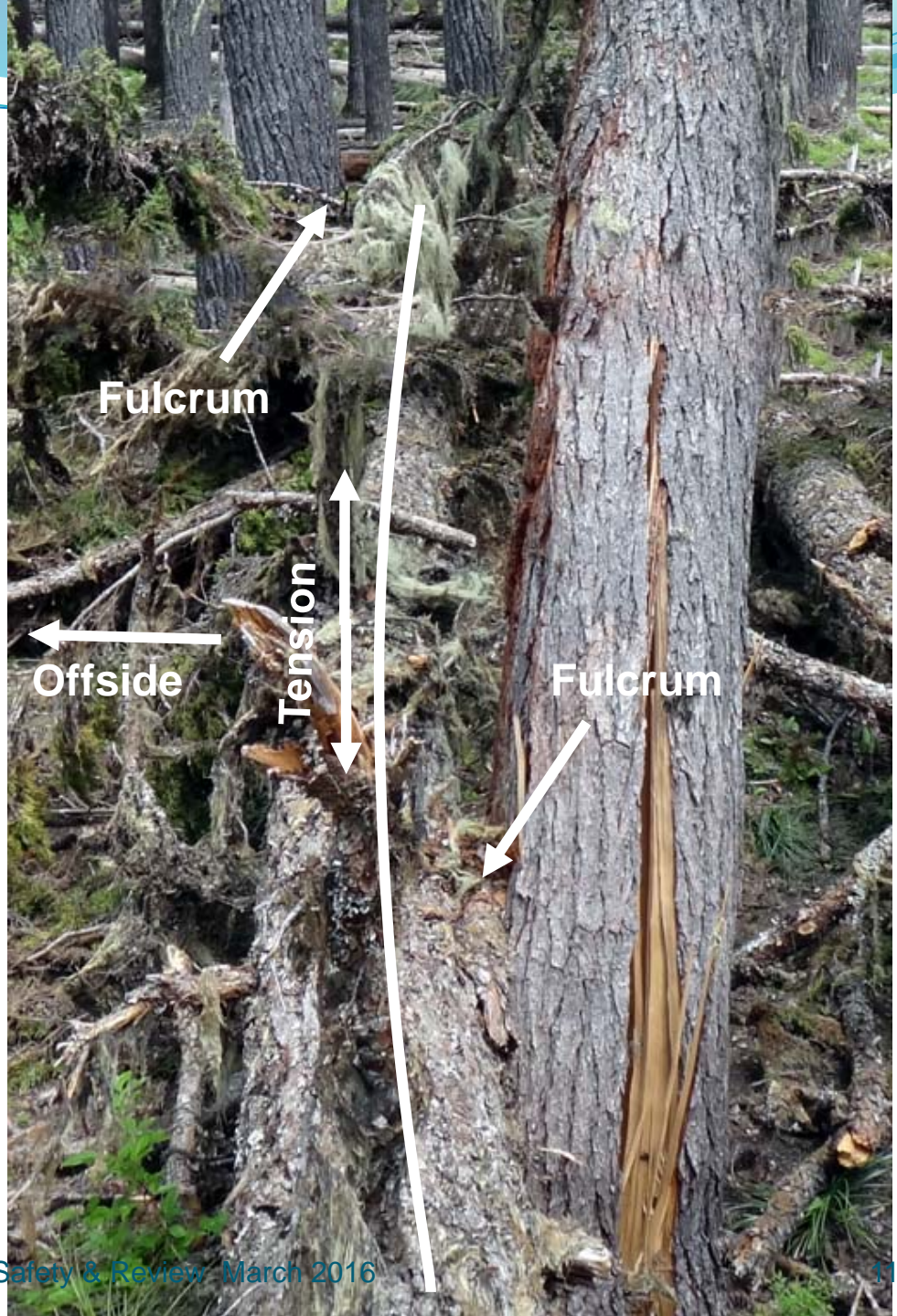
Condition of Leaner



Side Bind

- Because the northernmost blowdown was wedged between the leaner and a sound tree on the other side of the trail, it developed a severe side bind.
- This tree had approximately 6 feet of horizontal bend over a distance of 50 feet.

Side Bind



Go or No-Go?

- Using established Go/No-Go criteria, the initial volunteer saw crew decided this situation was beyond their capability.
- The crew clearly marked the hazard area and reported the situation to the USFS, the agency managing this section of the PCT.

Marked Hazard Area



Two Weeks Later...

- A second crew of volunteers plus a USFS recreation manager returned to site.
- Decision was made to temporarily reroute trail 15 feet west to avoid leaner.
- Area was cleaned up. Log with side bind severed (with 3 feet of springback). All logs bucked, opening temporary bypass.
- Long-term plan: return trail to original route after subsequent winter winds take down leaner.

Reroute

