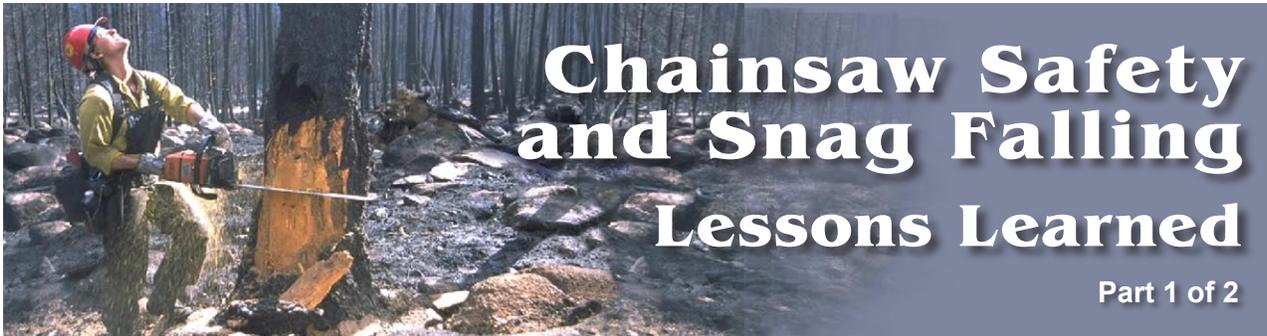




A lesson is truly learned when we modify our behavior to reflect what we now know.



Twelve journeymen chainsaw operators including regional saw program coordinators from the federal fire agencies and the private sector were recently interviewed regarding their notable successes, most difficult challenges, effective practices, and most pressing safety issues in chainsaw operations with respect to Lookout/Communications/Escapes Routes/Safety Zones (LCES) and Situational Awareness (SA). Special thanks are extended to these subject matter experts for sharing their important lessons and practices with the wildland fire community.

Notable Successes in LCES and SA

Importance of Saw Team Partnerships

A former hotshot superintendent, saw boss, and lead sawyer has observed that saw team members are watching out for each other, and that new sawyers apply LCES in fireline chainsaw operations. He regards these as notable successes. Quite often, in fire suppression operations, crews rely on speed and efficiency to complete their tactical objective, and

Type 1 crews regard their speed and efficiency as a point of pride. However, they must also maintain their situational awareness (SA) and LCES. So how do sawyers who are wearing earplugs and running a chainsaw maintain a high level of SA and ensure that LCES is in place? This is accomplished by developing a sawyer/swamper relationship that allows the sawyer to work at maximum productivity while the swamper maintains radio communication, assists in identifying hazards, and watches out for other personnel in the area. Even with this relationship in place, the sawyer should always try to maintain full SA as well.

The majority of saw work in fireline construction involves brushing and limbing requiring debris removal from the fireline. While pulling debris from the line, the swamper should keep far enough from the sawyer to avoid contact with the moving chain, and still be able to hear radio transmissions.

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Importance of Saw Team Partnerships (continued)

When it comes time to drop a hazard tree, there are very few, if any, situations where the swamper needs to be at the base of the tree with the sawyer. The sawyer should understand the concept of individual complexity, know their own limitations, and take pride in walking away from an unsafe situation to seek alternative methods of mitigation. The swamper can assist with the size-up and hazard identification, and once done, should then position him or herself in a predetermined safe area, helping to ensure that no other personnel enter the cutting area.

The Saw Boss or Falling Boss also has a critical role in maintaining LCES and SA. Along with many other tasks, the Saw Boss should help pre-identify specific hazards and ensure there is adequate spacing between saw teams, diggers, and crews. In addition, the Saw Boss or Falling Boss should make sure that critical radio communications are “copied” by the saw teams.

One Tree at a Time

Several experienced chainsaw operators describe a tree falling success as “any time one safely walks away from falling a snag.” Every hazard tree must be assessed individually, as each tree represents a new and individual problem. One 33-year veteran recalls a wildfire assignment in Oregon’s John Day Wilderness in the mid 1990’s when approximately 200 large snags were cut during a 21-day detail. This type of assignment provides the sawyer and swamper with unique opportunities to gain valuable saw operations experience in a high hazard environment.

DEFINITIONS

Backcut The last of the three cuts required to fall a tree. Located on the opposite side of the tree from the undercut (face) and minimally two inches (5 cm) above the horizontal cut of the undercut (face).

Barber-chair Vertical split of a tree during the felling procedure. Commonly a result of improper facing and/or backcutting. Characterized by a portion of the fallen tree being left on the stump.

Boring Method of using the bottom half of the guide bar tip, to saw into the tree while felling or bucking.

C Faller Certifier The highest level of certification for chain saw operators in the agency wildland and prescribed fire qualifications system. The C Faller Certifier conducts chain saw classroom and field training, evaluates and documents the performance of A, B, and C level chain saw operators and recommends to their employing agency their appropriate level of certification. Determination of qualification for this designation is left to employing agency discretion.

Cat-Face Scar or deformed section at the base of a tree caused by rot or fire.

DBH Diameter of a tree at breast height (4.5 feet above ground level).

Faller A person employed in felling trees.

Faller A An individual being trained or evaluated in introductory level, noncomplex chain saw operations. Work of A sawyers must be under the supervision of a qualified Faller B or Faller C.

Faller B An individual certified at the Faller A level who has demonstrated sufficient judgment, skill and knowledge to be trained or certified in moderately complex chain saw operations. Certified Faller B individuals may work independently on project or fireline assignments up to their level of skill. They demonstrate the judgment to decline assignments that exceed their skill level.

Faller C Individual who has demonstrated judgment and proficiency in correctly handling complex sawing and felling in wildland fire operations.

Hazard Tree A standing tree that presents a hazard to people due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem, or limbs, and/or the direction and lean of the tree.

Kerf The width of a groove or notch made by a saw or an ax.

Sawyer A person employed in limbing, bucking and falling trees in non-complex situations.

Side-Boring Backcut Side-boring is a technique for establishing the amount of holding wood required to fall a tree. The guide bar tip is plunged into the tree behind the hinge wood above the undercut (face) to establish the back cut.

Source: S212 Wildland Fire Chainsaws

Incident within an Incident

When thinking back over the years, several incidents on smaller fires come to mind as notable successes. Deciding whether or not to fall a snag on a small fire represents a crucial decision, one that must be made before starting work on the fire. First, decide if the fire is big enough to drop the tree inside the fire. Then complete a risk assessment before any falling operation begins. When cutting the snag, cool the tree down as much as possible. Try to have the spotter position themselves completely outside the falling area. Pre-work involves deciding if the tree can be dropped into the most open spot and, if not, preparing the intended drop zone area as much as possible. Large limbs can land 30-40 feet away. Maintain this mindset and approach the tree as if it is an “incident within and incident.”

Contract Faller Procurement Program

The Faller Module Procurement program was implemented in the Pacific Northwest in 2004. Through this program, minimum standards were implemented. At implementation, two companies were providing rosters of commercial timber fallers. In the commercial timber market, bringing a new sawyer up to grade is a five-year process involving 1000 hours per year. This new program allows for a significant number of contract sawyers to come on board in 2006, though there is still a larger demand than resources available. The Northwest Timberfallers maintains a standard of five years of timber falling experience and the current Pacific Northwest timber faller solicitation is adopting the same standards. For more information on the Faller Module Procurement Program go to:

<http://www.wildfirelessons.net/documents/FallerModuleRosterModel.jpg>

Adhering to Standard Operating Procedures

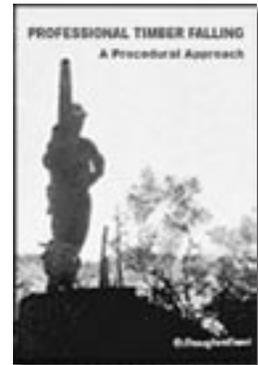
Selecting fireline sawyers and having them follow crew-specific standard operating procedures (SOP) creates success within a falling program. Working as partners, saw teams stay together for an entire fire season. The Saw Boss reviews the crew chainsaw program with every new employee, and then coordinates with the Squad Bosses to select the saw teams. Eight hotshots are made into four saw teams with the Saw Boss overseeing the operations. The Saw Boss and Squad Bosses monitor and mentor the saw teams during a mock fire drill at the beginning of the season. This is done to observe and assess the teams' overall operation, attention to safety, and adherence to the crew SOPs.

Alternatives to Falling

One subject matter expert recounts a success on the County Line wildfire on the Boise National Forest in Idaho in the mid 1980's. The fire burned through an area that previously had a high water table. Dry roots were exposed on all of the trees along a well-used, major road in the Bear Valley area. Initially saw teams were brought in to fall the trees on either side of the road. One of the lookouts immediately recognized an unsafe situation, as there were no good escape routes or safety zones available, and whenever one tree was dropped, several others fell. The sawyers were removed, and a blasting team was assigned to handle the unsafe situation. The moment of success came when the problem was quickly identified and a much safer alternative was chosen to complete the job.

The Procedural Approach

Success will occur when saw teams employ a “procedural approach” for falling a tree. Professional faller Doug Dent developed this approach years ago, and his book entitled *Professional Timber Falling – A Procedural Approach*, is still considered the source of information pertaining to snag falling. The procedural approach is used for every single tree, every single time. It starts when walking up to the tree from a safe distance and the risk assessment of the overall scene begins. The procedural approach is drilled into the saw teams continually so that it becomes habit. During the procedural approach, the saw team establishes their LCES, and LCES must be in place before anyone ever puts the saw to wood.



Numerous Hazard Trees
Courtesy of Gene Eastman

Falling Operations on Large Incidents

A 33-year veteran, who has held the position of Snag Falling Coordinator on large fires, ensures success by managing the falling program as a separate entity. He places priorities on areas to assess, and then removes snags prior to crews being assigned. He works with the Branch Chiefs and Operations Section Chiefs on Type I Incidents. This expert first performed as a Snag Falling Coordinator in 1987 on the Forks of the Salmon Complex in Northern California. During this assignment, the expert matched-up saw team resources with requests from Operations at planning meetings, and ordered additional resources if needed. He has also provided coordination during Burned Area Emergency Response (BAER) project on the Bitterroot National Forest in Montana, where he coordinated the work of 56 fallers and 21 Falling Bosses. Success was achieved as all timeframes were met through planning and then deploying saw team resources in an organized manner prior to winter weather setting in.

Difficult Challenges in LCES and SA

Controlling the Cutting Area

Transitioning from brushing and limbing operations to falling a tree presents a significant challenge. The sawyer is ultimately in charge of the cutting area and all other personnel need to be two and a half tree lengths away during falling operations. If necessary, post additional lookouts during the falling operation. This use of extra lookouts applies especially on large incidents where the large number of fire personnel on the line can result in accidental entry into the falling area.

Avoiding Tunnel Vision

Since the sawyer's work tends to involve concentration on a specific task, they are susceptible to tunnel vision while focusing only on the specific cutting situation. Earplugs block out sound and the steady noise of the chainsaw adds to the tendency toward tunnel vision. Sawyers need to make a continual, conscientious effort to maintain their situational awareness, beginning at the moment they start sizing-up the tree from a distance.

Ceasing Night Falling Operations

Sawyers used to cut snags at night, but the U.S. Forest Service suspended this practice in 1999. However, night falling still sometimes occurs on wildfires. Night falling presents a very dangerous challenge and an unsafe practice, because saw teams are unable to see the tops of the trees in the dark, and therefore cannot identify overhead hazards. The saw teams are also unable to see if the canopy is open or closed, and one cannot see if the top section or limbs of the tree are falling until it is too late. With safety in mind, it is better to put in an extra chain of line around the tree in question, or just deal with it in the morning during daylight hours.



Cat face
Courtesy of NWCG S212 Course



Grant West accident snag is the center snag
Courtesy of National Park Service

Maintaining Solid Situational Awareness

Keeping a solid LCES system established and maintaining good situational awareness with saw teams presents an ongoing and difficult challenge. A short lapse in situational awareness is part of what happened during the 2004 Grant West Prescribed Burn in California. At the time of this incident, no job hazard analysis (JHA), specific to working around burning hazard trees had been completed, although having a JHA in place would not have prevented the subsequent Dan Holmes fatality. JHAs provide a helpful tool for educating the employees at the beginning of a new project, but the rubber meets the road in the pre-shift safety briefing. It is in this briefing that the specific job hazards and human factor issues are addressed. Always treat every falling operation the same in regard to communicating proper procedures.

The Grant West Prescribed Burn was innocent in appearance and considered a low complexity operation. It should be noted that the falling team on this incident never started the chainsaw. The fatality snag was a very solid, greater than 60" DBH white fir, with red needles and tight bark.

During the test burn, the very top of the snag caught fire. The area around the snag was kept clear after the tree caught fire and LCES was maintained. The lead saw team was called in to assess and size-up the tree. The saw team decided to drop the tree. However, a hoselay needed to be relocated before the snag could be felled. This is where the "distraction factor" (human factors) came into play. The relocation of the hoselay disrupted the falling team's procedural approach. Dan and his partner were at the tree, watching the burning top, while their fellow hotshots moved the hose lay. Dan lost his SA momentarily when he and his partner went to help the rest of the crew relocate the hose. In doing so they entered into the danger zone under the lean of the tree. Eight to fourteen firefighters watched and then yelled as the burning top of the snag snapped out, and fell from 130 - 140 feet up. The top 8-12 feet of the tree struck Dan on the head as they were running away from the tree. According to witness estimates, it took approximately 2 seconds for the top of the tree to fall and strike Dan.

Heroic medical efforts were performed to try to save Dan, but his injuries were too severe. One of the lessons learned in this tragic accident is that this momentary distraction was a key component of the fatality. There was a momentary loss of focus on the falling operation, which resulted in a lapse and degradation of the saw team's overall SA.

Suspending Unsafe Saw Operations

Stopping an operation because the sawyer is performing unsafely or not using proper techniques represents a big challenge. When a sawyer performs unsafely, speak directly to the individual first, even if you are not their supervisor. Next, go up the chain of command. When dealing with a safety issue, the overhead will listen. In the Southeast, C-certifiers encounter these circumstances more with contract crews, used more on hurricane cleanup than wildfire, than agency crews.

It CAN Happen to YOU!

Overcoming the “it can’t happen to me” attitude presents a very difficult challenge in the eyes of a now 18-year veteran faller, who did have it “happen to him.” A snag, in the form of a “cat faced” white fir that burned off at the stump, fell on him during a prescribed burn on the Malheur National Forest in Oregon in 1989. When the snag fell, it broke his back and leg. Trees in the area in which he and other saw teams were cutting had been previously flagged. This particular white fir was not flagged. As a result of the injuries, he went through 18 months of physical therapy.

It is important to slow down and not get complacent in this line of work. NEVER cut corners. There is no need to hurry, particularly on single snags. More important to note is this particular C-certifier has never been on a fire where a tree had to be felled immediately.

Seasonal Workforce Challenges

It has become quite a challenge to develop an adequate number of experienced agency C fallers. The majority of the U.S. Forest Service workforce consists of seasonal employees, many of whom are college students. Most seasonal fallers are employed three to five months per year. In this short time span, they encounter very few opportunities to fall moderate to large diameter trees of various complexities. Except for those who come to the U. S. Forest Service with a timber falling background, or an exceptional individual who possesses a natural talent and quickly learns the dynamics of felling trees, it usually requires four to five seasons for an individual to become a C certified faller from the basic entry level. Obviously some will never attain C certification. Experience, poise and maturity cannot be learned in the classroom and these traits usually require many years of actual work experience to develop.

The employees who receive either part-time or permanent appointments are nearly always enrolled in upper level supervisory training courses. The majority of C fallers and certifiers are generally in fire management positions (Engine Foremen, Fire Operations Supervisors, etc.) and are continually being enrolled in upper level fire management courses. By the time these employees are in their late twenties or early thirties, they are usually in supervisory Incident Command System positions. Because they are desperately needed in these critical supervisory roles, they are no longer available for C faller assignments, except possibly on their local units during initial attack activities. Regardless of the need for agency C fallers, no individu-

al should be certified at the C level unless they are truly qualified. Mid and upper-level managers must be held accountable to ensure that the integrity of the training and certification process is maintained and that the established standards are not compromised.



Hang-Up
Courtesy of NWCG S212 Course

The Dangers of “Hang-Ups”

Of the hazard trees, hang-ups are the most dangerous trees to work with. Especially dangerous, are hang-ups on fire. When standing at the base of the tree, the sawyer is constantly playing cat and mouse with it. Large diameter, single standing trees sometimes make firefighters nervous but they are straightforward compared to these hang-up trees. The first priority is making sure that the base of the tree does not come back toward the sawyer. The second priority is to look up. One can argue that one should always be looking up, but situational awareness at the base of the tree is needed as well.

Hang-up removal presents a very real safety challenge. Trees hung up on other trees cause more injuries and fatalities during falling operations than other hazard trees. Consider re-routing the fireline and/or using equipment such as dozers and harvesters to fall hang-ups. When hang-ups are being felled by hand, someone will have to stand in the danger zone, with no escape route. Utilizing equipment, when available, to remove hang-ups or rerouting the fireline is the preferred technique.

Thinking Like a Tree

Every tree possesses its own unique characteristics. Until it is felled, each individual tree remains the current “most difficult challenge.” The difficulty for the sawyer is to figure out what the tree “wants to do,” and then making it do what you want it to do. Ensure that all crewmembers are two tree lengths away from the tree, unlike an experienced sawyer who once broke this rule while taking a photograph and was almost killed by a tree when the holding wood broke. The sawyer did not expect the tree to fall. However, he should never have been that close to the base of the tree in the first place.

Making Safe Decisions

On a one-acre fire on the Payette National Forest in Idaho, part of a 100-foot tall, five-foot DBH Ponderosa Pine was on fire, with debris falling from the tree. One faller, of the assigned six-person smokejumper crew, attempted to fall the pine and managed to get it partially cut. However, he was uncomfortable with the situation, and did not finish falling the tree. The six jumpers talked about what to do, and one of the other jumpers went in and dropped the tree. The lookout was two tree lengths away.

In retrospect, the lookout was ineffective, as there was no escape route and the falling debris was a major hazard. The firefighters should have secured the area and let the

tree burn itself out, or brought a helicopter in to drop water on the tree to cool it down. The second sawyer’s “can-do,” macho attitude overcame safe saw practices. Training sawyers to gain experience and get away from competitive, macho attitudes remains a challenge.

Training the Military

Training members of the military to run chainsaws presents a big challenge. In order to use military resources for mop up, they have to be able to buck-up trees. In one case, the fire organization brought in an experienced sawyer to train military personnel. A cadre instructed a condensed S-212 Wildland Fire Chainsaws course. The training focused on chainsaw safety, maintenance, bucking, and brushing, with no falling during the day and a half training session. Additional days in the field involved hands-on operations.

For agency personnel, the challenge comes from working with the military non-commissioned officer (NCO,) who has the overall responsibility for the personnel and their role as future sawyers. In this case, the immediate need for saw teams on the fireline created pressure to get quality training done quickly and effectively. The lack of incidents and injuries among 120 personnel demonstrates the success of the training effort.

Scratchline Chainsaw Safety continues in Issue 17

Investigation Reports Involving Hazard Trees

The following final reports are in the Reviews and Investigations section of the Lessons Learned Center Website library:

http://www.wildfirelessons.net/documents/Poplar_Log_Fire_2001.pdf

http://www.wildfirelessons.net/documents/Holmes_Accident_Investigation_Report_Part_One.pdf

http://www.wildfirelessons.net/documents/Holmes_Accident_Investigation_Report_Part_Two.pdf

http://www.wildfirelessons.net/documents/FCWFU_Missouri_Ridge_Fire_Falling_Snag_090605.pdf

http://www.wildfirelessons.net/documents/M_Stanley_accident_report.pdf

http://www.wildfirelessons.net/documents/2002_Missionary_Ridge_24_72_hour_Reports.pdf