Sunflower Fire

Hazard Tree Felling Accident

Facilitated Learning Analysis

Tonto National Forest
June 2012

Contents

"These two are my most experienced sawyers…[injured sawyer] is by the book."

Engine Captain

"Listen to that little voice."

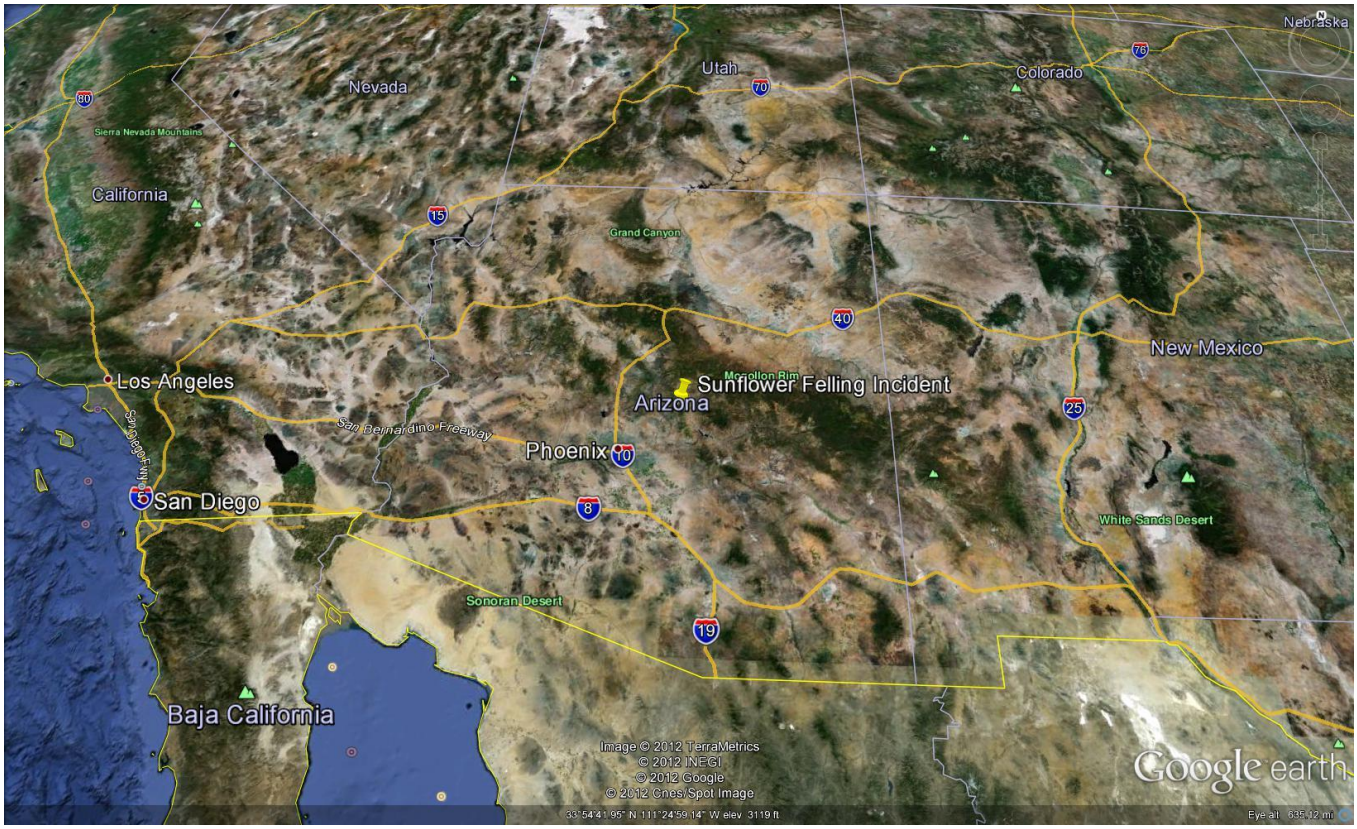
Injured Sawyer

1. Leader's Intent

On June 8, 2012, Neil Bosworth, Forest Supervisor on the Tonto National Forest, issued a Delegation of Authority for a Facilitated Learning Analysis (FLA) Team to review the felling accident that occurred two days earlier on the Sunflower Fire.

In his Delegation of Authority letter, Bosworth explained that he expected the FLA Team members to include the following in their analysis and report:

- A description of the accident.
- A factual chronology of the events leading up to and including the accident.
- The immediate response to the accident.
- A synopsis of the lessons learned at all levels—Firefighter, District, and Forest.



Figures 1 and 2

2. Narrative – Telling the Story

A. Background

The Sunflower Fire starts on May 12, 2012 on the Tonto National Forest between Mesa and Payson Arizona. (It eventually grows to a final size of 17,446 acres.) At the time of the hazard tree felling work, the fire is being managed locally as a Type 4 incident.

On June 6, two members of a local engine crew are felling hazard trees at the north end of the Sunflower Fire. The area where this felling work is occurring initially burned during the 2004 Willow Fire, and burned again during the Sunflower Fire.

Most of the trees determined to be hazardous are dead Douglas firs located on north and east slopes along Forest Road (FR) 201. The elevation of the work area is approximately 6100 feet above sea level.

Intermittent work on the hazard trees has been occurring since 2005. Following the Sunflower Fire, a more deliberate effort is implemented.

During the days prior to June 6, after some hazard tree removal was accomplished by visiting hand crews, local engine crews continue to work on the hazard trees along FR 201. The Tonto National Forest realized that this hazard tree removal is necessary for public safety (FR 201 leads to recreational trail heads) as well as safety for Burned Area Emergency Response (BAER) work. In addition, this hazard tree removal represents an opportunity for saw/felling training for local fire personnel.

Figure 3

Upon arrival at the work area, the two crew members discuss the work to be done and a strategy to safely go about it. In doing so, prior to beginning, they discuss the "whys" and "how's" of the work.

Crew Assigned to Another Engine;
Captain and One Crew Member are Elsewhere

On the morning of Wednesday, June 6, the engine crew assigned to the hazard tree work—due to pump repairs on their normal engine—is staffing another local engine (apparatus). Additionally, the engine crew Captain is tending to the administrative needs and medical attention of another crew member who suffered a minor injury from physical training a few days prior.

The remaining two crew members are given a few other assignments prior to heading to the hazard tree removal work.

The Captain and the crew member with the minor injury take the chase truck. The other two crew members staff the borrowed engine. After addressing the medical needs of the injured crew member, the Captain plans to join the other crew members.

The day's plan includes the two crew members parking the engine at a guard station below the Sunflower Fire and accessing the work area in a Utility Task Vehicle (UTV).

While gathering equipment off their borrowed engine for their saw work, it becomes apparent that some of the equipment that they are accustomed to using is not onboard this engine. Specifically, they do not find a falling axe nor the 10-person first aid kit they were expecting. (This engine, however, did have a larger trauma bag that they elected not to haul to the project site.)

After spending time searching for this equipment at the guard station without success, they chose a Pulaski tool for pounding wedges (utilizing the flat sides between the axe and grubbing end). Both crew members were also aware that each one was carrying individual first-aid kits and additional 8 x 10 gauze bandaging in their gear.

Upon arrival at the work area, the two crew members discuss the work to be done and a strategy to safely go about it. In doing so, prior to beginning, they discuss the "whys" and "how's" of the work. They are both familiar with the area and the assignment of felling these hazard trees. A few days earlier, their entire engine crew had been in this same area performing this same work. Because both crew members plan to operate saws, they decide to stagger their starting locations—as well as separate themselves, with one above the other.

Their subsequent pattern of moving from tree to tree is much like how igniters might be staggered and placed on a slope during a burning operation. They also ensure appropriate separation—to be safely apart and well outside the danger zones of dropping trees.

Figure 4

The work this day is concentrated on the uphill side of FR 201. This section of the road has a fairly significant cut bank uphill and a steep slope downhill (see Figure 4 above).

Each crew member had a radio and all appropriate PPE.

The Cutting Begins

The cutting begins at approximately 1220 hours. About 45 minutes into the work, one of the crew members returns to the UTV to sharpen the saw's chain. At this time, the crew member observes that a hazard tree, located just above the cut bank on the uphill side of the road, has been missed.

This crew member moves the UTV back down the road and positions it in the middle of the road—to serve as a barrier should there be any other fire/agency traffic. (The road is currently closed to the public.)

At 1311, he makes a phone call to the Captain (who is still addressing the other crew member's minor medical needs) to update him on their progress, and inform that he has cell coverage. He says that the phone will be on "vibrate" mode in his pocket.

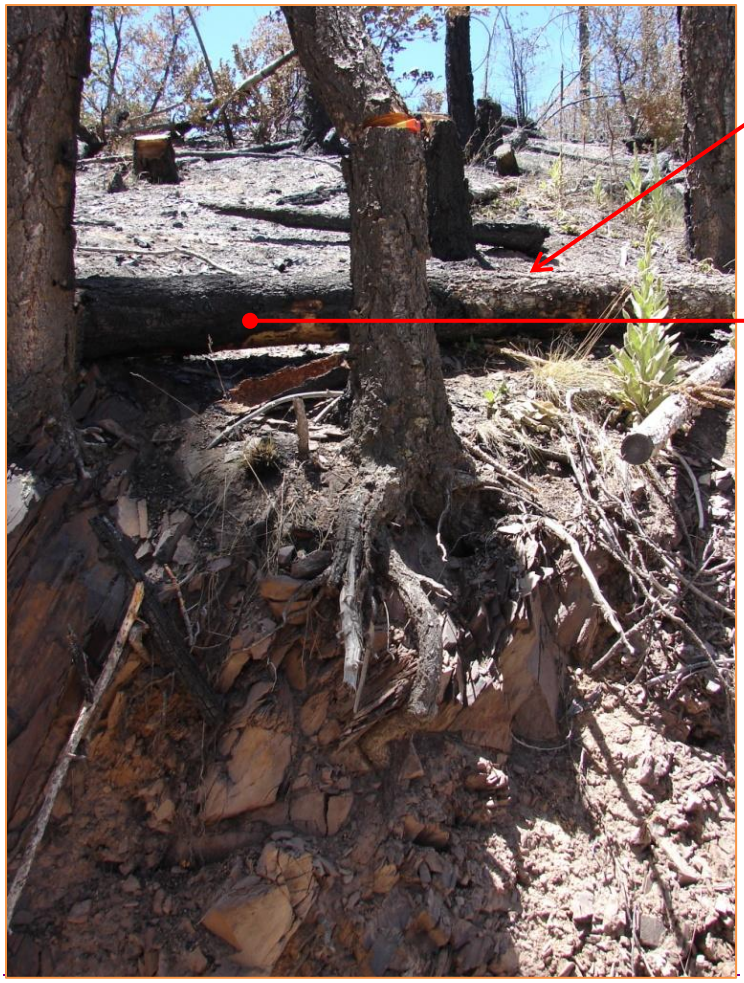


Figure 5

He returns to the missed tree to size it up. *[From this point forward in this FLA report, this crew member will be referred to as "C-Sawyer" and the other crew member as "B-Sawyer".]*

C-Sawyer determines the safest and most successful option is to direct the tree into the slope, up-hill and to the right (as viewed from the road) of a live Douglas fir approximately 70-80 feet tall and 6-8 inches in diameter. This fir is located approximately 12 feet up hill of the hazard tree being cut.

As the C-Sawyer explains to the FLA Team:

> *"I sized the tree up from the road and determined its primary lean was uphill and away from the road—but I also determined that if there were a wind event over the location, the top of the tree could snap off and land on the road, which was what we were trying to avoid happening, so it met the criteria of removal.*
>
> *I sized it up as being a fire-killed Doug fir, approximately 35 feet in height with about a 10-12 inch DBH. The tree had very little top weight and no obvious widow makers the entire length."*

"I had this feeling come over me, like something was going to happen."

Due to the cut bank, the safest side to cut this tree is on its right side (as viewed from the road). He makes all three of his cuts from the same side. His position on the cut bank also hinders his ability to use the "gun sights" on the saw. In setting up his cuts, C-Sawyer opts to leave in place a 10-inch diameter downed log to secure his footing while cutting above the road's cut bank. He purposely straddles this log as an anchor for his right foot (see Figure 5 on previous page).

B. The Accident

At approximately 1315, C-Sawyer is making his final back cut on the hazard tree. He is utilizing a back-sighting method with attempts to verify the direction of fall over his shoulder. He stops his back cut at the appropriate point—in order to not compromise the hinge-wood—and removes the saw and sets it down.

He inserts a small wedge, using the Pulaski tool, to start the fall.

As C-Sawyer starts on his planned egress route, he sees that just short of the point in the hazard tree's fall where the hinge wood was to snap, it hangs up in a small branch, bare of needles, in a nearby green/live Douglas fir.

C-Sawyer approaches the hazard tree to analyze the situation. He determines that because the hinge wood is still intact, he is unable to push the tree from its hung position.

His size-up of this new situation—the tree now hung on the same side of the green tree as he had been cutting, with an up-hill lean—leaves him only one option: To cut the leaning hazard tree from the side opposite his initial cuts.

C-Sawyer finds a new escape route to the left of the hung tree (as viewed from the road), just above and parallel to the cut bank of the road (see figures 8 and 9 on page 12). The nearly six-foot drop to the road from the top of the cut bank prevents C-sawyer from making his escape directly to the road. He clears several small diameter logs away from this escape route path. Much like during his first cut, he opts to leave the same log at the base of the leaning tree to serve as a foothold during the cut—and to stabilize himself for his egress.

His plan is to "drop-cut" this leaning tree above the pie cut. Even though C-Sawyer has cut many trees in similar hung situations, something is making him uncomfortable about this one. He informs after the incident: "*I had this feeling come over me, like something was going to happen*." He contacts B-Sawyer to have him watch over—from a safe distance away—the felling of this leaning tree. (See figures 6 and 7 on next page.)

Figure 6

Figure 7

As the C-Sawyer explains to the FLA Team:

> *"I called [B-Sawyer] over to 'keep an eye on me'. I told him I didn't feel good about the tree and just make sure nothing happens. He got in place and I asked if he was ready? He replied: 'Yes, go ahead'.*
>
> *He was 2½ tree lengths away, if not more.*
>
> *I finished my top drop cut, saw that the kerf was closing, and removed the saw from the cut to begin the undercut or release cut. I cut into the tree using the top end of the bar until it looked as if it were to go any second. Then I nipped once, and then twice."*

At the End of His Escape Route, C-Sawyer is Knocked to the Ground

As the leaning tree breaks free of its lean, C-Sawyer moves quickly down his escape path (see figures 8 and 9 on next page).

At about 30 feet away, he glances over his right shoulder—to see the tree coming at him. Before he can reach the road at the end of his escape route, he is struck in the head with a glancing blow on the right side of his hard hat, followed by a strike to the right arm.

There, at the low point in the cut bank at the end of his escape route, he is knocked to the ground. C-Sawyer's hard hat and sunglasses are knocked off of his head, either from the force of the tree, or the resulting tumble to the road.

He receives a puncture wound to his right arm just above the elbow, and he also experiences a momentary loss of consciousness.

Based on interviews and radio recordings from the Dispatch Center, C-Sawyer is struck by the tree within a six-minute time frame—sometime between 1315 and 1321 hours.

As the C-Sawyer explains:

> *"Once it struck my hard hat, my vision went black very quickly and returned and I knew I had been hit by the tree. It had hit me so hard that it knocked me onto the road off the cut bank, which is where I had intended to go anyways. But I fell face first and tumbled out onto the road. I immediately got up onto my feet..."*

Figure 8

Figure 9

C. Medical Treatment and Transport

As C-Sawyer makes his escape and disappears from B-Sawyer's view, B-Sawyer runs to the road and turns toward where he expects to see C-Sawyer on the road.

After being knocked down, C-Sawyer immediately gets up and—as he explained in an interview during the post-accident site visit—says he was "ready to fight…something just hit me."

Within seconds, as described by both sawyers, C-Sawyer is applying pressure to his wound and making the initial radio call to the Dispatch Center (recording found at 1321) for an ambulance to meet them at the highway, about 25 minutes away in the UTV.

As B-Sawyer explains: *"By the time I got to him, he had already called dispatch and was at the UTV with the tailgate down."*

At this point, very little medical assessment occurs. B-Sawyer buckles C-Sawyer into the UTV, straps the radio to the center seatbelt and hands the microphone to C-Sawyer. C-Sawyer is insisting that B-Sawyer "just drive."

As C-Sawyer will describe in his own assessment regarding this string of immediate events, it is clear that he recognizes the gravity of their situation and starts making sound and quick decisions. He does not want to waste time at the accident scene, wanting to get closer to medical attention should his condition worsen. (He is also aware of an existing landing zone for a helicopter if needed below their current location.) In addition, C-Sawyer says he was trying to remain calm and keep control of the incident to ensure that B-Sawyer could concentrate on driving safely to the highway. C-Sawyer recalls:

> *"He [B-Sawyer] put my hard hat on, buckled me into my seat and began to drive me out, asking me to talk to him while he was driving. We had left everything else at the sight of the accident. I had no idea what my condition was like at the time and was afraid it was going to get worse as we drove to the turn off. I was operating off of pure adrenaline at the moment and was trying to keep myself calm to avoid any shock*."

Injuries are Relayed as "Non-Critical"

Approximately10 minutes into their drive to the highway, they stop to further assess the situation. B-Sawyer suggests C-Sawyer roll his sleeve above the elbow of his right arm and pull the Velcro wrist strap tight to supplement the direct pressure that C-Sawyer is already applying to himself.

At this time, C-Sawyer tells B-Sawyer that he had been hit in the head and knocked to the ground. B-Sawyer does a quick assessment of C-Sawyer's head and neck.

According to interview statements, a radio transmission is made by C-Sawyer between the time of the initial call at 1321 and when they arrive at the ambulance. In this call, C-Sawyer indicates that his injuries are "non-critical". This "non-critical" message is relayed at least once more over the radio when C-Sawyer confirms their arrival at the highway—and the nearly simultaneous arrival of the ambulance at 1349.

At 1348, just prior to the arrival of the ambulance, via the radio, C-Sawyer requests Law Enforcement and the District Duty Officer to respond to begin an accident investigation. C-

Sawyer also passes on some instruction to B-Sawyer for assisting Law Enforcement. At 1349, C-Sawyer answers a request from the Dispatch Center to confirm that the ambulance has arrived. This is confirmed, that the ambulance has arrived at the turn-off from the highway as initially requested.

Despite the Captain having his radio and cell phone with him while tending to the medical needs of the crew member (PT injury), no clear transmissions are heard by the Captain until he is outside of the medical facility. Through interviews, it is believed that the Engine Captain hears only the first "non-critical" transmission.

Several notifications are made between the Captain and the Dispatch Center, including with the District AFMO, the Acting Forest Fire Staff Officer, and the District Duty Officer.

It is important to note that, at this point, only B-Sawyer and C-Sawyer know that C-Sawyer was hit in the head by the tree. Upon arrival at the ambulance, C-Sawyer does tell the attending EMTs that he was hit in the head. It is unclear as to when, but at some point prior to C-Sawyer's transportation to the hospital, there is discussion and a decision by the Acting Fire Staff to have him transported to a specific hospital for appropriate treatment for a suspected trauma injury to the head and/or spine. Based on interviews, it is clear that the Acting Fire Staff is making this decision based on her emergency medical background and reacting to the mechanism of the injury to C-Sawyer.

Before this decision reaches C-Sawyer—or is relayed to the attending ambulance company—the C-Sawyer is transported to the closest emergency room at a regional medical facility, located much closer to the C-Sawyer's pick-up point by the ambulance.

After Release from First Hospital, Patient is Transferred to Another Hospital for Necessary Tests

Upon learning that C-Sawyer has been transported to the smaller hospital, the Captain follows him there and arrives shortly after C-Sawyer's arrival. At this hospital, the most immediate attention is provided to the wounded arm, including x-rays, irrigation, sutures, and dressing.

During this time, there is regular contact with the Acting Fire Staff Officer. As a result, both the Law Enforcement Officer and the Captain request the attending physician to clear C-Sawyer of any head, neck, or spine injuries by specific means—CT scan or MRI.

Despite multiple efforts to relay to the physician that such clearance is being directed by an agency official, initial and subsequent requests for this specific medical attention go unanswered. In fact, the physician, who appears to be frustrated and annoyed by these requests, responds by saying: "Are you a doctor?"

After approximately three to four hours at this hospital, C-Sawyer is released—without the requested CT scan or MRI tests. After some deliberation, and at the request of C-Sawyer, the Captain is considering taking C-Sawyer directly home.

The Captain stated that he was tempted to believe that the attending physician was confident in his initial assessment and by clearing C-Sawyer without such definitive care and analysis.

However, en route home, C-Sawyer exhibits signs of nausea and vomiting (he had done so once before in the small hospital). While this reaction is suspected to be due to the pain medication, it nonetheless triggers substantial concern. Thus, the Captain calls the Acting Forest Fire Staff Officer. The decision is made—once again—to transport C-Sawyer to more definitive care available at another hospital.

At this second hospital, C-Sawyer is given immediate attention based on the mechanism of injury (MOI). This treatment includes an MRI of the head, neck, and spine. C-Sawyer is cleared of any injuries to the head, neck, or spine. He is released from the hospital.

3. Accident Circumstances

A. On-Site Circumstances

- C-Sawyer: Current C Certified Sawyer and previously certified EMT.
- B-Sawyer: Current B Certified Sawyer and certified EMT.
- Dead-standing Douglas fir tree (hazard tree): 8-9 inches DBH, approx. 52 feet tall.
- Distance between the base of dead Douglas fir tree (hazard tree) to base of green tree causing hang-up: 12 feet.
- Pie cut and back cut appropriate with appropriate holding wood. Hang up prevented "snap" of hinge wood.
- Use of the wedge was appropriate to ensure an uphill direction of fall. The small diameter of the hazard tree prevented continued use of saw in back cut with a wedge inserted.
- The use of a Pulaski to tap the wedge into the back cut was of no consequence to this accident.

Figure 10

Red dotted lines show the probable position of the hazard snag where it hung up on adjacent tree's limbs.

- Direction of fall misaligned slightly left of C-Sawyer's desired direction of fall. The difficulty in the back-sighting technique and position of the hazard tree on the cut bank contributed to this slight misalignment of the fall.
- Escape route relatively clear of trip hazards.
- Heavy log left at base of cut tree—per C-Sawyer's plans—was not cleared. The log for both initial cuts and drop cut was intended for leverage and did not contribute to the accident, nor present a hindrance to escape routes.
- Evidence of two under-cuts on the leaning tree supports C-Sawyer's account of having to make second attempt in releasing the leaning tree.

- Stump (w/pie cut) height from ground to release cut is approximately 10 feet. First piece of felled tree (laying parallel to road on edge of cut bank) is approximately 36 feet long. Second piece (on roadside below end of escape route) is approximately 4 feet 10 inches in length (see Figure 11). Third piece (cast up hill and beyond end of escape route) is approximately 3 feet 6 inches in length.

Figure 11
The energy associated with the felling tree striking C-Sawyer's right arm is also suspected to contribute to knocking the saw out of his right hand and either casting it off the cut bank or rolling off the cut bank down onto the road in an upright position.

- Estimated point of impact at 36 feet, or first break, forcing C-Sawyer forward. C-Sawyer's own forward momentum, the forward and downward momentum of the tree, and the likelihood of the C-Sawyer's stepping in the direction of the road, is suspected to contribute to the distance he tumbled forward and downward to the road.
- The energy associated with the felling tree striking C-Sawyer's right arm is also suspected to contribute to knocking the saw out of his right hand and either casting it off the cut bank or rolling off the cut bank down onto the road in an upright position. C-Sawyer neither recalls having the saw in his hands nor setting it up right when he stood up after being knocked to the road. B-Sawyer's eye-witness account is similar in not seeing C-Sawyer touch his saw any time after being struck by the tree. C-Sawyer is certain that upon his last drop cut, he engaged the chain break, followed by switching saw to his right hand during escape.

Figure 12
Scratch on right side of C-Sawyer's hard hat indicates his—and tree's—forward momentum at time of strike.

- Horizontal and curved scratch on right side of C-Sawyer's hard hat indicates his forward momentum and forward momentum of felling tree at time of glancing blow (see Figure 12).
- Green Doug fir (causing hang up): approximately 6-8 inch DBH, 70-80 feet tall.

- Upon first assessment, the limb causing hang-up appeared to be a dead limb with no needles. Upon further assessment during site visit, it was determined this limb may have been green and therefore unable to snap away. Based on the angle of the lean (as recreated by red lines overlaid in Figure 10 (page 16), the hazard tree may have been supported by bole of green tree in addition to suspected limb. Support of the green bole may have contributed to the hazard tree righting itself (see Figure 10).
- Momentum of butt-end (bottom) of hung tree (after down-cut) may have contributed to righting the tree upward, allowing slope to take effect and bring the tree down into escape route, and not allowing it to continue with its lean uphill.
- Injured sawyer and second sawyer were both operating saws, but safely separated and coordinated. No additional swampers/observers were on site at the time of the accident.
- Injured sawyer requested other sawyer to be lookout when he experienced difficulty with cutting hung tree.
- According to C-Sawyer, he had used his individual identifier over the radio. He had to relay this initial call a second time at the request of the Dispatch Center. Dispatch recordings include a very broken transmission at 1321 hours. After repeated play-back, this transmission appears to be the voice of C-Sawyer calling the Dispatch Center and identifying himself by his individual title and number. This is supported by C-Sawyer's interview in which he recalled calling in his own injuries using his individual identifier instead of the engine's call sign. This is followed by an immediate request from the Dispatch Center: *"Unit calling, please repeat."* No further transmissions regarding this accident were recorded until 1348. The time between radio traffic supports reported travel time from accident site to highway where sawyers met the ambulance.
- Known landing zone (LZ) below accident site was not verbally identified/shared.
- Despite injuries, C-Sawyer demonstrated situational awareness and the ability to remain calm and direct the incident. He was able to communicate his needs, provide direction to B-Sawyer, and prepare for an accident investigation.

B. Circumstances on the Fringe

- Interviewees recognized an opportunity for more robust Job Hazard Analysis (JHA) program. Tailgate safety meetings are occurring on the District, but admittedly they are poorly documented.
- A significant tailgate safety meeting was held two days prior to the accident with the entire engine crew. On the day of accident, discussion between the two sawyers occurred on how to safely coordinate cutting along roadway.
- Due to new Albuquerque Service Center (ASC) policy, handwritten CA-1 is rejected. This limits ability of supervisor to immediately address administrative needs without access to computer or network.
- C-Sawyer shared that part of his motivation behind his "non-critical" statement over the radio was to encourage B-Sawyer and himself that the injury will have a positive

outcome. C-Sawyer stated in interview that he recited to himself on the way down the road to the ambulance: "not today, not me."

- No 24-hour telephone number available any longer at ASC for after-hours OWCP/injury issues. Could be an issue in past/future accidents occur after normal hours or on weekends.
- Policy allows for single sawyers to cut without a swamper/observer—at discretion of the sawyer.
- Dispatch voice recorder missing data during this incident. In looking for other specific events, the FLA Team found further missing data. Conversation later with Dispatch Center Manager indicated two new dispatch consoles recently installed and awaiting "hook-up" to voice recording device.

C. Significant Themes

Morning Chaos

Engine crew members all felt not having their own engine with their own equipment started the day with chaos: their own engine was in the shop for maintenance; the crew was split with different assignments; their tools were on different vehicles; their medical bag was not with the two fallers. These factors led to a general feeling of being out of "routine" more so than confusion.

"Non-Critical" Statement

The initial statement from the accident victim that his injuries were "non-critical" may have set a certain tone. Many of the people interviewed by the FLA Team noted hearing this and making assumptions as to the level of care needed. Had the mechanism of injury (MOI) been known earlier and this statement of "non-critical" had not been made, many interviewed indicated that more definitive care may have been initially provided.

Mechanism of Injury

Many people interviewed who had EMT experience felt a bias developed toward the "non-critical" injuries instead of adequate attention being paid to the MOI. There was a general impression among all involved that the "non-critical" statement may have unintentionally influenced the actions of those involved in the initial assessments of C-Sawyer toward less definitive care. The concern by those who shared this theme was of a potential to miss greater injuries that are commonly associated with trauma to the head, neck, or spine.

Leader's Intent on Cutting Mission

Generally, leadership and engine crew understood that hazard trees were to be removed and that this also provided an opportunity for local engine crews to get saw/felling training. However, both leadership and crew members noted some lack of understanding on priorities, methods, and limitations on what was to be cut. Two of the leadership personnel voluntarily noted they could have done better in laying out specifics/expectations in intent.

Radio Commo/Dispatch Recording

Recurring reliability issues with the Forest radio repeaters/network system may have contributed to radio traffic not being heard. No evidence was found that a missed radio transmission had a negative outcome on this accident. However, this finding indicates the potential for a significant incident—B-Sawyer felt relatively certain that a radio transmission was made regarding the injured arm and glancing blow to the head. It is uncertain as to whether or not the transmission actually occurred, or if it was not transmitted due to repeater malfunction. The FLA Team discovered several instances of radio traffic unrecorded that otherwise were noted in interviews or WildCad logs. While the FLA Team saw no direct consequence on this accident, these findings of missing recorded data could become significant in the event of other future critical incidents.

Ownership

All parties interviewed displayed a genuine concern and willingness to take ownership in the accident and the events leading to it. Accountability and learning from mistakes was a desired outcome of all participants in the FLA at all levels of the Forest's organization.

Definitive Care

Once the MOI was realized by all parties (at various stages of the incident), and once it was determined that the initial care physician was unwilling to conduct follow-up and tests to clear the injured sawyer of head and spine injuries, a decision was made to obtain further evaluation at a second care facility. All of the interviewed individuals showed an understanding of the potential severity in injuries involving blunt force trauma to the head, neck, and/or spine. Whether some involved understood this potential early or late in the accident's time line, the realization and understanding to seek more definitive care occurred, nonetheless, by nearly all of those involved. Additionally, there was a common understanding of the need to seek this definitive care for the sake of the employee's health and compensation and for the sake of the agency's culpability.

4. Lessons Learned and Recommendations

C-Sawyer/Accident Victim

- "Listen to that little voice."
- Always cover/go over emergency transportation plan on any cutting project.
- Two people aren't enough on remote felling projects. One injured and one to take care of medical isn't adequate. Need a minimum of four people to ensure there are at least three people present to administer first aid, transport (backboard if necessary), and communicate/request assistance.
- Having backboard and C-Collar (Cervical Collar) is worth carrying on our engines. If the situation was worse, or my condition had declined, the first aid supplies we had on hand would not have been enough.
- A certain degree of "discomfort" is normal when cutting. If you're too comfortable, you're overconfident.
- We should always have a spotter. Not everyone on a project should be cutting.
- "Hangers" (hung trees) can come down in any direction. "*I thought my tree would shake out on the right side of the green tree*."
- Everyone should carry extra bandaging material in their line gear.

B-Sawyer

- Ensure that you have all your equipment before your head to work area/project—such as medical gear bag and wedge-pounder.
- Ensure intent is clear in limitations/expectations of the assignment. Could we have cut green tree causing the hang-up?
- Reconsider taking over the situation and not allowing injured party to run radio traffic.
- Next time, should not allowing statements such as "not-critical" to overshadow potential serious injuries such as head injury.
- Reconsider the necessity of running two saws with two sawyers when there is no other personnel on hand.

Engine Captain (C-Sawyer/Accident Victim's Supervisor)

- Need to respond to the mechanism of injury without delay.
- Have a Forest plan—much like the NWCG Burn Protocol—in which the response to a burn center is dependent on the severity or area burned. In this case, more care would be required for a possible head, neck, or spine injury.

- Don't feel rushed in morning plans. Take time to go over details.
- Have medical bag and back board on all projects (if necessary, take from engine).
- Practice the way we train. This engine company had been training recently in handling EMS incidents by assigning roles within this crew—one person to handle radio/IC, one or two to treat injuries, one to assist in gathering equipment or drive, etc. Had more people been on the project at the time of this accident, people would have been in roles to assist.

District AFMO

- Could have made hazard tree removal objectives more clear to crews.
- District's JHA program not as strong as it could be. Documentation of JHAs/reviews needs improvement.
- Operate such cutting projects much like sawyer testing days: EMT on scene and not cutting; trauma equipment on hand; perhaps an individual dedicated to project oversight on scene, not cutting.
- Could have better coordinated with BAER team on FR 201 needs; open or closed.
- Good: I have quality people on my District who I can trust. Bad: I may have taken for granted the trust I have in my people to the point of interfering with providing clearer intent.
- Balancing administrative and field responsibilities is challenging.

FLA Team

- **Act on District's Own Recommendations**
  The District and Forest should review internal lessons learned and recommendations that have resulted from this FLA and seek opportunities to implement them Forest-wide (perhaps recommend Region or Agency-wide). Several renditions of a suggestion to conduct projects that involve chainsaws had merit. They included having an individual dedicated to project oversight without running a saw; having appropriate minimum numbers of people to conduct emergency evacuation; have trauma equipment on site; and have emergency medical technicians on site.

- **Err on Side of Caution When Relaying Method of Injury**
  In addition to descriptions relayed from the scene of a medical emergency ("non critical," not life threatening"), give equal or greater consideration to the mechanism of injury (MOI) in the level of response and emergency care.

  Err on the side of caution—based on the MOI. Seek more definitive care immediately (reference the NWCG burn protocols as a model). This is not to confuse seeking immediate/closest available care as determined by the critical care needs and stabilization of the injured. Rather, this recommendation is to establish a protocol/policy that ensures injuries to the head, neck, or spine are evaluated and cleared as part of the initial care. At

the same time, such care is not to interfere with the immediacy or proximity of emergency care.

The agency needs clarification on how to seek definitive care without jeopardizing OWCP regulations. Similar to the burn injury protocol, an employee's representative needs the ability to seek Agency Administrator's authority to pursue and obtain more definitive care for the injured employee.

- **ASC 24-Hour Employee Injury/OWCP support**
  ASC should reconsider providing employee injury/OWCP support after normal business hours, on weekends, and on holidays. Current procedures on "verbal authorization" and 48-hour follow-up are unclear. The ability to seek answers to questions and gain authorizations is needed by the field seven days per week and at all hours during incident assignments.

- **Forest Radio Network and Recording Equipment**
  The Forest should request the immediate attention of the Forest Service's Chief Information Office (CIO) to diagnose and remedy recurring radio network issues and ensure that all dispatch consoles and recording equipment are working properly. If this has occurred, the Forest should ensure the request has been honored to completion and periodically monitor the system to ensure recording of radio traffic is captured.

- **Emergency Medical Technician (EMT) Program**
  The agency should implement a serious and accelerated approach to an Emergency Medical Technician program that includes training, certification, and sponsorship.

5. Commendations

Recognizing—and Acting On—Risk Potential

The injured sawyer recognized the difficulty in the hung tree and the potential for an accident. Before proceeding, he stopped the cut and asked the second sawyer to observe and serve as lookout.

Promoting a Learning Culture

Multiple individuals demonstrated humility and the willingness to take ownership of this accident and the events that precipitated it. Furthermore, there is a strong desire at multiple levels on the Forest to learn from mistakes. The FLA Review Team noted an across-the-board positive motivation and enthusiasm by everyone involved to share these insights and lessons.

Preparedness

All engines on the District are equipped with back boards, C-Collars, and multiple person trauma bags (first aid equipment).

6. FLA Team

Bea Day, Team Leader
Forest Fire Management Officer, Cibola National Forest and Grasslands

Pete Gordon, Team Leader Trainee
Fire Staff Officer, Prescott National Forest

Tony Pacheco, District Fire Management Officer
Mt. Taylor Ranger District, Cibola National Forest

John Johanson, Engine Captain
Tonto Basin Ranger District, Tonto National Forest

Paul Keller, Technical Writer-Editor
Wildland Fire Lessons Learned Center