

## Executive Summary

On March 19, 2026, a snag struck a sawyer during attempted mitigation efforts as part of prescribed fire operations on the Blue Buck Unit on the Mark Twain National Forest.

The incident occurred during an active operational period characterized by multiple prescribed fire activities and concurrent wildfire response across the forest, contributing to an elevated operations tempo.

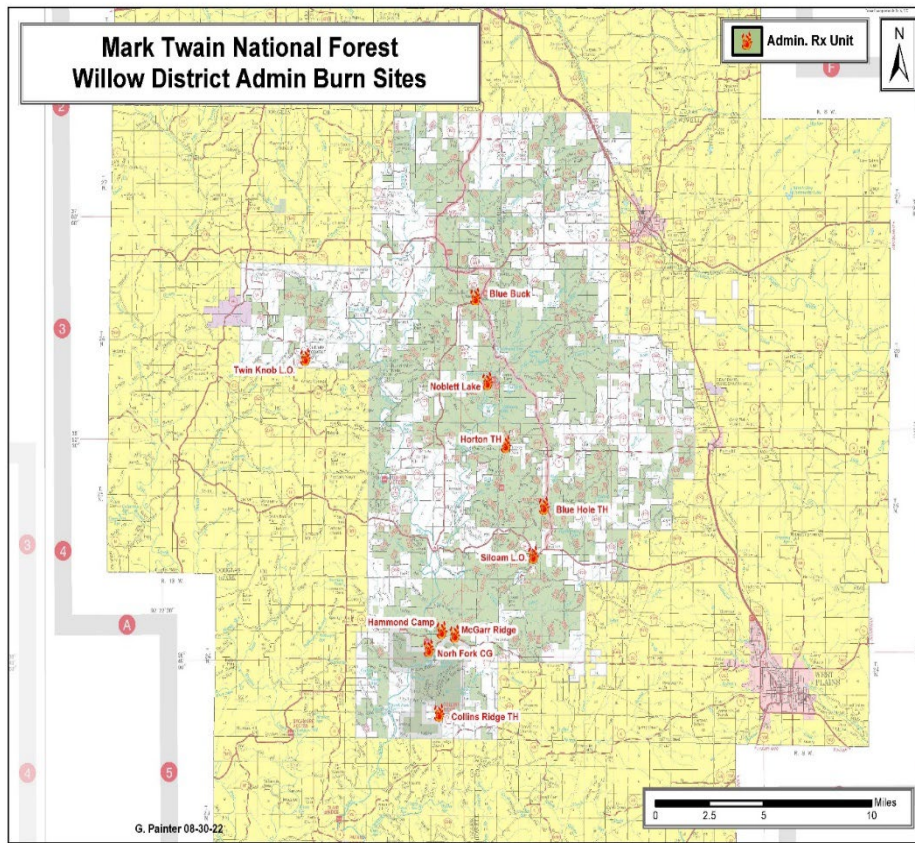
Following completion of ignition, resources transitioned to monitoring and mitigating hazardous trees within the fire perimeter. Post-burn conditions included actively burning snags, compromised wood structure, residual heat and lingering smoke. Saw teams worked independently in separate areas of the unit. As additional hazard trees were identified, the scope of work expanded beyond initial expectations.

During these operations, a sawyer engaged a black oak snag. The tree fell in an unintended direction and struck the sawyer, resulting in serious injury. Personnel on scene immediately initiated communication and medical response.

This Facilitated Learning Analysis (FLA) examines the conditions and influences present at the time of the incident, including operational tempo, work organization, communication, and sawyer proficiency. The intent is to understand how these factors interacted in the field and to identify opportunities to improve safety and effectiveness in similar operations.

## Fire Program Overview

In mid-March 2026, the Mark Twain National Forest was engaged in an active spring prescribed fire implementation period. Multiple burn units were being conducted across several ranger districts concurrent with ongoing responses to wildfire activity across the geographic area. These operations were carried out by interagency resources, including U.S. Forest Service personnel and partner



*Mark Twain National Forest and Willow District Administrative map showing various prescribed fire burn units. The Blue Buck Unit is located top center.*

organizations, with some crews composed of ready reserve employees working in small modules across a geographically dispersed landscape.

This time period represented a primary window for prescribed fire implementation prior to seasonal green-up, resulting in a sustained operational tempo as crews worked to take advantage of favorable—though often narrow and variable—weather conditions. Portions of this area had not received measurable precipitation since the previous spring, contributing to ongoing wildfire activity and adding to the baseline workload for fire personnel. Concurrent prescribed fire activity across the forest, combined with dynamic environmental conditions and increasing regional fire activity, contributed to a complex and time-sensitive operational environment in which multiple burn operations were occurring simultaneously.

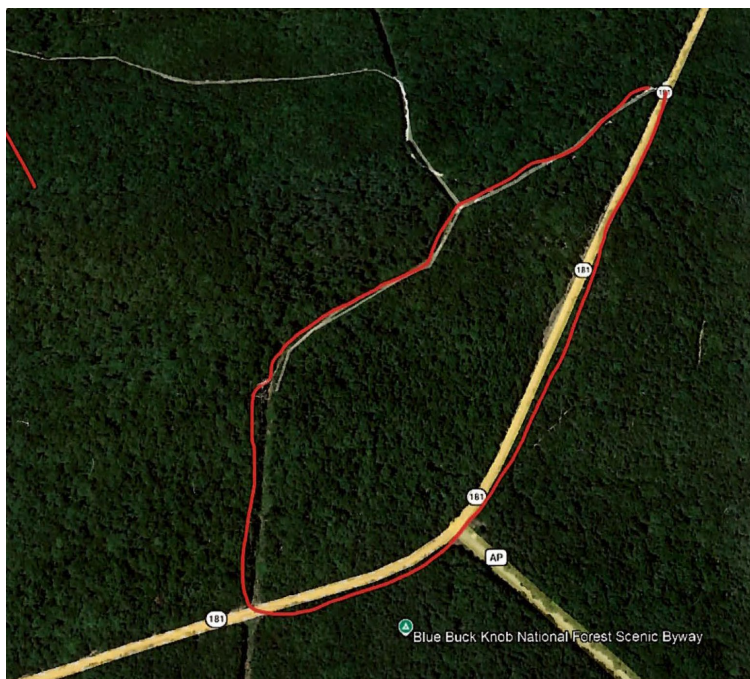
### **Blue Buck Prescribed Fire Unit – Perimeter and Boundary Features**

The Blue Buck Prescribed Fire unit is situated within the Mark Twain National Forest in terrain characteristic of the Missouri Ozarks, consisting of mixed hardwood stands, variable slopes, and dissecting drainages. The unit perimeter is defined by a combination of natural and constructed features.

Primary boundary features include existing road systems, including segments of Missouri Route 181 along the southern boundary, as well as Forest Road 419 to the west, and a powerline corridor on the east side of the unit that was reinforced with handline. These features provided access and served as primary control lines, forming a triangular-shaped unit with the lookout tower located at the apex.

The unit is located close to developed and semi-developed recreation features including the Blue Buck Lookout area and nearby day-use sites, that required the consideration of public access and infrastructure during planning and implementation.

The unit reflects a typical prescribed fire configuration for the region, utilizing a combination of road systems and constructed lines to establish containment across a moderately complex and variable landscape.



*The Blue Buck Prescribed Fire unit boundary, identified in red, and associated road systems.*

## Blue Buck Prescribed Fire

On March 19, 2026, three engine modules and a Prescribed Fire Burn Boss (Type 2) were on scene at 1120 hours on the Blue Buck Prescribed Fire unit. That morning, some of the crewmembers conducted preparation work, using blowers to clear containment lines and accomplishing mostly low-complexity saw operations prior to a briefing and the initiation of a test fire on the 20-acre unit that began at 1219 hours. One tree that required high-complexity saw operations provided an Advanced Faller (FAL1) the opportunity to train an Intermediate Faller (FAL2) and a Basic Faller (FAL3), talking them through the operation.

The spot weather forecast for March 19 indicated decreasing cloud cover, afternoon minimum relative humidity values of 30-35 percent, southwest winds at approximately five mph with gusts up to 10 mph, and temperatures in the mid-to upper-70s, creating conditions conducive to ignition. The test fire was successful. Crews continued with ignitions under favorable conditions, completing 50 percent of the target by 1346 hours.

## Incident Narrative

Following the completion of ignition operations, the burn transitioned to monitor and hold status at approximately 1500 hours. At that time, the three engine modules and Burn Boss conducted an after-action review (AAR). During this period, several members of the engine crew were able to take their first break of the operational period and eat.

Shortly after the AAR, at approximately 1740 hours, the Burn Boss and two engines departed the unit to engage in other assignments, leaving a four-person engine module who were off-Forest U.S. Forest Service personnel on scene to monitor the burn and mitigate hazardous snags that were burning within the fire perimeter that had the potential to threaten containment. Although they were seasoned employees with years of experience, they had comparatively less exposure to high-tempo operational environments and the felling of hardwood and fire-weakened tree species.

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*“I knew both the FAL1s well and was confident in their skillset. I felt comfortable leaving them alone to conduct felling operations.”*

*—Burn Boss*

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## Workflow and Tempo

The Mark Twain is commonly known to have the highest fire load in all of Region 9. Therefore, this forest relies heavily on partnerships built with other units throughout the region and around the country to keep pace with its prolonged and often high-paced fire season. Although the tempo of operations is considered normal around this part of Missouri and leadership actively promotes recovery and does an excellent job of creating order out of chaotic situations, this tempo takes a toll on support resources. Crew swaps, tour extensions, missed breaks, and postponed mealtimes lead to cumulative fatigue. Individuals involved in this tree-strike incident shared a sense of what may have been a self-imposed high-work tempo and fatigue, with some on extended tours and employees regularly missing mealtimes and breaks.

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*“Lots of work to be done each day and the tempo of operations on the Mark Twain with all that was going on seemed a bit high.”*

*—Sawyer*

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The remaining personnel divided into two saw teams to maintain appropriate qualifications, ensuring that a qualified FAL1 served as the lead sawyer on each team, supported by FAL2- and FAL3-qualified sawyers. Although the fire perimeter had been snagged to approximately 1.5 times average tree height prior to ignition, post-burn conditions included numerous trees exhibiting open flame, heavy smoke, and falling embers—presenting ongoing hazards that were a cause for concern. FAL1 remarked about the quantity of snags present before the burning began and reiterated this concern during the AAR.

The saw teams separated to improve work efficiency and to maintain control of operations. Saw Team 1 began working along the two-track road, starting near Missouri Route 181 and working westward up the hill toward Blue Buck Lookout Tower, a historic fire lookout that sits atop Blue Buck Knob at an elevation of approximately 1,450 feet. This feature represents the primary topographic high point at the apex of the triangle-shaped prescribed fire unit.

Although preemptive snagging of the day-use area, the handlines, and other containment features had been completed prior to ignition, additional work remained following the burn. Efforts shifted to securing the fire perimeter.

During this period, several complex saw operations were undertaken. Large-diameter hardwood trees with broad canopies—many actively burning and exhibiting compromised wood fibers and hollow stems—were evaluated and felled without incident. Some situations were identified as complex by personnel, prompting discussion between FAL3 and FAL1 sawyers while observing operations from a safe distance. Each tree was mitigated safely and successfully. The time spent discussing size-up and cutting plans provided opportunities for mentorship and skill development.

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*“The workload seemed reasonable and within our scope.  
We felt snagging the perimeter by day’s end was attainable.”*

**—FAL2**

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While Saw Team 1 worked up the two-track road toward the lookout, Saw Team 2 began working down Missouri Route 181 from east to west, utilizing a UTV to transport fuel and equipment that was also equipped with a small tank to spray water. A rider scouted for hazard trees requiring falling along the roadway. Given the two-person configuration of this team, one individual functioned as a road guard while also assisting with saw operations.

From the FLA Team’s perspective, although Route 181 was signed to warn drivers of prescribed fire activity on both ends of the unit, this configuration presented potential limitations in maintaining effective traffic control and operational support. However, this arrangement was not identified as a concern by personnel involved at the time of the tree strike incident.

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*“Although felling operations seemed to be going well, at times it seemed to be taking a lot of time and effort to fell some of the trees.”*

**—Sawyer**

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As the work progressed, additional hazard trees were identified, and the saw teams began to recognize that the scope of work was greater than initially anticipated.

This theme emerged during multiple interviews with the FLA Team. Fire leadership believed that hazard trees had been mitigated prior to ignition and questioned why additional trees were being cut. In contrast, personnel engaged in the work reported encountering numerous hazard trees that appeared to threaten containment—despite their understanding that prior mitigation work had occurred.

At approximately 1800 hours, fatigue began to set in.

Several minor saw issues began to occur across both saw teams. Due to the distance between these teams, neither group was aware of the challenges that the other was experiencing.

While attempting to fall a small-diameter tree exhibiting back lean, FAL3 on Saw Team 2 worked closely with FAL1, who provided step-by-step coaching throughout the cutting process. During execution of the cuts, the hinge was inadvertently severed, resulting in the tree falling backward approximately 180 degrees from the intended lay and becoming hung up in an adjacent tree.

Feedback from FAL1 to FAL3 indicated that maintaining hinge integrity on small-diameter trees with back lean can be challenging, particularly when balancing precise cut placement and control. The

potential to lose control of the tree was discussed in advance. The associated risk was acknowledged and accepted by both sawyers.

Due to this tree's small size, the situation was safely mitigated using a series of vertical bypass cuts, removing one section of the stem at a time until the hung-up tree fell to the ground.

However, during efforts to remove the hung-up tree, the saw began cutting poorly and the chain was thrown. The chain had to be replaced with a new chain, requiring the clutch cover and bar to be removed to reinstall the chain.

At approximately the same time, upslope from their location, Saw Team 1 experienced a separate equipment issue when FAL1 attempted to fall a compromised, heavily forward-leaning tree. The saw bar became pinched while attempting an undercut, requiring removal of the saw's powerhead. FAL2 returned downslope to the engine to retrieve a replacement saw intended to fall the heavily leaning tree and retrieve the stuck bar. While awaiting the saw, the tree failed under its own weight and the bar was subsequently recovered.

Shortly after FAL3 from Saw Team 2 replaced the thrown chain and rejoined their saw partner, a black oak broken-top snag was observed from the roadway. The team positioned the UTV off of Missouri Route 181, crossed a steeply-sloped ditch line adjacent to the roadway, and moved upslope to size-up the snag together.

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*“I was shocked as I watched it all happen. I thought for a moment he might be dead.”*

**—FAL3**

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### **Tree Strike Incident**

Due to a gap in FAL1's memory, this account of the tree strike incident reflects FAL3's perspective—who was the only witness to the incident.

*We had been separated for approximately 10 minutes while I replaced the thrown saw chain. When I rejoined FAL1, I was just behind him as we walked up the roadcut into the timber where I handed him the axe and his 500i with a 25-inch bar. I observed him walking upslope toward a black oak snag, which did not appear overly complex from my perspective.*

*As he approached the snag, which was standing some distance inside the fire perimeter near the lower edge of the unit, it appeared to me that if the snag were felled, it would not reach Missouri Route 181. I positioned myself just inside the tree line at the bottom of the slope. The ground was still hot, and smoke in the area from the completed burn partially obscured my view of the stump.*

Additionally, during the interview, FAL3 noted that there was a gap in their memory that made it difficult to recall exactly what occurred at the stump.

FAL1 asked: “Do you want to cut this one?” FAL3 responded: “I can, but do you want to?” FAL1 decided to proceed with cutting the tree. FAL3 recalls seeing two wedges in the back of the tree and does not recall seeing a wedge in FAL1’s hands when FAL1 started running after the tree started falling.

FAL3 continues:

*It was at that point I recalled the tree beginning to fall towards me, with FAL1 moving in the same direction with saw, axe, and wedge in hand. I yelled, “Watch out,” but he did not turn or look back.*

*The top of the snag struck the ground within several feet of where I was standing, striking FAL1 on his left side, causing him to collapse to the ground. I heard the loud impact and watched the event unfold.*

*I remember thinking, “This can’t be happening right now,” as I moved quickly toward him. He was lying on the ground approximately 10 feet away. I immediately contacted Saw Team 1 via the radio and notified them of the incident. The FAL1 on Saw Team 1 was a trained Emergency Medical Technician [referred to as “EMT” from this point forward].*

*I knelt next to FAL1, who was lying unconscious just to the side of the tree. I was touching his arm, but he wasn’t moving. I could hear a wheezing sound and observed that his eyes were open and bloodshot. I repeatedly said, “Stay with me. Can you hear me?” while awaiting assistance from the other two personnel from Saw Team 1 who were moving in our direction.*

### **Stump and Stem Analysis**

The undercut, which remained present at the stump at the time of the FLA Team’s site visit, appeared to create an opening of approximately 45 degrees but less than 70 degrees. This falls within acceptable limits for softwoods, though it is somewhat a shallow angle relative to typical hardwood best practices.

It is inferred that the back cut was completed on the downhill side of the stump, beneath the lean of the tree, effectively placing the sawyer on the “bad side” (under the lean).

The end of the tree stem was located approximately six feet from the stump and at an angle just greater than 90 degrees when compared to the gunning lines of the undercut.

The hinge wood was fully severed across the stump.



*The black oak stump cut by FAL1 that resulted in the tree strike.*

No clearing of surrounding timber was completed to establish an unobstructed lay, which would have improved sawyer safety and operational effectiveness during felling operations. Several adjacent trees, each approximately 4-6 inches DBH, were near the stump. These included one within the intended lay and another directly adjacent to the stump on the downhill side, both of which would likely have impeded aspects of the felling operation.

### Medical Response

The EMT (FAL1), positioned at the top of the unit and awaiting FAL2 to return with a replacement bar and chain from the engine, heard the call for help on the radio and responded.

This radio traffic was also heard by the Burn Boss, who was traveling in a vehicle toward Ava, approximately five miles from the Blue Buck Unit.

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*“I heard the response from the EMT and could tell something was going on.*

*I got that feeling.”*

*—Burn Boss*

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The transmission “Medical incident, assistance needed—tree strike,” was heard over the radio.

The Burn Boss immediately turned their vehicle around and began returning to the Blue Buck Unit as quickly and safely as possible.

The EMT, positioned near the top of the unit at the time of the call, responded on foot, moving directly downslope through the burn area to the incident site.

FAL2, who was at the engine, also heard the call, retrieved medical gear and began moving upslope on foot along the two-track road toward the lookout while attempting to locate FAL3 and the injured FAL1. The location of the incident was not immediately clear.



*Looking uphill at accident site just above the cutbank off of Missouri Highway 181. This image was taken immediately following the tree strike incident, showing equipment and helmet placement after FAL1 was transported to the ambulance.*

*“When I heard the call come across the radio, I realized it was just myself qualified as an IC and EMT. I knew this would be a difficult task to respond with only three of us on scene.”*

*—EMT*

After determining the incident site was located downslope near Missouri Route 181 at the junction of Missouri Route AP, FAL2 returned to the engine, drove to the location in the engine and activated the vehicle’s emergency flashers to slow approaching traffic and provide scene awareness. By this time, FAL1 had regained consciousness and was sitting up. The EMT arrived on scene and began patient assessment and stabilization, including cervical spine stabilization and, at 1750 hours, requesting an ambulance. FAL2 subsequently moved upslope with additional medical equipment, including a Kendrick Extrication Device (KED) and trauma bag, and assisted with patient care.



*The accident site looking downhill with Missouri Highway 181 in the background.*

By 1757 hours, the Burn Boss returned to the scene and assumed the role of Incident Within an Incident (IWI) Incident Commander (IC).

At this time, FAL1 remained sitting upright, was alert to name and location, but remained somewhat confused regarding details of the incident. The Burn Boss contacted Dispatch to report arrival on scene, provided a patient update including a Yellow/Red medical, and confirmed the ambulance should continue responding.

As the incident occurred near county boundaries, there was initial confusion between Dispatch and on-scene personnel regarding which ambulance service would respond. This was resolved in a timely manner and an ambulance was confirmed to be in route.

During the medical response, several members of the public stopped at the scene and offered assistance to the personnel who were providing patient care. These individuals included a retired

military veteran, a nurse, and a local volunteer firefighter. This unplanned support reflected the proximity of the incident to a traveled roadway and the potential for additional assistance from bystanders.

After a cervical collar was applied, FAL1 was moved from the accident site using the KED and MegaMover a short distance downslope to the ambulance.

The ambulance arrived on scene at approximately 1825 hours. Based on the mechanism of injury, ambulance personnel determined that the patient would be air transported to Springfield in accordance with standard protocol. As local resources who were familiar with the area, ambulance personnel identified a nearby private landowner's field along Missouri Route AP as a suitable landing zone that was less than a mile away.

A LifeFlight helicopter arrived and the patient was transferred from the ambulance to the aircraft. The helicopter departed the scene at approximately 1900 hours.

### **Transport Within the “Golden Hour”**

Several personnel noted that the injured sawyer was transported to definitive care within the “Golden Hour”—a timeframe often associated with improved outcomes in a traumatic injury. The timely coordination of on-scene care, ambulance transport, and air medical evacuation contributed to the patient reaching a higher level of care within this window.

### **Patient Medical Status**

The patient sustained multiple traumatic injuries, including multiple fractured vertebrae and contusions, lacerations, and small avulsions to the head, neck, and back. Following air transport to a trauma center, the patient was evaluated, treated, and hospitalized for several days prior to release. On March 24, 2026, the patient returned to their home unit via agency transport.

### **Hospital Liaison Program**

The U.S. Forest Service Hospital Liaison Program is a critical (but often under-discussed) part of the agency's response system for serious injuries and medical incidents. This program is designed to



***Top – FAL1's helmet showing external damage to its shell.  
Bottom – FAL1's helmet showing its internal damage.***

support both the injured employee and their family, while also helping the agency manage communication and logistics during high-stress events.

A Hospital Liaison was assigned to support the injured employee and coordinate communication between the hospital, family, and agency. The Liaison also played a critical role in helping ensure that the employee received appropriate medical care and that required documentation for workers' compensation (OWCP) was understood and completed correctly. This support contributed to continuity of care and the employee's long-term recovery.

### **Conclusion**

This incident occurred within a dynamic and evolving operational environment in which personnel were managing multiple priorities, including prescribed fire operations and hazard tree mitigation under changing conditions. As the operational period progressed, factors such as workload, distributed resources, and increasing complexity influenced how work was organized and carried out on the ground.

This tree strike injury resulted from a combination of conditions present at the time, including the characteristics of the snag, the surrounding environment, felling techniques and practices, and the broader operational context in which the work was being performed. Availability of crewmembers to perform prep work, lack of a break prior to beginning the burn, and only one break afterwards before mop up work was begun in the evening were all contributing factors.

The response that followed demonstrated timely communication, coordination, and medical care, resulting in the injured sawyer being transported to a higher level of care within critical timeframes.

This Facilitated Learning Analysis brings forward key insights into how operational tempo, work organization, communication, and technical sawyer practices interacted within this environment. These insights are intended to inform future operations by highlighting opportunities to strengthen preparedness, support decision-making, and enhance safety when operating in similarly complex and time-sensitive environments.

The following Lessons Learned section builds on these insights, highlighting key learning themes that reflect how system influences, field conditions, and decision-making interacted during this event.



*The black oak stump showing the intended lay (identified by pink flagging) and the unintended lay (identified by orange flagging). Missouri Highway 181 can be seen in the background. This image was taken weeks after the tree strike incident during the FLA Team's site visit.*

## LESSONS LEARNED

### **Workload Management and Operational Fatigue**

At a systems level, personnel are required to balance primary duties, collateral assignments, and training requirements within a complex and high-tempo work environment. The cumulative effects of workload, stress, and competing priorities can reduce available capacity and impact task focus. Contributing factors often include prolonged work hours, missed breaks, postponed mealtimes, and cumulative fatigue. These types of conditions should not be considered normal operating conditions for a workforce expected to be retained and ready to respond to emergencies.

Given these conditions, there is a need for leadership at all levels to actively support work-rest practices, including the consistent use of breaks, regular mealtimes, and recovery periods during assignments. Emphasis on recovery is critical, particularly in environments in which individuals may become accustomed to sustained high workload demands over time.

### **Cutting Techniques and Sawyer Proficiency**

Across federal land management agencies, developing and sustaining proficiency in advanced sawyer skills—including those required for felling hardwood species—particularly in this incident, remains an ongoing challenge. Despite established training programs and qualification systems, variability exists in the depth and consistency of sawyer experience, especially as personnel move between regions with differing fuel types and operational demands.

Although the FAL1 tree-strike victim has been to Missouri previously and experienced cutting trees in this environment, task complexity varies with location and continues to present challenges for sawyers detailed to unfamiliar, or less familiar, environments.

On the Mark Twain National Forest personnel reported that some firefighters arrive with limited experience in hardwood felling techniques, including those required for managing large, asymmetrical canopies and complex lean characteristics common in this region. Techniques commonly applied in softwood-dominated environments do not always translate effectively to hardwood systems, in which cutting strategies, hinge management, and tree response can differ significantly.

Additionally, maintaining sawyer proficiency presents an ongoing challenge. Saw operations are a perishable skillset that requires deliberate practice, repetition, and oversight to retain effectiveness. Competing operational demands, limited opportunities for focused skill development, and workforce turnover may contribute to variability in sawyer capability over time.

From the FLA Team's perspective, these factors represent broader system influences that may shape how saw operations are approached in the field, particularly in environments requiring specialized hardwood felling techniques.

### **Medical Response Organization and Preparedness**

This incident highlighted the value of clearly defined roles during medical response. Participants noted the benefit of designating a medical scribe to document patient care and key events, allowing the medical provider to remain focused on patient assessment and treatment.

Additionally, separating Incident Command (IC) from direct patient care responsibilities was identified as an important consideration. When the responding EMT also assumes IC responsibilities, competing demands in a high-stress environment can create challenges in maintaining both effective medical care and overall incident coordination.

Participants also emphasized that prior investment in medical training, equipment, and preparedness contributed positively to the medical response. Maintaining EMT qualifications, routinely practicing IWI scenarios, and ensuring access to appropriate medical gear were all viewed as critical factors that supported an effective and timely response in this incident.

### **Hospital Liaison Program (HILA)**

HILA's often serve in this role as a collateral duty while continuing to manage their primary responsibilities. This can require balancing routine work demands with additional time, coordination, and emotional investment associated with supporting employees during critical incidents.

Given the collateral nature of this position, maintaining proficiency in HILA roles and responsibilities can be challenging, particularly when assignments are infrequent or there are extended periods

between activations, coupled with evolving and often complex documentation requirements associated with the OWCP process.

Several participants noted that Hospital Liaisons may operate without consistent administrative structures, such as resource orders, job codes for travel and overtime, clearly defined on-shift expectations, or standardized timekeeping guidance. This can create variability in how support is provided and how Hospital Liaison responsibilities are managed.

From a systems perspective, opportunities may exist to further standardize administrative and logistical support for Hospital Liaison assignments. This could improve consistency and allow individuals serving in this role to focus more fully on supporting injured employees and their families.

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### **The Blue Buck Tree Strike Facilitated Learning Analysis Team**

**Aaron Pedersen**, Regional Saw Program Manager, Pacific Northwest Region

**Tym Sauter**, Assistant Fire Management Officer, Eagle River/Florence Ranger District

**Michael Lewis**, Writer-Editor, Ava/Cassville/Willow Springs Ranger District

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

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