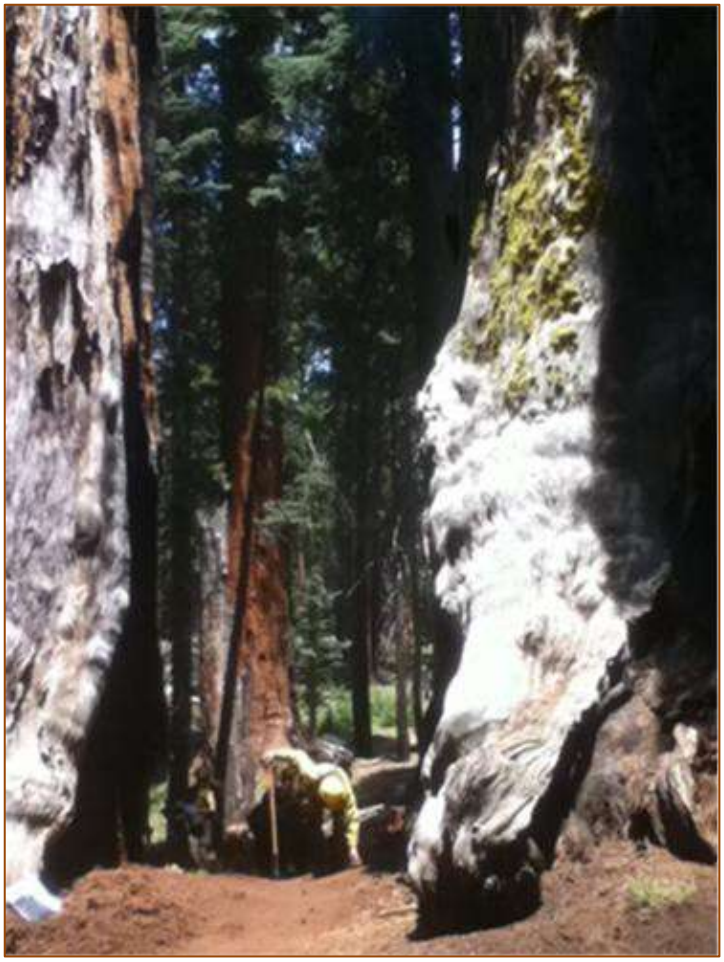
Broken Ankle

Lessons Learned Review



Circle Meadow Prescribed Fire

Sequoia and Kings Canyon National Parks

August 2012

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1. Leader's Intent

On July 17, 2012, the Superintendent of Sequoia and Kings Canyon National Parks issued a Delegation of Authority for a team to review a broken ankle incident that occurred on the Circle Meadow Prescribed Fire on June 26, 2012.

From the Superintendent's Delegation of Authority direction to the Lessons Learned Review Team:

> *The primary goal of the review is to determine lessons learned and better manage risk into the future. I would like your team to focus on two specific issues for Organizational Learning:*
>
> 1. *Sequoia and Kings Canyon National Parks "Trees of Special Interest Policy" (and how it is implemented) found in the Park Fuels and Fire Management Plan; and*
>
> 2. *The post-incident medical response.*

2. Introduction

"The purpose of this prescribed fire operation is to reduce hazardous fuel loadings and maintain the natural fire cycle in the giant sequoia ecosystem of Sequoia National Park. Fire is one of the only natural means to prepare a mineral soil seed bed, for which giant sequoias require to regenerate. There are seven trees of special interest located within the burn unit which will be protected per the Sequoia and Kings Canyon National Parks Fire Management Plan."

From the Circle Meadow Prescribed Fire Plan

On Tuesday, June 26, 2012, the Circle Meadow Prescribed Fire was ignited in the Giant Forest area of Sequoia National Park. Due to the number of "Trees of Special Interest"[1] (see Chapter 6 and Appendix) located in the prescribed fire unit, a Resource Advisor (READ) was assigned.

As operations progressed, the Resource Advisor became concerned about fire threatening the trees known as the "Pillars of Hercules". Fire did eventually enter the exclusion area around the Pillars.

As the Resource Advisor was assessing the feasibility of suppression actions, a snag fell toward him—causing him to twist and lunge out of the way. This quick action to avoid the snag resulted in the Resource Advisor breaking his ankle. Medical response was immediate and resources on scene treated, packaged, and transported the patient to advanced medical care within one-and-a-half hours.

[1] "Trees of Special Interest" are giant sequoias that are significant because of the attention they receive from Park visitors. These trees have captured human interest over time and have generally been recognized with individual names or some other form of special identification. For the purposes of this review, these trees are generally referred to as "Named Trees".

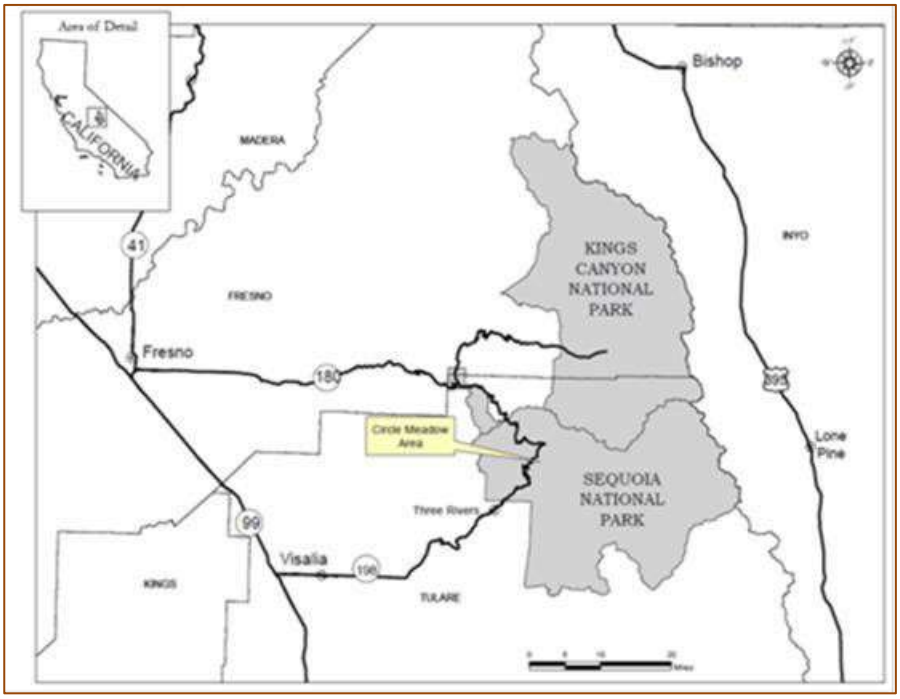
3. Incident Narrative

Actions Never Go as Planned

The day of the prescribed fire, Tuesday, June 26, started with the typical struggle of “getting up the hill”.

A major roadway in the Park, under construction for the past two years, limits traffic to one-way travel, alternating on the hour.

If you don’t get in on the group let through, you have an hour to wait—which is what happened to Crew 91 (local fuels crew) that morning. The briefing was therefore delayed.



Yellow pointer indicates the Circle Meadow Prescribed Fire area’s location in Sequoia and Kings Canyon National Parks.

The previous day had also been a “hurry up” day. Crew 91 received the word to prepare (“prep”) the Circle Meadow Prescribed Fire Unit on June 24, just two days prior to the ignition date, allowing only one day for scouting, and one day of actual prep work.

This unit had numerous Named Trees. The crew had to make difficult decisions on how much time and effort to put into each tree. (Complete minimal prep—line construction but no bucking and removal of heavies—on all of them? Or, perform maximum prep work on some and not get them all done.)

What are the Prep Standards?

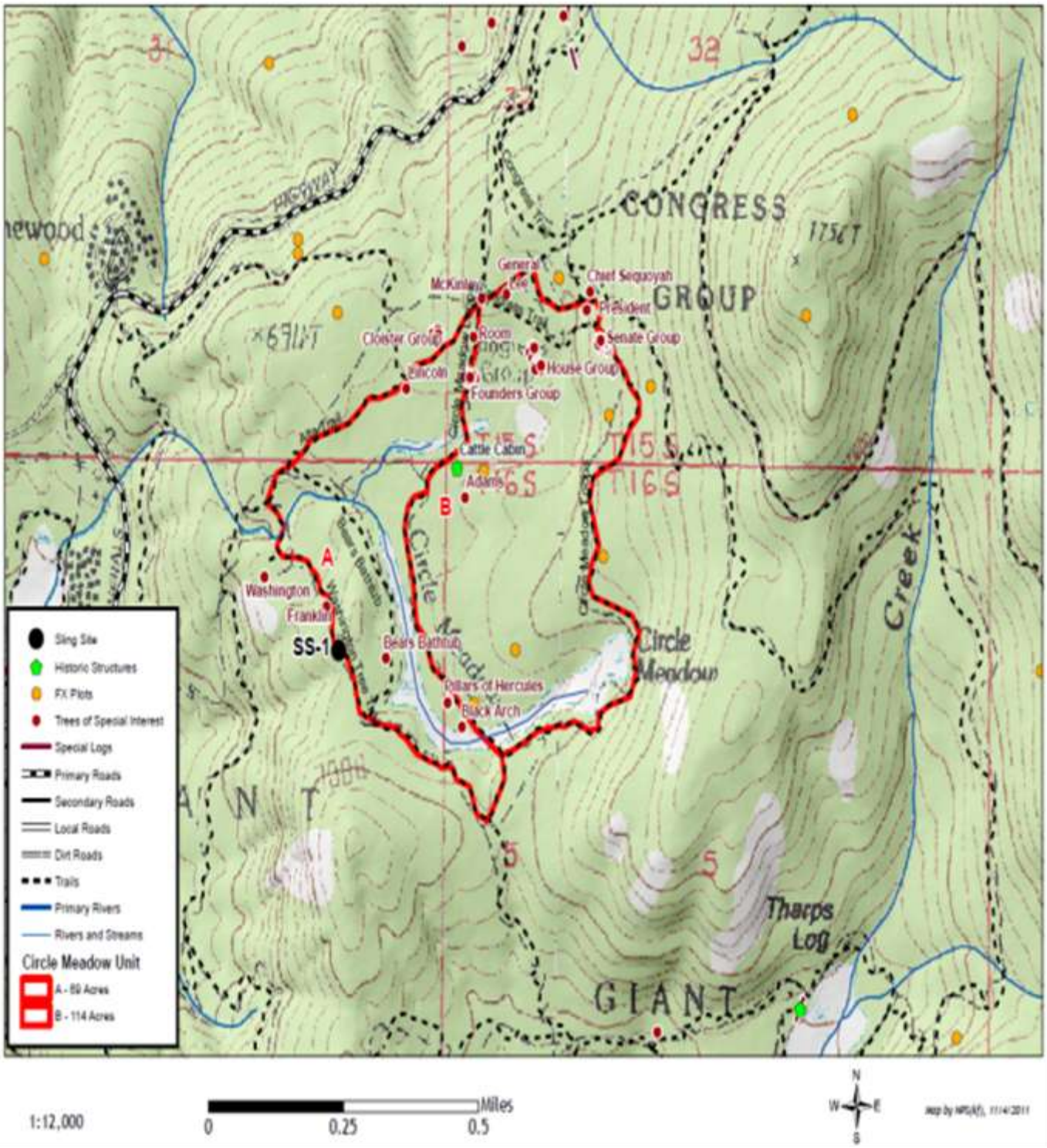
“The range of options and needs are based upon each individual burn boss and each tree in particular.”

Park Manager

Although the Crew Leader had never seen the portion of the Sequoia and Kings Canyon National Parks Fire Management Plan that addresses Trees of Special Interest prep standards (see Appendix), the crew had prepped multiple units with named trees before.

On the afternoon of Monday, June 25—the day prior to ignition—the Resource Advisor walked a portion of the unit to inspect the prep work around the Named Trees. He recognized that the line around the Named Trees had “generally been placed right at the base of the trees,” a practice that could damage the shallow roots of the giant sequoias. Due to time constraints complicated by the road construction, the Resource Advisor was not able to inspect all of the Named Trees in the prescribed fire unit.

Circle Meadow Prescribed Fire Unit



The day of ignition, the operational briefing was thorough. It covered, in detail, all of the typical burn components: organization, operational assignments, communication, medical plan, etc. (For the burn organization that day, see next page.)

Due to the numerous Named Trees located within the prescribed fire unit, a Resource Advisor was assigned. Assignments for the day consisted of the Firestorm 1 crew (20 people) holding the eastern line and Crew 91 (13 people) igniting and holding the western line. Four members of Crew 9, the Parks' fire effects crew, were absorbed into Crew 91.

The EMT from Crew 91 paid close attention during the briefing. He knew he was the only EMT on scene and, therefore, he wanted to be prepared for any emergency response. It has become standard practice at Sequoia and Kings Canyon National Parks to provide all EMTs with the Incident Medical Plan (ICS 206 – one page out of the Incident Action Plan). This practice developed after the realization that not everyone gets an IAP. This often results in EMTs (who are typically crewmembers) not having a copy of the ICS 206. At the briefing for the Circle Meadow Prescribed Fire, the crewmember EMT received a copy of the 206 and had time to study it thoroughly. *This is one of the many actions that went right that day.*

3. INCIDENT NAME **CIRCLE MEADOW**	4. OPERATIONAL PERIOD DATE: 6/26-28/2012 TIME: Day Shifts
5. OPERATIONS PERSONNEL: BURN BOSS: HOLDING BOSS:	FIRING BOSS: FIRE INFORMATION OFFICER: SMOKE TECHNICIAN: **N/A**

6. RESOURCES ASSIGNED THIS PERIOD

STRIKE TEAM/TASK FORCE/ RESOURCE DESIGNATOR	LEADER	NUMBER PERSONS	TRANS. NEEDED	DROP OFF PT/TIME	PICK UP PT TIME
Crew 91		13			
Crew 9		4			
Firestorm 1		20			
Fire Monitor		2			
Resource Advisor		1			

As part of the Medical Plan portion of the briefing, a location for staging the trauma bag and litter was identified (Cattle Cabin). Staging medical equipment onsite is a relatively new practice in the Park. In the past, this equipment was available in its normal location: on the trucks. While this burn was relatively close to the parking area (approximately one mile by trail), this distance, in certain medical scenarios, would be enough to cause a potential crucial delay.

This possible delay was recognized and easily mitigated by transporting the medical gear from the vehicles and staging it at a central location. As this precautionary transfer was happening, one individual on scene remembers thinking: *"OK, this is getting a little ridiculous."* By the end of this day, however, this perspective will totally change.

Ignition Plan Calls for 'Soft Line' to Divide Unit into Two Parcels

The ignition plan for the day consisted of teams laying east/west strips across the prescribed fire unit, progressing the black from south to north. The unit is bisected by the Cattle Cabin Trail, which would be utilized as a "soft line" to break the unit into smaller parcels (segments A and B) for smoke management concerns. The plan was to burn the eastern half (Segment B) first, using the Cattle Cabin Trail as the western holding feature for one operational period.

The Scenario Facing the Circle Meadow Prescribed Fire Burn Crew

How do we handle "protecting" (keeping fire out of) certain resources (structures, archeological sites, specific habitat areas, etc.) on prescribed fires?

Under these circumstances, what level of risk are we willing to accept?

On the Circle Meadow Prescribed Fire—as with all burns with Named Trees—it's pretty straight forward on the trees completely interior: prep them thoroughly, light around them, and move on.

No one is expected to hang around protecting a tree completely surrounded by fire, that's too much risk/exposure.

When the tree is on or near the line, however, why wouldn't you post someone in the area? You're holding the line anyway. But what if the line the tree is on is not interior today, but it will be tomorrow. What then?

This is the scenario that faced the burn crew members on the Circle Meadow Prescribed Fire.

Although used regularly at this unit and everyone is familiar with it, the "soft line" can sometimes create a bit of a dilemma for those prepping and/or holding it. Everyone knows they need to keep fire on one side today, but tomorrow the line will be interior. So, should you put just as much effort into snagging and moving heavies off the "soft line"? Why not do minimum prep—just enough to check the fire to satisfy the smoke requirements—because tomorrow it's going to be all black anyway?

The "Black Arch" tree, one of many fire-sculpted Named Trees located within in the Circle Meadow Prescribed Fire area.

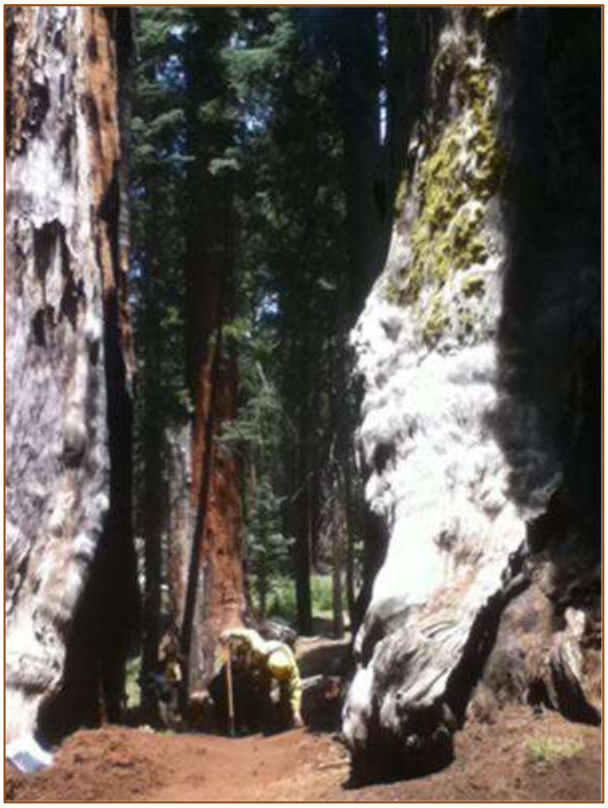
This approach makes sense. It is what was used in this instance. When you have a "hard hold" line around certain flammable objects positioned against your interior "soft line," this tactic potentially becomes more troublesome.

Resource Advisor Concerns

As everyone began to get in place for the test fire, the Resource Advisor examined the Named Trees closest to the starting point. He was not satisfied with what he found: "After I looked closely at the scratch lines, I felt they weren't all down to bare mineral soil and

that—with the dry conditions—they would likely not hold. I then dug deeper at a couple of locations on these lines to see how deep they would need to be and realized that the downhill side of the trees had accumulated a very deep layer of duff and buried woody debris (branches and bark) greater than 12-18 inches deep. I also noticed that we were going to be cutting into sequoia roots and that this would possibly be impacting the trees. After consulting with the Burn Boss, and because of the fuel jackpot and the issues with the holding lines, it was decided to move the scratch lines around these trees about 5-10 yards farther away from the tree bases on the downhill side of the trees where litter/duff was shallower, and use rock outcrops as much as possible. It was felt these lines would better protect the trees from embers that could be thrown by the fuels in the jackpot and reduce impacts from digging at the base of the trees. These new lines were in a segment where ignition was to occur on Wednesday [the following day]."

***Named Trees** – The Pillars of Hercules. Top photo shows the top of these trees; bottom photo shows their base.*



This prep work adjustment was completed and a test fire was started at the southern end of the unit. The test fire was successful and ignitions proceeded. As the firing progressed to the north, the first Named Tree needing protection was encountered, the Black Arch, one of many fire-sculpted Named Trees located in this area.

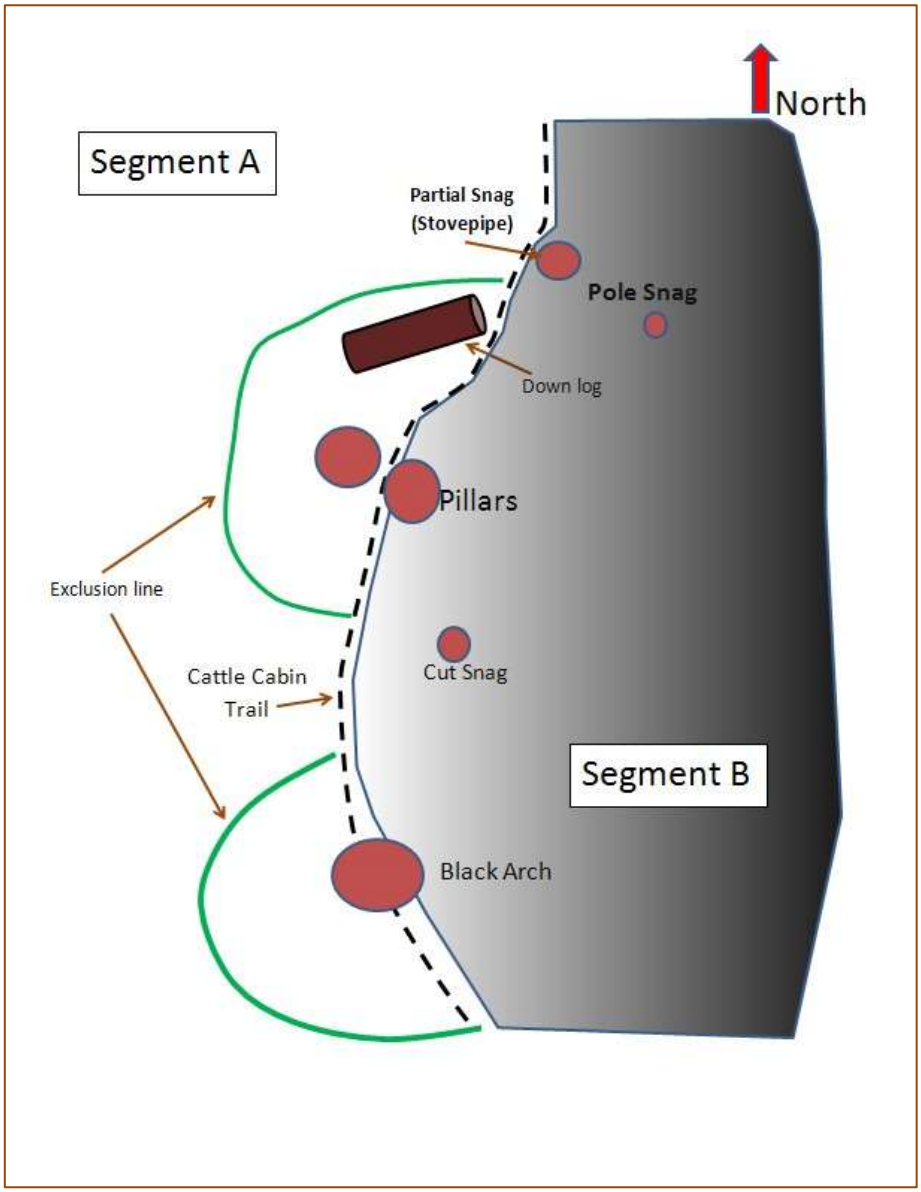
As the fire burned into the area of the Black Arch and the Pillars of Hercules Named Trees, several snags began to cause concern. One 15-20-inch DBH snag located between the Black Arch and Pillars of Hercules leaned heavily and threatened the exclusion area around the Black Arch tree.

The base of this snag was already burning. The Burn Boss was made aware of this concern. A decision was made to cut the snag down. A saw team cut the snag and also looked at a pole-sized "culprit" tree located near the Pillars of Hercules. However, because this nearby area was too hot, they couldn't take this tree down.

A third partial snag (later called "the stovepipe") was positioned on the Cattle Cabin Trail across from the new

Click here to see a short video of the "stovepipe" and "pole-sized" snags.

line around the Pillars of Hercules. This partial snag was approximately 15 feet tall, surrounded by heavy fuels.



As the sawyers departed the area, the Resource Advisor and the two holders (Fire Effects crewmembers assigned to Crew 91) remained in the area to monitor the situation. The main concern was the burning stovepipe and its potential to send embers into the Pillars of Hercules—or the exclusion area around them. Complicating this scenario was the danger that the pole-sized snag represented if a need to take action inside the exclusion area occurred. In the meantime, the partial snag continued to burn.

"As it [the partial snag] burned, it developed a fissure down the center and we were concerned it could fall across the outer scratch line around the Pillars," explained the Resource Advisor. "One crew member was identified to watch the pole-sized snag if the others needed to control any fire crossing the line from the partial snag. Someone was to be watching this snag at all times."

A lookout was posted near the base of the Pillars of Hercules to watch the pole-sized snag. The Resource Advisor and another crewmember watched from a safe distance, ready to take action if the fire entered the exclusion area. The crewmember with the Resource Advisor had questions concerning what—if needed—these specific actions might be. However, these questions were never really answered (in part because it's never certain exactly what will need to be done until the situation presents itself).

Stovepipe Falls, Starts Fire in Exclusion Area

True to the prior concerns, the top portion of "the stovepipe" partial snag broke off and fell into the exclusion area, landing against a punky log. As planned, the Resource Advisor and one crewmember immediately took action while the lookout performed her duties. This suppression action was an attempt

to roll the burning portion of the snag into the trail. However, this piece had wedged itself between the punky log and a small stump. It was too hot to approach or work beside. Water from a bladder bag was not effective in cooling the piece down. Very quickly, the punky log ignited, as well as the ground litter and duff surrounding it.

The pair backed-off from suppression efforts. The Resource Advisor sent the lookout to retrieve the additional bladder bag from the Black Arch tree area and notified the Burn Boss of the situation. The nearby Crew 91 Squad Boss heard this radio traffic and began that direction to assess and help. This Squad Boss requested Saw Team 1 to also start heading there.

As the lookout returned with the additional bladder bag, the Burn Boss inquired about the possibility of a saw team cutting the log and rolling the burning portion into the black. The lookout dropped the additional bladder bag at the base of the Pillars of Hercules. The other crewmember, who was attempting to limit the spread of the fire around the log, started walking up the trail to retrieve the bladder bag. The Resource Advisor walked back to the area to determine whether or not the Burn

Accident site where the "pole-sized" snag (identified by arrow) fell and forced the Resource Advisor to take evasive action—breaking his ankle.

Boss's suggestion would work.

At this point, someone yelled: "Tree!" (Everyone agrees that someone yelled it, but no one can remember doing it.)

"I looked up, saw the snag falling in my direction, and instinctively lunged back and to the left. The snag hit somewhere behind and below me," recalls the Resource Advisor.

The "pole-sized" snag fell and hit the large log. The top several feet of the snag broke off. This broken section was three to four inches in diameter and two to three feet long. When the Resource Advisor sat up, he realized there was a problem with his ankle. His foot was twisted at an odd angle.

To both crewmembers, it looked like the tree had struck the Resource Advisor and sent him tumbling down the hill. One of the crewmembers called out and asked if he was OK. There was not an immediate response. Eventually, the Resource Advisor said that he had a broken ankle.

Both crewmembers rushed to his side.

4. The Medical Response

The following transmission came across the radio:

"Burn Boss, medical!"

This message stopped everyone within earshot of a radio.

The message was repeated a second time: *"Burn Boss, medical!"*

"Unit calling," responded the Burn Boss, *"identify yourself."*

"It's me, Resource Advisor."

At this point, all over the prescribed fire, an unspoken shift in priorities from burning to medical response simultaneously occurred, including:

Another view of the accident site and "pole-sized" snag that triggered the medical incident.

The Squad Boss, enroute to help with the spot, picked up his pace and starting thinking in terms of medical response.

The EMT put his torch out and told the Firing Boss he was responding.

The Burn Boss and Captain 91 started gathering more information while heading toward the Pillars of Hercules.

Saw Team 1 (already headed to the area to help with the spot fire) pick up the staged medical equipment (trauma kit and backboard).

The Squad Boss—headed back to help with the original spot fire—was the first to arrive on scene. The Squad Boss, a "certified first responder" (a person who has completed a course and received certification in providing pre-hospital care for medical emergencies) went immediately into patient assessment and preparation for the EMT who was enroute.

The Squad Boss—with a calm and organized approach—was crucial in setting the tone for the entire, overall emergency response. The Burn Boss and Captain 91 arrived shortly after. The Burn Boss appointed Captain 91 as the medical incident's Incident Commander and began activating the procedures laid out in the medical plan (ICS-206):

Section 8 of the Emergency Medical Plan

8. Medical Emergency Procedures
Burn Boss or Ash Mountain Fire will contact Lodgepole Rangers each day of the burn to confirm the staffing and availability of the Lodgepole Ambulance and availability of Park Medics. Burn Boss or designee will ensure that at least one backboard and trauma kit is positioned at a pre-determined location on the fireline. Communication of the incident will follow the guidelines on **page 49 of the Incident Response Pocket Guide**. In the event of a medical emergency provide information to **Park Dispatch.** 1. All Injuries to be assessed by supervisor and nearest EMT. Contact the Burn Boss if medi-vac is imminent. 2. Burn Boss will assign a medical IC who will coordinate medi-vac with Park Dispatch. 3. Declare the nature of the emergency and recommended transport (air vs. ground, need for paramedics, etc.): a. Medical injury/illness? If injury/illness, is it Life Threatening? 4. If Life Threatening then request that the designated frequency be cleared for emergency traffic. 5. Size-up to include: identify nature of incident; number injured; patient assessment(s); and location (geographic and GPS coordinates). 6. Develop a primary plan for patient care, and transportation options. 6a. For ground transport, Medical IC will contact Park Dispatch to order nearest ambulance listed above. 6b. For aerial transport, Medical IC will contact Park Dispatch to request Sky Life Flight, CHP, or Helicopter 552 which will land at the nearest SEKI approved helispot (Red Fir). Helicopter 552 may be able to land in Circle Meadow if conditions are dry enough. Helicopter 552 can also land at Beetle Rock (visitor management by Rangers will be necessary). Helicopter 552 has short haul capability. Burn injuries will require flight to Fresno Regional Community MC. 7. Request resources and/or equipment and/or capabilities needed. (i.e. ALS ambulance, short-haul) 8. Develop contingency plans (The What If?). 9. Identify any changes in the on-scene person-in-charge or medical personnel as they occur. Make notification of incident status, termination of medical incident, communicate emergency has been mitigated and resume unrestricted radio communications. Document all information.

The nearest Park Medic, who had been designated for the Rx burn that morning, was assigned through Park Dispatch.

On scene, patient assessment and preparation continued as Saw Team 1 arrived with the trauma kit and backboard. In preparation for the arrival of the EMT, the patient was moved to a safer location, his boot was removed, and equipment from the trauma kit was laid out in an organized and accessible manner.

The EMT arrived and took control of patient care.

“Once I made patient contact,” said the EMT, “I began to assess the patient and the trauma to the right ankle. I documented vitals, motor and distal pulse of the injured extremity.”

Everyone agreed that the medical pack-out scenario covered in the Parks' annual fire refresher was critical in preparing them for this instance.

Excerpt from the Parks' Annual Fire Refresher Scenario

You are an ICT5 with an initial attack squad on a Type 5 fire in mixed conifer timber. Your sawyer is felling a small snag when a small branch breaks off. Your sawyer stumbled while running away and is struck in the leg by the branch. Initial assessment determines a probable broken leg in the tibia/fibula region. The firefighter is coherent but dazed and is experiencing significant pain in their leg. They are lying prone on the forest floor when you arrive. Your entire squad is already on scene and the branch has already been removed from on top of the sawyer. Fire behavior is minimal, however only about half the perimeter is contained.

As the EMT became busy with patient care, others worked to suppress the spot fire, secure the scene (chock logs to prevent rolling toward patient), and prepping the pack-out route (cutting a path to avoid travel near a previously identified burning tree near the trail).

The EMT continued packaging the patient for transport:

> "I used a SAM [Structural Aluminum Malleable] splint and wrap to stabilize the injured extremity. Once stabilized, I reassessed the distal pulse and motor of the injured extremity. I instructed personnel to secure the patient to the backboard for carry out while I took another set of vitals. Once the patient was secured to the backboard, I reassessed the distal pulse and motor of the injured extremity. I then instructed personnel to begin the carry out of the patient while I maintained patient contact."

Parks' Annual Fire Refresher Critical in Preparing for this Incident

Everyone involved in the incident agreed that the medical pack-out scenario covered in the Parks' annual fire refresher was critical in preparing them for this incident.

Everyone had done this before. They knew what to expect, what their role was, and how to do what was being asked of them. Because it had already been practiced by everyone on scene, the entire operation went smoothly.

"When I heard the initial radio call, I thought it was another simulation," said one crewmember.

Carrying someone on a backboard is awkward, tiring, and stressful. The pack-out team quickly realized that the pack of the person nearest the injured leg was bumping the patient, causing the patient pain. Therefore, the EMT took that pack and carried it, in addition to his own pack.

"During the carry out," the EMT explained afterwards, "at approximately 15 minute intervals, I instructed personnel to set the patient down long enough to reassess the patient and to rest the carry out personnel."

Should everyone have their packs on while carrying a patient on an active fire? Not wearing a pack certainly makes the pack-out more comfortable and less tiring.

"I would have been fine with everyone ditching their packs. There wasn't any dangerous fire behavior."

Burn Boss

The carry out progressed initially along the cut out path (to avoid the burning tree) and eventually back onto the trail. It took 40 minutes to go three-quarters of a mile, where the group met the Park Medic.

The patient was secured to the wheeled litter provided by the Medic. Patient care was officially transferred to the Medic. Some of the group went with the Medic to help with the wheeled litter.

The patient was taken by ambulance to the nearest Emergency Room. He was eventually diagnosed with a trimalleolar fracture (involving both malleoli and the posterior rim of the distal tibia) which most commonly occurs when there is a twisting injury of the foot.

"During the carry out," the EMT explained afterwards, "at approximately 15 minute intervals, I instructed personnel to set the patient down long enough to reassess the patient and to rest the carry out personnel."

At this point, the focus returned to completing the prescribed burn operations.

EMT Implements Several Key Actions
In addition, the EMT implements several key actions:

He goes back to repack the trauma kit and places it back in service.

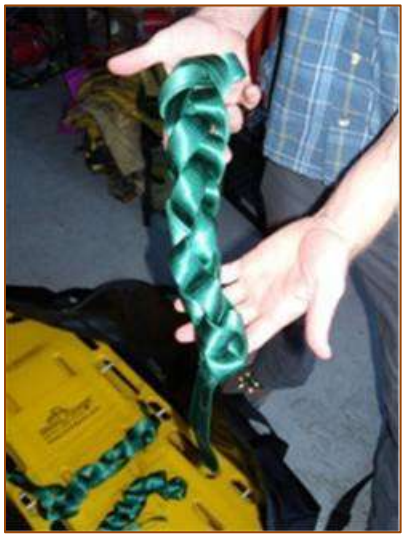
He revisits the Incident Medical Plan to adjust for changes (nearest Medic is now much farther away, no more backboard, etc.).

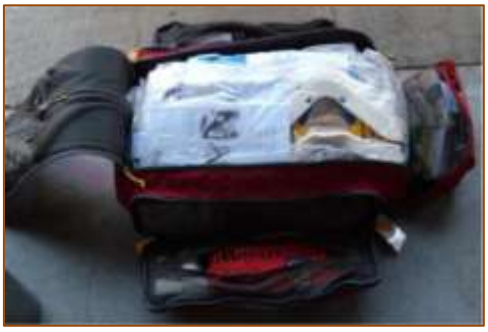
He starts planning for the next medical situation, having just seen the benefit of forethought and preparation.

Fortunately, no other medical incidents occur.

5. Lessons from Participants

A. Medical Operation





Backboard with webbing (top) and trauma kit (bottom).

Preparing for the Worst

Go through medical kits with EMTs and get to know equipment names, uses, and location in kit.

Provide EMTs a copy of the medical plan, even if they don't have the rest of the IAP. Include a map of the burn area on the back of the medical plan.

Include lengths of webbing in trauma kits or line gear to carry backboard. Practice attaching and using these straps.

Stage trauma kits and backboards where they can be put into action quickly. This may be on a UTV, a central location, helibase, etc.

Plan, practice, and brief on your incident-within-an-incident radio traffic protocol (clear traffic?, assign new frequency?, no change?). Know what you're going to do and do it.

Training on low-frequency high-consequence events is worth the effort.

When it Happens

The Burn Boss or overall IC should be conscious of how their presence may impact the ability or inclination of the medical IC to truly take control of the incident-within-the-incident.

The medical IC functions best when they can stand back from operations to direct and lead—rather than participate directly.

Initial responders can communicate status of patient to other responders to help prepare them for the scene, as well as inform concerned non-responders.

On Patient Carry Outs

When out of fire danger, consider dropping fire packs.

Rotate litter-bearers (head-toe, right-left, on-off) to maintain strength and efficiency. Bearers, too, may be subject to injury.

It may be appropriate to rest every 15 minutes to check vitals and rotate carriers.

Be sensitive to bumping patient's injuries. Some bearers may need to drop gear to avoid contact with patient.

Take all the help you can get (rotating litter bearers, clearing trail, carrying gear, etc.). Medical IC and Incident IC should coordinate to make this happen.

After the Incident

Immediately revisit the medical plan to make adjustments for the duration of operation.

Record why equipment has been added to trauma kits (such as carrying straps) to prevent removal as budgets are cut or concern over weight/space surface.

Incident participants and review team discuss the sequence of events at the Pillars of Hercules.

B. General Operations

Be conscious of the incident chain-of-command, especially if your "day job" supervisor or program leader is present—but is outside your incident chain-of-command. This situation may contribute to confusion in times of heightened intensity.

If a high-value resource is located on the perimeter of the fire, you may need to "snag" more heavily because there will likely be people monitoring fire there. This will require more time for prep.

All resources are firefighters (including Resource Advisors). Expect them to take action as they see fit. If this is not desired, direct them otherwise.

C. Risk and Decision Making

Analyzing Risk to Reward is difficult. Consider multiple factors. For example: Is it worth it to chase spots at night on a small fire with only a few people assigned to an incident? How are you going to get someone off the hill if there is an injury?

Before rushing into action, consider a tactical pause. For example: We are hanging back because of snag danger. Then, when a spot or slop-over occurs, we rush in to work it—even though the snag is still posing a threat.

When working with high-interest values (structures, cultural resources, etc.), be cognizant of the tendency to get “tunnel vision” or “target fixation”. ICs may wish to clarify the specific hazard analysis applicable to that resource.

When protecting any feature, consider doing the prep and walking away to avoid escalating commitment. If staying to defend, be clear about the risk.

D. Key Take Home Lesson: Medical Scenario Training

“You will only get out of it [the refresher medical scenario] *what you put into it.”*

Incident Participant

Include realistic medical scenarios in your annual fire refresher training.

All participants agreed that their challenging medical pack-out scenario during (spring or pre-season) training prepared them for this incident. They confirmed that this training directly contributed to their mental and physical confidence during this actual response.

In your training, include as many diverse resources as possible (law enforcement, secondary fire personnel, etc.). It is probable that these people will be involved in an actual incident.

Medical scenarios should always be taken seriously.

6. Trees of Special Interest

Most of our country's national forests, parks, and refuges oversee high-value resources. Examples include: owl habitat, red cockaded woodpecker trees, panther dens, archeological sites, and historic cabins. In Sequoia and Kings Canyon National Parks, this key natural resource is the "Trees of Special Interest".

The Trees of Special Interest portion of the Park Fire Management Plan states:

> *"The purpose of providing special management to these trees is to increase the likelihood that natural objects of emotional importance to park visitors survive for future enjoyment. Realizing that, being organic objects, they will eventually die or decay."*

The Public's Attachment to the Parks' Named Trees

Sequoia and Kings Canyon National Parks has learned from past experiences (see "Trees of Interest Special Timeline" on next page) regarding the significant magnitude of public attachment to the Parks' Named Trees as they currently exist. This strong public connection to these giant sequoias can influence national as well as local Park management policy.

> *"The scenic and emotional values associated with giant sequoia are immense (Cotton and McBride 1987[2]; McBride 1993[3]). In 1985, concern over the impacts of prescribed burning on scenic values (creating and enlarging fire scars and causing bark char) shut down the prescribed fire program for a year (Parsons 1990[4]). Partly in response to such concern, extra efforts are now made to remove heavy fuel from around the base of giant sequoias before burning."* – Parsons 1995

Complexity surrounds the issue of "protecting" *any* sequoia tree from fire due to a combination of two primary reasons:

The sequoia trees' natural adaptation to fire.

The additional exposure to personnel required to protect the trees from fire.

The challenge for Park managers is to find an acceptable level of risk in two areas:

The exposure of firefighters protecting the trees.

Potential programmatic constraints resulting from public criticism.

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[2] Cotton, L.; McBride, J. R 1987. Visual impacts of prescribed burning on mixed conifer and giant sequoia forests. In: Davis, J. B.; Martin, R. E., tech. coords. Proceedings of the symposium on wildland fire 2000.1987 April 27-30; South Lake Tahoe, CA USDA Forest Service Gen. Tech. Report PSW-101: 32-37.

[3] McBride, J. R 1993. Managing national parks. Natural Resources J. 11(I): 24-25.

[4] Parsons, D. J. 1990. The giant sequoia fire controversy: the role of science in natural ecosystem management. In: van Riper, C.; Stohlgren, T.; Veirs, S.; Hillyer, S., eds. Examples of resource inventory and monitoring in national parks of California. 1988, September 13-15; Davis, CA Washington, D.C: USDI National Park Service Trans. & Proc. Series No. 8: 257-267.

Trees of Special Interest Timeline

1867 — **General Grant Tree named**
Initiates the practice of naming trees.

1890 — **September 25, 1890** Sequoia National Park established to protect giant Sequoia groves.

1945 — **Practice of naming trees largely abandoned**

1966 — **California Tree**
Charlie Castro climbs the California Tree to suppress lightning fire high in the tree.

1985 — **The "Black Bark" controversy**
Public outcry over char on trees triggers two year prescribed fire moratorium while a committee studies Parks' fire practice. ("Christensen Report")

2003 — **Washington Tree**
Washington tree burns during wildfire resulting in public concern and leads to the creation of specific fire policy regarding Trees of Special Interest.

2004 — **August 28, Colonel Young Tree Named**

2012 — **Circle Meadow Incident**
Park employee seriously injured while protecting the Pillars of Hercules during a prescribed fire.

Common Perspectives

Three main perspectives regarding Trees of Special Interest and risk management surfaced during this review that typically aligned with three professional positions/groups: 1) Implementers; 2) Field Managers/Supervisors; and 3) Policy Makers.

1. Implementers

Those people carrying out the policy or direction (firefighters) simply crave clarity of intent and the appropriate time and resources to carry out the mission. Individuals in this group often have an opinion about the soundness of the policy or direction, but will carry out the mission regardless of their opinion (to the extent they are personally willing to risk harm). This group is far removed from the potential programmatic impacts of the policy (public concern, media, politics, etc.).

2. Field Managers/Supervisors

This group directly oversees the Implementers, makes decisions about risk, and decides how much exposure their subordinates will endure. This group has a strong understanding of the policy, its history, importance, and the broad-scale consequences of public concern. This group is also expected to always provide for firefighter safety. The expectation of exposing firefighters to additional risk for the purpose of excluding fire from a fire-adapted species in one instance (Named Tree) and not the other (unnamed tree), is at times difficult to reconcile—and can lead this group to ask "should we be protecting these trees (is the exposure worth it)?

3. Policy Makers

By circumstance, policy makers are very close to the serious programmatic impacts of events like the "Washington Tree" or the "Black Bark Controversy" (see "Trees of Interest Special Timeline" on previous page) which extend well beyond the Fire Program. Because of the existing requirements and large-scale consequences, to this group the issue is *how* to protect the named trees, not *should* we protect them.

Recurring Themes

In dialogue with incident participants during this review, the following recurring themes and questions surfaced.

Update Fire Management Plan?

Is there a need to revise the Trees of Special Interest portion of the Sequoia and Kings Canyon National Parks Fire Management Plan? What are the specific consequences and benefits of doing so? Would this actually change anything on the ground?

Discussion revolved around two approaches:

Rigid guidelines, a checklist of specific protection tactics to follow in every instance.

Provide only overall intent and allow for situational discretion. (If so, at what level? Crew Leader or Burn Boss.)

Does the checklist approach provide individuals and the Park "protection" if a tree is damaged? Does it impede efficiency and erode tactical decision space for implementers?

If only overall intent is provided, allowing for situational discretion, are you prepared to support your staff when those decisions get tested (injured firefighters or burnt trees)?

'Prep It and Leave' Culture

Is there merit to a culture of "prep it and leave"? During this review, this suggestion surfaced multiple times from all levels. What would that have looked like in this instance (Pillars of Hercules)? By staying to "defend" a tree, are we transferring risk from the tree to the firefighter? If so, is that what we want? How far do we want to go to "increase the likelihood" of the tree's survival?

Create Dialogue

These recurring themes should be addressed in dialogue among all the individuals involved. If you have high-value resources on your unit, adapt these themes to your specific situation and include all levels of the organization in the discussion.

7. Commendations

- Prior to the incident, the Park Fire Division built trauma kits available from the local cache.
- A trauma kit and backboard were staged onsite.
- The Parks' annual fire refresher is very high quality. Much time and effort is put into the planning and execution of this eight-hour course. It pays off.
- After the incident, the responding EMT—totally unprompted—requested a "station day" for all the Fire Division EMTs to review the contents of the trauma kits and to teach all crewmembers the names, locations, and basic uses of essential gear to aid in communication during an incident.
- In the days immediately following the medical response, the Park Fire Division acted on the experience of the lengthy backboard carry out by purchasing four carrying straps for each of their backboards.
- The Park Fire Division has established an environment where junior members feel comfortable speaking up and acting on their own when they see opportunity for improvement.

8. Further Learning Opportunities

Skills Drill

Have you practiced medical scenarios?

Use this medical emergency Tactical Decision Game.
(Click to follow)

http://bit.ly/medical_tdg
[Same URL link as above—provided again (spelled out) for hard copy-only readers.]

Watch This Video

"Remembering Andy Palmer"

This is the story of how we arrived at today's Dutch Creek Protocol guidelines for emergency medical response and extractions.
The video's conclusion stresses the importance of three key questions:

1) *What will we do if someone gets hurt?*
2) *How will we get them out of here?*
3) *How long will it take to get them to the hospital?*

http://bit.ly/andypalmervideo
[Same URL link as above—provided again (spelled out) for hard copy-only readers.]

Review Feedback

This link (below) takes you to a four-question feedback form on the effectiveness of this report. Please help us improve how we review and learn from events like this.

Circle Meadow Lessons Learned Review Feedback
(Click to Follow)

http://bit.ly/circlemeadowfeedback
[Same URL link as above—provided again (spelled out) for hard copy-only readers.]

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10. Appendix

‘Trees of Special Interest’

Section 5-4

Sequoia and Kings Canyon National Parks

Fire Management Plan

[This appendix is the verbatim text from the “Trees of Special Interest” Section 5-4 of the Sequoia and Kings Canyon National Parks Fire Management Plan.]

TREES OF SPECIAL INTEREST

Purpose

The Fire and Fuels Management Plan for Sequoia and Kings Canyon National Parks provides guidance for the protection and management of “trees of special interest” as a part of the Parks’ fire management program. Other Park programs may also provide special protection to this category of trees. The category “trees of special interest” includes standing trees, groups of standing trees, and tree-related objects (dead snags, down logs, and stumps). The purpose of providing special management to these trees is to increase the likelihood that natural objects of emotional importance to Park visitors survive for future enjoyment. Realizing that, being organic objects, they will eventually die or decay.

The protection of trees of special interest does not exclude all fire management activities. The Parks will use appropriate techniques (listed later in this chapter) to protect these trees from fire. However, it must be understood that sequoia groves are natural systems and, despite the Parks’ best efforts and/or actions, fire may affect a tree of special interest.

Background

Giant sequoias as a species are of considerable ecological value. One of the purposes of the Parks is to protect the greater Sierran ecosystem — including the giant sequoia groves — and its natural evolution. But from an ecological perspective, one giant sequoia has essentially the same value as any other. Placing a name on a giant sequoia (or designating it as a tree of special interest) does not make it more significantly ecologically.

“Trees of special interest” are giant sequoias that are significant because of the attention they receive from Park visitors. This designation is based primarily on social criteria. These trees (including groups of trees, and tree-related objects as defined above) have captured human interest over time and have generally been recognized with individual names or some other form of special identification.

Cultural Resources

Social significance is distinctly different from cultural significance. The only culturally significant giant sequoia trees are those that have been evaluated against National Register criteria, deemed significant, and therefore listed on the Parks' List of Classified Structures (Appendix H). The protection and management of LCS structures is outside the scope of the "trees of special interest."

Criteria for Trees of Special Interest

"Trees of special interest" are standing giant sequoia trees (Sequoiadendron giganteum), groups of giant sequoia trees, dead giant sequoia snags, down giant sequoia logs, or giant sequoia stumps. The trees listed in Table 5-3 meet one or more of the following criteria:

- Identified by name on an official Park "map and guide" issued since 1980.

Fire and Fuels Management Plan 5-5

- Identified by name within the official trail map series issued by the Sequoia Natural History Association. (The trail maps for Giant Forest and Grant Grove identify specific named trees.)
- Identified by name within the Congress Trail and Grant Tree Trail brochures issued by the Sequoia Natural History Association.
- Identified by name by official NPS-erected signs at some time since 1980.
- Identified by name by official NPS-erected wayside exhibits at some time since 1980.
- Identified as one of the forty largest giant sequoia trees in the world as listed in Flint and Law, To Find the Biggest Tree, Sequoia Natural History Association, 2002. Such trees are sometimes not named or are not clearly named (e.g., "Unnamed tree near Ed by Ned").
- Incorporated as a design element of a designated trail (for example, a log that serves as a bridge, or a log with a pedestrian tunnel). Such trees are sometimes not named or are not clearly named (e.g., "unnamed tunnel log on Congress Trail").

It is recognized that the "trees of special interest" list is not static. From time to time, it may become advisable to add or subtract trees from this list. Such changes will be made through update and replacement of the Policy Statement Defining "Trees of Special Interest."

Responsibilities

The Chief Ranger and the Chief of Resources Management and Science will jointly ensure that the trees of special interest listed in Table 5-3 are managed under the procedures specified in this plan. This includes ensuring that burn plans identify appropriate protection measures for any trees of special interest that occur within the burn unit.

The Chief of Resources Management and Science will ensure that an up-to-date GIS layer of the trees of special interest is maintained and that an up-to-date cultural resources GIS layer (including any giant sequoias which are on the LCS) is maintained. Giant sequoias will be formally evaluated against

National Register criteria when appropriate. Trees found to be eligible through this evaluation process will be included on the LCS and in the GIS layer.

The Park-wide policy regarding Trees of Special Interest is contained in a Park-wide document called Policy Statement Defining “Trees of Special Interest” dated March 2, 2007. This Park-wide policy statement is an addendum to the FFMP.

Mitigation Measures: Objectives

For SMAs or identified trees of special interest, Park management will strive to meet the following objectives during all fires while maintaining firefighter and public safety:

Strive to prevent excessive bark charring on a tree of special interest: 1) greater than ten feet above the ground, 2) around more than 50 percent of a tree’s circumference, 3) on more than 10 percent of trees with a diameter of four feet or greater (at breast height). In certain cases, heavy fuels (e.g. giant sequoia logs at the base of trees) may preclude meeting this objective.

Strive to prevent no more than 30% of total crown scorch on trees of special interest with a diameter of four feet or greater (at breast height). In certain cases, heavy fuels (e.g. giant sequoia logs at the base of trees) may preclude meeting this objective.

5-6 Fire and Fuels Management Plan

Strive to prevent the ignition of fire scars on trees of special interest. Should ignition occur during the smoldering stage of a fire, the scar will be extinguished if safe and practical to do so. In addition, steps will be taken to ensure that there is little or no change in visual character of trees in these areas.

Use ignition techniques that will limit torching and spotting from ladder fuels in the vicinity of a tree of special interest or SMA thereby limiting chances of spot fires igniting in the canopies of trees.

Mitigation Measures: On-the-Ground Techniques

The following techniques will be used to accomplish the objectives above:

1. Inspecting Fuel Conditions – Prior to the fire, all trees of special interest in the fire area will be inspected for fuel conditions in a buffer zone 20-feet in diameter around the tree’s base. If unnatural accumulations of 1,000 hour fuels (three-inch diameter and greater) are found in this buffer, they will be removed.

Giant sequoia logs, single snags near sequoia trunks, debris from a fallen sequoia top or branch, do not in themselves constitute unnaturally heavy fuels, although the tonnage can be enormous. Such fuels can be left in place to burn, but may radically alter the appearance of neighboring giant sequoias. Taking photographs pre- and post-burn in these areas will document the change in fuels. These pictures, along with shots during the burn, will provide important interpretive and documentary tools to display the area’s biological and scenic recovery.

If the tree of special interest is on a slope, fuel will be scattered to the sides of the trees. The fuel will not be scattered above or below the trees, if possible. If space is limited, fuel removed from around a tree may be piled in a clearing or opening.

2. Inspecting Crown – Prior to the fire, all trees of special interest in the fire area will be inspected for the probability of ignition in the crown. The probability of ignition in the crown will be considered when choosing operational techniques but will not preclude using fire in the area.

3. Choosing Ignition Distance – When determining the appropriate distance to ignite from the base of a tree of special interest, the tree's fire scars and surrounding fuel loading will be considered. Most often, a six-foot separation will be an appropriate distance.

4. Assessing Need for Fireline – If needed, a fire line may be placed around a tree of special interest if judgment determines the presence of unnaturally heavy fuels. Generally, such fuels are of larger diameter (>three inch - 1,000-hour fuels) which are principally fallen cedar, fir, and pine trees or unusually heavy litter and duff accumulations. A fireline should not be used if roots deeper than 12" will be uncovered. Surface litter may also be raked from around a tree.

5. Using Foam or Water – Foam or water may be applied to the trunk of a tree of special interest if accessible by equipment.

Risk will always surround our efforts to maintain the giant sequoia ecosystem in Sequoia and Kings Canyon National Parks. The snag accident that occurred during the 2012 Circle Meadow Prescribed Fire resulted in a broken ankle. Eight years prior, while implementing a prescribed fire in Kings Canyon National Park, a fatality occurred.

In Memory of Daniel P. Holmes

January 16, 1978 – October 2, 2004

On Saturday, October 2, 2004, the falling top of a white fir tree in Kings Canyon National Park squelched a bright light of positive energy and boundless life. At Dan Holmes's October 7 funeral in Rochester, New Hampshire, Dan was honored with a hero's farewell—complete with fire engines, bagpipes, and the Arrowhead Hotshots. Dan was a member of the Arrowhead Hotshots, an elite crew of firefighters who routinely travel the country tackling the largest forest fires.

Although Dan lived only a short time, he made an indelible mark on everyone he met. From his infectious smile to his trademark quote, "peace out," Dan was the type of guy who imparted a bit of goodness on everyone. His enthusiasm for life led him to delve into climbing with unmatched passion; working in Mount Rainier and Denali National Parks, he attained the summits of both landmark peaks with a relatively small amount of experience. He also went on a climbing stint in the Southern Alps of New Zealand. We have never seen anyone pick up anything with such gusto – and thus was the path of his life. Dan packed more into his 26 years than most people manage to fit into a lifetime.

In reality, Dan's death is a bitter, yet joyous occasion; it is a celebration of how he lived, which was always about the moment, and more than all else, the beauty of nature and life itself. If any of us could live life with just half of Dan's enthusiasm, we would be achieving something grand indeed. Peace out, Dan! Wherever you are, my brother, we're sure you're smiling in the thin air of a mountain summit.

-Brit Rosso and Ryan Heinsius

For more information about Dan Holmes:
http://www.arrowheadhotshots.org/dan.html

To see the accident report that documents Dan's tragedy:
http://wildfirelessons.net/documents/Holmes_Accident_Investigation_Report_Part_One.pdf
http://wildfirelessons.net/documents/Holmes_Accident_Investigation_Report_Part_Two.pdf