United States Department of Agriculture
Forest Service

Serious Accident Investigation Report

Steep Corner Fire Fatality

North Fork Ranger District
Clearwater National Forest, Idaho
August 12, 2012

January 2, 2013

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/s/ G. Sam Foster January 2, 2013
Signature Date

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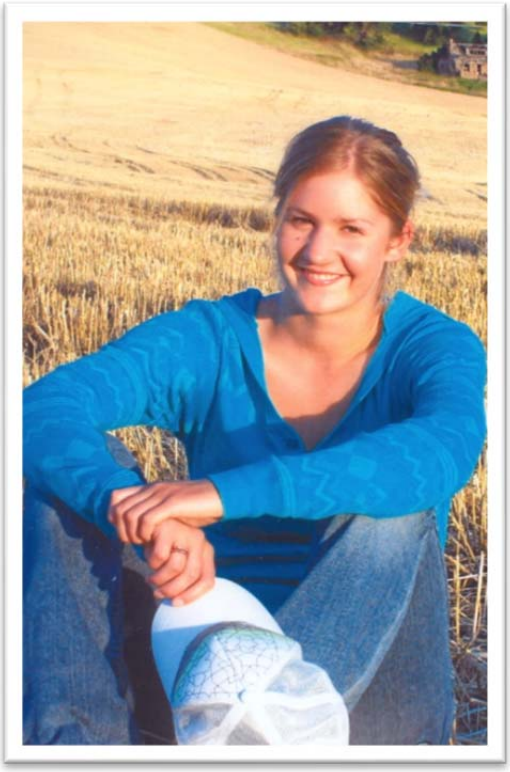
Acknowledgment

The Serious Accident Investigation Team thanks those employees of the Nez Perce-Clearwater National Forests, the Clearwater-Potlatch Timber Protection Association, the Idaho Department of Lands, and Dabco, Inc. who helped with our investigation. Their willingness to share information about the Steep Corner Fire and the tragic loss of a firefighter, while difficult and emotional, provides learning opportunities and increased understanding of the event to the firefighting community.

In Memory of Anne Veseth
April 5, 1992 to August 12, 2012



Anne was the youngest of four children born to Roger and Claire Veseth. She grew up in Moscow, Idaho and was grateful to be raised in the midst of the Palouse Hills. The death of her father in 2003 profoundly affected her life. Throughout high school, Anne played basketball, rode horses, enjoyed social outings with friends, and practiced breakdancing. In 2009, she was awarded Junior Miss second runner-up, following an amazing breakdancing performance.

Anne attended Lewis-Clark State College, where she graduated in May 2012 with her associate's degree in auto mechanics and had planned to pursue her bachelor's degree. Anne had worked for the U.S. Forest Service as a firefighter for two seasons on the North Fork Ranger District where she was much loved by her co-workers and known for her dedicated work ethic. She was a conscientious employee who went above and beyond expectations.

Anne enjoyed being outside and working with her hands. She was good at making other people happy and was always the first to laugh at herself. She never backed down from a challenge, whether it was hard manual labor, a workout at the gym, or a car's mechanical problem. In her spare time, she would work on her truck, listen to country music, go for hikes, and drive backcountry roads. Anne was, and will always be, deeply loved by those who knew her, and her death leaves an immense hole in many hearts.

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Executive Summary

"Snag falling!" Kerry yells as he sees a tree across the creek falling toward them. Everyone scatters; some firefighters run downhill while Kerry and Anne run uphill. A quick glance and Kerry sees it strike another tree and – believing he and Anne are in its path – yells *"Down!"* and switches directions, running down the fireline. With his fists and teeth clenched, he expects to be hit. He hears a tremendous sound as the trees crash downward and feels the whip of limbs on each side of him. He falls down but, upon realizing he is uninjured, quickly gets up and looks for Anne who he thought had been right behind him. He finds her three or four strides uphill under the tree branches. After quickly clearing them away, he determines she did not survive.

The Chief of the Forest Service commissioned a Serious Accident Investigation (SAI) Team the next day, August 13, 2012, to review the circumstances surrounding the fatality. The team's charge included identifying opportunities to strengthen our safety culture, without fear of reprisal and with the focus on learning, which is vital to accomplishing our mission safely and successfully.

During the afternoon of the fire's second day (the day before the accident), two fire crews shared safety concerns and mitigations needed to fight the fire with the leaders on the fire. That evening, leaders acted on the safety mitigations. The next morning, one of the two crews re-engaged, seeing safety concerns were addressed or in the process of being employed. The second crew received an assignment to another fire.

Just after 1230 pm on August 12, in the moments before the accident, firefighters were focusing on a faller who was cutting down three hazard trees. During the operation, a firefighter observed a tree on the opposite side of Steep Creek falling toward them. Although everyone scattered, Anne died instantly when the tree, a green cedar weakened by fire, struck her in the head. This tragedy resulted from the chance alignment of certain conditions: an emergency response to control a wildland fire, which required the presence of firefighters in an area where fire-weakened trees could fall on their own with little or no warning. The SAI Team concluded that the convergence of these events – in a very specific way and with very specific timing – resulted in the fatal accident.

After considerable review of the incident, including the leadership, qualifications, interagency cooperation, fuels, weather, incident management organization, and local policies, the SAI Team concluded that the judgments and decisions of the firefighters involved in the Steep Corner Fire were appropriate. Firefighters performed within the leaders' intent and scope of duty, as defined by their respective organizations. The Team did not find any reckless actions or violations of policy or protocol.

Introduction

Purpose

The purpose of this report is to present the facts about the accident and share the SAI Team's analysis in a way that enhances the reliability and resilience of the Federal, State, and Clearwater-Potlatch Timber Protective Association wildland fire organizations. The intent is to spur discussion and learning for those in the fire and safety community at all levels, and to prevent future accidents.

Notes to the Reader

This report does not precisely follow the traditional format of serious accident investigation reports. It presents a story, derived from interviews, of the events leading up to and surrounding the fatality. The present-tense narrative provides the perspectives of those involved as those events unfolded. The purpose is to place you in their shoes with the information they had at the time, and to provoke you to view the situation as they did. Names have been changed to protect the privacy of interviewees. Quotes, sidebars, and questions are scattered throughout the report to inspire dialogue, not because they point to any causes of the accident. In fact, this accident could have occurred on almost any fire, to almost any firefighter.

The analysis portion of this report focuses on conditions that were present even though they did not cause the accident. We address those conditions because they offer learning opportunities to the firefighting community. Numerous studies have shown that, by focusing on learning, we can improve our safety culture.

Instead of judging, take the more difficult path toward learning by asking questions as you read this report. For example, can you understand how the actions of individuals and organizations made sense at the time? What do you know about incentives and disincentives in the organizational culture that would cause them to make sense? How does that affect our collective management of risk? Even if you truly feel you would act differently under similar circumstances, what is different about your own workplace conditions that others could learn from? How did those come to be? How can you share that information? What needs to change in the broader fire culture before all would respond in a way you believe they should? What messages do leaders need to reinforce with their own people right now, and later with other resources?

Organizational Background

On August 12, 2012, employees from four organizations were on the ground at the Steep Corner Fire. These organizations include the U.S. Forest Service (Nez Perce-Clearwater National

Forests), the Idaho Department of Lands (IDL), the Clearwater-Potlatch Timber Protective Association (C-PTPA), and Dabco Inc. (a logging company). Adding aviation resources to the mix increased the number of organizations, as different contractors fly individual aircraft.

Nez Perce-Clearwater National Forests. A Forest Fire Management Officer (FMO) and a Forest Assistant Fire Management Officer (AFMO) manage the fire and aviation program for the Nez Perce and the Clearwater national forests. The Steep Corner Fire spread from private land to the North Fork Ranger District, one of four districts comprising the Clearwater National Forest. A District FMO and a District AFMO manage the North Fork Ranger District's fire program.

Idaho Department of Lands. IDL is responsible for statewide fire prevention and protection on more than 6 million acres of state and private forests and rangelands. Their fire management program includes more than 40 full-time employees and approximately 150 seasonal firefighters. IDL fire suppression efforts focus on initial attack.

Clearwater-Potlatch Timber Protective Association. State of Idaho law allows forest landowners to form timber protective associations to provide wildfire protection on their land. Timber protective associations are subject to rules established by the state. Each year, the State Forester certifies, and the State Board of Land Commissioners confirms, their qualifications to provide adequate protection. The associations' objectives are to stop fires while small through quick and effective initial attack. A board of directors comprised of association members governs C-PTPA. The IDL is a member of C-PTPA and has a representative on its board.

The Clearwater Timber Protective Association, formed in 1905, and the Potlatch Timber Protective Association,

C-PTPA Fire Response

The C-PTPA, headquartered in Orofino, protects over 988,000 acres of land in the Clearwater River Basin. Under one chief warden and four area wardens, management activities include fire suppression, prevention, and prescribed fire. C-PTPA firefighters receive training and red cards following guidelines established by the National Wildfire Coordination Group (NWCG), and participate in large fire support all across the west.

Over the last 20 years, C-PTPA has fought approximately 1,850 fires for a total of 1,600 acres burned. This remarkably low acreage is a direct result of their objective to keep fires small through aggressive early detection and initial attack processes. C-PTPA flies daily detection flights, increasing that number to twice daily during periods of high fire risk. They rely heavily on helicopters and a network of over 400 ponds to drop water on fires, especially before ground crews arrive. In average years, C-PTPA handles fires with IDL and contract resources. The last time federal firefighters worked on a C-PTPA fire was in 1996, which was the last time a fire grew larger than 100 acres. Additionally, that incident (the Deer Creek Fire) was the last time C-PTPA needed an organization higher than a Type 3 incident command.

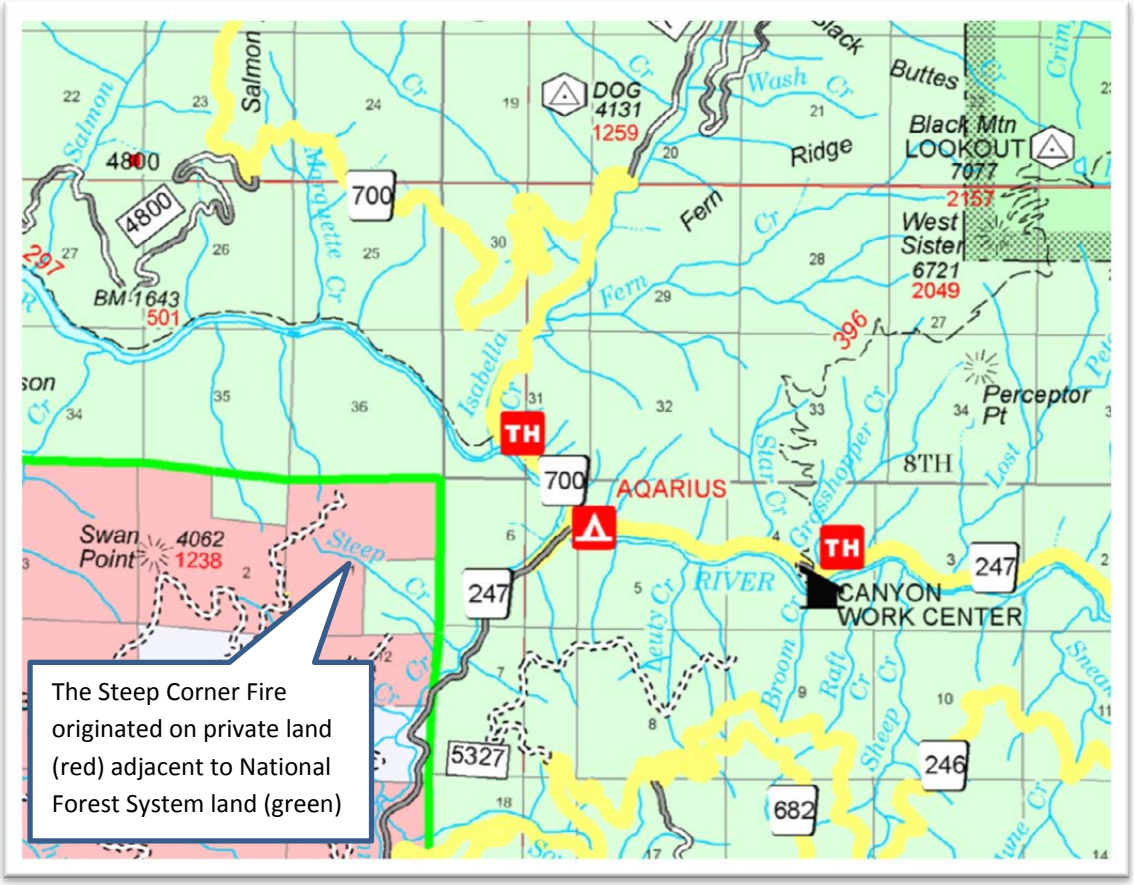
established one year later, joined forces in 1965 as the Clearwater-Potlatch Timber Protective Association. C-PTPA employees respond to wildfires in Idaho's most active fire district.

What cooperators and partners do you have in your area? How well, and how often, do you work together?

Dabco Inc. Dabco, a logging company based in Kamiah, Idaho, was logging on Potlatch Corporation land where the Steep Corner Fire started on August 10, 2012.

Dispatch Centers. Two dispatch centers operate in the area. The Grangeville Interagency Dispatch Center (GVC) processes Federal and State resource requests and C-PTPA operates its own dispatch center in Orofino, Idaho. The C-PTPA Dispatch Center is responsible for coordination of association resources within their protection district. GVC coordinates the mobilization of C-PTPA resources outside the C-PTPA protection district.

Looking down into the Steep Corner Fire



Story of the Accident

Friday, August 10, 2012

The Logging Operation

The morning of August 10, employees of a local logging company are a month and a half into a logging operation on Potlatch Corporation land. The property is about 56 miles northeast of Orofino, Idaho and borders the western edge of the Clearwater National Forest's North Fork Ranger District. With steep slopes averaging 50%, the loggers must rely on a cable yarding system, which uses cables to pull the cut logs uphill to a landing.

The harvesting operation has been uneventful until late morning when a fire starts in an area of recently harvested trees and deep slash. The loggers immediately attempt to extinguish the fire. Quickly recognizing the need for assistance, a logger notifies C-PTPA at 1130 of the fire and requests a helicopter to drop water.

Elevations on the fire ranged from approximately 2,600 to 4,100 feet. Elevation at the point of origin was approximately 3,500 feet. The slope in the area averaged 50%. Cover type in this area consists primarily of mixed conifer forest dominated by old growth western red cedar.

Initial Attack

Chris, a C-PTPA firefighter, receives the initial call and the Chief Fire Warden is notified. With the Type 4 Incident Commander (IC) on medical leave and the Type 3 IC an hour away, Chris heads to the fire to oversee the initial attack. The Chief Fire Warden, knowing that any cable logging job is in steep terrain with deep slash, acts immediately to order aircraft and other resources, stating later, "I'd rather be questioned about sending too many than too few resources." If they do not act aggressively and catch the fire in its early stage, it will spread quickly. Indeed, the incident transitions from a Type 5 to a Type 4 fire "right off the get go." By midday, four helicopters, two single-engine air tankers (SEATs), dozers, three water tenders, three engines, a Department of Corrections crew, C-PTPA firefighters, and logging company employees are fighting the fire or are heading that way. The Type 3 IC arrives and assumes command with the assistance of Chris, who has been on scene for about three hours.

> *"The most risk occurs when fires transition quickly. We have to accelerate the response."*
> *– C-PTPA Chief Fire Warden*

View of the Steep Corner Fire looking southwest from the Black Mountain Lookout, August 10, 2012

The fire is in the cutting unit immediately above National Forest land, which has a dense cover of mixed conifers dominated by western red cedar. The North Fork Ranger District's Canyon Work Center (WC) is approximately three miles away and the Black Mountain Lookout is about 5½ miles to the northeast. The (b) (6) [redacted] who has a good working relationship with local C-PTPA personnel, sends the Forest Service's exclusive use helicopter to the fire and offers the assistance of the E-31 crew stationed at the work center.

Friday morning, Anne Veseth and another crewmember assist with transferring personnel and supplies to the Black Mountain Lookout. She was excited because they flew by helicopter, her first opportunity to do so. While she's at the lookout, E-31 receives orders to report to the fire. A four-person crew leaves the work center but, upon hearing Anne is available to join them, returns. After the helicopter transports her to the work center, she eagerly joins her crew and they set off as an initial attack resource.

E-31 Arrives

The fire covers 5 to 7 acres on the south side of Steep Creek when the E-31 crew arrives around 1600. After Lee, the engine boss (ENGB), discusses radio communications and tactics with Chris, he leads the crew to the fire's south flank where he meets with the C-PTPA employee supervising suppression operations there. Lee and Kerry, the engine boss trainee (ENGB(t)), talk to their crewmembers about how LCES[1] was going to be implemented and their goal of building a fireline through a strip of uncut timber (the leave strip) on the south flank. The E-31 crew and four C-PTPA firefighters make good progress with line construction through the leave strip and soon reach the recently logged area below. Progress slows due to the heavy saw work occurring, as the unyarded timber and slash is 6 to 8 feet deep in some areas.

Although designated as an engine crew, E-31 often operates without the engine, functioning as a hand crew on fires and project work while drawing from personnel at two work centers.

Night Disengagement

By early evening, the IC feels like they will succeed in containing the fire. With the steep terrain, deep slash, rolling materials, and hazard trees, he is concerned about risks after nightfall and decides to withdraw the firefighters. Four C-PTPA crewmembers arrive as night patrol. C-PTPA discusses the situation with the Grangeville Interagency Dispatch Center, which places an order for an Interagency Hotshot Crew (IHC).

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[1] Lookout(s), Communication(s), Escape Route(s), and Safety Zone(s).

> *"20 to 30 years ago, it was not our style to pull crews off at night due to safety concerns."*
> *- C-PTPA Chief Fire Warden*

Saturday, August 11, 2012

The Day's Operations

Overnight, the fire continues burning actively downhill and hooks around the incomplete sections of line and into unyarded timber and slash. Many times, fire behavior moderates at night, but not always. It grows from about 7 acres to approximately 40 acres. The loggers do not return, nor do the two SEATs due to the difficulty of flying into the drainage. The IC assigns the returning resources to three division supervisors. A second Department of Corrections crew, unexpected but welcome, joins the first corrections crew on the fire's south flank. The five-person E-31 crew will join approximately 15 C-PTPA and three IDL firefighters who are already working the north side.

Gaps in the Line: Two Perspectives

Lee, the ENGB, works behind the E-31 crew using a hoselay pumping water from the creek to secure fireline and watching for hazard trees. The other four E-31 firefighters reach the fire's northeast corner by early afternoon and begin working south across the bottom of the fire. There they observe several burning trees threatening their work area.

C-PTPA's Perspective	E-31's Perspective
Blair, the Division Supervisor (DIVS), decides to move past two areas to avoid hazard trees. He feels comfortable leaving the gaps in the fireline because fire activity is low and the humidity is high. Additionally, a helicopter is keeping the situation "in check," an IDL firefighter is scouting ahead, and a hotshot crew will be arriving to help.	On Blair's instruction, the E-31 firefighters move past an area to avoid hazard trees, leaving a 100-foot gap in the fireline. The IDL scout identifies another "scary" burning snag and the crew leaves a second gap to avoid it. On his way to rejoin his crew, Lee sees the two gaps in the line and expresses his concern to Blair, since constructing "unanchored" fireline is counter to principles of safe fireline construction as taught in basic firefighter training.

The IHC's Assessment

An IHC arrives on the fire around 1400. After a briefing with the IC, the IHC Superintendent heads down the fireline through the leave strip that was the south flank the previous day. The IHC Foreman begins scouting downhill along the north flank. The two meet at the bottom of the fire, then meet with Lee and express their concerns about communications, tactics, and

hazard mitigation. When Chris joins them, the IHC Superintendent and Foreman identify the need for better radio communications and professional fallers for hazard tree removal. They also question the gaps in the fireline as well as the lack of medevac sites and a medical plan. Chris states, *"We're doing the best we can with what we've got."*

After this discussion, the IHC Superintendent and Foreman continue uphill along the south flank of the fire toward the corrections crews. One of them starts coordinating bucket drops – even though the IHC has not formally engaged – because he sees the fire may hook the corrections crews, threatening their position. He is frustrated because no one appears to be coordinating the air operations from the ground.

Before leaving the fire, the IHC supervisors inform the IC they will not engage on the fire unless a number of safety concerns are mitigated first. They give him a written list of those concerns. After communicating with Dispatch, the IHC is assigned to another fire. They spend the night at the Kamiah administrative site, where they meet the (b) (6) and the (b) (6) the following morning and explain their reasons for not engaging. The IHC files a safety report (SAFENET) three days later on August 14.

Mitigating Safety Concerns

In late afternoon, Lee and Kerry talk to Chris about their concerns and feeling that the operation is overextended. Declaring, "*We're not going to catch this thing,"* Lee suggests they re-organize and he offers Forest Service overhead and resources.

Saturday Afternoon

Changing Risk Perception
Saturday afternoon, as C-PTPA firefighters begin cutting a line around a spot fire near the fire's southeast corner, a helicopter drops a bucket of water, nearly hitting the C-PTPA sawyers. Seeing this, Kerry shuts down his saw and takes a moment to assess the situation. He thinks, "What are we doing here?" and talks to Lee about beginning to feel "overextended."

Bucket Drop
The IHC supervisors hear radio traffic about clearing the fireline on the bottom, leading them to think nobody is in the drop area. They are not aware the E-31 and IDL firefighters have decided to disengage and are hiking out. Turning a corner to go uphill, the firefighters hear an inbound helicopter. Radio traffic is heavy and Chris cannot get through to notify the IHC supervisor that people are in the area. The helicopter drops water, almost hitting several firefighters as they quicken their pace uphill.

Disengaging
Chris respects E-31's decision to disengage, stating, "I don't want you to do anything you aren't comfortable with."

Lee and Kerry discuss the situation further after hearing the IHC's concerns about communications, medevac sites, and hazard trees. On one hand, their ability to talk from the fire to the (b) (6) at their work station on tactical Comm2 channel – a fact that the IHC was not aware of – was a "confidence booster." Additionally, they are accustomed to working without sufficient or proximal medevac sites, which is typical on the North Fork District where

"down and out" is the escape route and heavy, closed-canopy timber and steep slopes are the norm. On the other hand, while hazard trees are always a problem, the lack of sufficient fallers required them to leave two gaps in their fireline. It is late in the day, their crew is fatigued, and an unknown amount of work lies ahead of them. They ask, *"What are we gaining?"* and determine they are *"not risking everything to save nothing."* They decide to disengage the E-31 crew from the fire for the evening.

Before leaving, Lee talks with the IC about his concerns and makes some recommendations to improve the organization and mitigate hazards. Back at the work center, he also discusses the situation with the (b) (6) and the (b) (6), reiterating the need for fallers and an overhead structure.

That evening and the following morning, C-PTPA begins implementing hazard mitigation measures shared by the IHC and E-31 crew. They complete an Incident Action Plan (IAP) and place resource orders for additional crews, overhead and professional sawyers. The objectives in the IAP are to: 1) ensure firefighter safety and 2) minimize loss of timber resources.

Sunday, August 12, 2012

Morning Operations

Like Friday evening, C-PTPA keeps crews off the fireline Saturday night due to safety concerns and the fire continues to grow. It grows from 60 acres Saturday night to about 70 acres Sunday morning, spreading downhill.

The (b) (6) and C-PTPA's Chief Fire Warden talk by phone about the IHC's decision to disengage. The Chief Fire Warden accepts the offer of sending the (b) (6) to the fire under a Unified Command structure. At 0730, the (b) (6), who had already provided a status report to the (b) (6) joins them, along with the (b) (6) and the Grangeville Dispatch Center Manager, on a conference call to talk over fire operations and safety measures. Afterward, he proceeds to the fire where he discusses the hazard mitigation plans with the IC and Lee and offers additional resources.

Upon arriving at the fire Sunday morning, the E-31 crew receives an IAP, hears more crews are on order, and learns two contract fallers have started working ahead of their fireline construction. Kerry thinks, "Wow, all the things we wanted" and is feeling good about the situation. He is impressed with the expertise of the contract fallers.

With safety concerns being mitigated, the E-31 crew returns to the fire at 0810 with two additional crewmembers from the Kelly Creek Work Center. They, along with 3 IDL and 10 C-

PTPA firefighters, will continue constructing line on the north side while fallers cut trees ahead of them. Their objective is to hold the fire south of Steep Creek until additional crews arrive.

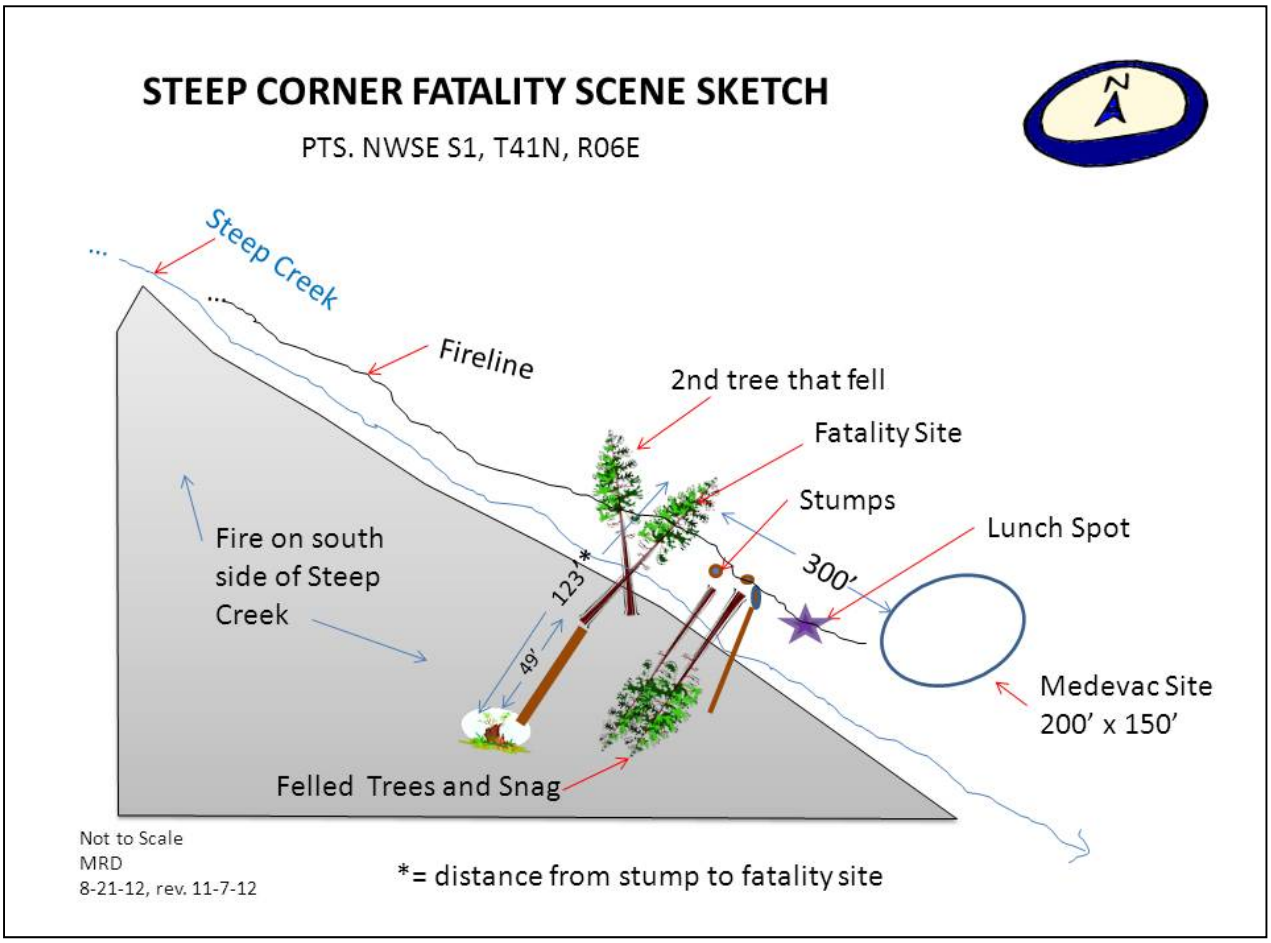
After meeting with the (b) (6) [redacted] and the IC, Lee appoints one of the E-31 firefighters as a lookout, instructing him to go directly across the canyon to a clearcut with good visibility. Lee heads downhill to join the rest of his crew around 0930 or 1000 and observes the fire has moved approximately 150 yards down Steep Creek since the previous night. He confirms with Division Supervisor Blair that E-31's objective is to "hold what we got" and keep the fire south of Steep Creek without attempting to hook below it. They wait 30-40 minutes for the professional sawyers to get ahead of them. The E-31 firefighters keep constructing line downhill and, by about 1130, finish the line to the bottom edge of the fire. They pause to eat lunch around 1230.

Fire Crosses Steep Creek

While at the lunch spot, Kerry sees several C-PTPA firefighters pointing uphill, to a place where the fire has crossed Steep Creek. The fire is not spreading fast, it is just creeping, and flame lengths are small. It is burning toward a small section of indirect line they had put north of the creek where the terrain was better. Two live cedars and a white pine snag adjacent to the line are starting to burn and catface. C-PTPA firefighters, Kerry, and firefighter Anne Veseth throw dirt on the burning trees to help cool them down. Helicopter 68H drops a bucket of water "spot on" the three trees at approximately 1235 then heads to Orofino to refuel. Over the next

The tree that struck Anne was on the south side of the creek; she and other firefighters were on the north side. It was a green cedar tree, approximately 150' tall and about 40" dbh. Either a previous fire or the current fire had hollowed out the tree from its stump (see above) to at least 20 feet above the ground. The tree fell on its own across the slope from south to north and slightly downhill. As it fell, it struck a second green cedar tree on the south bank of Steep Creek. The second tree fell in a direction approximately 45 degrees left of the direction of the first tree's path, away from firefighters. Sawyers were not, nor had they been, working on either tree. The distance between the stump of the fatal tree and Anne was approximately 123 feet. The diameter of the tree where it struck her was 13 inches.

10-15 minutes, one of the contract fallers cuts the snag. It hangs up so he undercuts it and it falls to the ground. He cuts one of the cedars, which falls into the black. Those standing nearby are focused on him as he begins a face cut on the third tree.



The Accident

While the other three E-31 crewmembers remain in the lunch spot, Kerry and Anne stand together with other firefighters uphill, approximately 30' to 40' behind the faller as he works on the third tree. Kerry sees the top of a tree across the creek starting to move toward them and yells, "Snag falling!" Everyone scatters. Kerry and Anne start running uphill together while the other firefighters and the faller sprint downhill. Kerry sees the falling tree strike another tree and – believing he and Anne are in its falling path – he yells "Down!" and switches directions, running down the fireline. With his fists and teeth clenched, he expects to be hit. He hears a tremendous sound as the trees crash downward and feels the whip of limbs sweeping on each side of him. He falls down but, upon realizing he is uninjured, quickly gets up and looks for Anne who he thought had been right behind him. He finds her three or four strides uphill under the tree branches. After quickly clearing them away, he determines she did not survive. The time is between 1245 and 1256.

Only seconds, maybe five at most, pass between the verbal warning and the time the tree is on the ground.

Response and Recovery

The firefighters in the immediate area, after seeing the tree come down, rush to assist. Kerry, an EMT for eight years, tells them it's "no good." Wanting to isolate the three E-31 crewmembers from the scene, he instructs them to hike to a bench about 50 yards away and to stick together. He turns his radio to a local Forest Service frequency that they had been using for a crew channel and advises Lee, who had been scouting ahead, of the fatality. The (b) (6) [redacted] driving up the road at the fire, also hears the transmission.

One C-PTPA firefighter sprints uphill for a backboard, returning with Chris and a tender operator who is also an EMT. A request for Life Flight is relayed to dispatch and fallers begin cutting a helispot below the accident site. Blair, Lee, and Kerry determine the location is unsuitable for a helicopter landing and, realizing time is not critical, decide on a long line extraction using a helicopter already assigned to the fire. The order for Life Flight is cancelled.

C-PTPA and IDL firefighters work with Kerry to transfer Anne to a backboard and carry her to the extraction site. The pilot of Helicopter 68H, who is halfway between Orofino and the fire, drops his bucket at a dip site. He returns to Orofino to pick up a 150' long line, a 4-point Stokes basket, and two EMTs, then proceeds to the Canyon WC to drop off the EMTs. He hooks up the long line and the Stokes basket and flies to the extraction site. After firefighters on the ground place Anne in the Stokes basket, the pilot returns to the Canyon WC. EMTs transfer her to a backboard for placement inside the helicopter. 68H flies to Headquarters, Idaho to meet a deputy sheriff and an

Recovery Actions

Numerous individuals at the accident scene performed admirably. The ENGB(t) switched to a local frequency to prevent Anne's brother, also a Forest Service (b) (6) [redacted] from hearing the news on the radio. He sequestered the other crewmembers away from the scene, and gathered documentation such as GPS coordinates and photographs that he knew investigators would require. A C-PTPA firefighter ran uphill for assistance – an arduous feat given the steep terrain. The faller, recognizing the danger still presented by the standing third tree, got everyone to move so he could fell it before anyone else was hurt. A C-PTPA tender operator, who is an experienced EMT, quickly came downhill and helped control the scene, directing a faller to cut the tree off Anne. Fallers quickly cut a recovery site and several people, including the IC, helped move her to the helicopter. The pilot, with years of backcountry search-and-rescue missions behind him, successfully dropped below the tree canopy of the small sling site to accommodate the long line's limited length.

ambulance. The extraction process takes 2 hours and 26 minutes.

Radio transmissions and post-accident interviews indicate people use the term "medevac" differently. For some, it is a medical evacuation for an injured person. For others, it can also mean recovery of a body. The differences in these meanings, along with the request for Life Flight, may account for some of the confusion over the nature of the accident as portrayed in dispatch records.

Post-Accident Actions

The (b) (6) [redacted] who was at the Black Mountain Lookout, prepares to hike off the mountain after hearing radio traffic identifying the fatality as a Forest Service employee. During the extraction operations, the (b) (6) [redacted] requests a helicopter to transport the (b) (6) [redacted] to the Canyon WC. All Forest Service employees are withdrawn from the fire and the E-31 crew hike downhill toward the road along Beaver Creek. The (b) (6) [redacted] (b) (6) [redacted] and the (b) (6) [redacted] meet the crew there and they return to the work center. Other line officers are notified and Dispatch orders a Critical Incident Stress Debriefing team at 1602. At the work center, (b) (6) [redacted] and the (b) (6) [redacted] stay with the E-31 crew and advise them to make no phone calls until Anne's family is notified. Later that evening, the deputy sheriff takes statements and the sheriff's chaplain provides counseling to the crew.

Firefighters experienced steep terrain and dense vegetation.

Fire Containment

The Steep Corner Fire burned 310 acres and took 16 days and $2,118,745 to contain. A Type 2 team assumed command on August 14 and, during peak operations, 118 people were assigned to the fire. On August 23, a Type 3 team took over and contained the fire on August 26.

This photo was taken August 19, 2012 from the accident site toward Steep Creek.

Analysis and Conclusion

The cause of this accident was that a green cedar tree, weakened by fire, fell and struck a firefighter in the head. It fell with a force far greater than the design limits of any hardhat could withstand. This tragedy resulted from the chance alignment of certain conditions: an emergency response to control a wildland fire, which required the presence of firefighters in an area where fire-weakened trees could fall on their own with little or no warning. The SAI team concluded that the convergence of these events – in a very specific way and with very specific timing – resulted in a fatal accident. Slight differences in any number of factors could have led to drastically different results.

Firefighters faced the same choice on this fire as they do on almost every fire: engage the fire and expose firefighters to a certain set of risks in order to control the fire, or don't engage the

fire and don't control it, knowing that such a decision often poses a wider range of risks to firefighters and the public. Firefighters made the same basic risk decision on the Steep Corner Fire as they do routinely on most fires: to engage the fire and attempt to control it, knowing that firefighters would be exposed to hazards during suppression efforts.

On the day of the accident, after the implementation of safety mitigation measures, the firefighting professionals involved in the Steep Corner Fire reasoned the risks of engaging and suppressing the fire to be acceptable. After considerable review of the incident, including the leadership, qualifications, interagency cooperation, fuels, weather, incident management organization, and local policies, the SAI Team concluded that the judgments and decisions of the firefighters involved in the Steep Corner Fire were appropriate. Firefighters all performed within the leaders' intent and scope of duty, as defined by their respective organizations. The team did not find any reckless actions or violations of policy or protocol.

On August 11, the day before the fatal accident, two Forest Service resources decided to limit their acceptance of risk on the Steep Corner Fire. Both the IHC and the E-31 crew identified necessary safety mitigations. The IHC chose not to engage. The E-31 crew disengaged and indicated they would not return to the fire until mitigation measures were implemented.

C-PTPA took these events seriously and subsequently addressed the recommended mitigation measures. Personnel became the "adapters" that allowed C-PTPA and the Forest Service, two organizations with very different natural resource management mandates, to function together. Mitigation measures included ordering more firefighting resources, adding line overhead and a radio repeater, and using contract fallers to fell hazard trees ahead of those digging fireline. The morning of August 12, the E-31 crew decided to re-engage when it became clear C-PTPA was addressing their safety concerns. The IHC was already reassigned to another fire and did not return. In general, firefighters expressed their impressions that Saturday was a bad day but Sunday (before the accident) was much better, in terms of organization of the fire and mitigation of the hazards.

Unfortunately, the increased measures taken toward hazard mitigation on Sunday did not prevent a fatal accident. This underscores the fact that it is not possible to mitigate risk to zero; that, in the words of the Forest Service's doctrinal statement, the wildland fire environment "possesses inherent hazards that can – even with reasonable mitigation – result in harm to firefighters engaged in fire suppression operations."

Were the mitigation actions on the Steep Corner Fire on August 12 "reasonable"? The answer is subjective. A local fire manager, looking back on that day, stated unequivocally "I don't think we missed anything."

Conditions

A tragedy such as the Steep Corner fatality lends an opportunity to look deep into an organization and possibly highlight conditions that, while having no direct bearing on the outcome, provide opportunities for learning. Below is a summary of conditions that the SAI Team identified as present during the Steep Corner Fire. An expanded discussion of conditions is available in Appendix D. We address these conditions so other firefighters and organizations at all levels, through honest inquiry, can be thoughtful about what is in their area of influence and act accordingly.

Cultural and Organizational Conditions

As expected, most organizations have differing philosophies and values. Members of organizations tend to communicate with each other in ways accepted within their own organizational culture, which may be very different from practices in other organizational cultures. Communications during the initial and extended attack phases of the Steep Corner Fire were challenging and members ("adapters") of each organization identified ways to work around these problems.

Organizations that have not worked closely together face challenges in working together effectively when conducting complex emergency operations. The last time the Forest Service worked on a large C-PTPA fire was in 1996, which was the last time a C-PTPA fire grew larger than 100 acres. As the operational tempo escalated on the Steep Corner Fire, the level of complexity and challenges also increased. Both organizations grappled with the challenge of working closely together in an emergency, without having a history of doing so. This is not unusual in wildland firefighting, but when resources are from the same geographic area, it is possible and probably beneficial to develop a history of working together.

Risk Perception Conditions

Factors influencing a person's perception of risk include organizational culture, training, risk experience, and individual motivation. Risk perception, which varies from person to person and from moment to moment, drives the prioritization of risk, communication about risks, and actions taken to mitigate risks.

While the numerous people on the Steep Corner Fire had different perceptions of the relative dangers or risks associated with the fire, interviews revealed a common assessment or sense of the risks they faced. The most experienced firefighters noted this was not a particularly difficult fire for mitigating the safety concerns. The terrain was challenging but not remarkable and fire behavior was not extreme. For example, fire managers perceived the risk of constructing line downhill (a tactic often discouraged because of inherent hazards of an active fire below

firefighters) to be low due to relatively benign fire behavior. Their biggest concern was the threat of hazard trees, which is a routine hazard for wildland fire operations.

An individual's perceptual abilities (What are you looking at? What are you not hearing?) limits their capacity to identify hazards and evaluate risk, as do their notions about which risks are more significant or likely to cause harm. The day of the Steep Corner fatality, firefighters did not specifically identify the strike tree as a hazard tree. It was one potential hazard tree in a forest full of hazard trees. In a sense, everything around was a hazard.

A firefighter's choice, conscious or unconscious, to focus attention on one thing or another is governed by a number of factors. Focusing on one risk may lessen or eliminate a focus on others. People focusing on a felling operation may take a fraction of a second longer to identify and react to a different threat. People do not "lose situational awareness" because, while conscious, they are always aware of something. In this case, they focused on a felling operation.

Decision-Making Conditions

In some situations, a person has a single chance – meaning there is only enough time to act upon a single option – to decide and then act. There is no time to reconsider or make a different decision. For this reason, it is important to think ahead and plan escape routes. When time is short, you fall back on what you know, what you've done before, or what you've preplanned to do. How do we prepare for those situations? During a high-risk, low-frequency event, how should one react? Remember, we tend to fall back on what we practice. Firefighters tend to think of escape routes and safety zones in relation to fire behavior. What if those same concepts were applied to escaping or taking refuge from falling trees? In some cases, firefighters are already doing this, but these concepts are not widely taught in the wildland firefighting curriculum.

Recommendations

The concept of LCES (Lookouts, Communications, Escape Routes, Safety Zones) originally was designed for fire entrapment avoidance. As taught throughout the National Wildfire Coordinating Group (NWCG) curriculum, the entire emphasis is on avoiding entrapment by fire behavior. However, the same concept has some application to avoiding other hazards, e.g., being struck by a hazard tree.

> **Recommendation:** Forest Service Fire and Aviation Management should work with NWCG Training Development to introduce the LCES concept (for use in areas beyond

fire behavior) into the NWCG curriculum in the appropriate courses, for the benefit of the interagency fire community.

Outside the fire community, hazard trees pose a threat to all forest workers and visitors. Non-fire employees may or may not be familiar with the concept of LCES.

Recommendation: Occupational Safety and Health Office should develop a methodology for effectively teaching non-fire workers the concepts related to hazard tree identification, scouting an area, and determining escape routes and safety zones for overhead hazards.

Appendix A: Acronyms and Glossary

AFMO	Assistant Fire Management Officer
C-PTPA	Clearwater-Potlatch Timber Protection Association
dbh	Diameter at breast height
DIVS	Division Supervisor
ENGB	Engine Boss
ENGB(t)	Engine Boss Trainee
FMO	Fire Management Officer
GVC	Grangeville Interagency Dispatch Center
IAP	Incident Action Plan
IC	Incident Commander
IDL	Idaho Department of Lands
LCES	A standard safety checklist used by firefighters to ensure they have provided for Lookout(s), Communication(s), Escape Route(s), and Safety Zone(s).
NWCG	National Wildfire Coordinating Group
RAWS	Remote Automated Weather Station
SAFENET	An anonymous tool for reporting and correcting unsafe situations and for sharing critical safety information related to wildland and prescribed fire operations.
SAI	Serious Accident Investigation
SEAT	Single Engine Air Tanker
WC	Work Center

Catface: Defect on the surface of a tree resulting from a wound where healing has not re-established the normal cross-section.

Hoselay: Arrangement of connected lengths of fire hose and accessories on the ground, beginning at the first pumping unit and ending at the point of water delivery.

Leave strip: A narrow band of forest trees left between cutting units or adjacent to a road or stream —*also* buffer strip, green strip, or streamside management zone.

Appendix B: Chronology of Events

Approx. Time	Event
Friday, August 10, 2012	
1140	Loggers report fire to C-PTPA Dispatch
1147	C-PTPA Chief Fire Warden receives report of fire and orders resources
1200-1230	C-PTPA firefighters arrive on fire; fire is about 1.5 acres
	Aggressive initial attack with 4 helicopters and 2 SEATs, dozers, three water tenders, two T4 engines, one T7 engine, and ICIO on order
1352	Grangeville Dispatch orders E-31
1500	C-PTPA's Type 3 IC arrives on fire
1600	E-31 arrives on fire; ENGB discusses radio & LCES with C-PTPA
	E-31 crew follows CPTPA crew downhill to build line down through riparian area
1630-1700	First ICIO crew arrives in mid-afternoon and is assigned to south line
1930-2000	E-31 is off the fire by dark
2130	E-31 returns to Canyon WC and goes off shift
2138	Grangeville Dispatch orders IHC
	C-PTPA crew serves as night patrol
Saturday, August 11, 2012	
0800	E-31 arrives at fire, which has grown from about 7 to 40 acres overnight. IC assigns E-31 to work on north side (Steep Creek side)
	Hazard trees are a problem and firefighters are directed to leave 2 gaps in fireline to avoid threatening trees
1400	IHC arrives on fire; IHC Supervisors begin scouting
1600	IHC Supervisors discuss safety concerns with ENGB then continue to scout across bottom of fire toward corrections crews. They decide not to engage the IHC.
	ENGB discusses strategy with C-PTPA and expresses need for fallers to take down snags in gaps; states USFS has more overhead and resources to help; informs C-PTPA that E-31 is disengaging until safety concerns are mitigated.
1700-1800	E-31 begins hiking out. IHC Supervisor orders bucket drop, not realizing people are in the area.
1930-2000	E-31 returns to Canyon WC and goes off shift

Approx. Time	Event
	(b) (6) [redacted] calls Chief Fire Warden about safety concerns. C-PTPA works on mitigation measures and develops an IAP
Sunday, August 12, 2012	
0615	(b) (6) [redacted] informs (b) (6) [redacted] that fire safety concerns are being mitigated and E-31 will return to the fire
0730	USFS and C-PTPA discuss fire situation during interagency call
0810	With two additional crewmembers, E-31 arrives at fire, which has grown from about 60 to 70 acres overnight
	(b) (6) [redacted] discusses IAP with C-PTPA. E-31, along with IDL and C-PTPA firefighters, will continue constructing line on the north side while fellers cut trees ahead of them
1130	Crew has constructed line to bottom edge of fire
After 1200	E-31 breaks for lunch
1230	Fire crosses Steep Creek; 2 live cedars and a white pine snag adjacent to the line are starting to burn and catface
	Faller begins cutting the 3 hazard trees
Between 1245 & 1256	**Fatality occurs**
1310	Initial radio communications do not clarify the accident is a fatality and C-PTPA Dispatch receives a request for medevac.
1320-1330	Since there is no suitable landing site, fallers begin cutting trees near accident site for a sling site. Contract helicopter offers to assist in extracting Anne.
1330-1350	Contract helicopter drops bucket and returns to Orofino for EMT and Stokes basket. Coordinates are provided for the sling site, which is ready by 1348. A ground ambulance is at Headquarters, ID.
1500	E-31 crew returns to Canyon WC
1520	Contract helicopter lands at Headquarters with Anne onboard. Ambulance and deputy sheriff are waiting.
1602	Dispatch orders a Critical Incident Stress Debriefing team

Appendix C: Environmental Conditions

Fuels and Topography

The Steep Corner Fire originated in Clearwater County, Idaho on Potlatch Corporation land under fire protection of the Clearwater-Potlatch Timber Protection Association. The fire started in an active logging unit. Loggers had removed most of the cut timber upslope of the point of origin. Near the origin, cut trees remained on the ground until loggers could yard them up the hill. This accumulation of cut timber was up to 8 feet deep in some locations.

Elevations on the fire eventually ranged from approximately 2,600 to 4,100 feet. Elevation at the point of origin was approximately 3,500 feet. The slope in the area of the fatality averaged 50%. By the second day, the fire was well established in uncut timber below the logging unit. Cover type in this area consists primarily of mixed conifer forest dominated by old growth western red cedar.

Western red cedars (*Thuja plicata*) occur commonly on moist sites and on a variety of landforms, including rocky slopes, at 0 to 5,000 feet in elevation. They usually grow in shaded, mixed coniferous forests, rarely in pure stands, and are large to very large trees with diameters ranging from 2 to 8 feet. Western red cedar has very thin bark and highly flammable foliage, and the older trees often have open cavities filled with dry heart rot. They are highly susceptible to mortality by fire. Typically, fires establish inside the rotten cavities, burning and hollowing out the tree and leading to collapse.

Weather

The National Weather Service forecast for the fire area predicted warm and dry conditions for August 12, 2012:

- Maximum temperature: 95° - 100° F in the valleys, 80° - 85° F on the ridges
- Relative humidity: 13-23%.
- Winds: Upslope/up-valley, 4-8 mph in the lower elevations and southwest up to 5 mph at the ridge tops

No weather observations were taken directly at the fire site. The Eagle Remote Automated Weather Station (RAWS) site, roughly six miles east, recorded the following on August 12:

- Maximum temperature: 86° F
- Minimum relative humidity: 16%

Near the time of the accident, the Eagle RAWS recorded:

- Maximum temperature: 81° F
- Minimum relative humidity: 17%
- Winds: from the northeast, maximum of 4 mph

In contrast, the Eagle RAWS recorded the previous day's temperature as 81° F maximum and a minimum Rh of 21%.

Appendix D: Risk, Organization, Culture, and Human Factors Analysis

Preface

Wildland firefighting involves a fundamental dilemma: either you fight the fire or you don't fight it. Both alternatives involve risks; there is no "zero risk" alternative. The fire itself poses a hazard that, if left uncontrolled, could harm the public or damage property or natural resources. Yet, the only way to mitigate the hazard posed by the fire is to expose firefighters to that very hazard. So which risk do we accept: the risk of the fire burning uncontrolled or the risk to firefighters who attempt to control it? Typically, we choose to send in firefighters to reduce the risks of an uncontrolled fire. The experience, training, and equipment of our firefighters give them the opportunity to control the fire successfully and to survive the experience unharmed. Yet the risk to firefighters can never be zero once they start heading towards the fire.

The only certain way to avoid a firefighter fatality on the Steep Corner Fire would be to have no firefighters on the fire. On the third day of a growing fire – a fire on timbered lands under multiple ownerships – and with no break in the weather forecast, that was an unlikely scenario. Once firefighters are committed to any fire, they are exposed to a variety of hazards including those associated with fire behavior, driving, aviation, and falling trees and rocks, to name a few. Even before firefighters are committed to an incident, they are inevitably exposed to a variety of hazards such as arduous training, aviation and driving.

The accident on the Steep Corner Fire happened because firefighters were present, doing their jobs. As described below, multiple risks were recognized and mitigated, and fire managers traded some risks off against other types of risk. These situations are not unique to this fire; rather, they are common to all wildland fires fought in the U.S. every year.

Risk Perception and Acceptance

Risk perception or "awareness" can vary from one individual to another or from one organization to another. How people perceive risks can influence how they decide and act. The ability to sense and avoid harmful environmental conditions is necessary for the survival of all living organisms. It is not possible to "lose" situation awareness; "we cannot 'lose awareness' other than by becoming physically unconscious." If a person is conscious then they are always aware of something.[2] The question is, what are they aware of and why was their attention focused where it was?

Individuals perceive risks differently. Risk perception drives the prioritization of risk, communication about risks, and action taken to mitigate risks.

Organizational perception of and mitigation of risk are products of collective sensemaking. This process of sensemaking was continuous and evolving during the Steep Corner Fire.

[2] Sidney Dekker, *The Field Guide to Human Error Investigations* (Ashgate Publishing Co., 2002).

It is evident from the Incident Action Plan (IAP) for August 12 that fire managers did not view fire behavior as a significant hazard for firefighters on the Steep Corner Fire. The safety message in the August 12 IAP did not even mention it. Firefighters were accomplishing downhill line construction, which typically is generally considered a hazardous endeavor even for seasoned firefighters. The IAP does not mention it either. Local conventional wisdom is that fires typically burn downhill in this area; rapid uphill crown fire runs in heavy cedar are unusual. Once the fire got outside the logging unit where there was heavy slash, fire intensities were fairly low. Aircraft on scene also provided the ability to cool areas of the fire that became too active.

Clearly, the hazards perceived as most important on the Steep Corner Fire were identified and communicated to firefighters. At any rate, well-trained and experienced firefighters could see them for themselves. The day prior to the accident, firefighters had observed multiple fire-weakened trees falling, even though it was not a windy day. The day of the accident, contract fallers arrived to mitigate the hazard, a process known as "snagging." A typical snagging operation involves fallers moving through an area in advance of line-digging crews. The fallers remove hazard trees in the vicinity to make the area safer to work in. During a snagging operation, the fallers themselves are exposed to the hazards of falling trees and must take steps to mitigate those hazards. In 2002, a sawyer felling hazard trees on the Missionary Ridge Fire in Colorado died after a tree fell on its own and struck him from behind.

Snagging operations often have at least two objectives: to remove hazard trees that threaten to compromise the fireline and to remove hazard trees that might threaten firefighters working in the vicinity. In an area of timber as thick as Division Y of the Steep Corner Fire, it would not be practical to remove *all* tree hazards. If that were attempted, fire spread would easily outpace the movement of the sawyers. Thus, there is a risk tradeoff between the snagging operation making an area "safer" and the need to move with some rapidity in order to construct effective fireline and contain the fire's spread.

Based on interviews, it is likely that no one on the fireline on Division Y that day viewed it as a safe location, even with the snagging operation underway. Many trees in the area had fallen already, trees felled by the contract fallers and fire-weakened trees that had fallen on their own.[3] It is certain that all firefighters present were highly aware of the risk posed by falling trees, even though the tree that caused the fatality was the first one to fall on its own on that part of the fire that day. It is unknown whether any firefighter identified the fatal tree as a particular hazard prior to the accident.

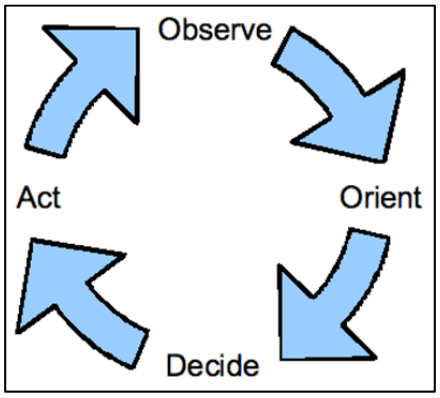
An individual's ability to identify hazards and evaluate risk in their environment is limited by their perceptual abilities as well as their notions about which risks are more significant or likely to cause harm.

In order to be aware of a risk, a person must first be able to detect it. The ability to sense risk is limited by a person's ability to see, feel, hear, smell or taste it. An individual's judgment comes into play when the incoming sensory input is filtered or assigned relative importance through the process of cognition. So there are really two kinds of risk "perception," the ability to sense or detect risk in the first place, and then what or how we think about that risk (how we perceive it to be and what meaning we assign to what has been perceived).

[3] Two months after the accident, a cause and origin investigation team visited the Steep Corner Fire site. The fire had long been contained and no longer smoldered. The team was there on a windy day and, during their time on site, they heard several large trees fall on their own. This experience underscores the fact that fire-weakened trees can fall on their own at any time, even after the fire has been out for weeks.

It is clear that firefighters on Division Y on August 12 had a common understanding of the threat posed by falling trees, but there is another aspect of risk perception: the ability to see, understand and react to a hazard. The wildland fire leadership curriculum describes this process as the Situation Awareness Cycle, which is part of the Decision Making Cycle. Military organizations describe it as the "OODA Loop," which is an acronym standing for Observe, Orient, Decide, Act. It is important to understand the challenges posed to firefighters on the Steep Corner Fire in each of these areas.

To "Observe" something, you must be able to sense it in some way. The primary senses that firefighters use to observe a falling tree are sight and hearing. Sight distances in the area where the accident occurred are variable, with perhaps the maximum distance being 200 feet. In some directions however, it would be difficult to see even 10 or 20 feet due to thickness of live foliage and tree stems. Smoke would also obscure visibility. Firefighters also would be challenged in terms of where their attention needs to be directed at any given time. For example, they have to watch where they are walking so they are not injured in a fall. Therefore, the individual firefighter's ability to scan the environment and identify trees that might be a threat is somewhat limited. Even after a tree begins to fall, because of the density of the vegetation, it may be difficult to predict accurately where it will land.



Humans do not have an unlimited ability to pay attention to everything in their environment. In fact, the attention resources that humans have are limited in a number of different ways. When multiple tasks are performed, aspects of attention that come into play are scarcity of attention resources, allocation of those resources, and relationship to task difficulty.[4] In the Steep Creek drainage, the limited attention resources available to firefighters would have to be allocated between multiple tasks. Just walking in that drainage is difficult due to steep slopes, loose soil, rocks, fallen trees, and brush. Anyone walking there is forced to allocate a significant amount of their limited attention resources simply to avoid falling, because walking is a difficult task in that environment. Once those attention resources are allocated to walking, they are not available for other purposes such as identifying every potential hazard tree in the vicinity or predicting fire behavior. In this situation, people are forced into switching attention between various tasks. To state that a person "lost situation awareness" here would be to ignore aspects of attention that directly bear upon what is attended to, and why.

In the fire environment, on a fire in heavy timber, hazard trees can be very difficult to detect. Potentially, all trees are hazardous.

The recently published "Visual Danger Tree Indicators" poster from the Missoula Technology Development Center contains this statement: "not all dead trees are dangerous; not all green trees are safe." This perfectly sums up the challenge in detecting hazard trees in a forested environment: potentially any tree can pose a deadly hazard.

How easy or difficult it is to perceive something can be somewhat subjective. For example, green western red cedar (*Thuja plicata*) burns in specific ways. Like many other coniferous species, green cedar trees readily catch

[4] Diane L. Damos, ed., *Multiple task performance* (Taylor and Francis, Ltd., 1991).

fire from a creeping ground fire and burn at the base, a process called "catfacing" by wildland firefighters. Older or "decadent" cedars are usually hollow or rotten on the inside. Many trees naturally catface on the uphill side on steep slopes. In some cases, only a hollowed-out area is left to scar the bole of a tree. In others, the entire inside of the tree burns and the tree eventually falls over because it can no longer support itself. This is what occurred on the Steep Corner Fire, both to the tree that caused the fatality and to hundreds of others. If you are in the bottom of a drainage, as the firefighters were on Division Y on August 12, you will be looking up at the downhill sides of most trees. Thus, you would not see a catface on the uphill side of a tree. You would have to go to the tree and look at its uphill side in order to see the catface. Of course, if a tree is still burning, you might be able to observe smoke coming from it. However, if fire has hollowed a tree and caused it to become unstable, it would be very difficult if not impossible to see this from a distance if the tree is no longer on fire.

The ability to hear a threat is also challenging in the fire environment. At the time this accident occurred, several sounds were continual or intermittent in the environment. These included the sound of water running in Steep Creek, the sound of chainsaws running and trees being felled, the sound of the fire itself popping and crackling, and the sounds of radio traffic. The first two of these sounds, water running and chainsaw operations, would tend to obscure the sound of a tree beginning to fall. The third sound, the fire itself popping and crackling, in some ways resembles the cracking sound a tree makes when it begins to fall. In summary, firefighters face some challenges simply observing a tree beginning to fall.

"Orient" is the next step in the OODA Loop. In this step, a firefighter "orients" to the threat, or makes a determination as to where the threat is, how serious the threat is, and where they are in relation to the threat. The time available to orient on a problem is necessarily limited by the time required to simply observe it in the first place. Given the conditions present in the fire environment, it is often difficult to both observe and orient on a problem quickly enough to take effective action.

In some situations, a person has a single chance to decide and then act. There is no opportunity to reconsider or make a different decision.

In such a situation, when there is a deadly threat, a single wrong decision can be fatal. Should I go this way, or that way? Should I hide behind something or run? It is possible to Observe and Orient on a situation correctly, and still make a less-than-optimal decision.

The next step is to "Decide" what to do. At any given point in time, various courses of action are available. The amount of time it takes to Observe and Orient on a threat can limit the number of feasible options available. Typically, the number of options available decrease with the passage of time. In the case of a falling tree, the following choices may be available: stay where I am, because I don't think the tree is going to hit me; move to a location where I don't think the tree will hit me; and get behind something that can shield me from the impact of the falling tree. The decision hinges on an ability to predict accurately what will happen in the future: precisely where is the tree going to land?

The "Act" step is where you put it all together and do something, based on what you observed, how you oriented on the problem, and what you decided. When the tree that caused the fatality began to fall, firefighters probably had five seconds to traverse the OODA Loop. They needed time to observe that a tree was beginning to fall, orient on where it was, and predict where it was going to fall. It is unknown how much time this took, but it is known that firefighters made the decision to run and acted upon that decision. Logically, they would run in a direction

that they thought would take them away from the location where the tree was going to land. However, a tree falling in thick timber can be deflected from its normal arc to the ground. This would render a firefighter's prediction about where it was going to fall inaccurate. When the fatal tree fell on the Steep Corner Fire, it knocked over another tree as it fell. That second tree likely confused firefighters as to which tree was a threat and made it more difficult to predict accurately where either tree was going to land.

An increase in the level of firefighter exposure to hazards can occur gradually or suddenly. When the exposure level increases gradually, it can be difficult to detect.

As firefighters move or as the fire behavior or weather change, conditions surrounding firefighters change. If these changes are subtle, they may be hardly noticeable. For example, if a fire is burning with average 1-foot flame lengths, and suddenly the flame length increases to 8 feet, most people would notice very quickly. However, if flame lengths transitioned from 1 to 2 feet over the course of two hours, it would be more difficult to detect.

Another aspect of risk perception or situation awareness that is pertinent to this accident relates to how the crew approached the area in which they would be working. To some extent, they were dealing with the familiar. August 12 was the third day on the fire for five of the seven E-31 firefighters. However, as they worked downhill and got farther into the creek bottom, the vegetation changed subtly. There was no vegetation in the clearcut at the top of the Division. At the edge of the clearcut, the conditions abruptly transitioned to heavy forest. Proceeding lower on the hill and into the creek bottom, the vegetation becomes even thicker with more cedar. This transition may be subtle, going from thick vegetation to very thick vegetation. As firefighters worked downhill, they could have made this transition without really recognizing it.

A firefighter's choice, conscious or unconscious, to focus attention on one thing or another is governed by a number of factors. Focusing on one risk may lessen or eliminate a focus on others

Firefighters continually make choices about which risks are worthy of their attention. This likely is based on an assessment of which risks are likely to cause them harm. It is probable that risks that firefighters can see, hear or sense in some other way are deemed more likely to cause harm – and thus worthy of more immediate attention – than risks they cannot detect.

A final aspect of risk awareness on the Steep Corner Fire, right before the accident occurred, may be important. Firefighters near the accident focused on several things just prior to the tree falling. The first was a bucket drop on a tree that was on fire. The second was a group of firefighters throwing dirt on the tree that was on fire so the fallers could cut it. The third, immediately prior to the accident, was the fallers cutting that tree and two other hazard trees. Regarding the first activity, it is good risk management to pay attention to bucket drops if they are occurring nearby since they can pose a hazard if the drop is off target or if it dislodges rolling objects on a steep slope. For the second activity, throwing dirt on flames, it is necessary to focus attention on the task, which prevents one from simultaneously focusing on identifying other hazards in the environment, at least momentarily. For the fallers cutting trees, the act of everyone in the vicinity focusing on that activity was also a form of risk mitigation. When a sawyer is felling a tree, it is reasonable to predict that the tree will soon fall and that there could be associated hazards such as flying debris or domino falling of nearby trees. It might even injure the faller, which would require firefighters to respond with medical attention. In this case, a nearby firefighter would be

directing attention towards a known threat, as opposed to an unknown, lower-probability threat of a random tree falling in the forest.

The OODA Loop can be applied to organizational decision-making too. When the Steep Corner Fire started in the logging unit, C-PTPA and the timber company observed an imminent threat to valuable timber resources. A great deal of timber lay in the unit itself, already harvested and yarded into log decks for transport. The log decks in the unit itself represented a sizeable investment, one that would literally go up in smoke if the fire grew and that would threaten current profitability. Additionally, a growing fire might threaten other timber not yet harvested. In the words of one interviewee, timber company employees were trying to "save their livelihood." Finally, if the fire continued to spread, suppression costs would grow, especially if it spread onto lands owned by others. This would run counter to C-PTPA's values and mission: to protect Idaho's timber. C-PTPA and the timber interests it protects had a number of very good reasons for wanting to put the fire out as rapidly as possible.

As C-PTPA oriented on the Steep Corner as a problem fire, they recognized the very real nature of the threat the fire posed and decided to order resources that they typically do not use: federal firefighters and aviation resources. They applied those resources in an attempt to achieve their objectives.

Risk acceptance is related to individual or group determinations regarding how much risk is "too much," as well as calculations around which risks are more likely to result in harm. Many factors can influence this determination and the acceptance of risk can be either tacit or overt. Most firefighters intuitively understand that wildland firefighting is a hazardous occupation. Federal firefighters receive additional wages when they accept risk, wages known as Hazard Pay. Non-federal firefighters do not receive this type of pay, which may actually produce part of their value set ("We don't get hazard pay because this is our normal job. We are already paid to accept risk as a normal by-product of work in this environment; nothing unusual here.")

Firefighters are paid to accept risk. Some organizations provide "hazard pay" while in others, risk acceptance is just part of the job. How much risk firefighters accept represents a judgment call at both the individual and organizational levels.

All Forest Service firefighters on the fireline on the Steep Corner Fire received Hazard Pay until the fire was controlled. In essence, the Forest Service pays its employees to accept risk, although it trains them extensively in the various means and methods of mitigating the recognized hazards.

If firefighters were to accept no risk at all, they would not be firefighters and no firefighting would be accomplished. However, society-at-large and the federal government have determined that we will have wildland firefighters who will accomplish the mission of wildland firefighting. Thus, the definition of safety for wildland firefighters must involve "the reasonableness of risk." This can be both an individual and group determination, and is necessarily subjective. What appears to be a reasonable risk to one person may appear unreasonable to another, based on each individual's training, experience, motivation, and culture.

A number of different kinds of risk are present on any wildland fire. Risk is commonly characterized as a function of both probability and severity: is an accident likely to happen and if so, how severe will it be? In wildland firefighting in general, the probability of a firefighter being injured may be fairly high. There are many sprained ankles and lacerations. The probability of a firefighter being killed, however, is fairly low. In the history of wildland firefighting since 1905, there was no documented wildland firefighter fatality in or near the location of the Steep

Corner Fire, although many fires have occurred there. Some parts of the country have a long history of fatality fires in the same geographic area or even administrative unit. That is not the case in this area, and the absence of historic fatality fires here may have led to a willingness to accept risk given the low probability of a severe outcome, based on history. At any rate, some level of risk acceptance is recognized as necessary to conduct the wildland firefighting mission. How much risk is "too much"?

Risk acceptance always involves risk tradeoffs.

Accepting one kind of risk may lower another kind of risk. For example, speeding up to pass another car may minimize your time in the passing lane where the risk of a head-on collision is greater.

Another aspect of risk acceptance has to do with timing. Accepting one risk now may lead to lower risk later. Not accepting a risk now may lead to more risk later. In wildland firefighting, these risk tradeoffs are very evident in the decision about whether to use direct or indirect tactics. C-PTPA firefighters on the Steep Corner Fire recognized this and decided to use direct tactics. Fire intensity on the north side of the fire was low on August 12, so it was possible to "go direct." Not only was it possible, but from a risk perspective, it seemed to make the most sense. Why back off to the ridge top another 200 yards to the north if you didn't need to? Not only would that lead to more loss of timber, which is against C-PTPA values, but it also might lead later to more risk exposure to firefighters if the fire made an uphill run to the ridge. In attempting to hold the fire on the ridge, firefighters would be exposed to almost exactly the same hazards they would be exposed to in the creek bottom: falling trees, fire behavior, heat, and so on. C-PTPA firefighters considered these things in deciding to use direct tactics.

Even before this decision, fire managers made other decisions that directly influenced whether and how the fire got into the Steep Creek drainage in the first place. On the nights of August 10 and 11, C-PTPA firefighters decided not to staff a night shift on the Steep Corner Fire *for safety reasons*. If the downhill side of the Steep Corner Fire was unsafe during the day, it would be even less safe at night. C-PTPA incident commanders decided to staff only a "night patrol" limited to the road system on the nights of August 10 and 11. Unfortunately, this had the result of allowing the fire to spread at night, which it did with some gusto on both nights. Although firefighters made progress toward containment during daytime on August 10 and 11, that progress was lost as the fire spread outside containment during the night and burned additional acres. Each morning, a new fire dilemma awaited fire managers because of a risk decision not to staff the fire at night. C-PTPA managers indicated they would not have made this decision "20 years ago" because the aggressive drive to protect timber would have led to staffing of a night shift regardless of the hazards.

Organizational cultures and mental models play important roles when it comes to the acceptance of risk. For C-PTPA, their mental model[5] and history is all about keeping fires small. In the past 20 years, they experienced around 1,850 fires that burned about 1,600 acres total. When fires are kept small, overall exposure of firefighters to hazards is also kept low, at least in the short term. However, when a fire such as the Steep Corner Fire cannot be kept small, exposure to hazards escalates as fire size and complexity increases and more firefighters are committed. Since this happens infrequently, C-PTPA may not have a model within their organizational culture for managing larger, more complex fires. If such a model does exist, it has not been exercised in the recent experience of most people on the Steep Corner Fire.

[5] Philip N. Johnson-Laird, *Mental models and deduction*, TRENDS in Cognitive Sciences, 5, no. 10 (2001), 434-442.

If an organization's stated goal is to keep fires small, it begs the question "what happens when a fire doesn't stay small?" As the Steep Corner Fire escalated in size and complexity, the organizational response and Leader's Intent was slow to change accordingly. Objectives and tactics were nearly identical on Day 3 to what they were on Day 1 during initial attack. This may have led to an inadvertent increase in the acceptance of risk on the part of the organization, as essentially the same approach was attempted repeatedly even in the face of changing conditions.

Without a history of working together, organizations that attempt to conduct complex operations face difficult challenges in accomplishing operations effectively.

C-PTPA's fire management model is to suppress fires as rapidly as possible and keep them small. The organization is very successful at this the majority of the time. Because of this, most C-PTPA personnel had limited recent experience working in complex air operations, or working with aircraft other than those contracted by their own organization.

One artifact of a wildland fire organization's willingness to accept risk is its preparedness to respond to medical emergencies. In theory, if an organization considers a certain contingency to be likely, the more prepared it will attempt to be for that eventuality. C-PTPA employs a number of personnel who are trained and equipped Emergency Medical Technicians. Under the best circumstances though, extraction of an injured firefighter from the area where the accident occurred would have been difficult and time-consuming. There was no landing area for a helicopter nearby and the forest was closed canopy on a steep slope, with no natural openings to accommodate any kind of helicopter external load operations. Without a landing area for a helicopter and with no hoist or long line extraction capability, any medical evacuation was destined to take a long time. The artifact of not having an effective medical evacuation plan in place could imply an assumption that nothing very bad was likely to happen. Helicopters that were on scene at the time of the accident were committed to other missions and thus not available to perform a medical evacuation immediately even if a landing area had been available.

This situation is not unusual for a fire of this size and complexity. In fact, many initial and extended attack fires do not have readily accessible medevac landing sites. The risk of not being able to quickly perform a medevac, if firefighters are committed, is traded off against the risk of not being able to initial attack the fire, if firefighters are not committed.

Although a medical evacuation was not necessary for this accident, it still took nearly 2½ hours for the designated helicopter to depart the fire, land in Orofino, refuel, remove seats, put EMTs on board, return to the fire, and travel to Headquarters, Idaho. The impromptu extraction helispot that was built immediately after the fatality never was suitable for landing a helicopter. At best, it was a marginal sling spot even after fallers cut down dozens of trees.

The recovery operation for the fallen firefighter itself illustrates specific aspects of human behavior. Not all personnel on the fire or at other off-incident locations immediately recognized that there had been a fatality. This is at least in part because, in the words of one of the firefighters present, "I guess we were hoping that maybe it wasn't a fatality." Radio traffic was not clear text on all channels used on the incident, so the channel you were monitoring dictated what information you did or did not have at any given time. People knew someone had been hurt, but not everyone knew just how bad it was. Thus in the initial stages of the recovery operation, Life Flight was ordered even though there was no living patient and no area suitable for a Life Flight helicopter to land (the order was subsequently cancelled).

A sense of urgency seemed to drive all of those involved in the recovery, even though fire spread did not threaten the accident site. No doubt, none of the firefighters at the accident site wanted to linger there, given the fact that it had just proven to be an extremely hazardous location. Jumping into the new mission likely gave firefighters a sense of purpose, which they badly needed immediately after losing one of their own. Finally, it was more natural for firefighters to operate as though this were a medevac, because most firefighters have been involved in and trained for medevacs in the past. Few firefighters have been involved in a recovery operation for a fallen firefighter, or trained for it. Many individuals displayed admirable leadership during the recovery, under extremely difficult conditions.

Organization and Culture

The photos above are of two different kinds of hose fittings. The one on the left is a ¼-turn quick-connect fitting, used by some non-federal fire departments in the U.S. and in other countries such as Canada. The one on the right is an NPSH, or "threaded" fitting, of the type used by federal wildland fire management agencies in the U.S. Without the right type of adapter, these two hose fittings are incompatible; they will not fit together.

On the Steep Corner Fire, one organization (C-PTPA) uses quick-connect hose; the other organization, the Forest Service, uses NPSH hose. This basic incompatibility – they could not even connect lengths of hose together without an adapter! – seems a perfect metaphor for the mismatch of organizational cultures on the fire. The adapter is another metaphor: was there an "adapter," one or more individuals who helped the organizations work together? Whether or not the cultures of the two different organizations were compatible, and whether or not there were "adapters," may have no bearing on whether or not this accident happened. Trees can and do fall on their own, regardless of what kind of management system may be in place. But because cultures are so readily apparent, some discussion of them is necessary. Focus on these issues may be more useful in preventing the next accident than the last one.

In January 2006, Chief of the Forest Service Dale Bosworth committed the agency to a set of Foundational Doctrine principles for fire suppression. The first doctrinal principle reads as follows:

The Operational Environment

> *No resource or facility is worth the loss of human life, however the wildland fire suppression environment is complex and possesses inherent hazards that can – even with reasonable mitigation – result in harm to firefighters engaged in fire suppression operations. In recognition of this fact, we are committed to the aggressive management of risk.*

This statement sums up what most experienced firefighters feel: given the hazards in the wildland fire environment and the complexity of fire operations, a risk level of zero is unachievable. If this logic is accepted,

then the issues become a) what is "reasonable mitigation," b) what is "acceptable risk," and c) who gets to define those things?

Organizational Culture is important because members of several different organizations participated in suppression efforts on the Steep Corner Fire. Culture has been loosely defined as "the way we do things around here." More formally, organizational culture has been described as "the collective behavior of individuals that are part of an organization." The degree to which culture shapes how people and organizations decide, act, communicate, and work with others is worthy of examination. Organizational cultures likely had some influence on the management of the Steep Corner Fire.

People from four organizations were present on the ground on the Steep Corner Fire on August 12. These organizations were the U.S. Forest Service, the Clearwater-Potlatch Timber Protective Association (C-PTPA), the Idaho Department of Lands, and a logging company (Dabco). Adding aviation resources to the mix increases the number of organizations, as a different contractor flies each individual aircraft. An interagency mix of this type is not unusual, even on smaller wildland fires.

For the purposes of this analysis, we will focus on C-PTPA, the organization that was managing the fire at the time of the fatality, and the Forest Service, whose employee died in the accident. Each of these organizations has its own culture. Organizational culture likely plays a significant role in shaping how individuals decide what behavior is appropriate for a given situation. Significant differences in organizational cultures can lead to conflict between individuals and organizations, or at least create barriers to communication. Even within the same organization, subcultures can exist that differ from one another. The experiences of the members of each culture shape how they view their own organization as well as other organizations.

Many scientists have conducted years-long studies of organizational culture and written lengthy treatises on the subject. It is not possible in the context of an accident investigation to undertake an in-depth study of the organizational cultures present. This analysis is necessarily somewhat superficial and cursory, but still may shed some light on some of the cultural dynamics that were present on the Steep Corner Fire. Characterizations of individual organizational cultures are based on the observations and comments of people present on the fire and information in the public domain.

Edgar Schein, a professor at MIT's Sloan School of Management, has described various attributes of organizational culture.[6] The first is *artifacts*, or things that can be seen and heard and that may give clues to the underlying culture. For example, the use or non-use of Personal Protective Equipment (PPE) would be an artifact. *Values* are another aspect of organizational culture. Values are often stated by agency leadership and reflected by individual employees. For example, the fire suppression doctrinal statement at the beginning of this analysis is a statement of Forest Service values. *Assumptions* are another attribute that Schein uses to describe organizational culture. Assumptions are unseen and perhaps not recognized as they function to shape individual or organizational behavior. Assumptions may also be "unspoken rules."

Schein's attributes of organizational culture are useful in attempting to understand how organizations and individuals behave. It is possible to understand how an organization can say one thing and do another, e.g., how an organization can profess "safety first" while routinely exposing employees to significant hazards. An organization may state that its highest value is the safety of employees (Values) but employees recognize that "we are going to fight this fire no matter what" (Assumptions).

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[6] Edgar H. Schein, "Organizational Culture," *American Psychologist,* 45, no. 2 (February 1990), 109-119.

Organizations have differing philosophies and values.

As evidenced by statements on their public web sites, the two primary organizations at the Steep Corner Fire had differing values and philosophies.

- The Forest Service motto is "100 years of caring for the land and serving people."
- C-PTPA's motto is "Protecting Idaho's timber since 1905."

These slogans are clues to the values of each organization. Clearly, each organization takes pride in its 100+ years of existence. However, "caring for the land and serving people" is significantly different from "protecting Idaho's timber." At a fundamental level, these organizations possess very different value sets, which in turn influence the culture of each.

Digging a little deeper, C-PTPA's website states, "The Clearwater-Potlatch Timber Protective has become a highly mobile, economical, initial attack organization that prides itself on keeping fires small." It also declares, "Wildfires are started either by nature or by humans and need to be suppressed."

The Forest Service's public Fire and Aviation Management website states, "science has changed the way we think about wildland fire and the way we manage it. We still fight it, especially to protect communities and the resources people need—but we also use it to make forests and grasslands healthier and to protect communities and natural resources, especially clean, abundant water."

An oversimplified summary of the above might conclude that the C-PTPA exists to protect timber by keeping fires small. Forest Service Fire and Aviation Management exists to manage fire to accomplish a variety of different resource objectives. These are two very different organizations with very different missions, yet paradoxically they are also "cooperators." The Steep Corner Fire saw a confluence of mission that was easy to understand without a lot of discussion: suppress the fire. The organizational culture and mission of C-PTPA drove the chosen strategy: to suppress it as quickly as possible with the smallest perimeter using direct attack tactics.

One aspect of organizational culture is the safety culture of an organization.

Safety cultures are defined in different ways but all organizations involved in risky work in hazardous environments possess them. Visible markers as well as overt statements offer clues to the safety culture of an organization.

The Forest Service's first fire suppression doctrinal statement, quoted earlier in this analysis, mentions a commitment to "the aggressive management of risk." Public statements about safety in fire operations could not be found for C-PTPA but employees of several organizations stated in interviews that individuals within the C-PTPA organization personally espouse safety as an important value. All fire organizations place a high value on safety, for a variety of ethical, legal, and moral reasons. However, no fire organization has "being safe" as its *only* objective. Across all types of organizations, safety is recognized as a "cost to production."[7] In other words, safe mission accomplishment can be defined as achieving a workable balance between safety and mission. Individual employee creativity plays an important role in this.

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[7] Erik Hollnagel, *The ETTO Principle: Efficiency-Thoroughness Trade-Off* (Ashgate Publishing, Ltd., 2009).

Artifacts of the different organizations' safety cultures were apparent on the Steep Corner Fire. Perhaps the most visible of these was the use and non-use of Personal Protective Equipment (PPE). Forest Service firefighters arrived on scene clad in the PPE required by their employing agency, including flame resistant shirt and pants, hardhat and fire shelter. C-PTPA employees, in contrast, wore hardhats but none of the other typical wildland firefighter PPE, contrary to their employing organization's requirements. In interviews, this was characterized as "complacency." They had PPE there but were not using it, even on the second or third day of the fire. This is likely better described as "normalization of deviance"[8] or "practical drift." When a risk is accepted (in this case, not wearing PPE), it may gradually become a "new norm" in the culture after the passage of time when there are no adverse consequences.

This very visible difference in artifacts between the two organizations' employees almost certainly led to assumptions on the part of members of each organization about the value sets of the other. It may be that C-PTPA members viewed the Forest Service employees as unnecessarily bound by regulations and requirements, wearing protective equipment that wasn't really needed. Forest Service employees may have viewed C-PTPA employees as far too risk-tolerant. If they were able to ignore basic PPE requirements, what other safety requirements or guidelines might they ignore? This is certainly the view held by the Forest Service hotshot crew that was on the fire on August 11.

Organizations with different philosophies, values, and safety cultures can be in a position where they have to work together.

On the Steep Corner Fire, two organizations with different cultures must work together under difficult and stressful circumstances, but they have little experience working together on fires of this complexity.

A significant aspect of the Steep Corner Fire is that two organizations with different organizational cultures were working together on the ground for what was essentially the first time. Although the Forest Service and C-PTPA cooperate on a number of administrative issues such as the dispatching of C-PTPA resources out of region, they do not typically fight fire together at home. Numerous interviewees stated that this was the first fire in their experience – some of it dating back 30 years – on which the two organizations had ground firefighters on the same fire. The last time C-PTPA hosted an interagency Incident Management Team on one of their fires was in 1996, 16 years before the Steep Corner Fire. Many individuals also stated that their general view was that the working relationship between C-PTPA and the Forest Service was a good one. In essence, the two organizations co-exist and get along well in certain administrative contexts, but rarely if ever fight fire together.

The rarity of combined fire operations practiced by the two organizations, each possessing distinctly different organizational cultures, has implications. An often-quoted military adage is "train like you fight, fight like you train." Some well-known failed military operations of the past have involved units that were expected to conduct complex operations together, even though they had never or rarely worked together before.[9] Working together on a regular basis helps organizations and individuals understand the operational nuances and motivations of

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[8] Diane Vaughan, *The Challenger Launch Decision: Risky Technology, Culture, and Deviance at NASA* (Chicago: The University of Chicago Press, 1996).
[9] Scott A. Snook, *Friendly Fire: The Accidental Shootdown of U.S. Black Hawks Over Northern Iraq* (Princeton, NJ: Princeton University Press, 2000).

other organizations. This backdrop was absent on the Steep Corner Fire because C-PTPA and the Forest Service almost never work together on local fires. Some of the firefighters knew each other socially, but working together was another matter. Essentially these organizations are "cooperators in spirit" when it comes to local firefighting operations.

Another artifact of the lack of a history working together related to the use of aircraft on the Steep Corner Fire. Although a fixed-wing platform with Air Tactical Group Supervisor (ATGS) was over the fire at most times during the first three days, C-PTPA made little or no use of this resource as it is typically employed by federal and state wildland fire agencies. This is likely because they had little or no experience using this resource. One of the helicopters and its pilot is a C-PTPA resource that works extensively with C-PTPA ground firefighters. This has likely led to the development of a "comfort zone" for these resources when working together. No such comfort zone existed for the other aircraft and pilots who had never worked with C-PTPA before. Since most of C-PTPA's fires are kept small, they rarely involve complex air operations with multiple aircraft. Air-to-ground communications, target descriptions and general use of aircraft were not in accordance with what pilots used to working on federal wildland fires would expect. This led to high stress levels for some pilots working the fire and resulted in a SAFECOM being filed by the manager of a heavy helicopter on August 11.

Members of organizations tend to communicate with each other in ways accepted within their own organizational cultures. This can be very different from what is acceptable within other organizational cultures.

Because C-PTPA typically works on small fires with only the people from their own organization, they have developed ways of communicating that might seem confusing to people from other organizations.

Radio communications represent yet another cultural artifact of the organization managing the Steep Corner Fire. C-PTPA employees have designated call signs, which are a set of unique numbers, as well as names. On the Steep Corner Fire, employees used these interchangeably. For example, one transmission might refer to someone as "27" and the next would call him "Dave." Adding to the confusion, a transmission might also use a person's incident title, such as "Steep Corner IC." This is not unusual on small wildland fires where the organization is composed of people from the same organization who are used to working together. Even on larger fires, people who are in frequent communication with each other sometimes use first names.

It is likely that the practice of communicating over the radio this way had evolved over time as C-PTPA employees worked with each other on small fires that typically do not escalate in size or complexity. As the Steep Corner Fire grew and unfamiliar resources arrived on the ground and in the air, this method of communication led to some confusion. C-PTPA personnel stated that they used call signs when communicating with their own people but used names when communicating with "adjoining resources." On a small fire, however, all resources can hear most of the tactical radio traffic. People who do not recognize individuals by their voices or know specific call signs will naturally be confused when hearing this type of radio traffic. If this way of communicating is an artifact of organizational culture, then it almost certainly relates to the kind of fires and the kind of fire organization that C-PTPA normally experiences.

Intent

Intent, also known as Leader's Intent, is a concept typically associated with the exercise of leadership. Clear communication of Leader's Intent is a fundamental leadership responsibility. According to the National Wildfire

Coordinating Group publication *Leading in the Wildland Fire Service*, Leader's Intent "provides the foundation for ensuring that tasks are fully understood." Leader's Intent is frequently broken down into Task, Purpose, and End State. The NWCG Incident Response Pocket Guide (IRPG) contains the following description of Leader's Intent on page ix:

- Task = What is to be done
- Purpose = Why it is to be done
- End State = How it should look when done

On a complex incident, the Incident Objectives in the IAP often state the Leader's Intent. The Incident Objectives ICS-202 in the Steep Corner IAP for August 12 were:

- Ensure firefighter safety
- Minimize loss of timber resources

Clearly, the strategy of minimizing loss of timber resources was in direct alignment with the values of C-PTPA; they cannot "protect Idaho's timber" by using indirect tactics and allowing large timbered areas to burn. Given the organizational values of C-PTPA, use of direct tactics was the only available strategy for managing this fire. No other approach was ever seriously considered.

The Division Assignment ICS-204 for Division Y described the tactics: "Hold constructed line and continue line construction to the south toward the Y/Z division break." Operational briefings were minimal on the Steep Corner Fire, yet it is likely that these objectives, as well as overall Leader's Intent, were fairly evident to all firefighters present. The intent was to keep the fire as small as possible, using direct tactics. Later, intent was communicated verbally on Division Y as "hold the fire in Steep Creek," which is what the crew was attempting to do when the accident happened.

Leader's Intent regarding how to "ensure firefighter safety" is a bit less clear. The ICS-202 lists the following under "General Safety Message":

- Steep slopes
- Rolling material
- Snags
- Overhead hazards
- Dehydration

The Safety Message in the August 12 IAP is a reprint of a "6 Minutes for Safety" message about hydration. It is clear that the organization managing the fire recognized significant environmental hazards on the Steep Corner Fire. Based on extensive interviews, it is also clear that the fire management organization and individual firefighters took various steps to mitigate those recognized hazards.

It may be informative to attempt to fashion a Task, Purpose, End State statement for the Steep Corner Fire for each of the stated objectives. For the "Minimize loss of timber resources" objective, it might look like this:

- Task = Contain the fire at the smallest possible size
- Purpose = Minimize the loss of high dollar timber resources
- End State = Fire is contained/controlled at the earliest date and smallest acreage possible

The objective to “Ensure firefighter safety” might look like this:

- Task = Effectively mitigate exposure to hazards
- Purpose = Minimize firefighter injuries
- End State = Everyone comes home

The two incident objectives for August 12 indicate how easy it can be to state intent, but how hard it can be to deal with intents that conflict with each other. Obviously, these two objectives are in conflict with each other and risk tradeoffs abound in reconciling them. Containing the fire at the smallest possible size may lead to *increased* exposure for the firefighters on the fire at the time. However, it could also lead to *decreased* firefighter exposure later, if the fire is controlled at the earliest date possible. Exposure to some hazards may be increased in the short term, if direct tactics are used in creek bottoms with fire-weakened cedars present, but exposure to hazards may be decreased over the full term of the fire if its spread can be checked in the creek bottom where it is naturally wetter. The “best” approach may only be evident in hindsight.