



Frog Fire Fatality

Learning Review

Preliminary Report - Narrative

Modoc National Forest – July 30, 2015



"If this accident didn't happen, I wouldn't have any sense of the danger we were in."

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This is a preliminary report of the Frog Fire Fatality. This report contains the narrative and timeline which was developed during the data collection phase of the Learning Review. The Learning Review will next complete a sensemaking phase which will be followed by a Learning Review Board. Upon the Chief’s approval of the Learning Review Board’s recommendations, the final report will be released.

Learning Review Team Members:

- | | |
|---------------------------------|---|
| Mike Dudley (CRP Response Lead) | Randy Draeger (Learning Review Team Lead) |
| Joe Harris | Kevin Pfister |
| Don Boursier | Tony Petrilli |
| Curtis Heaton | Ruth Spradling |
| Shoshana Cooper | Joe Duran |
| Chris Boehm | |

Cover photo: Terrain around fatality site.

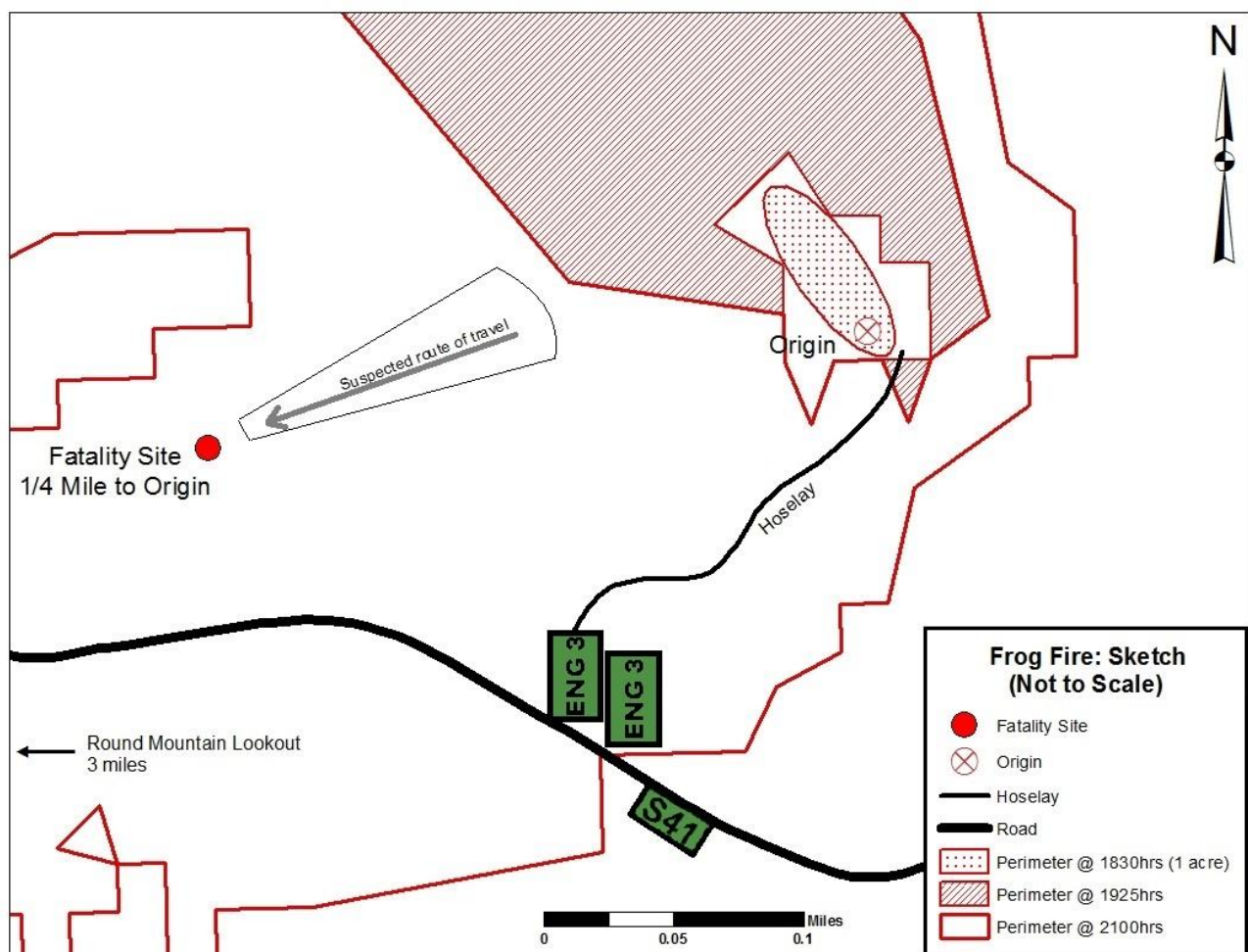
Executive Summary

On the evening of July 30, 2015, 38 year-old Black Hills National Forest Engine Captain, David “Dave” Ruhl, while scouting on foot during initial attack of the Frog Fire on the Modoc National Forest, was entrapped and killed. A Coordinated Response Team was convened with a delegation of authority from the US Forest Service Washington Office. The Team included a diverse cadre of members who were asked to understand the circumstances which led to this fatality and produce a report.

The scope of this report is to tell the story of events surrounding the death of Dave Ruhl based upon information collected through site visits and interviews. The team gathered and analyzed photos, videos, maps, dispatch logs, incident documentation, weather data, and other resources. Working with subject matter expert focus groups and academia, additional analysis of the conditions and sense making associated with these events will be presented in the future.

All names in this narrative are fictitious other than the deceased.

Frog Fire Sketch



The Story

The Frog Fire was started by a lightning strike recorded at 1732 on Thursday, July 30, 2015. Two storm cells were located near the fire and were reported to be small, light in color with virga, and difficult to pick out from under the tree canopy. Initially, the fire grew to the northwest at a relatively moderate rate influenced by the collapse of a southeasterly storm cell. Approximately one hour after ignition, the fire quickly spread toward the northwest as outflow winds increased to 9 mph with gusts to 28 mph from the southeast.

Outflow from a second storm cell located to the northeast of the fire caused a sudden wind shift to the southwest. This change in wind direction was felt directly on the fire line around 1930. The transition of winds created a powerful head fire running southwest with torching, spotting, and intermittent crown runs with flame lengths calculated between 20 - 80 feet.



Figure 1: Representative terrain and vegetation conditions.

Background

Situated in northeastern California, the Modoc National Forest is a land of contrasts, with an ecologically diverse landscape ranging from timbered mountains to high desert plateaus. The rugged landscape formed from expansive prehistoric lava flow is marked with areas of rough, broken lava rock ridges surrounded by deep basins. The term “lava reef” was developed locally on the Modoc to describe these volcanic flow structures, commonly 20 to 30 feet in height. Walking over them is deceptively difficult. Lightning ignites the majority of the 100 (on average) wildfires consuming an average of 14,200 acres annually. The Frog Fire was no exception. “What an ugly place to have a fire.”

Composed predominantly of ponderosa pine, scattered juniper, manzanita, bitter brush, and grasses, “gasoline alley” was primed for fire on the afternoon of July 30, 2015. No red-flag warnings were issued. The scattered clouds offered little relief from the 94° F temperatures, 9° F above the average high for

that time of year. Relative humidity measured 13 percent. South-southwest winds at 5 miles per hour, gusting up to 12 miles per hour, were recorded at a nearby remote automated weather station. Live fuel moisture in the bitterbrush, known locally as “plant-based gasoline,” was measured at 113 percent, making for volatile fuel conditions that Thursday when lightning struck.

The Modoc is managed by a Forest Supervisor and two District Rangers covering the four ranger district offices. All three line officers have been in place for approximately one year. The forest-level fire organization consists of Chief 1 (Forest Fire Management Officer), Chief 2 (Deputy Forest Fire Management Officer), Chief 3 (training) and Chief 4 (fuels). Chiefs 1 and 2 have been on the forest for many years.

The Forest has two fire zones managed by a Division Chief (District Fire Management Officer) who reports to a District Ranger. Each Division Chief has two Battalion Chiefs (Assistant District Fire Management Officers) and a Fuels Specialist. The East Zone Division Chief has been with the Forest Service for just over a year, but has a high level of local experience with another federal agency. The west zone has had a series of detailers due to transfers. The West Zone Division Chief is new (in place for about 3 weeks). Both West Zone Battalion Chief positions were filled with detailers going into the fire season. The west zone fire program experienced a high amount of turnover at the management and module levels, so detailers, new employees and ongoing vacancies were commonplace.

Dave Ruhl was detailed into one of the Assistant District Fire Management Officer positions for the west zone of the Modoc National Forest. His call sign was Suppression 41. Dave’s permanent position was engine captain on the Black Hills National Forest. During the almost seven weeks Dave worked in this position, he clearly articulated his goal of getting his ICT3 task book signed off to his supervisor. Dave was looking to advance his career, and this qualification was required for his next step.



Figure 2: Aerial view of fire origin and fatality site

The following account depicts how these conditions unfolded for the initial attack firefighters on the Frog Fire. To begin the story, multiple perspectives are used to illustrate the firefighter's different initial perceptions based upon their arrival times, means of travel and past experiences. Once all initial attack resources are on scene, the story transitions into one narrative.

At 1746, mere minutes after the extended staffing call was broadcast across the radio frequencies, the lookout spotted blue smoke drifting upward through the trees about 4 miles east-southeast from his perch at the historic Round Mountain Lookout tower. Initial attack resources immediately dispatched included two type-3 engines and a helicopter with five helitack crewmembers onboard.

Perspective 1: "Just a normal fire"

Perspective 1 Fire Behavior Observed

1 acre with 10'x10' spot

Erratic southwest winds

2-3' flame lengths

East flank actively burning

1828 The local engine positioned at a nearby guard station arrived first on the Frog Fire. Henry was serving as the engine captain that day. He regularly worked as the engine operator and was a qualified Type 5 Incident Commander (ICT5). Eager to paint a picture of the fire, Henry jumped out of the engine and headed cross-country toward the smoke while the engine worked its way down the road to find a better parking spot. He assumed the role

of IC and reported the initial size-up for a one-acre fire and a 10' x 10' spot fire burning with two to three foot flame lengths in manzanita and bitterbrush with a ponderosa pine over story. True to the lookout's recently broadcast observations, the fire was being influenced by erratic southwest winds.

After taking several laps around to scout the small fire, Henry thought, "Okay, once we get people on this, we can get it." It was "just a normal fire." He observed there was not a well-defined head to the fire and felt comfortable engaging. To the south of the small spot fire, a lava reef made a natural barrier, checking the fire's spread. The western side was smoldering and eastern side was active. It made sense to encompass the spot and main fire together. Henry directed the sawyer to anchor to the reef and cut saw-line through the thick brush on the hotter, eastern flank of the fire. Meanwhile, two other engine crewmembers started to build a hose-lay from the engine. The hose lay progression was slow and difficult as they negotiated the broken, rocky and brushy terrain extending 800 feet from the engine to the reef, considered the heel (anchor point) of the fire.

Henry heard the helicopter arrive overhead. By 1841, less than 15 minutes after arrival, he radioed dispatch to report increased activity on the west flank with a thunder cell in the area "giving down drafts" and creating erratic winds on the ground. He updated the fire size to two acres with a ¼ acre spot. Sensing a need for additional resources, and knowing a crew and an engine were on their way; Henry ordered more resources, including tenders, because water would be critical. Shortly afterward, the second engine arrived on scene.

Perspective 2: “Fire was pretty straight forward”

Perspective 2 Fire Behavior Observed

2 acres, ¼ acre spot

No wind

1-2’ flame lengths

No defined head or heel

West flank actively burning

1848 The second resource on scene was an off-forest engine that had been pre-positioned on the Forest for the past week to help with initial attack. They had been at the lookout tower to get a better vantage of the area when the smoke was identified. After successfully navigating the spider web of unmarked roads, the second engine arrived on scene. It was sunny, and a few puffy clouds were visible from the ground.

The Captain of the off-forest engine, Ryan, incorporated the two crewmembers from the local engine into his crew and continued the construction of 800 feet of hose lay through the green toward an anchor point on the fire. At this time, the west flank was noticeably the hottest part of the fire so the decision was made to extend the hose lay to the east following the reef. Ryan made his way along the hose lay. He felt pretty comfortable at this point because they were establishing a good anchor point and committing resources where they would do the most good. This feeling didn’t last long. As the interior heated up, Ryan noticed the wet line was not holding in places, so he stopped extending the hose lay, already an additional 700 feet beyond the anchor point, and focused on holding the wet line. About this time, the helitack crew arrived and was directed to start digging hand line.

Perspective 3: “Fire is starting to take off”

Perspective 3 Fire Behavior Observed

7 acres

Erratic winds

Active on all flanks

Trees torching

1838 As the local engine crew began the hose lay, the helicopter arrived and circled the fire a few times. They relayed a size-up and the current fire activity to the IC on the ground. They estimated the fire to be about seven acres. The smoke column was well defined and laid over to the northwest. From the air, the fire looked very hot and active on all flanks, but headed mostly to the north. The helitack crew knew it was going to be a

long night given the fire’s activity and the number of resources on hand. After scouting the fire, the helicopter located a landing zone ¾ of a mile southwest of the fire.

1900 – 1913 Upon landing, the five person helitack squad focused on getting to the black. The smoke column continued to grow darker and large groups of trees were quickly consumed by fire. “The terrain was much more difficult to navigate than it looked like from the air.” The 15 minute hike took them past the engines, up the hose lay, and to the anchor point to tie in with the ground resources. Not liking the look of the black at all, they discussed the lack of safety zones. The Helitack Superintendent, Casey, told his crew, “If things go [south], we need to beat feet to the road and out the east.” They were on high alert. They didn’t feel like they were in a dangerous spot so they agreed to support the current plan and engage the fire. The crew was given direction to build hand line to support the hose lay. The crew had mixed opinions about their ability to catch this fire, but not about their personal safety.

When the helicopter had launched at 1811, it couldn't have been a nicer day in Alturas. However, weather conditions in the direction of the fire were different; clouds seemed to be backed up along a ridgeline and clouds and virga were observed to the north and the south of the fire's coordinates. The pilot noticed that the thunder cells were a little unusual; small, light, and transparent, not dark and thick. He changed the flightpath to the south a little to navigate between cells and could see the smoke from about 20 miles out. It was putting up a pretty good plume of dark smoke like it was starting to take off. They received a little rain on the windshield during the rough and bumpy flight in.



Figure 3: 1903 - Looking south-southeast, fire spreading to the northwest.

Dave Ruhl Responded to Frog Fire

Dave responded to the Frog Fire from the Big Valley Ranger District office at 1809 and arrived at the engines a few minutes before the hose lay was charged. At this time, both engines were on scene, the helitack crew was on their way by foot from the landing zone, and the helicopter was getting a load of water. After parking near the engines, Dave cautioned an engine crewmember to be heads up for the squirrely winds which could push the fire toward the engines. Dave was obviously in a good mood according to those on scene, and energized to be there.

“This thing is blowing up.”

Henry, the ICT5, was at the end of the hose lay on the eastern flank, but made his way to the heel of the fire to rendezvous with Dave. The two of them briefed on the current tactics including resources already ordered as well as additional resources needed. Henry asked if Dave was going to take over as the IC now and Dave smiled, “No, you got this.” Dave was happy with the plan in place, and he quizzed

Henry about the protocols to order a spot weather forecast. Dave climbed up on the lava reef for a better view of the fire, turned back to Henry and said, “It doesn’t matter. This [thing’s] gone anyway.” With that, Dave scouted the west flank and Henry went the other direction up the east flank to see how the line was holding. At 1904, Henry relayed to Dispatch the transition to a type 4 fire with Dave as the ICT4 and himself as the type 4 trainee.

The Frog Fire more than quadrupled in size during the 30 minutes since firefighters first arrived. The reports from the lookout and the helicopter echoed each other; the fire was taking off. Erratic ground level winds contributed to group torching and short runs. With the hose lay charged, water was pumped onto the eastern flank in an effort to hold the line they had established. Once on scene, the five person helitack crew joined the folks from the engine and helped reinforce the hose lay by clearing brush and building hand line. Radio communication on the tactical channel was unreliable, possibly due to the lava reefs blocking line-of-sight transmissions. The local firefighters were aware of this condition.

Although they had never met face-to-face, Casey radioed Dave to clarify he was qualified as a type 3 IC, and Dave offered up he was interested in being the ICT3 trainee in the event the fire increased in size and complexity. With that fact established, the helitack crew returned to scraping dirt and cutting back vegetation along the heel of the fire. As the pilot circled the fire, the bubble on his side window was getting so hot that he had to back off from the fire. He thought, “Boy, this thing’s really burning hot.”

1917 – 1923 Trying to avoid congesting the radio with more traffic, the Round Mountain Lookout called the Dispatch Center on the phone to report a spot fire ¼ mile north of the fire with trees torching. Dispatch relayed this to Henry and asked if he could see it. “Not at this time,” he answered from the east flank near the end of the hose lay. There were very few vantage points and enough of an overstory that it was difficult to look out over the fire or even to see the column.

Henry heard the helicopter return and the chatter between the pilot and Dave. The second load was dropped on the same area as the first, on the west flank. Dave asked the pilot to scout ahead of the fire (north) to look for houses as well as the power lines and railroad. The pilot relayed that the fire was spotting ¼ to ½ mile ahead of itself to the northwest and that the fuels got thicker and denser to the north of the fire. He estimated the distance from the fire to the power lines to be about 4.3 miles. Dave asked if the fire was going to get there and the pilot responded it looked like it would. The pilot never noticed panic in Dave’s voice; he was controlled, calm, and professional. They had good communication, and Dave was really appreciative of the information he was getting.

1926 Henry then got a call from Dave who said, “Let’s do it, we’ll tie in at the heel.” Ready to pass the torch, Henry radioed this transition to Dispatch. “Transitioning to a Type 3 incident...[Dave] will be IC...[I] am no longer trainee. Request spot weather forecast for tomorrow.” The Zone Duty Officer, listening from the Doublehead Ranger District office, was a little confused since Dave wasn’t fully qualified as an ICT3. He followed up via text to Dave, “So you’re tied in with the ICT3 for a trainer? If so, get that over the airways.” Dave never replied.

After hearing the IC transition radio traffic, Casey was surprised. He did not think that the amount of resources on scene warranted a type 3 fire, and he also assumed he would have a face-to-face transition

before being named the IC over the radio. Casey and Henry waited at the heel of the fire feeling frustrated that Dave wasn't there yet. They couldn't raise him on the radio. Where was Dave?

“You could hear it boiling up inside...then it just blew out the other side.”

1930 With a bird's eye view from his tower, the lookout reported a second spot fire and torching. Shortly afterward, he radioed in to Dispatch that the direction of smoke dispersal changed. The smoke initially pushed to the northwest now headed south. To the firefighters on the ground, the wind shift manifested in erratic winds from all directions and a fire that began to boil. The pilot, who was returning with the third load of water at 1933, was concerned about the wind change. He tried to contact Frog IC, but Dave did not answer. He sent out an “all call” on air to ground to advise everyone the winds were coming from the east, almost a 90 degree change. He didn't know if anyone heard it, no one acknowledged the call. The fire was very hot, and it was “chewing up the trees.”



Figure 4: 1935 - Fire spreading to the southwest.

Countless embers were driven across the line as Casey yelled to his helitack crew, “Heads on a swivel, watch for spots!” Choked by smoke, struggling to catch a deep breath and eyes stinging, the firefighters took a lot of heat and knew the line was not going to hold. It was time to pull everyone off the line; they were too close to that thing. Looking up they saw the column laid over above them. It was like “day and night” compared to what the engine crews initially walked into.

In talking with Henry, Casey realized that Dave had been scouting the west flank, not

at the end of the hose lay as he thought. Henry told him, “I just saw him; he was right over there on some scree.” They continued to wait at the heel of the fire for Dave to show up thinking he must have gotten cut off but was on his way.



Figure 5: 1936 – Fire pushing the road where the engines and Dave’s truck were parked.

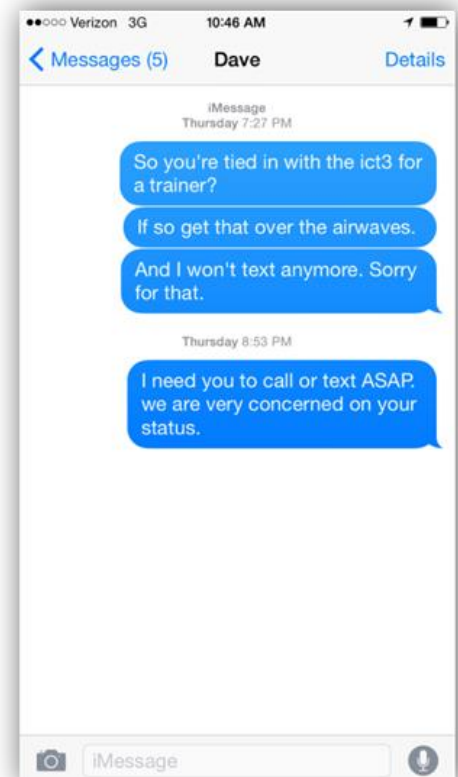
Silence

Modoc Dispatch and Henry attempted repeatedly to reach Dave on the radio.

No contact.

“Disengaging”

From the engines, the Operator saw the fire cross the road west of where the engines were parked and continue to eat up acres to the south of the road. They had nearly exhausted their water supply and needed to refill, so they unhooked from the hose lay and rolled the engines eastward. Gathering all the firefighters working the line, Ryan, the off-forest engine captain, led them through the green to the road east of the fire, away from the fire’s spread, to connect with the engines on their route out. Henry and Casey continued to wait for Dave to show up at his truck as the fire steadily backed toward them. They held onto the hope Dave



would show up. When the fire was within 30 feet of the vehicle, they were finally forced to drive Dave's truck out of there.

Casey assumed command of the Frog Fire as ICT3 at 2004.

2007 Frog Fire IC to Dispatch:

Rapid spread to west. Fire has compromised hose lay. Disengaging.

2008 Frog Fire IC to Dispatch:

Have been unable to reach [Dave] for about 20 minutes. Has dispatch been in contact with him?

Dispatch: *Negative.*



Figure 6: 2026 - Looking west as the firefighters disengaged down the road where the engines had been parked.

Additional engines, crews, and dozers began to stream into the fire's assigned staging area. Henry and Casey proceeded east to tie back in with the rest of the firefighters. Henry's anxiety for Dave was growing, and he wanted to search for Dave on foot, but Casey told him that he needed to pair up with somebody else for safety. As they drove out, they ran into the captain of one of the staged engines who was walking down the road toward the fire. Jumping on his chance to start searching for Dave, Henry enlisted the captain's help to look where they could. Casey continued to the staging area where he recruited the help of a crew boss to be operations for the fire and to be the point of contact for incoming resources. This freed him to focus on the search for Dave.

Back at the office, forest staff discussed the risk assessment and planning needs for the fire, well aware the Frog Fire was growing and a firefighter was unaccounted for. At 2043, Chief 2 (Deputy Forest Fire Management Officer) responded to the fire to help with leadership on the fire.

Engine Accident

Casey attempted to drive around the north end of the fire, but the road narrowed and he didn't like his position in relation to the fire. He called dispatch to ask if there was a prevention person available to help "bird dog" the roads, but none was available. He decided to drive back and tie in with the resources on the east side of the fire. Casey heard a medical call over the radio and, like many others that night, breathed a sigh of relief assuming that Dave had been found. He then learned one of the engines went off the road, a minor accident, and the growing sense of dread for Dave returned. After gathering the details, Casey relayed the info to Dispatch, ensuring the firefighter involved with the accident received medical care, and then returned his focus to the search for Dave.

Prior to 2109, the engines left the fire and headed toward water to refill their tanks. As it became later in the evening, the winds calmed, leaving dust hanging over the road which reflected the glare from their headlights. The off-Forest engine was in the rear, following the local engine through the maze of roads so they wouldn't get lost. After passing a dozer headed up to the Frog Fire, the off-forest engine hit a slick patch of needle cast and slipped into the ditch. The driver didn't want to overcorrect and tip the engine over. He thought, "no way, I can't believe this is happening!" The engine impacted a large rock, denting the rear door on driver's side and coming to an abrupt halt. One of the engine crew members was examined by an EMT staged at a nearby station and later at the hospital, but sustained no injury beyond bruising.

Search

After Chief 2 arrived and met up with Casey, still in the role of ICT3, they agreed that Chief 2 would take over command of the Frog Fire and Casey would take over command of the incident within an incident – the search for Dave. At 2237, Chief 2 assumed command of the Frog Fire and immediately pulled resources off the fire to reassess and develop a new strategy for this complex incident, focusing first on search and rescue.

The search for Dave continued the rest of that evening. As difficult as the decision was, Casey informed all the searchers they would call off the search at midnight due to the continued fire behavior, nighttime hazards, snags and potential for serious injury. It was a long night for many people, listening for any sign of hope on the radio while sleeplessly waiting for the sun to come up. The search resumed at 0500 the next morning.



Figure 7: 0733 - Crews lined out to grid through black.

Many firefighters and sheriff deputies walked grid patterns through the charred landscape, yelling Dave's name.

Tragically, Dave's body was found at 0917 on Friday, July 31, 2015, approximately one-quarter of a mile west of the lava reef upon which he was last seen. Although much will remain unknown about Dave's decision making and complete route of travel, the final 100 feet of his route were accurately established. It appears he was cut-off and overcome by fire during the period of time that the fire spread shifted dramatically toward the west-southwest.

Dave's fire shelter was not deployed.



Figure 8: Dave Ruhl

Timeline

