Facilitated Learning Analysis

STUMP SPRINGS ESCAPED PRESCRIBED FIRE

MAY 30, 2013

DIXIE NATIONAL FOREST

ESCALANTE RANGER DISTRICT

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The objective of this FLA is to focus on learning with the hope that this information might help prevent future unintended outcomes in the prescribed fire program.

SUMMARY

'Even the most experienced hands can get burned.' What was supposed to be just another prescribed burn in a very familiar setting ended up to be a wildfire that migrated off the Dixie National Forest onto private land.

The Stump Springs prescribed fire was intended to be a routine 1-2 day event, consuming approximately 150 acres of understory consisting of vegetative litter, pinyon-juniper and sagebrush beneath a canopy of Ponderosa Pine. District fuels and fire personnel had successfully completed 27 burns of this size in the Stump Springs area for nearly 10 years without incident. Weather conditions throughout May 2013 were hot and dry on the Escalante Ranger District, but no Red Flag warnings were issued and general forecasts were favorable for the latter part of the month. These parameters created an opportune weather window.

Burning commenced the morning of May 29 with a test fire and continued ignitions in Unit 2 of Block 3, but by mid-afternoon it became apparent that the intended target acreage was not achievable and a smaller perimeter was tied off with holding lines. Winds had begun to pick up in the afternoon and the Burn Boss (RXB2) knew to cease activities while operations were still under control. Only a few manageable spots flared up this day and all were easily addressed.

Personnel returned to the site earlier on May 30th intending to get more acreage treated before afternoon winds materialized. The plan was to complete the burn in Unit 2, and proceed to burn acreage within Unit 5. Unfortunately, initial test fires and subsequent ignitions resulted in higher fire intensities and the ignition personnel had to adjust their spacing and timing to allow management of this intensity before moving along the line. The day's progress slowed considerably.

Morning turned to early afternoon and it became apparent that at the current pace it was going to be a long day if they were to reach their target. Also, winds that became squirrely in mid-afternoon on the 29th materialized much earlier on the 30th. The first spot fires appeared around noon and the wind shifted at least three more times over the next hour, throwing spots in multiple directions along the east edge of Unit 5. Holding personnel did their best to attend to the multiple slop-overs and spots. At 1300 hours the RXB2 ceased all ignitions. By 1330 hours the RXB2 called module leaders to account for all personnel. The spots and slop continued east, approaching private land. Contingency resources were requested at 1345 hours. At 1406 hours the RXB2 realized that the fire had moved onto private land and declared an escape. The final fire size was 272 acres, 22 acres of which were on private land and one acre which occurred on National Forest System (NFS) land outside the project boundary.

"I've not seen things go to Hell that fast."

SETTING

The Stump Springs project area is on the Dixie National Forest, Escalante Ranger District, in Southern Utah. Elevations within the project area range from 7,200 to 9,000 feet. The forest type is primarily ponderosa pine and mixed conifer with smaller components of spruce-fir, pinyon-juniper, and sagebrush-meadows. Small areas of Gambel oak, white fir and Douglas fir are also present. In addition to these live components, scattered snags and dead and downed logs are present throughout the project area.

Ponderosa pine stand with pinyon-juniper/sagebrush meadow component.

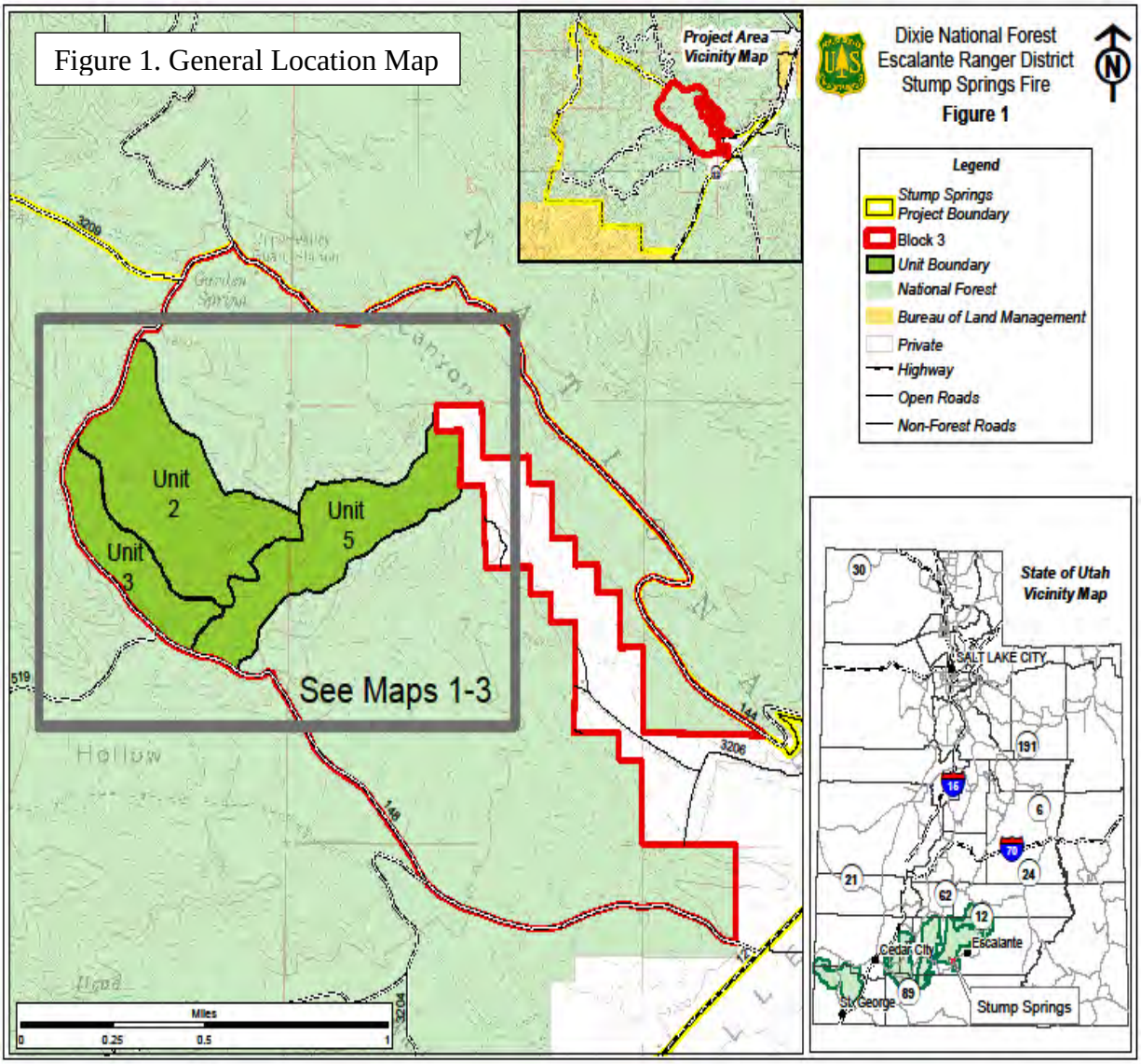
The project area is within the Upper Valley Creek watershed and is marked by several dry washes and intermittent drainages. A riparian area (Garden Spring) is located in the northern portion of Block 3. A single drainage carried water but more importantly the local topography produced by these drainage features had significant influence on the winds throughout project implementation.

Project Description

The Stump Springs project area comprises 8,616 acres of which approximately 5,400 are proposed for treatment with prescribed fire. An assessment of the vegetation condition identified a homogenous arrangement of mid-successional vegetation that would be susceptible to high-intensity fires, which may be large and severe in their impacts. Prescribed fire is intended to disturb these homogenous patches to produce a more heterogeneous landscape that is more resistant and resilient to wildfire. This increased diversity in the vegetative landscape would introduce biodiversity and other beneficial effects for wildlife and their habitats. The Stump Springs project addresses fuels loading problems and restores and maintains natural disturbance within the fire-adapted ecosystem dominated by ponderosa pine.

An Environmental Analysis was completed for the project in March 2003. Twenty-seven prescribed burns have taken place within the project area since 2004, the most recent burn having been completed in 2011. Typical sizes for these burns are in the range of 100-200 acres, an area that can be completed within a 1-2 day weather window. The current project is located in Units 2, 3, and 5 of Block 3, locations generally south of Garden Spring and west of Water Canyon. The area can be accessed by Forest Road (FR) 148 (see Figure 1).

Figure 1. General Location Map



View from Highway 12 as the prescribed fire escaped.

NARRATIVE

May 29, 2013 - *"A successful day"*

After a long wait, this was a burn day. It provided the first alignment of a weather window, availability of necessary personnel and completion of all approvals so that the Stump Springs prescribed burn project could commence. Personnel from the Escalante and Powell Ranger Districts met at their respective District offices that morning, gathered gear and mobilized to the Stump Springs location for an initial briefing. By 0900 hours, 22 personnel and two engines were on scene. By 1003 hours all notifications had been made, the briefing completed and personnel were set to go. Ten lighters were equipped that morning, the remaining staff assigned either to holding, acting as lookouts or fire effects monitors, or remaining with the engines.

A test fire of representative fuels was completed at 1030 hours and all results were consistent with expectations. Fifty percent of Unit 2 had been completed by 1159 hours. At approximately 1345 hours terrain driven winds coupled with lower relative humidity (RH) and higher temperatures, threw three small spots. Although not unusual, the affects from these winds had to be managed, so firing patterns and timing were adjusted. A second decision was made to tie off the holding line to an established location. Establishing this control point negated any further burning for the day. Although easily controlled, the RXB2 made the decision to start ignitions earlier the next day to avoid these "high end" conditions in the afternoon.

At 1443 hours crews completed ignition of approximately 80 acres and by 1808 hours all resources were released. There was an unburned 20-acre patch in the SE corner of Unit 2 left to complete the following day.

May 30, 2013 – *"A typical day"*

Resources began assembling at the junction of FR 148 and FR 519 at 0800 hours. There were 20 personnel present and 2 engines. Two additional firefighters arrived after the briefing. There had not been an After Action Review (AAR) the day before since personnel had been released from the burn at different times. As one person noted, "90% of us have been burning together for years, we're comfortable without an AAR." Some personnel were surprised they were going to try to burn on May 30, since they thought they had shut the burn down on May 29 due to winds. It had not been communicated that the burn was shut down because they had located a solid point to tie it off for the day, and since winds were picking up they had decided to call it a day.

The RXB2 completed the briefing at 0910 hours, about an hour earlier than the previous day. The first objective of the day was to complete the approximately 20 acres of ponderosa pine in Unit 2. The plan was then to burn off Unit 5, a 90-acre mixed conifer stand with a wide draw of sagebrush meadow in the center.

A test fire was conducted in Unit 2, in ponderosa pine understory near the tie-off point from the burn the previous day. This first test fire demonstrated more aggressive fire behavior than the

previous day because it had more ladder fuels present. The fire burned hotter than expected and the igniters decided to try another test fire further down slope where the fuels were predominantly litter. They were more satisfied with this result. Some parameters were at or near the high end of the prescription, but, for the most part, conditions did not seem much different than the day before.

For most of the personnel, May 30 was a typical day and they expected the same results as the day before. A couple of folks expressed misgivings about the hot test fire, and afternoon winds in the forecast. A few others felt the same, but they kept their thoughts to themselves.

The Morning - *"If it takes all day, it takes all day"*

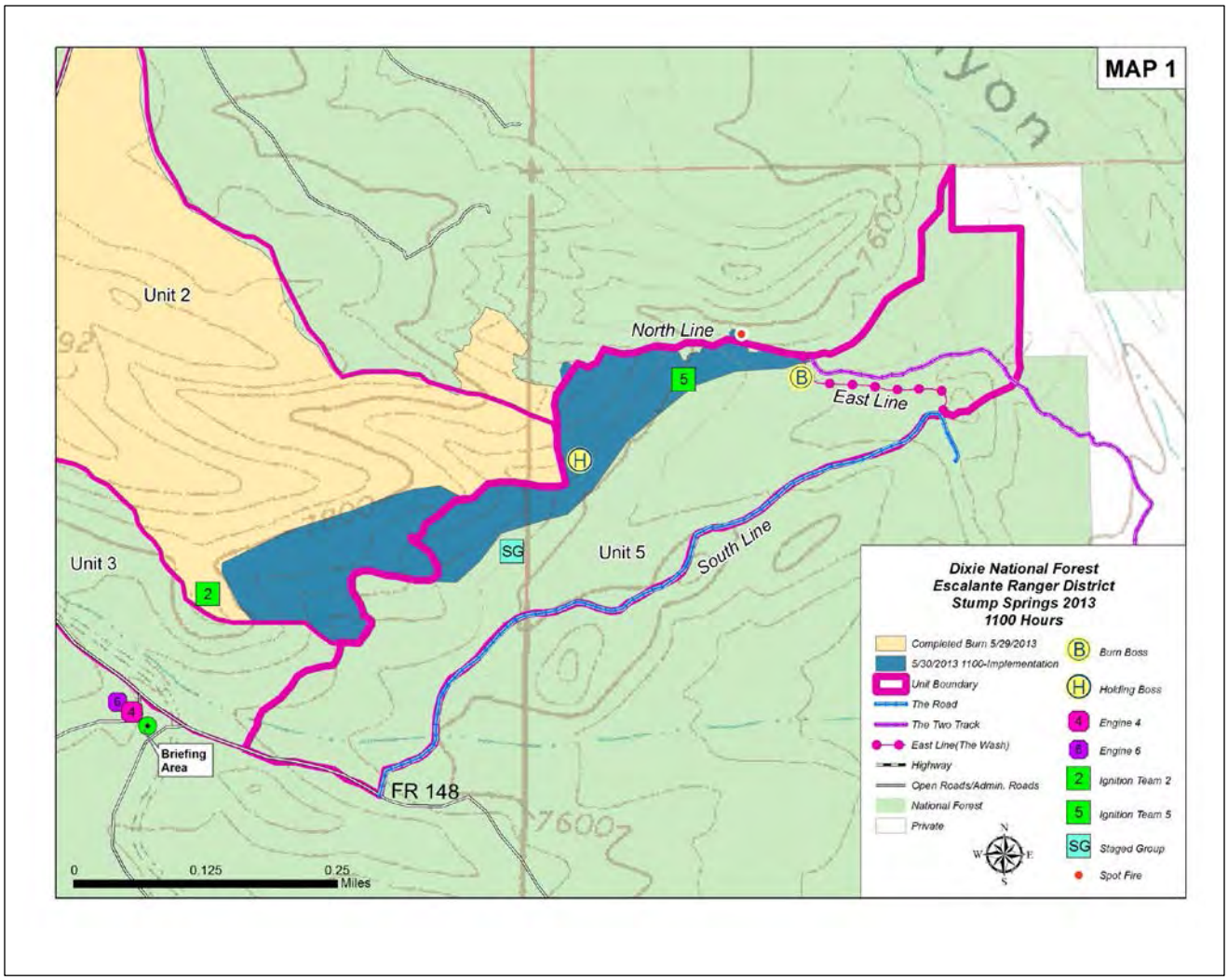
Ignition commenced shortly after 0920 hours on the south end of the previous day's burn. The plan was to light down the ridge into the bottom and the dry wash. Once ignition commenced it was obvious to several personnel that fire was burning hotter than the day before and that RH was lower. It was also clear that those who were lighting were too close together and needed to be staggered. The Firing Boss was concerned about coming off the ridge and made adjustments to the firing pattern, staggering lighters based on experience. This worked well, but the needle cast was holding the heat. Flames were 1-2 feet high in the needle cast. Occasionally a pinyon – juniper (PJ) would torch out. The firing crews were spread out every 100 feet. Top lighters were going 100-200 yards before giving the go ahead to the lighter below them. That worked to keep the fire cooler but it slowed the process down. One igniter commented that it was taking longer than planned. But slow was good in these fuels on this day, and another igniter commented that, "if it takes all day, it takes all day."

It was 1100 hours when they finally came down off the ridge and into Unit 5. The winds were light from the southwest, but gusting. And there were changes. One igniter noted that "the fuels were different in Unit 5, more open, more sage." They had not done a test burn in the sage, and according to another igniter, "I think the surprise came to us when we got down into the sagebrush".

Most everyone on the burn had a torch that morning, so much so that a couple of igniters never even put down fire. A large group of igniters had gathered along a fence line separating mixed conifer from the sagebrush meadow in Unit 5. At this point, the decision was made to split the ignitions teams. The Firing Boss remained with the Unit 2 Ignitions Team to torch unburned fuels. The large group of igniters (Staged Group) staged along the fence line, where they had lunch and waited for further instructions. A smaller group of igniters, Unit 5 Ignitions Team, worked along a scabby face on the north line of Unit 5, bringing fire as they went (*see* Map 1).

The plan was to have Unit 5 Ignitions blackline along a deep wash (the Wash) that defined the east line of Unit 5, the planned edge of the burn. They would then blackline along the south line of Unit 5, connect with the Staged Group and then burnout the middle. The Unit 2 Ignitions would work the west side of Unit 5.

But there were concerns. As one igniter commented "My gut was we were not going to get it tied in before the predicted afternoon gusts." There was concern about shifting winds where a draw from the west met the draw through the center of Unit 5. There was also concern about higher level winds carrying embers. One person commented "I thought about the wind a little bit...didn't want to be the odd guy to raise my hand." Nonetheless, everything was still looking good. Weather was okay, they were just behind the clock.



The North End - *"My wick just blew out"*

By 1140 hours, the Unit 5 Ignition Team reached the Wash on the east line and began lighting the blackline. They concentrated on lighting needle cast on the east edge of the Wash, following the fuels. Sometimes they stayed up on the edge, sometimes they went down into the Wash to light the fuels. It was slow going at first, one igniter following the fuels, starting a backing fire to establish the black line that would be the east edge of their burn that day; a second igniter following behind, dotting where unspent fuels remained and to maintain the fire intensity.

Another indication that things weren't quite what they seemed that day came shortly after the Unit 5 Ignition Team began firing along that east edge. One of the igniters, laying fire along the edge, noted that the wick on his torch was extinguished by a gust of wind, stating aloud, "my wick just blew out". This was a watch-out occurrence for him. He radioed back to the Holding Boss that there might be some spots coming his way.

An FLA member stands on the east edge of the Wash where the first igniter's torch wick blew out, alerting him to increasing winds and causing him to alert the trailing Holding Boss to expect more spots.

The Holding Boss had already asked for some help to patrol that east line. Four personnel from the Staged Group started to make their way down the south side of the meadow before crossing to the north. As they headed past unburned sagebrush they noted that smoke was filling the draw ahead of them, but that there wasn't much wind. They heard the Holding Boss report a couple of small spots on the slope west of the Wash. By the time this group joined the Holding Boss, he had already contained the spots. One in the group, looking at the blackline, asked, "How is this spotting? There's not enough heat."

Folks back with the Unit 2 Ignition Team, hearing the chatter on the radio about spotting down below were thinking, "Why is it spotting? There's no wind up here." Shortly after the first spots occurred, the RXB2, pulled up to the Staged Group in his UTV. He peeled a couple of igniters from the group to come with him to patrol the Two-Track north of the east line of Unit 5. Then he radioed Unit 2 Ignition to have the Type 6 Engine Boss move the engine from the briefing area to the same location and tie in with Holding Boss.

Shortly after the heads-up from the igniters, sure enough, the spots started popping up. Fire was creeping into the Wash and up the west edge in a number of places. In other places, higher level winds were casting embers and starting spots a little further to the west.

The winds were picking up, blowing from the south/southwest. In some places it would torch a PJ, in others in would climb the ladder to a ponderosa pine (pondo), in others it would hit the Two-Track on the west side of the Wash and lay down. The Holding Boss and his four

firefighters from the Staged Group were now the North End Holding Team. And they had their hands full.

They never thought there was something they couldn't handle. As the Unit 5 Ignition Team worked its way down the Wash, the creep and the spotting would follow. As long as they could keep up, the Holding Team felt they could keep it contained.

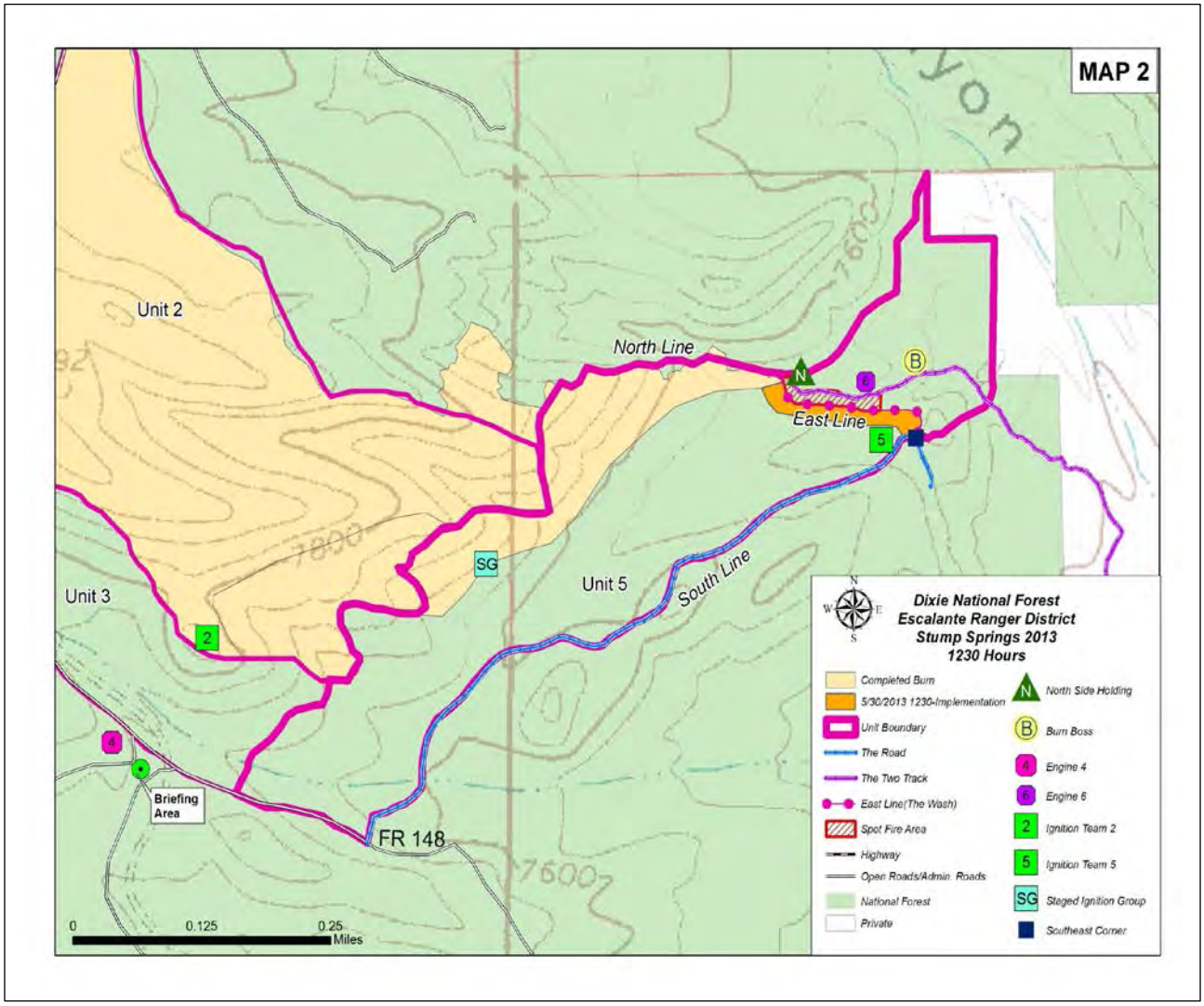
Example of creep and spotting along the west side of the Wash.

Right around 1230, the Type 6 Engine arrived, having left the briefing area to the south of Unit 2 and then following the Two-Track all the way around to the east line of Unit 5. The Engine Crew wasn't too worried about what they saw when they arrived. There were spots, but North End Holding seemed to have everything under control. The winds were acting differently though, so the Engine Crew patrolled the Two-Track along the west side of the Wash, putting water along the edge of the Two-Track (*see* Map 2).

As they were coming around to tie back in with North End Holding, everything changed.

Fire climbing up the west edge of the Wash had hit a "jackpot of heavies" – downed logs and logging slash, PJ and pondo – and the flames just funneled out of the Wash, crossing the Two-Track and slopping into the sagebrush and pine on the other side. As they turned the corner and saw the flames jumping across the Two-Track to the northwest, the engine crew figured they could handle it. Then they saw the spots on a ridge further north, with more popping up in between.

View of the Two-Track to the north of the Southeast Corner. The Two-Track splits here and turns west where it runs along the west side of the Wash along the east line of Unit 5. The Type 6 Engine patrolled this road from 1230 to 1300 hours, extinguishing spots. A slopover at 1300 hours from the east line ran northeast and occupied the Engine Crew and North End Holding for the next 30 minutes.



The Southeast Corner - *"Did me and you cause all that fire?"*

The Unit 5 Ignition Team continued lighting east until they came to the south line of Unit 5. The Wash was joined here by another wash coming from the southwest along the south line, and then wrapped around a knob and continued east. A Forest Service Road (The Road) sat above this junction. The Road was a hardline boundary for much of the south line. It widened out above the junction where it turned sharply to the east. However, there was no hardline boundary to tie the blackline on the east edge of the Wash to the west edge of the Road above it. This was the Southeast Corner of Burn Unit 5 (*see* Maps 2 and 3).

The Fuel Mule waited on the Road above the junction, where he could refuel Ignition Team 5 before they turned and headed up the south line of Unit 5. He noted that there was no line to connect the Wash to the Road. He also noted that his UTV, which normally held a cache of hand tools, only had one tool on this day, a Rogue hoe. While waiting for the Ignition Team to arrive at the junction, he scraped and kicked a handline from the Road down to the junction.

At about 1230 hours, the Ignition Team arrived at the Southeast Corner. They blacklined to the junction, and then they climbed up to the Road where they refueled and paused for about 15 minutes to report to the RXB2 by radio and to review their next actions.

At about 1245 hours, the Ignition Team climbed back down to the junction and turned south to begin firing along the south line of Unit 5. The Fuel Mule moved his UTV down the Road to the south, where he would stage and refuel the Ignition Team further down the line.

There was no one watching the Southeast Corner.

View to the Southeast Corner from within Unit 5. The Wash to the left is the east line. The Wash to the right is the south line.

At about 1300 hours, a member of the Ignition Team looked north to check the condition of the blackline behind them. He saw what he thought was a column shift in the smoke column to the north. The winds, though squirrely at times, had generally been coming *from* the south/southwest all day. When he turned and looked back, he saw the column moving *to* the south/southwest.

The Ignition Team stopped firing the line and headed back towards the Southeast Corner. When they arrived, they found that winds *had* shifted from the north, and there was spotting on the north face of a rise on the other side of the Road, right where it turned to the east and they had refueled. One of the Ignition Team, looking at the spotting, turned to another and asked, “Did me and you cause all that fire?”

They reported the spotting to the RXB2. The Fuel Mule brought his UTV down to see if he could help. The first problem was they only had one tool. Using that tool and their boots, they scraped a handline around the head of the spots.

About this time, the remaining Staged Group, hearing the chatter on the radio, contacted the RXB2 to ask if they could help. The RXB2 was surprised to hear that they were still staged. He, and others, thought they had come down earlier to help with North End Holding. People had been peeled off to join Holding, but the rest of the group had sat tight waiting for orders that hadn’t come. This group was told to make their way east to the Road. At the same time, the Firing Boss, the lone remaining member of the Unit 2 Ignition Team, was told to bring the Type 4 Engine down to the Southeast Corner. Before heading over to the engine, he had the Fire Effects Monitor (FEMO)(T) take control of his location and continue monitoring Unit 2. At that

point the FEMO(T) would be the only person on this end of the burn, but from her vantage point, would have a view to the smoke columns to the north.

When the RXB2 called up the Type 4 Engine and the rest of the Staged Group, he also called a halt to all ignitions. On the North End, fire had slopped over and was making a run to the north. At the Southeast Corner, fire had slopped over to the south. It was 1300 hours. The nature of the Stump Springs Prescribed Burn had changed from action to reaction...from burning to holding. By 1310 hours, they would be in full suppression mode.

Back at the Southeast Corner, the Ignition Team had gotten a line around the north facing spots and felt like they should be able to contain this location, when the wind shifted *again*, this time back from the south/southwest. The fire that they had contained began to spot on the knob north of where the Road turned east and it started to run.

More people were arriving to help. The RXB2 sent two firefighters that had been patrolling with him to help hold this slopover to the south. The Staged Group had tied in with the Type 4 Engine and were handling a spot further south on the Road, but a couple of firefighters from that group had come forward to help at the Southeast Corner.

The fire that had turned north came over the knob and hit the Wash on the other side where it stalled. It looked to the firefighters gathered there that they should be able to catch this thing. A couple of them followed the knob to the east, where they had a vantage point to the flats, and private property, to the north and east. They quickly realized that they didn't have a handle on this thing at all.

The East Side - *"He dropped his torch and ran down the road"*

From their vantage point on the knob, the firefighters could see a large pondo torching in the middle of the flat, about 400 yards distant. It was between them and the Two-Track, where it passed through private property (although they did not know that at the time). A couple headed down the slope to work a line around the torching tree. A few others followed with torches to start a backfire. The Fuel Mule took the UTV down to the east end of the Road and onto the flat. Before any of them could get down there it was evident the torching tree had already spread fire out, and spotting was starting to the north. This group became the East Side Holding Team.

View from the knob. From this vantage point firefighters could see the lone pondo engulfed in flames.

As East Side Holding gathered to reassess the situation, they determined to anchor a backing fire off the Two-Track. As the Fuel Mule was turning to hand a full torch to one of the igniters, he saw fire running at them from the southwest - from behind them - and told everyone to "get out of here." The igniter "dropped the torch and ran down the road." The rest of the team made for the Road, as well, where they decided to "hunker down" until the fire passed through. A couple of members of the team thought about trying to build some handline along the east edge, but that thought "came and went, as there were too many spots for us to handle." The team determined that "there was no way to stop it, just get out of its way."

It was at this time that the RXB2, concerned that personnel were getting scattered and Units were getting mixed, called for all Unit leaders to account for their people. Very quickly the Unit leaders reported that everyone was safe and accounted for.

Up above, by the Southeast Corner, the remaining members of the Unit 5 Ignition Team and the Staged Group formed the South Side Holding Team, and they were actively patrolling and building handline along the perimeter of the slopover south of the Road.

The Type 4 Engine, which had come around from the Road and up the Two-Track, arrived at about 1330 hours and hunkered down with the East Side Holding Team (*see* Map 3). The Type 4 Engine boss recalled thinking, as he was coming up the Two-Track, that now would be a good time to call in the contingency resources; and, just as he got done thinking it, the RXB2 made the call over the radio. The RXB2 also notified the Type 6 Engine that their escape route on the Two-Track from the north was cut off for now and directed the Type 4 Engine to notify the Type 6 when it was safe to pass through.

One member of the East Side Holding Team left to scout the east edge of the fire, but, for now and until the fire was declared an escape at 1406 hours, the East Side Holding Team and the Type 4 Engine stayed put, and the South Side Holding Team worked their perimeter.

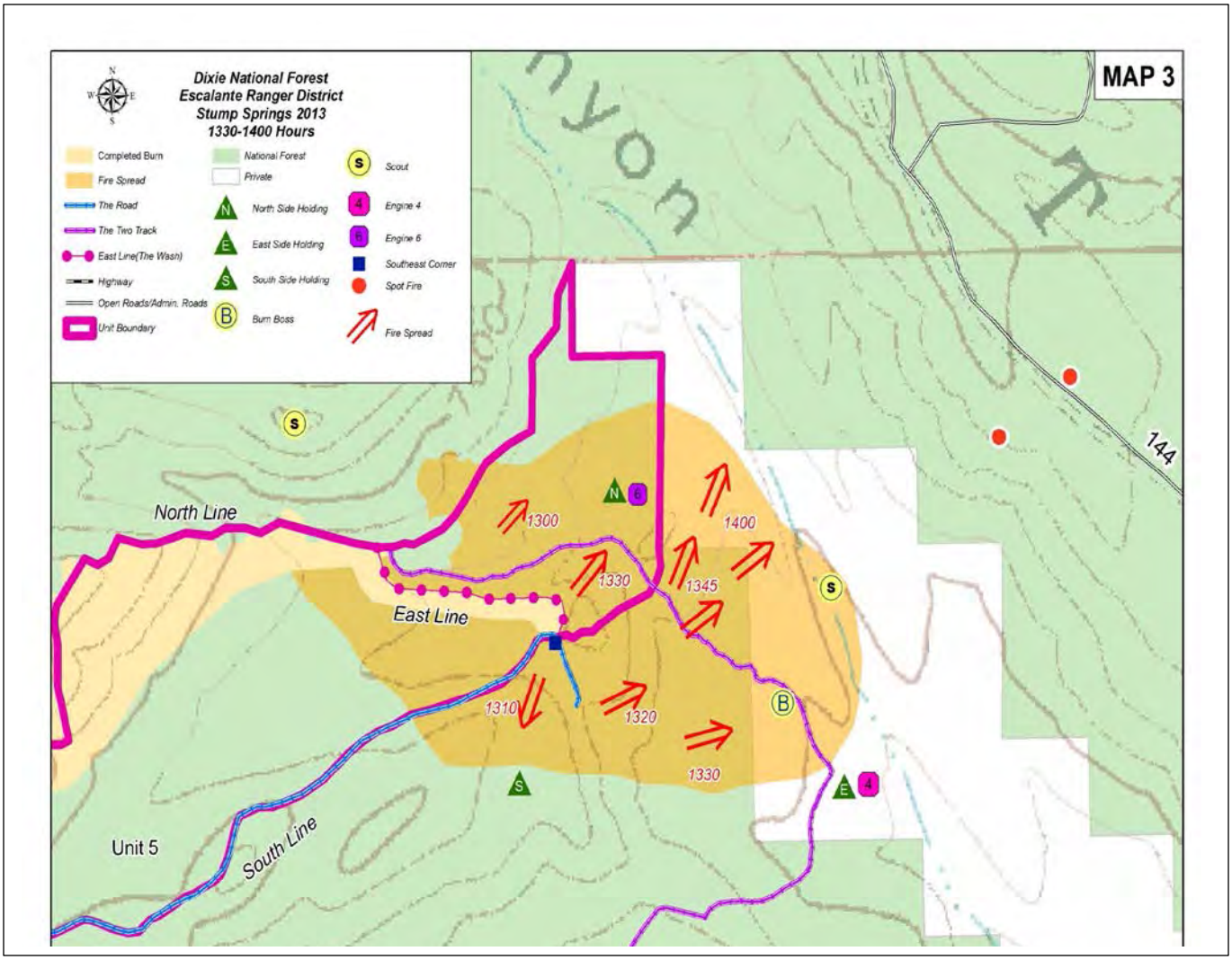
The North End - *"You can't fight fire from the middle"*

By 1310 hours, the Type 6 Engine and the North End Holding Team had collected most of the spots. They had moved further north and parked the engine in a cleared area. The RXB2 had joined them and then gone back to the south to scout the Two-Track and Wash. As some members of the Holding Team continued to look for spots, others verified that they had an escape route to the north. The Engine Boss picked up a transmission from RXB2 that the escape route to the southeast, via the Two-Track was cut off for the time being, as the fire was making a run to the north on the East Side.

About this time the winds picked up from the south, kicking up spots once again. A large patch of 5-6' high sagebrush torched off nearby, and the Engine Boss called all personnel back to the engine. They determined that one member of the Holding Team would climb to a scabby knob above them and scout, while another member would take his ATV about ½-mile north to FR 144 and scout along the Road for the leading edge of the fire. The Engine Boss piled the remainder of the Holding Team into the truck. Sagebrush and pondos started to torch up directly in front of them. He looked around and decided the engine was not in the best location. He decided that "we were right in the middle, and you can't fight fire from the middle", so he moved the engine into

the black by the ridge where the earlier slopover had burned. He informed the RXB2 that he was safe and was sitting tight until the Two-Track was clear. From this location, they heard the call for contingency resources and the declared escape at 1406 hours (*see* Map 3).

View looking north through the terrain patrolled by the Type 6 Engine after 1310 hours. The torched trees in the mid ground frame an area of black which formed the safety zone where the engine crew and 3 members of North End Holding parked after 1330 hours. Here they waited for the fire to burn past the Two-Track, their escape route to the southeast.

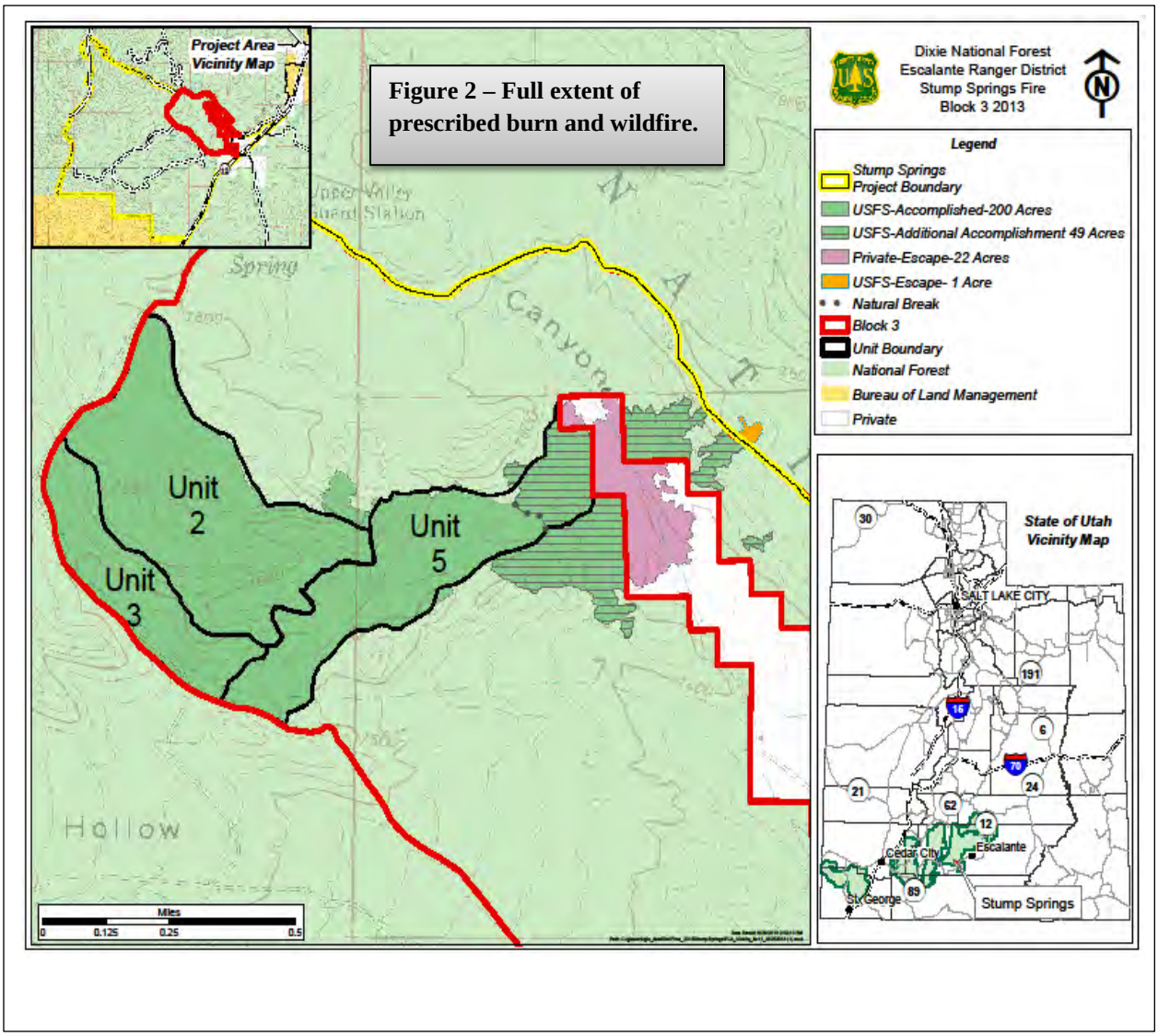


Boundary marker to the northeast of the Southeast Corner. The escaped burn spread onto the private land beyond the marker.

Declaration - *"We just got our butt kicked"*

It was a combination of things that led the RXB2 to make the call that the fire had escaped. He had learned from his scout on the east side that the fire had definitely crossed private property, and he could see it for himself on the North End. He had already called for contingency resources. The east side was running north. He needed a helicopter. Everyone was safe and accounted for. He could try to catch it and put his people at risk, or he could suck it up, make the call and get everything he needed to do this right. It really wasn't a question for him. He checked with his Duty Officer, who provided affirmation "without hesitation." Once he had the full picture, he made the call at 1406 hours. Walking the perimeter with the South Side Holding Team, one firefighter heard the call and thought, "we just got our butts kicked."

RXB2 would accept whatever came with declaring an escape later, but right now he needed to keep his game face on and start making the transition to wildfire suppression. He had a qualified Burn Boss working with the South Side Holding Team. He had an Engine Boss staged with the East Side Holding Team. And he was sitting at the toe of a running wildfire. Consulting with his team, he made the decision to take over the wildfire, and assign the burn to his qualified Burn Boss operating on the south side. It was time to shift gears. "I don't think anyone messed up. We weighed the risk & benefit but we got it handed to us that day."


Project Area Vicinity Map
Figure 2 – Full extent of prescribed burn and wildfire.
Dixie National Forest
Escalante Ranger District
Stump Springs Fire
Block 3 2013
Legend
Stump Springs Project Boundary
USFS-Accomplished-200 Acres
USFS-Additional Accomplishment 49 Acres
Private-Escape-22 Acres
USFS-Escape- 1 Acre
Natural Break
Block 3
Unit Boundary
National Forest
Bureau of Land Management
Private
Unit 2
Unit 3
Unit 5
Hollow
Miles
0
0.125
0.25
0.5
State of Utah Vicinity Map
SALT LAKE CITY
Cedar City
Escalante
St. George
Stump Springs

LESSONS LEARNED BY PARTICIPANTS

Interviews were conducted with key personnel involved with the Stump Springs Escaped Prescribed Fire. At the conclusion of each interview, each person was asked what they learned from this experience and what they believe fire and fuels personnel, and the agency could learn from this event. The following are those 'lessons learned'.

- Fuel moisture sampling should occur within a week of ignition.
- Identify location and quantity of contingency resources based on prescription parameters. Contingency resources could be located on site in "high end" situations.
- Key staffing assignments should be made prior to the morning of each day of the burn to allow for reconnaissance and preparation by those individuals.
- Hand tools should be readily available to all personnel including the ignition staff.
- Complacency tends to set in after previous success with similar jobs; address each day as a new start with new energy and attitude.
- A false sense of security can set in amongst staff personnel due to the years of leadership experience on hand. Always keep eyes and ears open for risk on a personal level and take responsibility to relay thoughts up the chain of command.
- Employees should not be afraid to voice their observations when more experienced personnel are present.
- "Expect the unexpected". This should not just be a cliché. The unexpected means considering what could go wrong, where it could happen, under what circumstances and how to prepare for it, should it happen.
- Hard perimeter boundaries are needed when burning in "high end" prescription. Ensure boundaries are prepped and locations known.
- There were too many people with torches and not enough people holding.
- Communications from burn site to CCIFC (dispatch) through areas repeaters were inconsistent.
- Provide feedback to National Weather Service forecaster on accuracy of spot forecasts.
- Leaders' intent during briefings should be concise and defined; briefings should be set up to encourage input from personnel.

- Roles and responsibilities among District fuels leadership (FMO, RXB2, FIRB, etc.) should be documented and reviewed prior to or during initial briefings.

- Spring windows to achieve prescribed fire targets are getting narrower.

- The district should have multiple tools available to treat fuels such as mechanical and prescribed fire.

- Make more time during operations for the RXB2 to meet and discuss with the Firing and Holding Bosses what they are seeing and to make adjustments.

- If the stagger distances are great and the wait is too long during torching, wait for another day.

- Try not to get spread too thin during the operational period. If personnel get scattered, call a pause and regroup.

COMMENDATIONS/SUCCESSES

- Onsite communications were utilized effectively throughout the event.

- RXB2 decisions to implement the contingency plan and subsequently declare an escaped fire were fully supported by the District FMO and District Ranger; this support provided the confidence to make this call, accept what had happened and keep focused on what needed to be done.

- Group dynamics throughout the event were professional. Personnel responded to changes in their assignment without question and smoothly made necessary transitions. This was especially apparent between the burn and the escape, at both the leadership and personnel level.

- IHC Superintendent from Cedar City monitored radio traffic between Dispatch and Stump Springs personnel and was prepared for contingency assignment before order was given.

- Experienced and inexperienced firing and holding personnel were blended to provide great training opportunities throughout event.

- District Ranger communication with County Commissioners, County Sheriff and private land owner after the declared escape was rapid and well received.

- The ability and willingness of Dixie National Forest fire personnel to work across district boundaries was exemplary.

- The RXB2's decision to regroup scattered personnel after the wind-driven spotting event was timely and necessary to restore order to a chaotic situation.

RECOMMENDATIONS

The FLA Team conducted personal interviews with key participants. The team also facilitated a running dialogue while walking Burn Unit 5 with all but a few of the participants from the events of May 29-30. Collectively, these conversations led the team to make two recommendations for the Forest Supervisor. One is an observation by the team, the other is a lesson expressed by many of the participants and summarized here. We highlight them here as the salient lessons learned from this event that can truly be embraced and carried forward.

Recommendation #1 – FLA Team Observation: *We've been here before …*

While reviewing the lessons learned from interviews and dialogue, the FLA Team noted similarities to other escaped prescribed burns in common fuel types. This prompted the team to review FLA reports from prescribed fire escapes that occurred between 2002 and 2012 in eastern Nevada, and central and south-central Utah. Five burns escaped during this time period, including the Sanford 2002 (DIF), Jungle 2007 (MLF), Steep Creek 2009 (FIF), Box Creek 2012 (FIF) and North Schell 2012 (HTF).

The factors common to these escaped burns include many of the same factors identified in the lessons learned for this event. A more comprehensive list of factors is included in Appendix B of this report, but those common to Stump Springs are listed here:

- *Boundary of the prescribed fire Unit, where the escape occurred, had no break in available fuels*
- *Be willing to share your experiences and observations with others.*
- *Given the excellent level of communication within the burn team, it was acknowledged that that this may make them vulnerable to confirmation bias or "Group Think."*
- *There is a human tendency to base predictions too much off of previous days observed fire behavior.*
- *Plan did not provide for Management Action Points (MAPs) useful in guiding actions in response to spots and/or slop overs.*
- *Increase in wind speed and/or change in wind direction. Wind influenced by topographic features can funnel and concentrate winds.*
- *1000-hr fuels are at or below critical levels.*
- *No significant precipitation in nearly 2 months*
- *Due to potential spotting, place a greater emphasis on 20-foot winds rather than eye level winds.*
- *Checking fuel receptivity outside the Unit may be as important as how it burns inside the perimeter. Test all fuel types. If there is more than one fuel type inside or outside the planned boundary we should be aware how each of these is going to respond. Contingency resources then can be ramped up or down accordingly.*
- *We should ask the same questions regarding small block burning as we would a large one: "What could go wrong here?" and "What am I not thinking about just because it's small.*

Recommendation #1 – As preparation for any prescribed burn in any given year, review the Lessons Learned from Escaped Prescribed Burn FLAs in similar fuel types, terrain and climate. These are all readily available on the Lessons Learned website.

Recommendation #2 – Critical Lesson Learned: *Listening to that little voice inside …*

Burning on the high end of a prescription should trigger a greater awareness of risk/benefit. As one participant said at the end of the facilitated dialogue, "We were going awful slow. If we have to slow down that much, maybe we should wait for another day."

The burn team assessed risk/benefit on May 30, and all indicators said it was a good day to burn. Based on this experience, the same burn team, assessing similar indicators, would ask the following before deciding to burn in the future:

Recommendation #2 – When deciding to burn on the high end of a prescription, consider the following questions:

- **Are contingency resources readily available and prepared to respond?**
- **Does the planned burn have hardline boundaries?**
- **Are trigger points and/or management action points in place, easily recognized and do they result in reassessment?**
- **Are all personnel assigned to the burn aware of the "high end" factors, and have their concerns been heard and considered?**
- **Do key personnel have adequate capabilities and qualifications to assert the appropriate span of control within their assignment?**

FLA TEAM MEMBERS

- **Team Leader:** Rob Fallon, District Ranger, Allegheny NF
- **Lead Facilitator:** Ken Maas, Humboldt-Toiyabe NF
- **Technical Specialist:** Russ Ivie, Fishlake NF
- **Technical Specialist:** Carol Carlock, Humboldt-Toiyabe NF
- **Writer/Editor:** Jamie Gough, Intermountain Regional Office

APPENDIX A

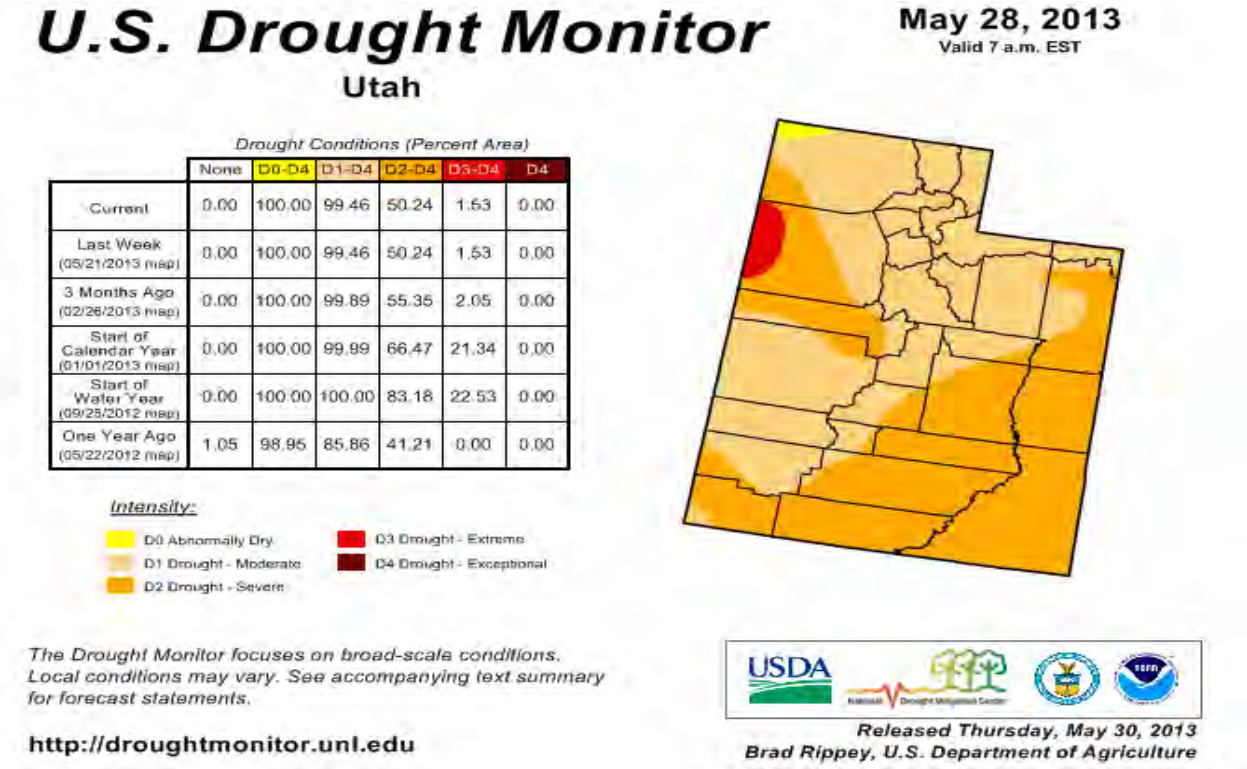
CHRONOLOGY OF EVENTS

PLANNING DOCUMENTATION	
March 2003	NEPA Signed
5/16/2011	Burn Plan approved by Agency Administrator
11/7/2012	Burn Plan certified by Agency Administrator
5/23/2013	Pre-ignition approval by Agency Administrator
5/29/2013	All notifications were completed but were not documented
5/29/2013	Briefing checklist (operational & crew)
5/30/2013	Briefing (No record of checklist)
6/1/2013	AAR Conducted (Includes Escape)

DETAILED TIMELINE DURING IMPLEMENTATION		
Date	Hours	
5/29/2013	1003	Briefing completed.
	1030	Completed test fire.
	1159	50% of Unit 2 complete.
	1400	Encountered wind and topography-influenced change in fire behavior in Unit 2.
	1443	Completed ignition of approximately 80 acres.
	1800	All resources were released.
5/30/2013	0910	Briefing completed.
	0930	Completed test fires in Unit 2. Second Test fire was a success and firing personnel continue with ignition.
	0945	Realized burning hotter in pine. Decide to stagger and slow firing.
	1100	Ignition crew splits into three groups. Unit 2 (5 people), Staged Group (10 people); and Unit 5 (3 people).
	1140	Unit 5 igniters begin to “blackline” along east line (Wash) of Unit 5.
	1200	Spotting occurring on east line. Holding resources expanded to address spots.
	1230	Type 6 engine arrives on the Two-Track to pick up spots north of the east line.
	1300	Slopover occurs on Southeast Corner of Unit 5. Type 6 Engine is positioned on the north side and moves to suppress.
	1310	Strong north wind pushes slop over to the south of the Southeast Corner of Unit 5. Additional onsite holding resources are assigned to the slop.
	1330	Change in wind direction from the southwest pushes the slop to the north and it runs. Crews split up to engage multiple spot fires. RXB2 asks Unit Modules to account for all personnel. All personnel are accounted for either actively holding or in safe locations.
	1345	Contingency resources ordered. Spots growing rapidly off the east line into private land.
	1406	Escape declared.

APPENDIX B

ANALYSIS OF SEASONAL SEVERITY, WEATHER EVENTS, AND ONSITE CONDITIONS LEADING UP TO THE WILDFIRE DECLARATION



U.S. Drought Monitor

May 28, 2013
Valid 7 a.m. EST

Utah

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	99.46	50.24	1.53	0.00
Last Week (05/21/2013 map)	0.00	100.00	99.46	50.24	1.53	0.00
3 Months Ago (02/26/2013 map)	0.00	100.00	99.89	55.35	2.05	0.00
Start of Calendar Year (01/01/2013 map)	0.00	100.00	99.99	66.47	21.34	0.00
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	83.18	22.53	0.00
One Year Ago (05/22/2012 map)	1.05	98.95	85.86	41.21	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

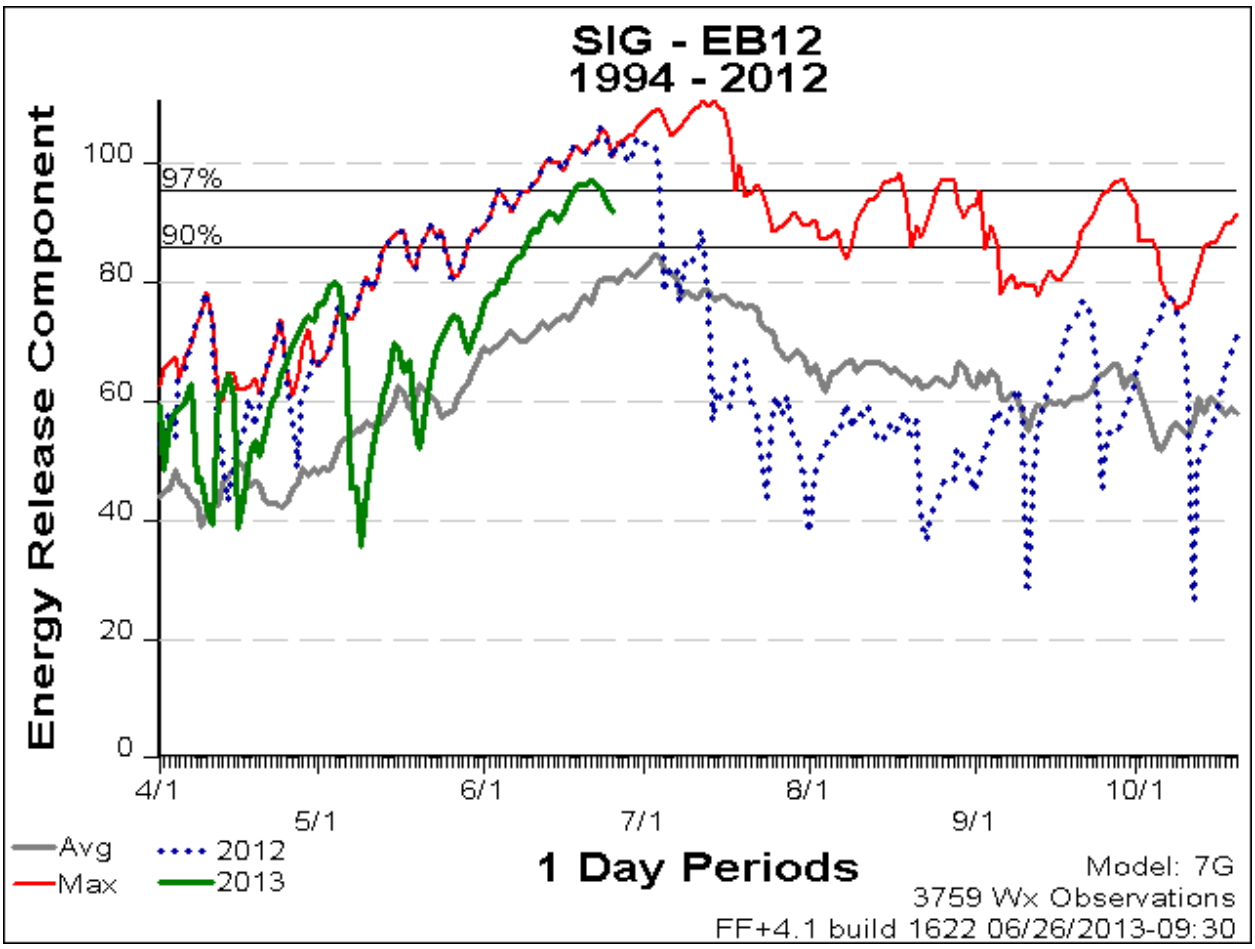
http://droughtmonitor.unl.edu

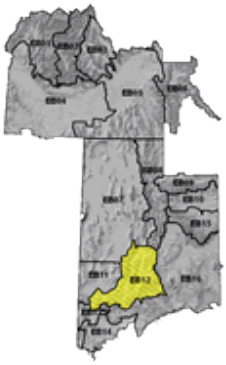
USDA

Released Thursday, May 30, 2013
Brad Rippey, U.S. Department of Agriculture

The U.S. Drought Monitor showed "Severe Drought" for the area. The U.S. Drought Monitor is a broad-scale analysis tool and does not provide site specific information. SNOTEL data for the Escalante River Basin indicated that the area was at 78 percent of average precipitation for the year.

The National Fire Danger System (NFDRS) index used to track the combined effects of fuel dryness on fire potential is known as the Energy Released Component (ERC). The ERC serves as a good characterization of local seasonal fire danger trends resulting from the area fuel moisture conditions. The ERC relies heavily on large and live fuels, has a low variability, and is not affected by wind speed. The following graph displays current ERC's and compares them to historical readings.





EB12 - South Central Utah Mountains

RAWS Name	WIMS ID
Assay Bench	422604
Buck Flat	422606
Lost Creek	421905

Explanation of Lines in this ERC Graph

The black lines mark the 90th and 97th percentile level of ERC. (Typically, large fires become more frequent when these values are above the 90th percentile.) The bold red line indicates the historic maximum values. The grey line is computed average for that date (1994 through 2012). The heavy green line signifies the values for the current year (2013). The dotted blue line shows values for the previous year (2012), which was an active fire year in Utah.

The ERC for Special Interest Group (SIG) EB-12, South Central Utah Mountains was near 70 on May 29th and 30th. This value is below historic maximum and the 90th percentile, but above the 18 year computed average (1994 through 2012).

WEATHER

The District fire and fuels staff requested spot weather forecasts through the National Weather Service, Salt Lake City for May, 28th, 29th, and 30th. No Red Flag Warnings were issued for Utah Fire Weather Zone 496 prior to the ignition on May 29th.

PREDICTED WEATHER – NATIONAL WEATHER SERVICE, STUMP SPRINGS PROJECT AREA

	May 28th	**May 29th**	**May 30th**
Sky Weather	Partly cloudy (50-60% cloud cover). A slight chance of showers and thunderstorms.	Mostly sunny (15-25% cloud cover) until noon… Then partly cloudy (35-45% cloud cover). A slight chance of showers and thunderstorms after noon.	Mostly sunny (5-15% cloud cover).
Max Temp. (°F)	63-65°	64-66°.	68-72°
Min. Relative Humidity (%)	22-24%	16-18%	11-15%
20' Winds (mph)	West winds 5 mph increasing to 20 mph in the afternoon	West winds 5 mph increasing to 10-15 mph with gusts to 25 mph in the afternoon.	Breezy. West winds 5-10 mph this morning increasing to 10-20 mph with gusts to 25-30 mph possible this afternoon.
Haines Index	4 LOW	4 LOW	5 MODERATE
Clearing Index	1000+	1000+	1000+

ONSITE PORTABLE RAWS OBSERVATIONS – ADJACENT TO PROJECT AREA (DIXIE PORTABLE #1)

	May 28th 0838-1838	**May 29th 0838-1838**	**May 30th 0838-1438**
Temperature (°F)	53-67°	48-63°	56-69°
Relative Humidity (%)	19-47%	15-40%	9-22%
Wind Speed (mph)	0-9 gusts to 23	2-7 gusts to 16	0-9 gusts to 20
Wind Direction	South, southwest through west, northwest	North through northwest	North through north, northwest
10 hr Fuel Moisture gm	4-5	5-7	4-6

The onsite portable RAWS collects weather observations at 38 minutes past the hour each hour throughout the day. The above table summarizes weather readings taken from the hours of 0838 through 1838 on May 28th and 29th, and 0838 through 1438 on May 30th.

FUELS

Fuels consist of a ponderosa pine over story. Encroaching intermittent stands of Gambel oak brush, manzanita, pinyon, juniper and forest litter make up the understory. Dead and downed

natural and activity fuels are light. Fuels within the Units are referenced as Fuel Model 9 (hardwood litter) and Fuel Model 6 (dormant brush, hardwood slash). The fuels described are continuous and extend through the Unit boundaries.

The Eastern Great Basin Fuels Status page did indicate fuels had reached critical status within Utah Fire Weather Zone 496.

Fuel samples were taken within the Stump Springs project area on May 15th. Samples from the Buck Flat RAWS, 16 miles northeast, were collected April 1st, May 1st, and May 15th.

Stump Springs Fuel Samples						
Date	**10-hour**	**1000-hour**	**Juniper**	**Pinyon**	**Ponderosa**	**Sagebrush**
May 15th	5	8.9	65.2	76.1	79.9	168.1

Buck Flat RAWS Fuel Samples				
Date	**10-hour**	**1000-hour**	**Bitter Brush**	**Ponderosa**
April 1st	10	9	Not Sampled	80
May 1st	3	6	77	79
May 15th	6	11	113	74

TOPOGRAPHY

The elevation of the burn Units ranges from approximately 7,500 feet to 7,800 feet. All aspects are represented within the Units. Topography of the Units consists of rolling hills and drainages. The Units are located to the east of a steep rugged rim that reaches above 10,000 feet in elevation.

ANALYSIS OF ACTIONS TAKEN LEADING UP TO THE WILDFIRE DECLARATION FOR CONSISTENCY WITH THE PRESCRIBED FIRE PLAN

The Stump Springs Prescribed Fire was implemented consistently with most parts of the Burn plan. Notifications were made according to the plan. All key personnel were qualified for the positions that they were assigned. The plan included a sound Prescription, Communication, and Medical Plan. Parts of the Holding plan were followed as directed in the plan. The area that was not followed in the Holding plan was “at a minimum an engine will be staffed with a qualified engine boss during ignitions”. The engines were not staffed, instead they were staged. There was no documentation that “Go-No-Go” checklists were completed for either May 29th of 30th.

The events on May 29 went as planned. The RXB2 knew that they were burning in the high end of the prescription, but there was no weather documentation to support exactly where they were in the high end. The team utilized information from the Dixie Portable #1 weather station that was located adjacent to the SW corner of the project area. Using this tool, it was determined that on May 29th between 1338 and 1438 hours, the 10-hour fuel moisture prescription was exceeded; that pattern continued through 0438 hours on May 30th. The 10-hour fuel moistures subsequently improved and met the upper limit of the ‘high end’ of the prescription from 0438 to 1138 hours, after which it again exceeded the prescription. The Relative Humidity between 1338 thru 1448 hours on May 30th was also out of prescription. The plan allowed for winds in

the 0-15 mph range and throughout the day conditions were within this range. Test fires were implemented according to the plan as representative vegetative types were selected. The firing team was forced to move fairly slow and fire activity picked up a bit towards the afternoon. They were getting some spots but nothing beyond expectations that was of any size. The holding plan as it pertains to staging personnel was implemented consistently with the plan. The decision was made in the afternoon of May 29 to have an earlier start time for May 30.

On May 30 resources showed up on site for brief with a couple of people missing the main briefing. Burning started for the day moving slow and started to get some spots but where picking them up. Around 1300 hours on May 30 they were getting multiple spots and some slopovers.

They utilized the trigger points that were identified in the Contingency plan and requested their Contingency resources to be dispatched to the burn. Once it was determined that the resources on site could not contain the fire and that the fire was also burning on private land they declared it a wildfire. Conversion of personnel and resources from prescribed fire to wildfire suppression was consistent with the prescribed burn plan.

ANALYSIS OF PRESCRIBED FIRE PLAN FOR CONSISTENCY WITH POLICY

The FLA Team reviewed the Stump Springs Prescribed Burn Project National Environmental Policy Act documentation and Prescribed Fire Plan and found that the prescribed fire plan was consistent with the NEPA document. The burn plan contains all elements that are identified by the Interagency Prescribed Fire Planning and Procedure Guide and Forest Service policy requirements. Even though the burn plan contains all Elements that are required, the following items were not completed:

- Burn Boss signature not in the Certification of Burn Plan table.
- No signed copies of Element 2-Prescribed Fire Go-No-Go Checklist for May 29th and 30th 2013.
- No signature on Element 3- Complexity Analysis Summary.
- No signature on the Prescribed Fire Plan Technical Peer review.
- Limited daily documentation.

The plan was developed as a training assignment by a Prescribed Fire Burn Boss Type 2 trainee (RXB2-T) under the supervision and oversight of a qualified RXB2.

The Prescribed Fire Agency Administrator Pre-Ignition Checklist was completed before operations began.

ANALYSIS OF PRESCRIBED FIRE PRESCRIPTION AND ASSOCIATED ENVIRONMENTAL PARAMETERS

The table below displays the Stump Springs Blocks 2 and 3 Prescribed Fire burn plan environmental prescriptions and actual conditions during the first and second ignition periods.

	Allowable Burn Plan Conditions	Ignitions May 29, 2013 1030	Ignitions May 30, 2013 0930
Temperature (°F)	30-85°	*54º	*58°
Relative Humidity (%)	25-12%	*29%	*17%
Mid-flame wind speed (mph)	0-15	*3 gust to 7	*4 gust to 10
Wind direction	120-360	*Northwest	*North
1-hr fuel moisture (%)	4-10	**6	**6
10-hr fuel moisture (%)	6-12	*7	*6
100-hr fuel moisture (%)	9-20	Unavailable.	Unavailable.
1,000-hr fuel moisture (%)	9-17	Unavailable	Unavailable
Live fuel moisture (%)	80-150	Sagebrush 168.1 Ponderosa Pine 79.9 Pinyon Pine 76.1 Juniper 65.2 May 15 Observations	Sagebrush 168.1 Ponderosa Pine 79.9 Pinyon Pine 76.1 Juniper 65.2 May 15 Observations
PIG (%)	31-63	50%	50%
Spotting Distance (miles)	0.1-.2	n/a	n/a

*Weather observations for 5-29-13 were taken off the Dixie Portable RAWS #1 at 1038 hours and on 5-30-13 weather observation were taken from Dixie Portable RAWS #1 at 0938 hours. **1 hr. fuel moistures calculated using Fine Fuels Moisture charts and weather observations from Portable RAWS. Probability of Ignition was derived from RAWS data and PIG chart. No onsite weather observations were available.

A REVIEW OF THE APPROVING LINE OFFICERS QUALIFICATIONS, EXPERIENCE, AND INVOLVEMENT

The Stump Springs Prescribed Fire Plan was approved and certified by the Agency Administrator, who has the delegation of authority to approve prescribed fire burn plans at all levels of complexity per FSM 5140, having attended Fire Management Leadership. In addition, the Agency Administrator has attended National and Geographical Fire Manager Training.

A REVIEW OF QUALIFICATIONS, EXPERIENCE, OF KEY PERSONNEL INVOLVED

The FLA Team found that all personnel involved in the Stump Spring Prescribed Fire were qualified for the positions held during implementation.

The preparer of the prescribed fire plan and the technical reviewer were both qualified at the RXB2 level, commensurate with the “Moderate” complexity level of the prescribed fire. An

additional preparer was also utilized in the preparation of the Stump Springs Prescribed Fire Plan, who at the time was working as an RXB2 trainee.

SUMMARY OF FACTORS CONTRIBUTING TO WILDFIRE DECLARATION

1. Environmental factors: drought, condition of the fuels, topography, weather.

2. Private land adjacent to the eastern boundary of the prescribed burn area was impacted by spotting and fire spread.

3. Lack of holding resources on the Southeast Corner of Unit 5.

4. Ordering resources outside of the prescribed burn contingency (i.e., Heavy Lift Helicopter).

APPENDIX C

Common Factors from Five Escaped Prescribed Fires, 2002-2012; Eastern Nevada, and Central and South-Central Utah.

Five prescribed fire escapes occurred between 2002 and 2012 in Eastern Nevada, Central and South Central Utah.

Sanford 2002 (DIF), Jungle 2007 (MLF), Steep Creek 2009 (FIF), Box Creek 2012 (FIF) and North Schell 2012 (HTF).

Reviews or FLA's were completed on these incidents.

Common factors leading to the escape…

- Boundary of the prescribed fire Unit, where the escape occurred, had no break in available fuels.
- Be willing to share your experiences and observations with others. Some participants regret that they had seen signals on recent burns on surrounding locations that could have provided some indication of what the potential fire behavior could be. In retrospect, they now wish they would have been more eager to share their experience and insights with the rest of the prescribed fire team.
- Given the excellent level of communication within the burn team, it was acknowledged that this may make them vulnerable to confirmation bias or "Group Think." To combat this tendency, the group may want to consider making more use of outside observers or internal players who are able to play "devil's advocate" to question the group's reasoning and force decisions to be analyzed with a critical eye.
- There is a human tendency to base predictions too much off of previous days observed fire behavior. We should be aware of this tendency and force ourselves to factor in the change we may see when forecasted conditions become more conducive to fire spread.
- Some factors contributing to the escape include project design where semi-continuous fuels extend beyond the project boundaries.
- Plan did not provide for Management Action Points (MAPs) useful in guiding actions in response to spots and/or slop overs.
- Increase in wind speed and/or change in wind direction. Wind influenced by topographic features can funnel and concentrate winds.

- Other factors that may have influenced the cause of the escape are increased fire behavior, rate of spread, conditions of receptor fuels caused a resistance to control – possibly influenced by extended drought -, lack of winter snow pack, and low moisture content of organic material.

- Spotting occurred early and/or frequently during the ignition phase.

- No significant precipitation in nearly two months coupled with below normal precipitation for more than one year.

- 1000-hour fuels are at or below critical levels.

- Trends for live and dead fuel moisture are at or below long term averages.

Recommendations from previous reviews…

- Set yourself up for success during the NEPA process… draw smart Unit boundaries that can be lit and held.

- Approach private land owners to see if you can include their land within your projects.

- Due to potential spotting, place a greater emphasis on 20-foot winds rather than eye level winds.

- Many escapes began to take place well before the first spot or slopover. A repeated recommendation for future prescribed burns starts with project design and environmental assessment.

- Check fuel receptivity outside the Unit as this factor may be as important as how fuels burn inside the perimeter. Test all fuel types. Contingency resources then can be ramped up or down accordingly.

- Identification of MAPs by the burn team might prevent the escape of the burn by establishing planned response. In this way, needed resources can be identified and ordered with adequate time for them to arrive and take necessary actions.

- …Run all scenarios through the "what if" game.

- Problems encountered on short duration burns are often not visible until the implementation phase is initiated. At this point, a burn boss's ability to adjust to these emerging problems is significantly reduced. A mindfull infrastructure that continually reassesses the situation is particularly valuable as time and opportunity to perceive problems – and react to them – is very limited.

- A small burning block may be seen as a “slam dunk” just because it’s small. Categorizing the risk of a burn based on its size is dangerous. This characterization oversimplifies a complex fire event. We should ask the same question regarding small block burning as we would a large one: “What could go wrong here?” And, “What am I not thinking about just because it’s small.