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BURDETTE FIRE CASE STUDY

Lolo National Forest, Montana

A NORMAL WORK*
LEARNING DOCUMENT
Summer - Fall 2017

Normal work consists of accomplishing the agency mission without an unintended outcome or near miss.

Forest Service

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Burdette Fire Case Study

July – October 2017
Executive Summary

On July 16, 2017, lightning ignited a wildfire within the Burdette Inventoried Roadless Area (IRA) on the Ninemile District of the Lolo National Forest. The fire was located in an area of the IRA that was difficult to access and had previously been identified as having a high concentration of hazards, such as steep, rocky terrain and high snag density. The initial dispatch of the fire very quickly led to a discussion that involved the District Duty Officer, District Fire staff, and the District Ranger. It was discussed that aerial insertion of firefighters and early dedication of resources could have limited the fire's spread potential. However, the fire location was a great distance from any values-at-risk. It was decided that the Burdette would be approached with a dynamic management response that minimized risk to firefighters while additionally providing benefit to the land resources through the reintroduction of wildfire.

During the next week, the fire was managed locally through observation and planning. The focus and intent was still to minimize firefighter exposure. Beyond that goal, the direction was to keep the fire within the IRA boundary and to attain some resource benefits through reintroducing wildfire to the area. The fire grew from 12 acres on the first day to 120 acres on July 20. While the local management was finding success in their approach to managing the Burdette Fire, they were quickly finding that the resources required to manage the fire as it grew would be unavailable with the increasing fire activity in Region 1 and in the nation.

Within the boundaries of the Ninemile Ranger District, the Sunrise Fire was threatening private property and local infrastructure. A Type 2 Incident Management Team (IMT) was ordered to manage the Sunrise Fire and included in the delegation of authority were management responsibilities associated with the Burdette Fire. Management on the Burdette Fire was to have a resource benefit emphasis within the IRA, combined with a point/zone protection strategy if the fire were to spread towards the rural interface in the surrounding areas. The IMT Commander received the intent and direction for both fires and assumed control of each.

The IMT was able to approach each fire independently though there was confusion as to the ultimate direction and soundness of decision-making surrounding the Burdette. Due to a combined camp and briefing, the strategy of direct suppression on the Sunrise and a long-term, indirect strategy on the Burdette became contentious and confusing to assigned resources. Assessments from field-personnel relayed information that full management of the Burdette Fire at the scale of the entire IRA would require a separate, Type 2 organization for support and management. As these concerns were voiced, District staff re-evaluated the Burdette Fire's management direction, and a visiting Risk Management Assistance Team (RMAT) was tasked with producing a number of analytical tools to critically evaluate the Burdette for risk management.

The RMAT was ordered at the request of the Regional Forester and evaluated a number of ongoing incidents during its visit. The Burdette Fire was an interesting subject of study because it had previously not established itself as a comparatively large incident. Until the point of RMAT analysis, topography, previous fuels treatments, bordering fire scars, and limited suppression activity had limited fire spread to a relatively small are within the IRA. It was, however, approaching a drainage bottom that could lead to more substantial fire growth and require a much larger investment of personnel and energy to effectively manage. The RMAT was set upon its analysis with the intent to increase the decision space for the District Ranger and Forest Supervisor—to provide them more options for handling the incident.

The RMAT's resulting analytics were framed in three different management scenarios: (1) immediate and direct suppression of the fire that was already established; (2) a longer-term approach to check the fire as it progressed using advantageous terrain and existing fire breaks; and (3) being a point-protection strategy of values-at-risk in front of fire progression. The point-protection strategy discussed was not considered as feasible due to the degree of risk that would be transferred to private landowners. The longer-term, indirect approach (big box) was considered as an alternative to direct suppression. Big box advocates pointed to the difficulty of extraction for injured personnel whereas direct suppression advocates pointed to the exposure of more people for a longer period of time throughout the course of action. The RMAT tradeoff analysis estimated 655 "person days" of firefighter exposure for the direct suppression approach and 4,116 for the indirect strategy. Following heated debate about the benefits and hazards associated with each approach, it was ultimately decided that the Burdette Fire would be suppressed.

After the decision was made to suppress the fire, the Agency Administrator briefed both hotshot crews that were engaging on the Burdette. She made it clear that there were no values-at-risk near to the Burdette Fire and the location had been identified as having a high concentration of significant hazards, months prior to the fire's start. She re-iterated that as soon as the crews left the ridges, extraction of an injured individual would be reliant upon a short-haul program, which was not readily available to the incident. Both crew superintendents acknowledged the intent and adopted tactics that minimized their exposure to risk and allowed for efficient work. As the crews increased the amount of containment on the fireline, a portion of line was left unchecked because it was unreasonably hazardous to insert ground resources. Aviation resources were employed in the area of concern to apply water. The entire containment process took three days. After the hotshots concluded their work, the Burdette was monitored from an aerial platform until there was no evidence of fire growth or activity.

The Burdette Fire was initially managed with a resource benefit emphasis, using a long-term, indirect strategy with the intent to minimize exposure to highly concentrated hazards for firefighters. As the fire season developed and it became clear that the Northern Rockies region was experiencing a higher than normal fire load, the Burdette Fire was reevaluated. The reassessment of the fire ultimately led to a change in management strategies that involved immediate and direct suppression. A greater understanding of the discussions that occurred surrounding this event follows.

Introduction and Purpose

On July 16, 2017, a lightning strike ignited a wildfire within the Burdette Inventoried Roadless Area (IRA) on the Ninemile Ranger District of the Lolo National Forest in western Montana. Because of the complexities and nuances involved in managing and ultimately suppressing the wildfire, the Rocky Mountain Research Station (RMRS) Innovation and Organizational Learning (IOL) Research, Development, and Application (RD&A) chose this fire—the Burdette Fire—as a case study. The document that follows outlines the conditions that created a unique management scenario and compares varying perspectives from multiple parties involved with advising, decision-making, and taking action on the Burdette Fire. This evaluation is not presented as a success or a failure. Instead, it is meant to help highlight the difficult conversations and thoughts that went into the actions taken for the purposes of learning and understanding.

The authors of this study chose to present the findings in a non-traditional format. The study is meant to allow readers to evaluate the varying perspectives of individuals engaged in discourse on the fire. The focus is as follows: what was said, by whom, when, and in what context—with no judgement of right, wrong, success, or failure. The opinions of those interviewed are theirs alone, and their privacy or ownership of their statements has been honored at their request. They have been given the opportunity to amend any statements they themselves made but have not been allowed to alter any other statements. Additionally, the views expressed in this document are those of several USDA Forest Service employees but do not necessarily reflect Forest Service policy or views.

Background

The Lolo National Forest encompasses an area greater than two-million acres, west of the continental divide in Montana. Influenced by both continental and maritime climates, the forest provides for diverse ecosystems that range from wet, western redcedar bottoms to high alpine peaks and forests of alpine larch and whitebark pine. The forest engages in numerous vegetative management activities involving timber management, wildlife habitat improvement, and hazardous fuels reduction; all focused on ecosystem resilience. With an estimated one-million visitors annually, dominant recreation user groups include anglers, campers, hikers, hunters, and wilderness enthusiasts. The Lolo National Forest is divided into five Ranger Districts: Missoula, Ninemile, Plains-Thompson Falls, Seeley Lake, and Superior.

Figure 1. Northwestern states with the Lolo National Forest highlighted.

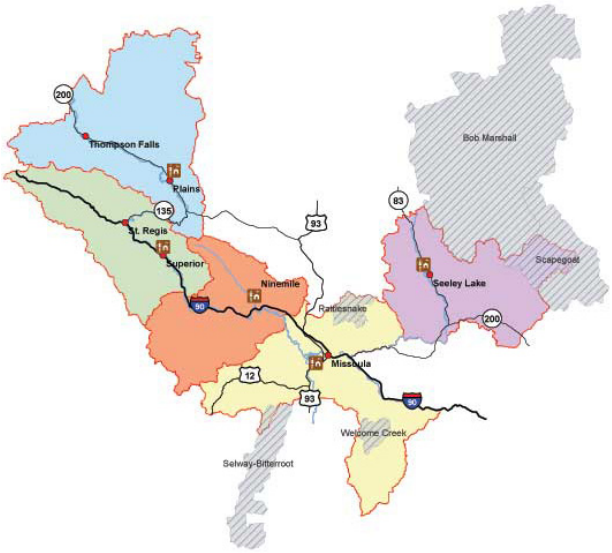


Figure 2. Lolo National Forest District Map.

The Ninemile District covers an area approximately 388,000 acres, bordered by the Missoula, Plains-Thompson Falls, and Superior ranger districts of the Lolo National Forest to the west and the east. To the north, the Ninemile borders Confederated Salish and Kootenai tribal land and to the south is the Idaho border and National Forest System land administered by the Nez Perce-Clearwater National Forest. The rural communities of Alberton, Huson, Lozeau, Ninemile, Quartz, and Tarkio all reside within the District, which is bisected by Interstate 90, a primary transit route for the northwestern United States. Numerous private landowners share boundaries with the Ninemile Ranger District in addition to multiple parcels of land owned and administered by the state of Montana. Within the Ninemile District, Forest Service employees and partners execute a complex fire program that includes focused fuel reduction in the wildland urban interface, active prescribed burning, and management of wildfires caused by natural ignitions, consistent with the Lolo National Forest's overall effort to align with the National Cohesive Strategy.

The Burdette Inventoried Roadless Area (IRA) is an area approximately 16,000 acres that was designated roadless in 1979. The management area consists of predominately shrub lands located at elevations below 5,000 feet on south-facing slopes. These areas are identified as being important deer, elk, and mountain sheep winter range and are generally unsuitable for regulated timber harvest. Historically, wildfire has played a major role in providing for the needs of big game in the area and as such, the management area goals consist mainly of optimizing deer, elk, and sheep winter range and providing opportunities for dispersed recreation. The IRA is classified into four strategic wildfire management zones, the majority being classified under community wildfire protection and wildfire maintenance, 42 and 55 percent respectively. This means that if fire response is placed on a spectrum between full suppression and managing for resource objectives, 97 percent of the Burdette IRA is identified on one side of the spectrum or the other. Forty-two percent of the area presents very limited opportunity to manage fire for resource objectives due to risk to communities; in 55 percent of the area, managing wildfire to meet resource objectives is encouraged. Forty-eight percent of the Burdette IRA has not significantly departed from a historical fire regime condition class,

but 52 percent is classified as either moderate or severe departure—32 and 20 percent respectively.

Initial Report and Response: July 16, 1600 Hours

On July 16 at approximately 1600 hours, Stark Peak Lookout discovered the Burdette Fire. Upon report, one engine and one helicopter platform were sent to assess the fire. The fire was lightning caused and located within the Burdette IRA. Access was difficult, and the area had previously been identified as a candidate for prescribed burning due to fuel loading and stand health. The fire was located on a ridge top. The fire behavior consisted of terrain-influenced backing fire with occasional torching in sub-alpine fir. There were few values-at-risk identified by the initial responding units. Additionally, the fire was located less than one-half mile south of the Thompson Creek Fire burn scar, (2003) and there were multiple roads and decommissioned roads in the area visible on Google Earth. The Thompson Creek Fire footprint was one of two pre-identified management action points on the Ninemile District that allow for more response flexibility due to the excellent tactical opportunities provided by post-burn fuels conditions.

"Four-five-acres; burning in timber; active ground fire; intermittent torching; no structures threatened; limited access; not seeing any helispots; would recommend a second helicopter for bucket work until access is established."

–Air attack on scene, 1638 on July 16

"Size update, 10 acres. Ran up to the ridge on the west side. Spotting on the east side. Water seems to be slowing it down a little."

–Incident Commander, 1822 on July 16

Figure 3. Burdette Fire initial size-up image taken around 1640 on July 16.

Sensemaking and Learning

Following the dispatch of resources to the Burdette Fire, the District Duty Officer (DO) notified the District Ranger (DR). Discussions immediately began on the topic of risk and imbedding people in an area that presented access difficulties and significant snag hazards. It was believed that the fire could be caught quickly if it was attacked aggressively through aerial insertion of firefighters and early dedication of resources. On the other hand, the fire was burning in an area that presented opportunities to allow for containment on more favorable and accessible terrain due to the substantial distance to values-at-risk.

Prior to the onset of the 2017 fire season, the Ninemile DR, District Fire staff, and District Fire resources had held several discussions about engaging on wildfires with two things in mind: values-at-risk and firefighter exposure. The conversations were partly motivated by the snag-related fatality that occurred on the Strawberry Fire the year prior. The snag-incident victim was Justin Beebe, a Lolo National Forest employee, serving on Lolo Hotshots. With such a visceral connection to a recent tragic event, the Ninemile District staff made a concerted effort to identify areas with high concentrations of known hazards, such as snags, and little to no values-at-risk. The only values-at-risk in these areas would be the firefighters engaged in suppressing fires. Several areas, primarily roadless areas, were designated as locations where multiple strategies for fire management would be assessed. The Burdette IRA was one of those areas.

On the same day that the Burdette Fire was initially being evaluated, the Sunrise Fire ignited on the border of the Superior and Ninemile Districts. The Superior Fire staff responded to the

Sunrise Fire with aggressive initial attack; this was described as being low in elevation, difficult to manage fire behavior, threatening structures, and had the potential to impact communities.

Innovations and actions taken

- The Burdette Fire was going to be monitored for containment opportunities that did not involve heavy insertion of firefighters to engage in direct attack.
- The DO notified responding resources that they were not expected to staff the fire that day or evening.
- Aerial resources were diverted to support the Sunrise Fire.
- The DR notified the Forest Supervisor that the Burdette Fire was a candidate for a strategic assessment of risk management, engagement, and resource benefits.

Local Management: July 17 to July 21

From July 17 to July 21, the local District managed the Burdette Fire with a focus on minimizing firefighter exposure to risks while identifying strategies to keep fire within the IRA boundaries and attainment resource benefits from the wildfire reintroduction. Topography and previous prescribed fire treatments from the 1990s inhibited large fire growth as the fire grew from 12 acres on July 17 to 110 acres by midday on July 19 and to 150 acres on July 20. Isolated torching continued to occur as crews began to improve access by scouting, improving helispots, and using heavy equipment to improve holding lines on the fire's western edge. Contact had been made with Montana Fish Wildlife and Parks, the land manager adjacent to the fire's west side. During this time, the communities of Petty Creek and Fish Creek were identified as areas with potential to be affected by the Burdette Fire; located seven miles to the east and six miles to the northwest respectively.

"Seeing an increase in activity; getting northwest winds pushing the fire to the southeast. Estimated size now 15-20 acres. Some single tree torching; all is well."

–IC Report 1548 on July 17

"Smoke is moving to the east; moderate fire behavior with occasional group torching. Grown about 10 acres."

–Human lookout, 1449 on July 18

"Wind out of the west is pushing smoke to the east and may be visible. [Dispatch] may get calls."

–Incident Commander, 1505 on July 18

"Secured more of the edge. Fire is getting high winds, so resources have moved back to the lookout. Walking the excavator out."

--Incident Commander, 1631 on July 20

At this point in the season, the Northern Rockies Region was at a Planning Level (PL) 4. There were 36 uncontained large fires in the nation, 15 of which were in the Northern Rockies and five of which were on the Lolo National Forest.

Figure 4. Image of the Burdette Fire at 0925 on July 17.

Figure 5. Image of the Burdette Fire at 1008 on July 21.

Sensemaking and Learning

The Burdette Fire had been selected as a candidate for a more indirect, longer-duration strategy due to the location, values-at-risk, access difficulty, and significant risk to firefighters with limited capacity to extract personnel in the event of an emergency. The direction from the District Ranger and District Fire staff was to monitor the fire, provide updates, and begin evaluation of areas to engage the fire with high likelihood of success and minimal risk to firefighters. The fire behavior allowed for limited scouting, again due to access difficulty and the inability to monitor fire progression from the ground.

The fire was located very close to Montana Fish, Wildlife, and Parks (FWP) land. The Ninemile District made contact with FWP to capture its thoughts and concerns in regards to the Burdette Fire management response. The FWP Agency Administrator gave Forest Service managers the impression that the area could tolerate a reasonable amount of wildfire due to past logging harvests; however, the area could not handle excessive use of heavy equipment off of existing roadways. While the land could tolerate fire, Forest Service managers deferred to suppressing any fire growth to the west onto Montana FWP managed land.

The District Ranger's direction remained to manage the fire with an emphasis towards resource benefit. District Fire staff, particularly the Fire Management Officer (FMO), expressed interest in managing the fire locally, without involving an Incident Management Team (IMT). However, based on the increasing fire activity in the Northern Rockies, reports began to surface regarding the scarcity of resources. If the District were to manage the fire in-house, it was perceived that the fire would be left understaffed with resources being sent to wildfires with higher priority. By delegating authority to an IMT, the team's organization would conceivably have the means to take action on the fire in the event it made substantial runs towards values-at-risk.

Innovations and Actions Taken

- Burdette Fire management responsibility would be included in the Letter of Delegation to the Incident Management Team managing the neighboring Sunrise Fire.
- The Burdette would continue to be managed with an indirect strategy that confined it to the IRA.
- As part of managing the Burdette Fire Management Action Points (MAP) and containment lines were to be identified. It was determined that if the fire were to exit the IRA, a full suppression strategy would be employed.

Incident Management Team: July 22 to July 31

On July 22, Shawn Pearson's Type 2 IMT was in-briefed at Ninemile. The team's delegation of authority included management responsibilities for both the Burdette and Sunrise fires. As the IMT engaged on the fires, the management direction for each incident was unique to the incident and location. The Sunrise Fire was to be managed with a confine/contain strategy with appropriate protection of values-at-risk. Because structures and rural interfaces were at risk, the Sunrise Fire quickly took priority for management and resource assignment. The Burdette Fire was to be managed with a resource benefit emphasis within the IRA. Any fire

outside of the IRA was to be suppressed using full suppression tactics where the likelihood of success was high.

During the period of time in which Pearson's IMT managed the Burdette Fire, several occurrences affected those working on the fire. A Wildland Fire Module (WFM) was ordered to help manage and monitor the Burdette. However, the module was ordered through the Region 1/Region 3 agreement and not through the IMT itself. During one of the module's first shifts, one module team member was diagnosed with a heat illness and had to be extracted from the fireline with a medivac helicopter. The individual was hospitalized and released, but the following day the WFM engaged in a safety stand-down to discuss events leading to and following the heat-illness incident. Midway through the IMT's management on the Sunrise and Burdette fires, the initial Division Supervisor was reassigned from the Burdette to the Sunrise Fire and a second Division Supervisor was ordered from outside the Region and assigned to the Burdette.

The Burdette Fire resources worked towards protecting the land to the west and the south of the fire perimeter while allowing the fire to progress into the Burdette IRA. The objective to contain the western perimeter of the fire was accomplished through the use of equipment, handline, and strategic burnouts. All of these operations were completed within a handful of shifts, leaving the eastern and northern portions of the fire to be monitored and assessed.

Sensemaking and Learning

While Shawn Pearson's team engaged on both the Sunrise and Burdette fires, conflicts concerning the Burdette Fire's management began among field personnel, District Fire staff, and the DR. From the initial Division Supervisor's perspective, the direction and intent were unclear. The difference in management approaches between the Sunrise and Burdette fires caused confusion and some consternation among assigned resources. He stated, "I had resources attending the briefing at a suppression fire [Sunrise], and I would have to re-brief them on modified suppression tactics [Burdette]. Getting buy-in from my resources was hard because they were hearing two different things." During daily meetings, the Division Supervisor expressed his concerns with the time of the year and the potential for the fire to last all summer long. He presented options that could delay large growth of the fire later into the summer, when conditions were more conducive to controlled burning, yet was still frustrated with the direction to allow fire to move around within the IRA. The Ninemile District FMO participated actively in the discussions surrounding the activity and actions on the fire. He encouraged the Division Supervisor and Operations Section Chiefs to allow fire to move around in the IRA. The sentiment he expressed was, "I would be perfectly happy if you just don't do anything in there." The Operations Section questioned why the Burdette was his IMT's responsibility—why that fire had been included in the delegation of authority. The District Fire staff reaffirmed their statement that the Incident Management Team would have the means and the support to take action on the Burdette Fire in the event that it escaped the IRA.

As the Sunrise Fire grew in complexity, the initial Division Supervisor was transferred to a Division on the Sunrise and a second Division Supervisor was assigned management responsibilities for the Burdette Fire. The second Division Supervisor came from Region 3 and

was not a regular member of Pearson's Type 2 team. This Division Supervisor received two in-briefings: one from the District Ranger and Fire staff and the second from the IMT. The perception from the incoming Division Supervisor was that the District had clear intent to manage the fire, but the IMT's Operations Section was not enthusiastic about having responsibilities associated with the Burdette Fire. Despite the conflicting feelings, the Division Supervisor engaged in his assessment and management of the Burdette Fire. He surveyed the land for the potential to manage the fire as a long-term event and was subsequently dissuaded from considering long-term management as a good decision.

A good deal of time and effort was spent evaluating the necessary support to manage the Burdette in a long term or "big-box" scenario. The Division Supervisor walked the Burdette's entire perimeter and spent substantial time assessing the entire IRA and planning area. He shared, "I walked the whole thing and if it [the fire] transitioned [to another drainage], we were gonna need a lot of horsepower. Either to pick it up or implement the big box." His assessment, with concurrence from the IMT's Operations Section, was that a separate Type 2 organization would be required to implement the big box and double the resources would be needed to burn and hold the box perimeter. Given a 32,000-acre planning area, the time of year, fire behavior occurring on neighboring, large incidents, and the scarcity of resources, the likelihood of success was perceived to be fairly low and at great expense to the District with substantial risk to firefighters later in the season. The Division Supervisor presented an alternative for two IHC crews and aviation support that could wrap up the fire in as little as three days.

Innovations and Actions Taken

- Full suppression tactics were applied outside of the IRA, controlling the fire's western edge.
- Within the IRA, the intent was still to allow fire to move around.
- Pieces of minimal, direct line were put in place on the fire's corners to prevent the fire's escaping early, before the District and team were ready to take full action and make a decision concerning the Burdette Fire.

Risk Management Assistance Team (RMAT): August 1 to August 2

During the summer of 2017, the Large Fire Risk Sharing Group tested a process to support Line Officers and Incident Commanders in changing the conversation around large fire strategies. The process developed was called the Risk Management Assistance Team (RMAT) program. This program supported Agency Administrators through the formation of ad hoc teams, comprised of experienced Line Officers, Incident Managers, and Decision Analysts whose goal it was to enhance the strategic evaluation process of large fire management and increase the decision space for Agency Administrators and Line Officers. An RMAT's role was to increase the managing official's capacity to examine alternative strategies that consider the tradeoffs between exposure, risk to valued assets, and opportunities for wildfire benefits.

As the fire activity increased towards the end of July, the Northern Rockies Regional Forester requested an RMAT to visit the Region and provide support to Agency Administrators struggling with an unseasonably heavy fire load. The team sent to Region 1 in July and August was comprised of a Team Leader and Line Officer Lead, a Line Officer Liaison, one Lead Fire

Research Analyst, a Wildfire Decision Support Analyst, a Fire Operations Lead, a Support Analyst, and a Research Economist. During their Region 1 visit, the team provided decision support to the Sunrise Fire, the Burdette Fire, and the Rice Ridge Fire, all on the Lolo National Forest. Additionally, team members conducted analyses on other ongoing fires during that time period.

The Lolo Forest Supervisor and Ninemile District Ranger requested the visiting RMAT apply its expertise and analytical capacity to the Burdette Fire following the Sunrise Fire. As the District Ranger put it, "The decision-making on the Sunrise was clear and straightforward, and I was comfortable with that. The Burdette Fire was the one keeping me up at night." The team accepted the task to complete a full trade-off analysis within 24 hours. The abbreviated timetable was due to the fire nearing a drainage bottom on a tributary to Burdette Creek, limiting the time available to make a decision and take action.

The RMAT prepared a number of analyses that were then presented to the Lolo Forest Supervisor, Fire staff, and Ninemile District Ranger. Two of the more prominent products that were scrutinized and discussed in detail were the trade-off analysis for three different courses of action and the fire behavior prediction surrounding a potential frontal passage, frontal passages being a weather event common to western Montana in August and September. The three courses of action discussed for the trade-off analysis were as follows: immediate and direct suppression, an indirect confine and contain strategy, and point protection of values-at-risk. The results of those two analyses are shown below, and the RMAT's full document list is available at the RMAT File Cabinet 2017[1] (see Folder 06 – R1 Support: Burdette Fire Aug. 2017).

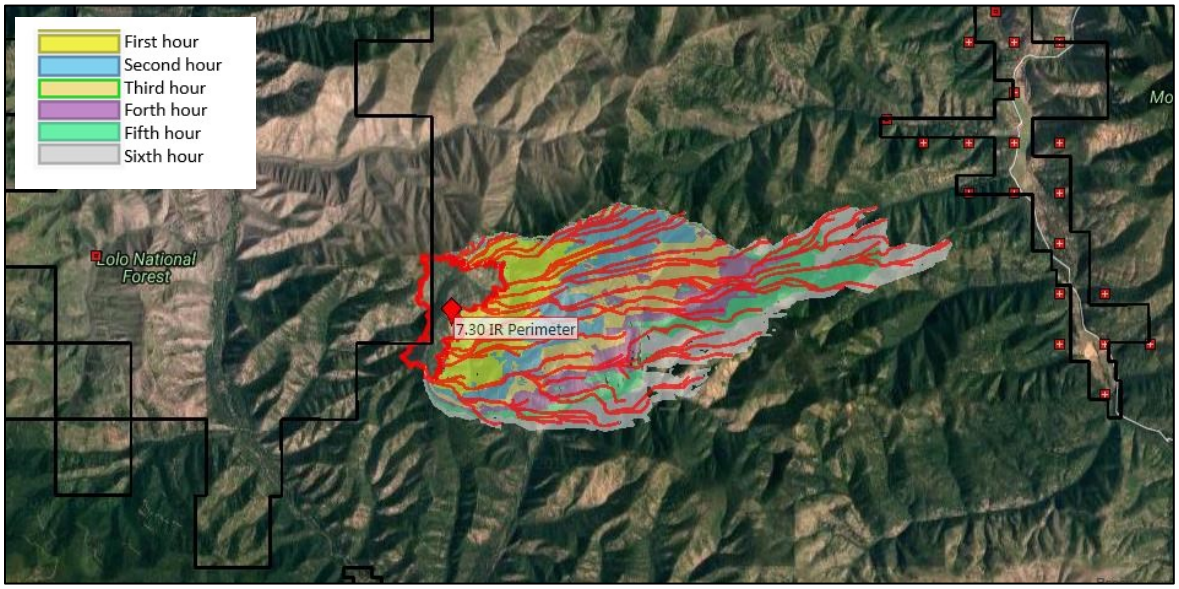


Figure 6. Short-term fire behavior modeling. Six hours of burning, 30 mph winds at 20 feet from 260˚, with fully cured live fuels. This scenario was meant to represent a worst-case scenario during a single frontal passage.

[1] Go to https://sites.google.com/a/firenet.gov/rmat/.

The short-term fire modeling was completed to mimic a worst-case scenario. The depiction above showed extreme fire growth, but the fire was not predicted to reach the values-at-risk in the Petty Creek drainage during one event. With the fire not impacting Petty Creek under the worst possible conditions, it could be assumed that more temperate conditions would lessen the impact even more. The underlying issue RMAT identified was that this modeled only one event when the typical fall weather patterns in western Montana could produce four to seven similar events over the course of the following three months.

	Score-Course of Action (COA) , 1 best-5 worst		
	COA 1 Current + Direct	COA 2 Current + Indirect (FR22) + Pt. Protection	COA 3 Current + Pt. Protection
	1	5	
OBJECTIVES			
Communities/Adjacent lands	2	4	5
Municipal watersheds	n/a	n/a	n/a
Ecosystem function	4	2	2
Infrastructure	1	3	3
Timber	1	2	3
Recreation	1	2	2
Wilderness characteristics	n/a	n/a	n/a
Habitat/ Winter range	4	2	1
	2.2	2.5	2.7
PUBLIC SAFETY			
I-90	n/a	n/a	n/a
Human Health (smoke)	1	4	5
Non-evacuees	1	3	4
	1.0	3.5	4.5
FIREFIGHTER SAFETY			
Fire Behavior	2	3	4
Heat	4	3	2
Tree strike potential	4	3	2
Steep Slopes	4	2	2
Driving	2	4	4
Aviation	3	4	3
	6.3	6.3	5.7
Objectives	2.2	2.5	2.7
Public Safety	1.0	3.5	4.5
Firefighter Safety	6.3	6.3	5.7
	9.5	12.3	12.8
Anticipated Incident Duration	5 days	21 days	14 days + 14 days
Exposure (people/day x days)	655 people days	4116 people days	3,010 + 4,606 people days
Likelihood of Success	1	3	5
Socio-Political	1	3	5

Figure 7. RMAT Trade-off analysis rating for: COA (1) Direct and immediate suppression; COA (2) Indirect, confine and contain strategy; and COA (3) Resource benefit and point protection.

The trade-off analysis and other analytic products bookended the potential management options between immediate, full suppression, and long-term management. It was designed to show where each option would place unnecessary risk and when each option would encounter a value-at-risk.

Sensemaking and Learning

The intent of the RMAT analysis was to increase the decision space for the Forest Supervisor and District Ranger in order to allow them to confidently make a decision. The trade-off analysis was based on reducing unnecessary risk to firefighters, the public, and to values while evaluating the positive effects a wildfire could provide to the landscape. The conversation and intended management direction became inevitably pointed towards the first of the three options: immediate and direct suppression. The RMAT leader said you almost hear a pin drop following the presentation.

Heated discussion took place concerning exposing firefighters to increased risk by inserting them within the Burdette IRA. The area had previously been identified as having diminished stand health and increased snag hazard. The topography was steep, rugged, and difficult to access, so much so that the extraction of an injured firefighter would be limited to a short-haul operation or a labor-intensive and time-consuming patient carry. With all the risk-and-exposure discussion, the fire was still located in a remote area with no values immediately threatened. All of these issues were at the forefront of the discussions that initially directed the Agency Administrator to allow the fire to be managed through an indirect, longer-duration strategy. Until August 1, only three injuries had occurred on the Burdette Fire; this low number was largely attributed to indirect tactics and limiting firefighter exposure to hazards. In addition to firefighter risk, the difficult terrain inhibited the ability of firefighters to extract injured personnel. By making the decision to suppress the fire with a direct strategy, the Agency Administrator would be exposing firefighters to known risks but in a limited time period, reducing the overall exposure. As the RMAT discussed the indirect option, it was clear that resource investment and firefighter risk would be much greater than in the direct option. The man-hours needed to prepare and then implement the “big box” would be difficult to support during a fire season that was already over-burdening the capacity for response to wildfires. The Burdette Fire was at a point that it could be suppressed quickly and with a comparatively small investment of resources. If the Burdette was “taken off the board,” firefighting resources could then be applied to other fires with greater values-at-risk throughout the Region and the country.

The Burdette IRA had been scheduled to be analyzed for a substantial fuels reduction project. A natural ignition within the IRA presented a unique opportunity to return fire to the landscape within an area that had seen significant departure from a historical fire regime. More than half of the Burdette IRA was considered to be a maintenance zone within the Lolo National Forest’s strategic wildfire management plan. This designation meant the role of wildfire was to be encouraged commensurate with the values-at-risk. Within the 32,000 acres of the Burdette IRA, the identified values would have benefitted from exposure to fire. The neighboring land manager, Montana Fish, Wildlife, and Parks had been advocates of returning fire to the landscape to improve habitat for large mammals. The District staff placed great

value in taking advantage of the ability to manage the fire regime in the Burdette IRA immediately, without delaying the introduction of wildfire through the NEPA process. The plan to confine and contain the Burdette Fire within the IRA was the right plan for the right place, but the individuals at the table were trying to determine if it was the right time.

The conversations being had were already difficult due to the complexity of the values-at-risk and the exposure of firefighters to risk on the Burdette. The decisions to be made were increasingly difficult because Agency Administrators, the RMAT, and the Incident Management personnel were operating in a grey area comprised of future uncertainty and "what if" scenarios.

To simplify the debate, the authors of this case study divided the camps of thought into two opposing positions—one position advocating for immediate, direct suppression **(DS)** and the other position advocating for a big box, with indirect containment **(BB)**.

Opposing Viewpoints

The fictitious dialogue below suggests how some of the conversations might have gone. Note: **DS** = Immediate, direct suppression advocate. **BB** = Big-box advocate, with indirect containment.

BB: There are no values-at-risk to fire damage besides the personnel we insert into the IRA.

DS: There are no values immediately at risk. The fire has potential to grow and impact infrastructure like the private land and structures in Petty Canyon.

BB: The absolute worst case scenario of a frontal passage shows that the fire won't reach Petty Canyon.

DS: One event won't reach Petty Canyon, but a second easily could. If the Region experiences two frontal passages, the Burdette Fire won't be the only show in town. Other fires will grow and require more manpower. Other large fires in the Region are already understaffed; the resources to manage this fire and others are not available.

BB: Using resources to manage this fire on more favorable terrain will reduce the likelihood someone could be injured.

DS: If the Burdette Fire is suppressed now, the exposure to risk is minimized by decreasing the number of people and time spent in unfavorable terrain. Even if resources are used on favorable terrain, they are being exposed to many of the same risks.

BB: We can utilize this fire to manage fire within the Burdette; we can reduce the risk of wildfire for future generations. By not managing the fire regime we are deferring risk into the future.

DS: By not suppressing the fire immediately, we are deferring risk to more people for several more weeks, maybe months. We see that using this fire for a resource benefit has value. The big box could be the right plan for the right place, but with the regional and national fire activity, this is not the right time.

BB: If this isn't the right time to manage this fire, when is the right time? We have an opportunity to manage this fire now, and an opportunity like this may not come again anytime soon. By deferring this action, we are allowing the IRA to continue to depart from a natural fire regime. We know that it will be difficult and there is a lot of risk involved, but we have an opportunity; we should act on it.

DS: Ultimately, by deferring to a big-box approach, you will accept risk to the firefighters required to implement the plan and to anyone impacted by the growth of this fire. What if it escapes the IRA and burns through a community? What if someone gets hurt or burned over when the fire grows?

BB: What if someone gets hurt while going direct?

Unfortunately, this division was not the RMAT's intent. As the RMAT explained, members had learned from previous fires that their role was not to advise a course of action. Instead, their aim was to increase the number of options and help to provide Agency Administrators with analytical support for each option. As the analyses were presented and discussed, the Agency Administrators saw less support for a big box and more reasoning to suppress the fire directly. The big-box advocates perceived the evidence presented as painting them into a corner with only one choice to make.

Innovations and Actions Taken

- A direct containment strategy was to be implemented.
- Actions were to be focused on options that had the highest probability of success while still minimizing risk to firefighters.
- If a crew refused an assignment due to safety concerns, there would be no re-evaluation or attempt to insert a different crew.
- Aviation resources were to be utilized only when and where successful operations were likely.

Direct Suppression: August 2 to August 6

By August 2, the Burdette Fire had grown to 625 acres. Fire growth had been limited to an easterly direction, into the IRA. The Line Officer's direction had changed from a resource benefit management to direct suppression. While most of the fire had been contained on the western perimeter, crews and overhead began to develop a plan to fully suppress the Burdette Fire. The Division Supervisor requested two hotshot crews to construct handline around the remaining uncontained fire edge. While waiting for the hotshot crews to become available, the Apache Kid Wildland Fire Module worked to expand containment lines around the portion of the Burdette Fire that was burning into the IRA.

On August 4, the Helena Hotshots and Lewis and Clark Hotshots arrived and received instructions that they would be working on the Burdette Fire to complete containment lines. Over the next three days, both crews engaged in direct line operations using minimal mop-up and limiting handline to areas that required it, employing cold-trailing tactics where possible. A good deal of effort was put into creating a medical extraction route and medivac points that were in close proximity to the fire's edge.

During this period of time, Pearson's IMT was transitioning command of the Sunrise and Burdette fires to Thurman's Type 1 IMT. In the transition period, the role of Division Supervisor for the Burdette Fire was filled by the Helena Hotshot Superintendent and Lewis and Clark Hotshot Superintendent.

Sensemaking and Learning

Prior to either of the hotshot crews engaging on the Burdette Fire, the DR took the time to convey her intent to the crew supervisors. Following their briefing at the Sunrise Fire, the DR spoke to the supervisors of Helena and Lewis and Clark IHCs and made it clear that there were no values-at-risk in the Burdette IRA. She impressed upon them the terrain and standing snag components were hazardous to anyone in the area. She conveyed that a large portion of the rationale behind managing the fire was the significant snag hazard in the area, which had not changed.

Firefighters on Lewis and Clark IHC described the Burdette as being rough country that was super snaggy. A medical extraction that had occurred on the crew earlier in the summer led to discussions regarding the potential time and energy it would take to remove an injured person from the fireline. Crewmembers described the work the sawyers did as being fairly heavy to allow for safe fireline operations. Excepting the efforts that went into snag mitigation, the tactics employed to control the fireline were relatively minimal. Crewmembers were told to cold-trail the fireline and only construct handline where it was necessary and made sense. After the perimeter was checked, the crew staged in areas relatively free of snag hazards and implemented a regular patrol of the fireline to check for any fire creeping across containment lines.

Ground resources left one final portion of the Burdette Fire perimeter entirely unchecked. The unchecked area was in a very steep and rocky portion of the drainage. The decision was made not to insert people because the risk was not worth the reward—the "juice wasn't worth the squeeze." In that area, helicopters were utilized to apply water to the burning materials. Several fuel cycles with a Type 1 helicopter were spent working the area until minimal fire activity was present.

Innovation and Actions Taken

- The work completed over the previous three days increased the Burdette Fire's containment amount.
- The section of line left unchecked by ground resources remained calm; the fire was placed into a monitor status.
- The IMTs that continued to manage the Sunrise Fire accepted management responsibilities for the Burdette Fire as well.

Monitor for New Activity: August 7 to Season's End

The Burdette Fire was managed for the remainder of the summer though little to no activity occurred on the fire following August 6. Aerial resources checked the fire occasionally for growth or fire activity. Final reported acreage for the Burdette Fire was 655 acres.

Further Discussion

The Burdette Fire generated substantial discussion and cause for reflection during the event. Questions remain for those individuals involved with the fire. Finding a "right" answer for any of these questions is not simple.

Hard Questions

Risk

- Does decreasing exposure really decrease risk?
- If we all have different tolerance for risk, is refusing risk the right thing to do? Or is it right to accept risk to limit exposure?
- Does turning away from a risky decision create potential for "I Told You So" moments if nothing but success is achieved? How does that burden weigh on decision makers?

- What are the values-at-risk being threatened by wildfire? Is protecting those values worth the exposure to firefighters?
- If a serious injury or fatality had occurred, would that outcome determine the success or failure of the decisions made?
- To what timeframe should we apply risk?

Land Management

- What does right look like? And to whom?
- If it's the right plan, right place, wrong time, when is the right time?
- Does local knowledge lead to local bias?

Prioritization

- If you're looking down the barrel of a long, hot fire season, is it best to take a catchable fire off the list to be done with it?
- Is our priority to protect homes and infrastructure? Or is it to manage the land? Are resources dedicated accordingly?
- Is the view best from the forest/region/nation during a fire season? Or is the view best from the forest/region/nation during a generation?

Outcomes

- Is an outcome-based model of success the right way to evaluate fires?
- What outcome(s) defines success?
- Is managing to prevent a negative outcome restricting our ability to achieve positive outcomes?

Striking Comments

"We made the right decision with the Burdette Fire." --Initial Attack Duty Officer, in reference to not staffing the fire.

"The right decision was made with the Burdette Fire." --RMAT Fire Analyst, in reference to the shift to direct suppression.

"[The DR's] course of action could have been brilliant. We could have had 30 - 35,000 acres burning in the IRA, letting Mother Nature do her thing and it might have been the right course of action all along, but we'll never know that." --Type 2 Incident Commander, Sunrise and Burdette fires.

"We were somewhat successful with the Burdette, but it was frustrating and could have been more successful." --District FMO, in reference to mixed suppression strategy.

"When you weighed all the factors, particularly where we were in the season, how much fire was on the landscape, the occurrence of frontal winds in relation to values at risk, and limited resources…she made, I think, the right decision…even though in other seasons it would have been the wrong decision." --RMAT Lead Analyst, in reference to the District Rangers' changing strategy to full suppression.

"We were successful in our mission to suppress the fire." –Firefighter Type 2, in reference to cold-trailing and patrolling.

"The conversations that occurred around Burdette were the right conversations." --RMAT Line Officer Liaison.

"We live in a culture where we don't accept questioning…we disguise learning as learning how to justify what we've done in the past." --RMAT Research Economist.

"A good decision was made by an individual who came in and said, 'Hey, you know, it's not worth it; let's hold it with some helicopters and look at a bigger box, some contingency options.'" --Helena IHC Superintendent, in reference to Lewis and Clark IHC not engaging direct on final piece of containment line.

"It's never going to be a perfect time; it's never going to be convenient or easy…That's not when we get these fires." --District Ranger, in response to "Right Plan, Right Place, but Wrong Time."

Conclusion

The Burdette Fire presented difficulties in management and direction for innumerable reasons. The conversations held at every level of the organization that contributed to the Burdette Fire outcomes were diverse and thoughtful. It is difficult or even impossible to label any one management decision as a success or failure, as right or wrong. However, this event did provide an example of a complex, dynamic, and evolving decision-making challenge. The discussions presented in this document are only a summary of the conversations that took place at the time of the event. These conversations were valuable learning experiences for all parties involved, and this document aims to present the dialogue to a wider audience. With any luck, these conversations can contribute to sensemaking and learning of a greater community among wildfire managers and operators.

> **"We learn from each other. We learn from others' mistakes, from their experience, their wisdom. It makes it easier for us to come to better decisions in our own lives."** *–Adrian Grenier, actor, producer, director, musician, and environmentalist*

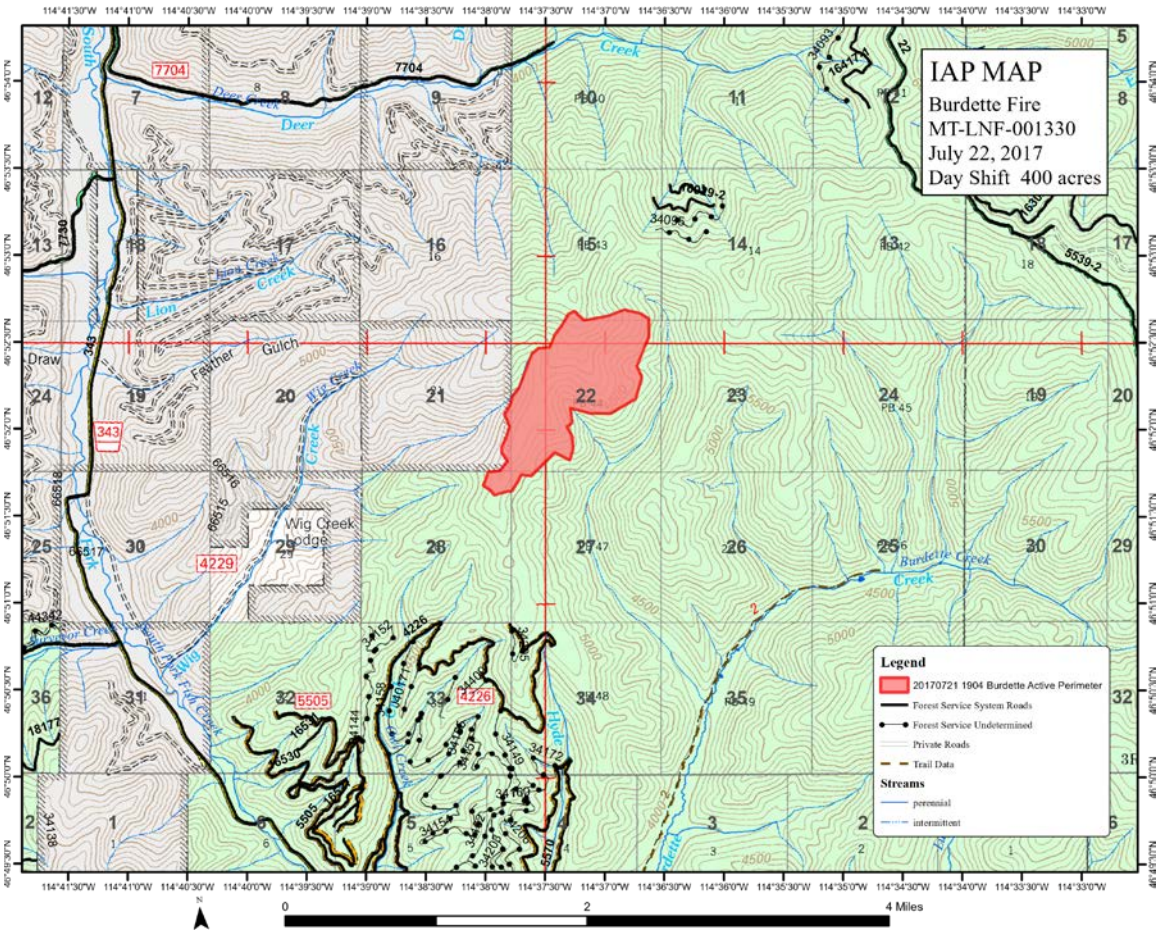
Ted Adams, a supervisory forestry technician in Region 6, produced this normal work case study while on detail with the Rocky Mountain Research Station Human Performance & Innovation and Organizational Learning Research, Development, and Applications. Ted leads the Snow Creek Wildland Fire Module (C-302) on the Deschutes National Forest Bend-Fort Rock Ranger District in Bend, Oregon.

Appendices

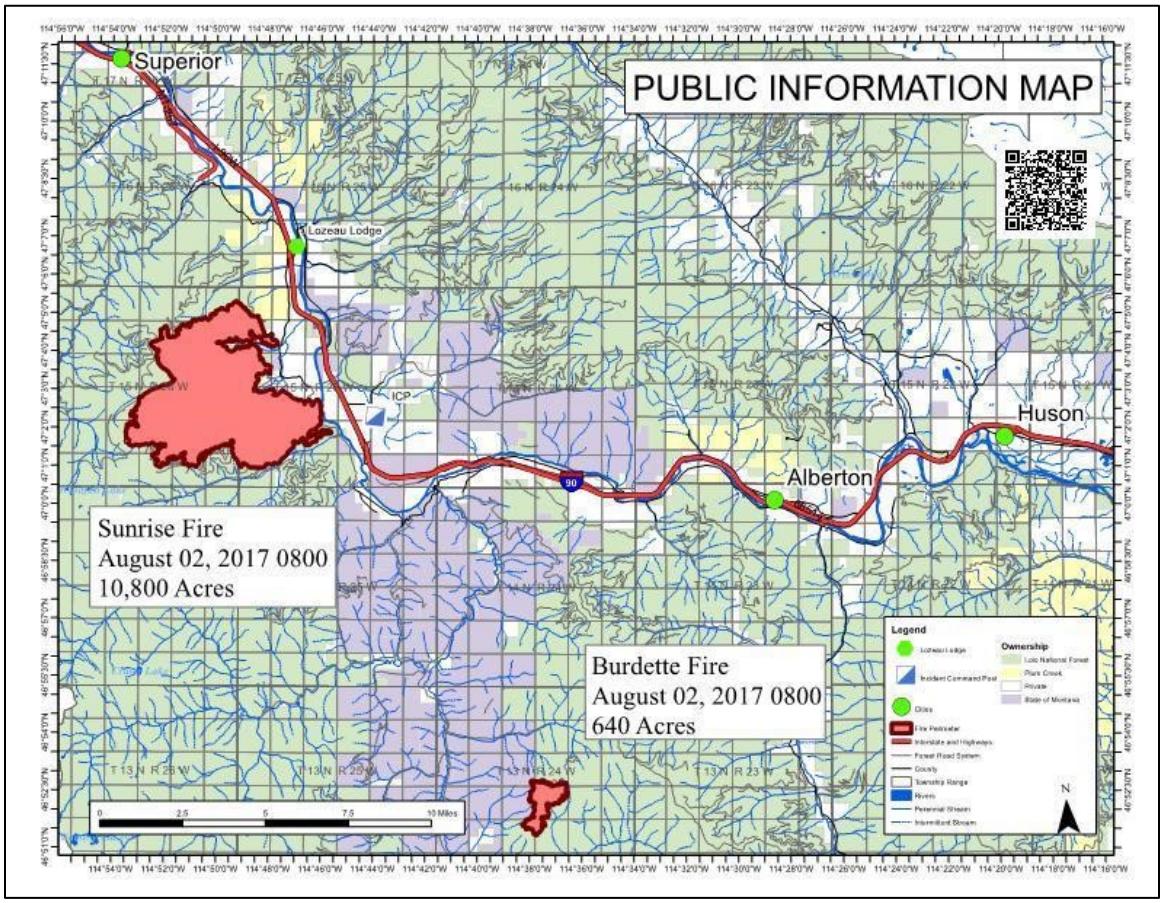
Burdette Fire: Wildland Fire Decision Support System
Course of Action

Activated	Deactivated	Item Description
07/20/2017	07/31/2017	Resource Benefit Objective Emphasis Limited point and/or zone protection with resource benefit opportunities exist in portions of the landscape. Point/Zone protection to the West of the fire on Fish Wildlife and Parks land in Deer Creek and in Wig Creek. Point/Zone protection to the East Northeast in the Petty Creek Drainage. Use resource benefit to the East Southeast.
07/23/2017	07/31/2017	Outside of the IRA Identify containment lines outside of the IRA when feasible to meet the objective of keeping the fire within the boundary of the IRA. If the fire goes beyond the boundary of the inventoried roadless area (IRA) full suppression tactics are to be employed. Utilize direct attack via ground or aerial resources where probably of success is high, particularly if the fire is approaching the Petty Creek communities or Fish Creek communities.
07/31/2017	08/07/2017	Utilize resources (ground, aviation, etc.) as appropriate to check fire spread around identified values at risk – ecological, private property and infrastructure.
07/31/2017		Coordinate and keep the local public, private landowners, DNRC, Montana DOT, Montana State Police, MT Fish Wildlife and Feathers, Mineral County Sherriff's department, and outfitters and guides informed of current fire status, the expected fire potential and how it may impact the various partners or adjoining land owners.
07/31/2017		Assess private land structures and Forest Service infrastructure for possible structure protection in the event structure protection needs to be implemented. Implement structure protection plans in areas where needed Fish Creek, or Petty Creek.
07/31/2017		Utilize resources (ground, aviation, etc.) as appropriate to check fire spread around identified values at risk – ecological, private property and infrastructure.
07/31/2017		Utilize resources (ground, aviation, etc.) as appropriate to check fire spread around identified values at risk – ecological, private property and infrastructure.
07/31/2017		Utilize resources (ground, aviation, etc.) to monitor fire spread in unstaffed fire areas to stay informed on fire behavior and associated growth in relation to Management Action Points.
07/31/2017		Maintain area and road closures within the area and extend the closures as needed based on the changing fire environment.
07/31/2017	08/07/2017	Utilize a SOPL to update the long term plan and management action points as needed throughout the life of the incidents.
07/31/2017	08/07/2017	Utilize FBAN/LTAN support to update long term Fire Behavior modeling as needed throughout the life of the fires within the Complex to help support strategic and tactical decisions.
08/07/2017		Utilize full perimeter control through equipment, aerial resources or ground crews to construct containment around the perimeter of the fire. Implement these actions with the least exposure possible and the actions are commensurate with the values at risk.

Burdette Fire Maps



Burdette Fire Maps, continued



Fire Management Units: Lolo National Forest (5/10/2016)

Strategic Wildfire Management Zones	Goal of Zone	Typical High Value Resource Assets	Modeled Wildfire Risk	Proposed Strategic Objectives for WFDSS	The Role of Wildfire for Resource Management Objectives
1 Community Wildfire Protection	To identify areas with the highest risk to Communities and Community assets. Can be used to help prioritize fuels treatments and fire management activities.	Concentrated human habitation, major infrastructure, high use recreational areas. Inholdings with improvements .	Areas that share the same very high density of modeled fire ignition points with fire perimeters that intersect areas of mapped Communities and Community assets.	Coordinate with all jurisdictional partners regarding the response to wildland fire. Where feasible use mechanical or prescribed fire treatments to reduce risk of damage from wildfire. Primary response is contain, control. When conditions allow evaluate wildfires that may attain ecosystem benefits.	The role of wildfire to meet any resource objectives is very limited due to very high risk associated with Communities.

Strategic Wildfire Management Zones	Goal of Zone	Typical High Value Resource Assets	Modeled Wildfire Risk	Proposed Strategic Objectives for WFDSS	The Role of Wildfire for Resource Management Objectives
2 General Wildfire Protection	To identify the areas with high risk to Communities and Assets as well as Natural Resources that would see a negative impact from wildfire. Can be used to help prioritize fuel treatments and fire management activities.	Major infrastructure, watershed, critical habitat, timber values, recreational infrastructure, ecological structure and function.	Areas that have a very negative net value change from modeled wildfires to identified HVRAs (Conditional Risk) or where there is a high density of modeled ignition points with fire perimeters that intersect areas of mapped Communities and Community assets.	Coordinate with all jurisdictional partners regarding the response to wildland fire. Where feasible use mechanical or prescribed fire treatments to reduce risk of damage from wildfire. Primary response is contain, control. When conditions allow evaluate wildfires that may attain ecosystem benefits.	The role of wildfire to meet any resource objectives is very limited due to high risk associated with Communities.

Strategic Wildfire Management Zones	Goal of Zone	Typical High Value Resource Assets	Modeled Wildfire Risk	Proposed Strategic Objectives for WFDSS	The Role of Wildfire for Resource Management Objectives
3 Restoration	To identify the areas with low to moderate risk to mostly Natural Resource values and some isolated FS owned assets. This may be used in the future Forest Plan Revision to help prioritize ecological restoration projects to achieve Desired Conditions.	Critical habitats not negatively impacted by wildfire, dispersed recreational opportunities, Isolated Forest Service-owned assets, Ecological structure and function.	Areas that had a low density of ignitions where fire perimeters intersected with values, or areas that saw a low net value change to assets due to wildfire impacts.	Where feasible use mechanical treatments combined with prescribed fire to reduce risk of damage from wildfire. Use wildfire to increase ecosystem resilience when conditions are feasible. Primary response is confine. Maximize the use of planned and unplanned ignitions on a landscape scale. Use roads, ridges, natural barriers to confine fires.	The role of wildfire to meet resource objectives can be considered commensurate with the values-at-risk.

Strategic Wildfire Management Zones	Goal of Zone	Typical High Value Resource Assets	Modeled Wildfire Risk	Proposed Strategic Objectives for WFDSS	The Role of Wildfire for Resource Management Objectives
4 Wildfire Maintenance	To identify areas with very low risk and where wildfires will very likely maintain of help achieve LRMP Desired Conditions. Management of wildfires to achieve resource objectives is encouraged.	Wilderness or Proposed Wilderness areas, Inventoried Roadless Ares, Ecological structure and function, some isolated backcountry Forest Service-owned assets.	Areas that have a positive to neutral net value change from modeled wildfires to identified HVRAs. (Conditional Risk is positive/ neutral.)	Use wildfire to increase ecosystem resilience when conditions are feasible. Primary response is confine. Maximize the use of planned and unplanned ignitions on a landscape scale. Use roads, ridges, and natural barriers to confine fires.	The role of wildfire to meet resource objectives is encouraged commensurate with the values-at-risk.

National Fire Danger Rating Products for the Ninemile Ranger District

FIRE DANGER INTERPRETATION				
Adjective	Index Range	Staffing Level	Dispatch Level	Historic Large Fire Occurrence
Extreme	ERC 64-+	5	3 - HIGH (BI 50+)	32%
Very High	ERC 55-63	4		39%
High	ERC 40-54	3	2 - MOD (BI 30-49)	24%
Moderate	ERC 25-39	2	1 - LOW (BI 0-29)	5%
Low	ERC 0-24	1		0%
Fire Danger – Lolo DNRC West (1999-2013)				

REMEMBER – What Fire Danger tells you:

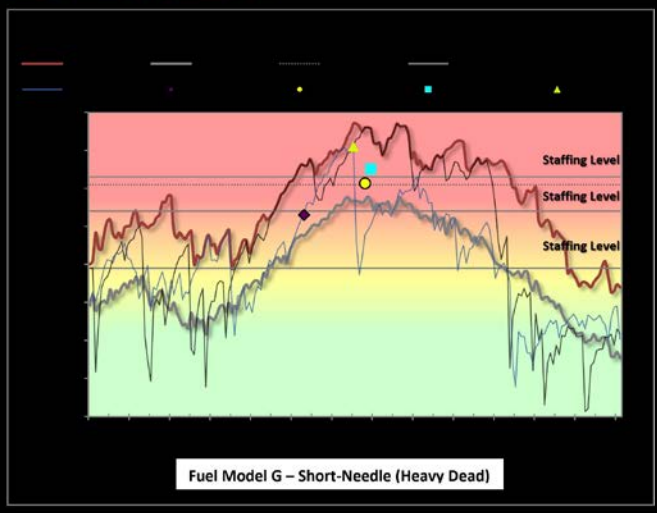
- Energy Release Component gives seasonal trends calculated from 1400 temperature and humidity, daily temperature & relative humidity ranges, and daily precipitation duration
- Wind is NOT part of the ERC calculation
- Pay attention to local conditions and variations across the landscape; Fuel, Weather, Topography
- Listen to weather forecasts, especially WIND
- Drainages may be susceptible to local winds and potential microbursts
- Fire Danger is calculated for the lowest and driest part of the zone (worst case)

LOCAL THRESHOLDS – historically large fires have occurred under the following conditions:

- Relative Humidity <25%
- Temperature >80 degrees
- 20-foot Wind Speed >10 mph
- 1000-hour fuel moisture <12%

WATCH OUT – when dry fuels are combined with any of the following:

- Alignment of Wind and Slope
- Haines Index of 5 or 6
- Dry Cold Front Passage - Strong winds combined with Low Relative Humidity



National Fire Danger Rating Products for the Ninemile Ranger District, continued