Reading Fire

Review

Smoke rises north of Reading Peak on Sunday, August 4, 2012—one week after lightning ignites the Reading Fire.

Left and middle Reading Fire suppression photos taken on August 16. Photo on right of firefighters gridding for spots is from August 15.

Lassen Volcanic National Park

December 18, 2012

The Reading Fire as seen from Mt. Harkness on August 6.

Contents

Cover page photo credits: Bottom left photo taken by Kim Lemke. All other photos provided by Lassen Volcanic National Park.

Reading Fire Review Executive Summary

On July 23, 2012, a lightning strike started the Reading Fire in the interior of Lassen Volcanic National Park. The fire, located at approximately 7,000 feet in elevation, was located in red fir with areas of rock and limited ground fuels. The initial assessment indicated that the fire would have resource benefits. It was monitored for several days and showed minimal growth.

Plans were made to hold the fire at the Lassen National Park Highway. However, during the first days of August, fire activity increased. On August 6, the fire jumped the highway and spread rapidly to the northwest. The fire ultimately spread onto Lassen National Forest lands and threatened the community of Old Station. No structures were lost, and there were two injuries to firefighters. When the fire was contained on August 22, 2012, it had reached 28,079 acres. As of the date of this report, the Reading Fire is estimated to have cost approximately $17 million.

Reading Fire Statistics

In total, the Reading Fire directly affected 28,079 acres: 16,925 acres (60 percent) on National Park lands; 11,064 acres (39 percent) on National Forest lands; and 74 acres (.25 percent) on private lands. At the peak of the incident, resources assigned included more than 1,200 personnel, consisting of 31 hand crews, 85 engines, 5 helicopters, and support staff.

A Learning-Focused Review of this Incident

The Regional Director of the National Park Service's Pacific West Region assigned a team composed of various specialists from a range of agencies to conduct a comprehensive learning-focused review of this incident.

Specifically, these review team specialists included: an Agency Administrator/team leader; policy and operations specialists; a fire behavior analyst; a fire information/education specialist; a Facilitated Learning Analysis (FLA) coach; and a writer/editor.

Purpose of this Review

Separate from this review, the National Park Service Regional and National Office Fire Management Staff determined that Lassen Volcanic National Park managers made their decisions and managed the Reading Fire within existing federal wildland fire management policy.

The purpose of this review is to identify and document lessons learned from the Reading Fire and to share these lessons with fire management personnel, both locally as well as with the greater fire management community. While learning from success is important, learning from events with unintended or unexpected outcomes is critical. Identifying and sharing the individual, unit, and organizational lessons learned should help improve future performance and prevent similar unintended outcomes.

Key Lessons Learned

Planning

Planning for the "worst case" outcome is critical when managing fires for one or more objectives. While the Park was confident that they could manage the fire within a specific area, as conditions changed and the fire spotted over planned containment lines (the Lassen National Park Highway) it became obvious that planning for a larger, more complex scenario would have been advantageous.

Fire Behavior

The Reading Fire's environmental conditions changed from the fire's first day to 14 days later when the fire made its initial extensive run. These changing conditions included the increasing National Fire Danger Indexes, decreasing relative humidity, and decreasing live and dead fuel moistures. Additionally, the fire continued to move from an area with relatively light surface fuel to an area with heavy surface fuel. Recognizing these environmental changes over time and incorporating them into the fire management decision making are critical parts of the process.

Public Information

Delayed information concerning the Reading Fire to the media and affected communities left business owners, residents, and elected officials not well informed with up-to-date information. Mixed fire messaging—not always reflecting current national fire policy—further hampered the Park's fire communication efforts. Starting fire messaging early in the Reading Fire's progress, with a focus on current national policy and terminology, would have assisted fire information efforts to help ensure accuracy to the public, stakeholders, cooperators, and elected officials. Preseason fire education outreach about Lassen Volcanic National Park's Fire Management Plan would have facilitated and enhanced relationships with communities, the media, and elected officials.

Human Factors

The collective focus during the Reading Fire's early stages was that it would stay in a much smaller planning area. The same collective thought was that the Reading Fire was as much fire as the Park could handle—which resulted in the suppression of newly ignited fires. Being mindful of paying attention not only collectively but as individuals in anticipating the unexpected improves decision making and resultant outcomes.

Management and Coordination

The need for agencies to focus on building and maintaining interagency relationships is fundamental to our commitment to safety, science, and stewardship. While always challenging to host an incident management team in national parks when suppression becomes—or is—the single objective, Park units learn that they must accept some level of resource impact to manage wildfires. Understanding each other's policies, practices and capabilities prior to engaging in fire management operations encourages cooperation and efficiency.

Recommendations

- Continue to Ensure Public Safety and Resource Protection through Collaboration – To ensure public safety and to provide for resource protection when managing wildfires, all units should continue to collaborate with other agencies, partners, neighboring communities, and the public. Ensure fire response dialog is included at annual operating plan meetings, during the fire season, and at after-season reviews.

- Public Information Considerations – It is essential that fire information and education be community and stakeholder inclusive year round. Meaningful fire education opportunities occur at many levels and times and should be utilized to enhance partnerships before a crisis occurs. To help build public trust, a continuous and year-round Lassen Volcanic National Park community fire education outreach effort is suggested that matches national fire policy. Build off the Reading Fire long-term messaging plan document that was produced during the fire. Early public notification and outreach is suggested to local communities with any smoke impacts that could potentially affect public health. Develop a Lassen Volcanic National Park "Fire Information, Education and Outreach Guide" and information notebook, which would include information checklists, contacts, and yearly Park fire potential and talking points. Develop an internal Park fire information training program to expand knowledge and expertise with other employees.

- Planning Based on Past Lessons Learned – Compile and refresh staff and managers on lessons learned from past fire reviews and risk assessments. Utilize these opportunities to refine decision criteria and risk assessments for future fires, including fire behavior analysis.

- Develop and Train an Interdisciplinary WFDSS Group – Develop and train a Park- or Park network-specific interdisciplinary Wildland Fire Decision Support System (WFDSS) support group to increase local capacity and competency. It is important for relative risk assessment and operational needs assessments to be completed in the WFDSS decisions for agency administrator approval.

- Future Pocket Card Use Considerations – For future use, as a new Lassen Volcanic National Park pocket card is developed, ensure that it is simple and accessible. In addition, ensure that the current and forecasted Energy Release Component (ERC) is communicated through the dispatch center. Encourage fire personnel to keep track of the changing ERC throughout the season by documenting the daily ERC on the chart located in the pocket card.

- Build a Resource Advisor Guide – All units should have a unit-specific Resource Advisor Guide.

The purpose of this review is to identify and document lessons learned from the Reading Fire and to share these lessons with fire management personnel, both locally as well as with the greater fire management community.

1. Introduction

Learning from Events with Unintended or Unexpected Outcomes is Critical

The purpose of this review is to identify and document lessons learned from the Reading Fire and to share these lessons with fire management personnel, both locally as well as with the greater fire management community. While learning from success is important, learning from events with unintended or unexpected outcomes is critical. The wildland fire community actively promotes a learning culture to enhance and sustain safe and effective work practices across the entire wildland fire community. [Reference: http://wildfirelessons.net .]

Separate from this review, the National Park Service Regional and National Office Fire Management Staff determined that Lassen Volcanic National Park managers made their decisions and managed the Reading Fire within existing federal wildland fire management policy and authority.

Lessons and recommendations regarding both operational and managerial improvements can lead to more successful fire management in the future. To best confront and adapt to the land management challenges of the future, the Reading Fire Review Team has acknowledged several lessons learned from the Reading Fire incident.

These observations now join many other documented lessons from various fires that have previously occurred in this and other geographic areas. The success of how agencies respond to these and similar incidents will depend greatly on our ability to adapt not only to the changing physical environment but also to the social-political and fiscal environment under which land use and fire management decisions will be made.

The Reading Fire Review Team identifies lessons and recommendations regarding both operational and managerial improvements in this report.

Photo by Lassen Volcanic National Park.

2. Background – Lassen Volcanic National Park Fire History

As you read this report, it is important to understand the fire history of Lassen Volcanic National Park.

This Park has a long record of using fire to accomplish resource management objectives. (See the 1911-2012 fire history map on page 9.)

Prescribed Fires Focus on Park Boundaries

Beginning in the early 1990s, prescribed fire operations focused on the Park's boundaries, with the majority of this treatment effort directed on the northern boundary to meet the goal of fuels treatment within the Park's designated wilderness.

In 1997, the Huffer Fire became an early test-piece for the concept of managing unplanned, naturally-ignited wildfires inside the Park. This fire, located in the Park's eastern-most portion, burned within the Park for just over a week before a full suppression strategy was utilized to confine the fire within Park boundaries.

Although the Huffer Fire did stay within the park and no structures were burned, its outcome became the focus of a national-level, interagency review that examined the application of the evolving federal fire policy during the management of this fire. [Huffer Fire Review: http://wildfirelessons.net/documents/Huffer_Fire_Review.pdf .]

Lessons from Huffer Fire Keep Focus on Park Boundary Fuel Reduction Projects

Based on many of the lessons of the Huffer Fire, the Park's fire management program continued to focus attention on boundary fuel reduction projects and prescribed fires. In addition, in the years following the Huffer Fire, a number of prescribed fires were undertaken in the vicinity of Park boundaries.

In 2004, the Bluff Fire was ignited by lightning. This fire burned 3,413 acres over the span of weeks. Again, based on lessons learned from the Huffer Fire, this fire was actively managed for the duration of the event, with many direct

Lassen Volcanic National Park Fire Incidents from 1984 to 2011

Incident	Year	Type	Acres
Badger	1984	WF	1,210
Puppy	1987	WF	700
Stacey	1987	WF	130
Boundary	1994	RX	220
Boundary	1995	RX	130
Bathtub	1996	RX	175
Crater	1996	WF	320
Lake	1996	RX	160
Crags	1996	RX	160
Flatiron	1996	RX	142
Huffer	1997	WF	2,290
Flatiron	1997	RX	338
Trail	1997	RX	126
Watertank	1998	RX	108
Fantastic	1998	RX	1,548
Flatiron	1999	RX	350
Hole	2003	RX	560
Manzanita Lake	2004	RX	611
Butte Lake	2004	RX	493
Bluff	2004	WF	3,413
Prospect	2005	RX	4,000
Horseshoe	2005	WF	1,525
Prospect	2005	WF	98
GR2	2006	RX	1,300
Loomis	2009	RX	115
Crescent Block B	2009	RX	1,118
Crescent Unit A	2009	RX	533
Fairfield	2009	WF	1,664
Crescent Unit C	2010	RX	180
Summertown	2011	RX	360
Summit Fire	2011	WF	13
Total Fires: 30 (21 RX, 9 WF)			**Total Acres: 20,760**

RX = Prescribed Fire WF = Wildfire

As the 2009 Fairfield Fire came to a close, nearly 15,000 acres of Lassen Volcanic National Park had been successfully treated with prescribed and wildland fire in the 12 years following the Huffer Fire.

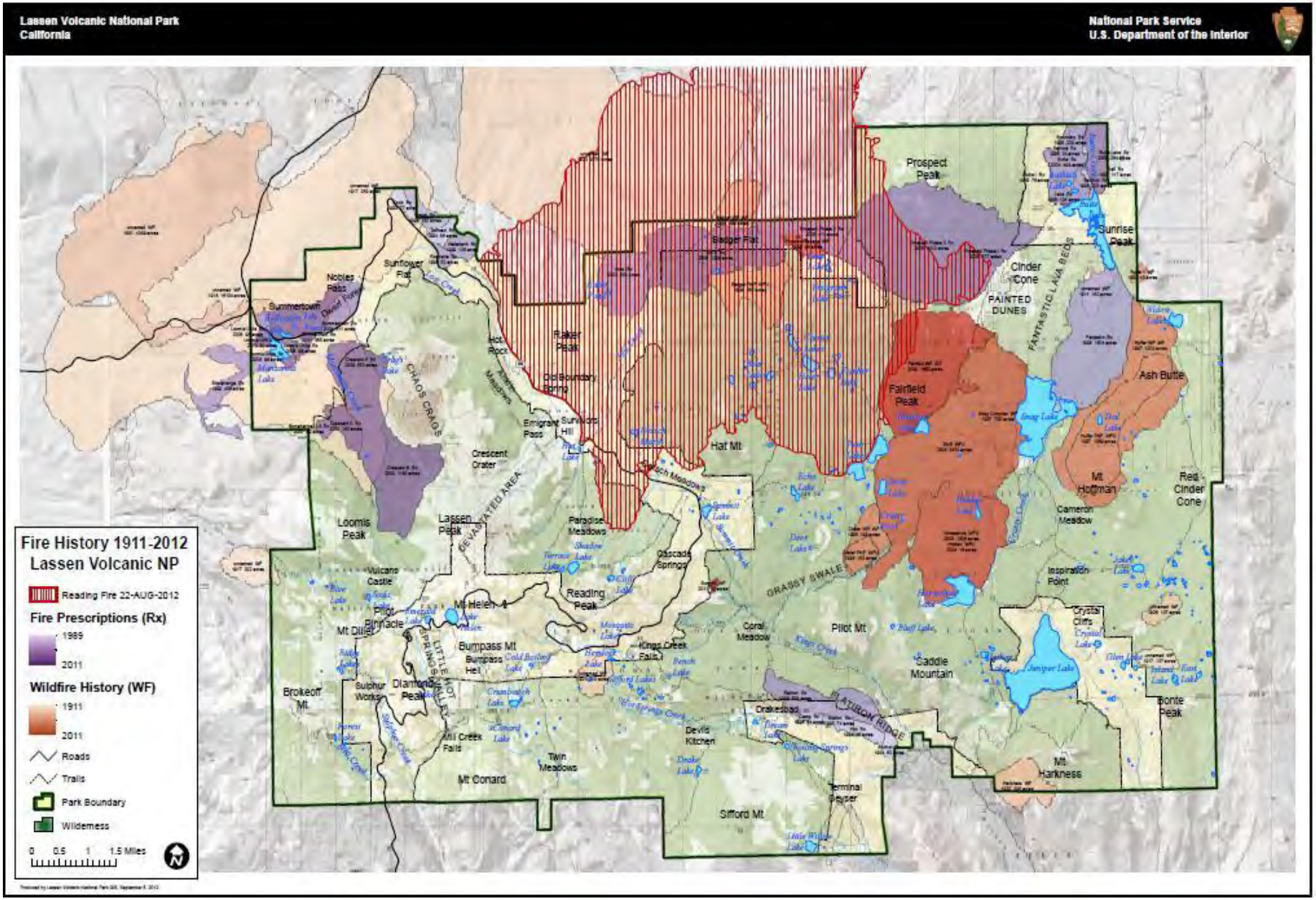
operational actions used to manage and check fire spread. The following year, another lightning-ignited fire, the Horseshoe Fire, burned 1,525 acres over a similar time span. This fire was also actively managed, even though full suppression was not the primary management objective. Later in 2005, the Prospect Prescribed Fire project was implemented. Conducted in three phases, this project brought efforts back to the Park's northern boundary.

In 2009, another lightning-ignited incident, the Fairfield Fire, burned in the vicinity of the Prospect Prescribed Fire and Bluff Fire. The Fairfield Fire successfully burned an area of the Park that had not yet been treated with fire.

As the 2009 Fairfield Fire came to a close, nearly 15,000 acres of Lassen Volcanic National Park had been successfully treated with prescribed and wildland fire in the 12 years following the Huffer Fire (see table on previous page).

When the 2012 Reading Fire was contained on August 22, it had burned a total of 28,079 acres, of which 16,925 acres were in Lassen Volcanic National Park.

.


Lassen Volcanic National Park
California
National Park Service
U.S. Department of the Interior
Fire History 1911-2012
Lassen Volcanic NP
Reading Fire 22-AUG-2012
Fire Prescriptions (Rx)
1989
2011
Wildfire History (WF)
1911
2011
Roads
Trails
Park Boundary
Wilderness
0 0.5 1 1.5 Miles
N
Prospect Peak
Badger Flat
Sunrise Peak
Cinder Cone
PAINTED DUNES
FANTASTIC LAVA BEDS
Noble Pass
Sunflower Flat
Summertown
Raker Peak
Hot Rock
Old Boundary Spring
CHAOS CRAGS
Emigrant Pass
Survivors Hill
Fairfield Peak
Ash Butte
Hat Mt
Crescent Crater
DEVASTATED AREA
Mt Hoffman
Red Cinder Cone
Cameron Meadow
Loomis Peak
Lassen Peak
Paradise Meadows
Cascade Springs
Vulcano Castle
Reading Peak
GRASSY SWALE
Inspiration Point
Pilot Pinnacle
Mt Helen
Mt Diller
Coral Meadow
Pilot Mt
Crystal Cliffs
Bumpass Mt
Bumpass Hell
Kings Creek Falls
Saddle Mountain
Brokeoff Mt
Sulphur Works
Diamond Peak
LITTLE HOT SPRINGS VALLEY
Drakesbad
PLATEAU RIDGE
Bonte Peak
Devils Kitchen
Mill Creek Falls
Twin Meadows
Mt Conard
Mt Harkness
Terminal Geyser
Sifford Mt

3. Summary

While learning from success is important, learning from events with unintended or unexpected outcomes is critical.

The Regional Director of the National Park Service's Pacific West Region assigned a team of specialists from a range of agencies to conduct a comprehensive learning-focused review of this incident. Photo by Lassen Volcanic National Park.

On July 23, 2012, a lightning strike started the Reading Fire in the interior of Lassen Volcanic National Park.

The fire, located at approximately 7,000 feet in elevation, was located in red fir with areas of rock and limited ground fuels.

The initial assessment indicated that the fire had resource benefits. It was monitored for several days and showed minimal growth.

Plans were made to hold the fire at the Lassen National Park Highway—informally known as "the main Park road." However, during the first days of August, fire activity increased.

On August 6, the fire jumped the Lassen National Park Highway and spread rapidly to the northwest. As the fire increased in complexity, the Park's response in both personnel and equipment also increased. Management of the fire was transferred to a Type 2 Incident Management Team and, later, to a Type 1 Incident Management Team. The fire ultimately spread onto Lassen National Forest lands and threatened the community of Old Station. No structures were lost, and there were two minor injuries to firefighters. When the fire was contained on August 22, 2012, it had reached 28,079 acres. As of the date of this report, the Reading Fire is estimated to have cost approximately $17 million.

A Learning-Focused Review of this Incident

The Regional Director of the National Park Service's Pacific West Region assigned a team composed of various specialists from a range of agencies to conduct a comprehensive learning-focused review of this incident. (See Appendix B – Review Team Delegation of Authority.) Specifically, these Review Team specialists included: an Agency Administrator/team leader; policy and operations specialists; a fire behavior analyst; a fire information/education specialist; a Facilitated Learning Analysis (FLA) coach; and a writer/editor.

The team examined processes, actions and activities on the Reading Fire to capture learning opportunities. During the week of Sept. 25, 2012, the team convened in Lassen Volcanic National Park. The team's activities there included a field visit to the site where the fire crossed the road and various interviews conducted with fire personnel, agency administrators, resource specialists, and interagency partners.

Purpose of this Review: Identify and Document Lessons Learned

As previously stated, the purpose of this review is to identify and document lessons learned from the Reading Fire and to share these lessons with fire management personnel, both locally as well as with the greater fire management community. While learning from success is important, learning from events with unintended or unexpected outcomes is critical.

Reading Fire Statistics

In total, the Reading Fire directly affected 28,079 acres: 16,925 acres (60 percent) on national park lands; 11,064 acres (39 percent) on national forest lands; and 74 acres (.25 percent) on private lands. At the peak of the incident, resources assigned included more than 1,200 personnel, consisting of 31 hand crews, 85 engines, 5 helicopters, and support staff.

Identifying and sharing the individual, unit, and organizational lessons learned should lead to successful management of future fires and prevent unintended outcomes.

Key Lessons Learned

The key lessons learned identified by the Reading Fire Review Team, explored in more detail in the body of this report:

Planning

Planning for the "worst case" outcome is critical when managing fires for one or more objectives. While the Park was confident that they could manage the fire within a specific area, as conditions changed and the fire spotted over planned containment lines (the Lassen National Park Highway) it became evident that planning for a larger, more complex scenario would have been advantageous.

Fire Behavior

The Reading Fire's environmental conditions changed from the fire's first day to 14 days later when the fire made its initial extensive run. These changing conditions included the increasing National Fire Danger Indexes, decreasing relative humidity, and decreasing live and dead fuel moistures. Additionally, the fire continued to move from an area with relatively light surface fuel to an area with heavy surface fuel. Recognizing these environmental changes over time and incorporating them into the fire management decision making are critical parts of the process.

Public Information

Delayed information concerning the Reading Fire to the media and affected communities left business owners, residents, and elected officials not well informed with up-to-date information. Mixed fire messaging—not always reflecting current national fire policy—further hampered the Park's fire communication efforts. Starting fire messaging early in the Reading Fire's progress, with a focus on current national policy and terminology, would have assisted fire information efforts to help ensure accuracy to the public, stakeholders, cooperators, and elected officials. Preseason fire education outreach about Lassen Volcanic National Park's Fire Management Plan would have facilitated and enhanced relationships with communities, the media, and elected officials.

Human Factors

*"**Human Factors**" is a generic term that encompasses a broad overview regarding human behavior—including the physiological and sociological aspects of human interaction. The term refers to how the following subjects—and others—are perceived and addressed: situational awareness, communication, decision making, risk management, and team work skills and interactions. Identifying and examining these "human factors"—and how they influence and shape our perceptions and decision making—can help us better understand and improve overall future system performance.*

The collective focus during the Reading Fire's early stages was that it would stay in a much smaller planning area. Little consideration was given to what if it did not stay within the planning area. The same collective thought was that the Reading Fire was as much fire as the Park could handle—which resulted in the suppression of newly ignited fires. Being mindful of paying attention not only collectively but as individuals in anticipating the unexpected improves decision making and resultant outcomes.

Management and Coordination

The need for agencies to focus on building and maintaining interagency relationships is fundamental to our commitment to safety, science, and stewardship. It is always challenging to host a full-size incident management team in national parks when suppression becomes—or is—the single objective. Park units learn that in managing wildfires they must accept some level of impact to resources regarding the use of retardant and mechanized equipment. Understanding each other's policies, practices and capabilities prior to engaging in fire management operations encourages cooperation and efficiency.

Review Report Summary

The body of this report details:

- The Reading Fire's chronology.
- Various factors which set the stage for fire managers.
- Lessons learned by the personnel involved and the Review Team.
- Commendations.
- Recommendations.

4. Reading Fire Chronology

This chapter provides a chronological summary of the key events associated with the Reading Fire. For a more detailed, comprehensive timeline of specific actions and events, see Appendix C.

July 23, 2012
Thunderstorm Ignites Fire

A thunderstorm passing over Lassen Volcanic National Park produces numerous lightning strikes, one of which ignites a fire in a designated Wilderness area one mile northeast of Paradise Meadows.

Fire behavior at its peak at 2 p.m. on July 25. Photo by Lassen Volcanic National Park.

Lassen Volcanic National Park Fire Management

Wildland fire has long been recognized as one of the most significant natural processes operating within and shaping the northern Sierra Nevada and southern Cascade Mountain ecosystems.

Virtually all vegetation communities here show evidence of fire dependence or tolerance. Many forest types in the Park have been shaped by frequent fire return intervals (ranging from 5-16 years).

At the same time, unplanned ignitions have the potential to threaten human lives and property. The Park's fire management program protects life and property from destructive wildfires. The program also reintroduces fire on the Park's landscape to ensure forest health

The use of prescribed fire and wildfire is among the several management strategies that the Park oversees to reach its land management goals.

More than 75 percent of Lassen Volcanic National Park is designated Wilderness.

Factors such as fire behavior, fuel loads, weather conditions, air quality, and potential threats to people and property are used to determine the ability to use prescribed fire or wildfire to meet ecological objectives.

The fire is sized-up as a single-tree red fir. The tree is located at the 7,000-foot elevation on a north-facing slope with sparse fuels.

After assessing fire danger and weather conditions, firefighter and public safety, containment opportunities, and availability of additional firefighting resources, Park personnel decide to manage this ignition under the "Wildland Fire for Resource Benefit" strategy. This decision is consistent with the 2012 Lassen Volcanic Park Fire Management Plan. (For more information, see box on this page.)

The Next Six Days
July 23 – July 28, 2012
Management Action Points Identified

The Reading Fire slowly spreads from one-tenth of an acre to one-half acre. (See fire progression maps starting on page 18.) A Type 4 Incident Commander with approximately 16 firefighters are assigned to the fire. The current course of action is to monitor the fire.

Management Action Points are identified to keep the fire contained south of the Lassen National Park Highway—utilizing drainages, natural barriers, and trails.

July 30
Fire Grows to Three Acres

The fire has grown to three acres. Existing natural and human-made barriers (such as rock fields and trails) are enhanced and improved by firefighters to contain

the fire's spread within its designated area.

The Reading Fire is reported to the Shasta County Air Quality Management District. A smoke management plan is under development.

August 1-2
Fuels Reduction Work Implemented for Burn Out Operation

Approximately 40 firefighters work to ensure that the fire stays within the defined boundaries.

When the fire spots within two-tenths of a mile from the Lassen National Park Highway, fuels reduction work is initiated along this road. This fire suppression activity is part of preparation activities for burn-out operations—designed to keep the fire located south of the road. This was an identified management action which was initiated based on the fire spotting downslope near the road.

Additional actions are taken to reduce potential smoke impacts to air quality and public health.

August 3
Fire is Now 50 Acres

The fire is now estimated at 50 acres in size. The smoke management plan is submitted to the Shasta County Air Quality Management District for approval. The weather forecast predicts a chance of rain and potential additional lightning.

August 4
Lassen National Park Highway Fuels Reduction Work Completed

The fire is now burning with low to moderate activity. By this afternoon, it has grown to approximately 94 acres.

Fuels reduction work has been completed along the Lassen National Park Highway in preparation for the burn out operations intended to hold the fire south of the road.

August 5
More Fire Crews and Engines Ordered

An additional 20-person fire crew and two fire engines are ordered to support burn out operations along the Lassen National Park Highway.

Two new lightning fires ignite within Lassen Volcanic National Park. They are immediately extinguished.

By August 4, the Reading Fire has grown to 94 acres. The next day, an additional 20-person fire crew and two engines are ordered. Photo by Lassen Volcanic

August 6
Type 3 IMT
Takes Command of Fire

Because of the growth and complexity of the fire, management is transitioned from the Park to a Type 3 Incident Commander.

Due to increased winds, fire behavior intensifies. For the first time, the fire spots into the Hat Creek drainage located across—to the north of—the Lassen National Park Highway.

A Type 2 Incident Management Team is ordered. By the end of this day, dry fuels and winds combine to expand the Reading Fire to approximately 1,010 acres.

August 7
Type 2 IMT
Takes Command of Fire

Driven by southerly winds, the fire quickly advances north and crosses onto Badger Mountain on Lassen National Forest lands.

At 6 p.m., the Type 2 Incident Management Team assumes command.

Continued attack consists of hand crews building "direct and indirect"[1] fire containment lines. The objective is to limit fire spread to the north toward the village of Old Station.

Top Photo
The Reading Fire burning on July 30.

Bottom Photo
The Reading Fire burning on July 31.

Photos by
Lassen Volcanic National Park.

[1] "Direct Attack" is any suppression treatment applied directly to burning fuel—such as wetting, smothering, or chemically suppressing the fire, or by physically separating the burning from the unburned fuels. "Indirect Attack" is a method of suppression in which the fire control line is located some distance away from the main fire's active edge. This strategy is generally implemented on fast-spreading or high-intensity fires to utilize natural or constructed firebreaks or fuel breaks—and favorable breaks in the topography. The intervening fuel is usually backfired. But, depending on conditions, the main fire is sometimes allowed to burn to the "indirect" fire line.

The Reading Fire viewed from Cluster Lakes.

Photo by Lassen Volcanic National Park.

August 8
Fire Behavior Intensifies

Continued spot fires on the northern fire perimeter prompt several air tanker retardant drops near Badger Mountain and West Prospect Peak. The fire spread slows to the north. It is moving primarily east and southeast.

August 12
Fire Threatens Village of Old Station

The Reading Fire, now approximately 15,491 acres in size, is threatening the village of Old Station, located adjacent to Lassen National Forest. Old Station, population 51, is located 13 miles north of Lassen Volcanic National Park.

Due to the increasing complexity of managing this fire, a Type 1 Incident Management Team is ordered.

August 13
Type 1 IMT Takes Command of Fire

The Type 1 Incident Management Team takes command of the fire and continues to implement a suppression strategy based on indirect line construction (The Type 2 Incident Management Team utilized these tactics prior to the transition to the Type 1 IMT.)

Burn out operations begin along indirect attack fire lines. This burn out strategy continues over the next three days.

Firing out August 14 on night shift. This is the Reading Fire's 22nd day. Photo by Steve Burns.

August 16
Burn Out Operation: Successful

The burn out operation is successful in limiting the spread of the fire.

August 17
Containment Lines Hold the Fire

Additional air tanker drops slow the fire's progression to the northeast and enable firefighters to successfully hold the fire containment lines on Prospect and West Prospect peaks.

August 18
Over Most of Fire, Suppression Efforts Transition to Patrol, Mop-Up, and Repair

Efforts now shift to patrol, mop-up, and suppression repair on the Reading Fire's north, south, and west sides.

The east and southeast flanks—located in designated Wilderness—are addressed by fire crews building hand line and attacking spot fires.

These efforts prove to be successful, especially where the fire moves into areas cleared by three previous fires—the 1996 Crater Fire, the 2004 Bluff Fire, and the 2009 Fairfield Fire.

August 22
Fire Declared 100 Percent Contained

The Reading Fire is declared 100 percent contained.

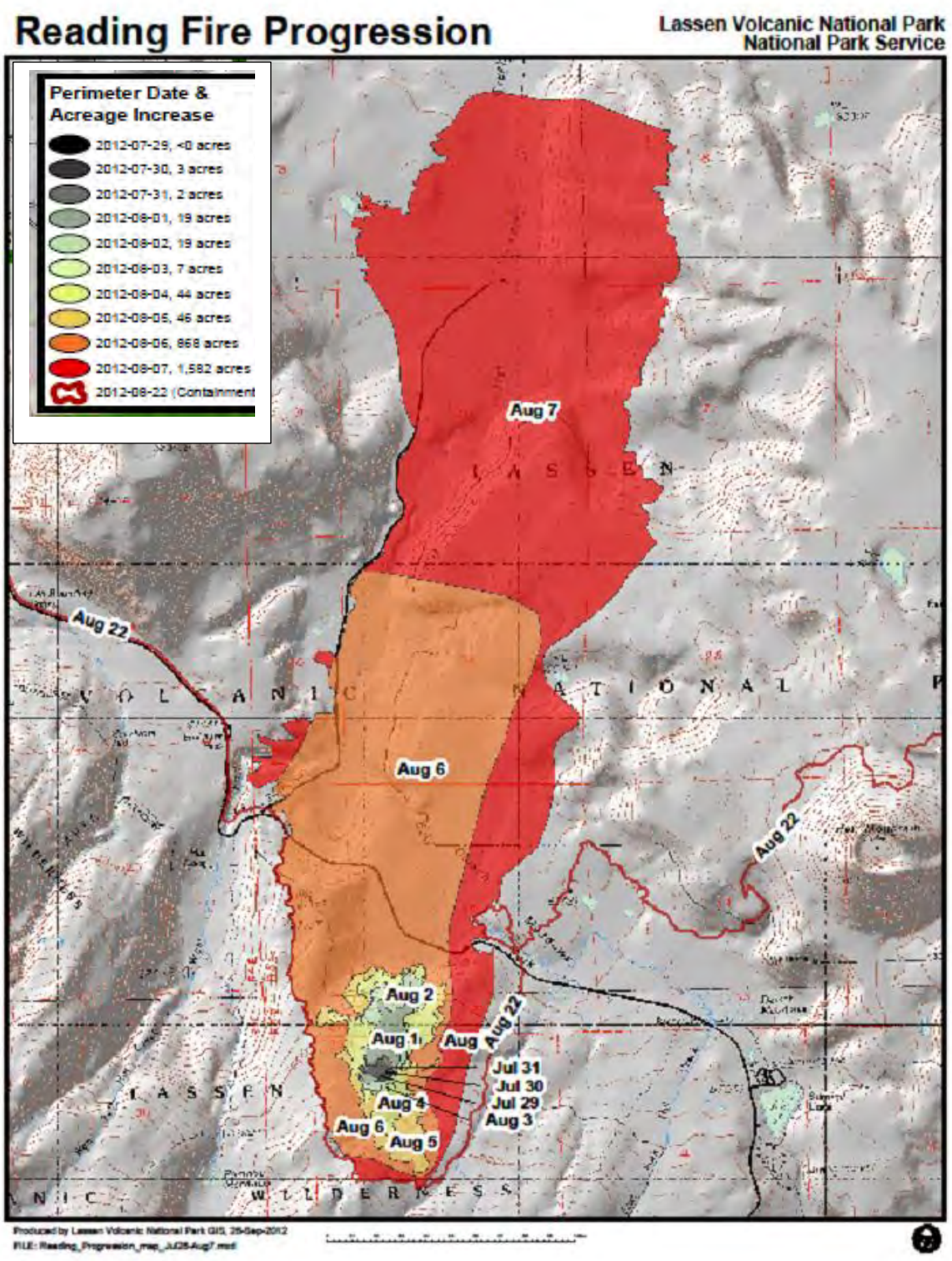
On August 22, the Reading Fire is declared 100 percent contained. Photo by Lassen Volcanic National Park.

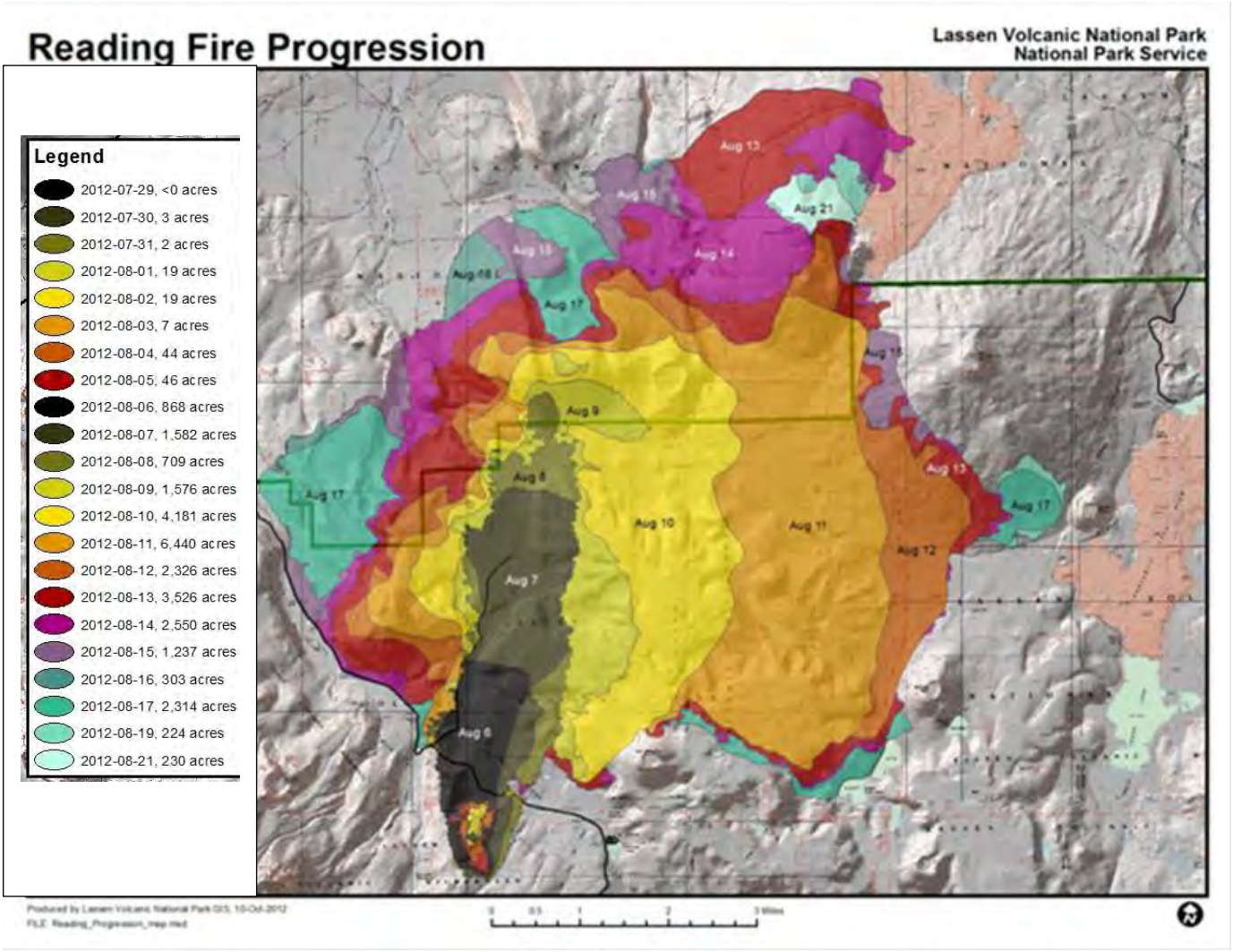
August 23
Type 3 IMT Oversees Mop-Up and Repair

The incident is transferred back to a Type 3 Incident Management Team who is responsible for overseeing primarily mop-up and repair of suppression damage.

August 30
Fire's Management Returns to Lassen Volcanic National Park

The management of the Reading Fire is returned to Lassen Volcanic National Park. Full control of the fire is estimated to occur during the 2012 fall and winter precipitation season. The Reading Fire is declared controlled on Oct. 23, 2012.


Reading Fire Progression
Lassen Volcanic National Park
National Park Service
Perimeter Date & Acreage Increase
2012-07-29, <0 acres
2012-07-30, 3 acres
2012-07-31, 2 acres
2012-08-01, 19 acres
2012-08-02, 19 acres
2012-08-03, 7 acres
2012-08-04, 44 acres
2012-08-05, 46 acres
2012-08-06, 868 acres
2012-08-07, 1,582 acres
2012-08-22 (Containment
Aug 7
Aug 22
Aug 6
Aug 22
Aug 2
Aug 1
Aug
Aug 22
Jul 31
Jul 30
Jul 29
Aug 3
Aug 4
Aug 6
Aug 5
Produced by Lassen Volcanic National Park GIS, 25-Sep-2012



The Reading Fire burning on the slopes of Raker Peak.

Photo by Jim Mackensen.

The Reading Fire as observed from Harkness Fire Lookout. Photo by Lassen Volcanic National Park.

5. Fire Behavior Summary

A. Environmental Setting

During the lightning-ignited Reading Fire's first eight days, it grew to only six acres. The calculated rate-of-spread during this time was .013 chains per hour—averaged over a six-hour burn period for each day. During the next seven days, the fire grew an average of 3.5 chains (approximately 230 feet) per hour. (A "chain" is a unit of measure in land survey, equal to 66 feet. This term/measurement is commonly used to report fire perimeters and other fireline distances.)

By August 5, the fire had grown to 141 acres. The following day, it was 1,009 acres. Between 1000 and 1500 hours on this day, the fire became significantly more active than in previous days. It ultimately averaged more than 100 chains per hour during this time (more than one mile per hour).

For the most part, this fast-moving fire was the result of short- and long-distance spotting ahead of the main fire front. Overall, this moderate-intensity surface fire was greatly influenced by torching and short- to long-range spotting. Without the spotting problems, the Reading Fire would likely have remained a surface fire and stayed within the Park's boundary.

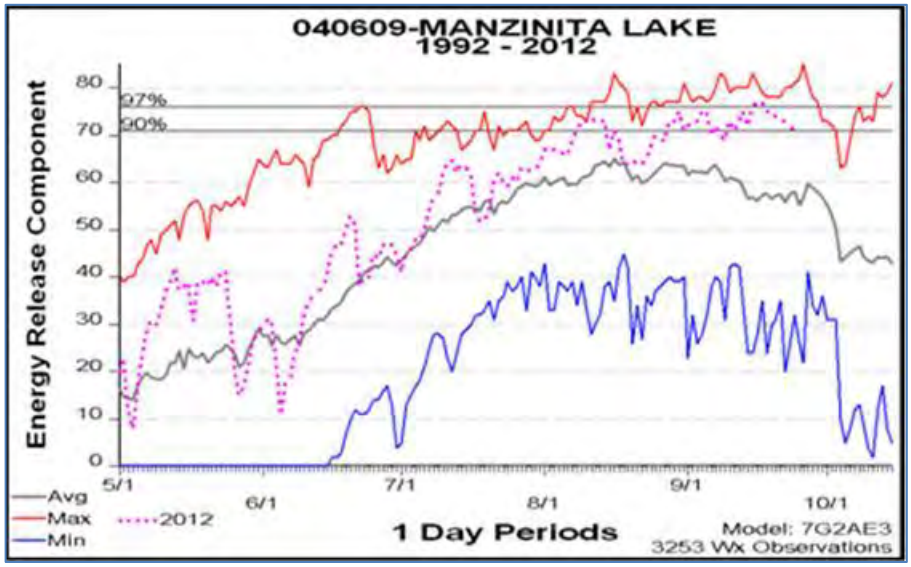
The key environmental factors that affected the Reading Fire's behavior:

- Dry dead fuel moisture,
- Relatively dry live fuel moisture,
- High National Fire Danger Rating System (NFDRS) Energy Release Component (ERC) index,
- Change to a more dense fuel type, and
- Wind gusts that occurred August 6 through August 8.

National Fire Danger Rating System

The fire danger conditions were calculated using the Fire Family Plus program from the Manzanita Lake weather station.

Fire Family Plus is a fire climatology and occurrence program that allows the user to summarize and analyze weather observations—associating weather with local fire occurrence data—and compute fire danger indices based on the NFDRS (See graph on upper right of this page.)



This graph shows the Energy Release Component (ERC) Fuel Model G for the Manzanita Lake weather station. The day that the Reading Fire ignited, the ERC was just above average for that time of year. Over the next several weeks, the ERC continued to increase until it reached near record highs and remained at, or above, the 90th percentile until August 15.

Pocket Cards

The purpose of the pocket card, a one-page standard template with local weather station information and thresholds shown graphically—usually printed small enough to fit into a pocket—is designed to brief local and incoming resources about current National Fire Danger Rating System (NFDRS) conditions relating to historical conditions, and for identifying local weather thresholds for large fires. These cards are utilized on a daily basis by the firefighter.

The pocket card should be based on a representative station that the dispatch center communicates on a daily basis, or is easily accessible to the fire personnel. This information is important for fire resources. It enables them to gain situational awareness about the fire area and incorporate this information into their operational decisions.

The Park's current pocket card (shown in Appendix D) is based (averaged) on a combination of three Remote Automated Weather Station (RAWS) stations. Using multiple stations for the analysis is a good process if the averaged data is available to fireline personnel through web or radio. However, this averaged information was not available during the 2012 season and, on the Reading Fire, was not communicated through dispatch or at the morning briefings.

The Lassen Volcanic National Park "pocket card", posted on the National Wildfire Coordinating Group (NWCG) website [http://fam.nwcg.gov/fam-web/pocketcards/pocketcards.htm#], identifies local thresholds: *"a combination of any of these factors can greatly increase fire behavior: 20-foot wind speed over 10 mph, relative humidity less than 25 percent, and temperature over 80 degrees…"* (See Appendix D.)

On the Reading Fire, these conditions were all predicted and occurred on August 6.

B. The Fire Environment

Fuel Type

Most of the Reading Fire area fuel types fall under four of the Fire Behavior Prediction System (FBPS) fuel models: Fuel Model 8 – closed canopy stands of short-needle conifer, mainly the red fir areas; Fuel Model 10 – short-needle conifer stands with heavy accumulations of dead/down material, many of which are dominated by lodgepole pine; Fuel Model 2 – open pine stands with grass understory or open meadow areas; and Fuel Model 5 – areas of low shrub cover, mainly dominated by pinemat manzanita or more developed montane chaparral, including Greenleaf manzanita, snowbrush ceanothus, and brush chinquapin.

The vegetation and fuels (top and bottom photos) in the Reading Fire area located south of the Lassen National Park Highway.

There are several wet meadows throughout the fire area with dense perennial grasses. These areas were mainly green throughout the duration of the fire. The moisture in these meadows prohibited the fire spread and acted as fuel breaks to surface fire spread.

Additionally, the areas with a high cover of pinemat manzanita generally burned with lower intensity. During the majority of the year, pinemat is generally a natural barrier to fire. However, where surface litter exists, enough heat is generated to cause the pinemat to ignite. Also, at the height of summer when the live fuel moistures of the pinemat are very low, this ground cover will support fire.

The Fuels Where the Fire Started and Initially Burned

The fuels where the fire started and burned for the first eight days were classified as Fuel Model 8. This included timber stands of mixed conifer, dominated by red fir with low to moderate dead and down fuel loadings.

The primary carrier of fire in this area is a moderate load of fine litter and coarse fuels, including small-diameter downed logs. The average rate-of-spread in these areas was fairly low. Flame lengths were also low. During the Reading Fire's first week, it exhibited these predicted conditions. The fire's spread rates for this fuel type were under three chains per hour, with two-foot flame lengths.

On August 5, Fire Burns into Heavier Fuels

On August 5, as the fire grew toward the north, in the vicinity of the Lassen National Park Highway, the fuel type transitioned into heavier fuels more dominated by lodgepole pine and FBPS Fuel Model 10. The primary carrier of fire in this area is moderate to heavy load forest litter, including larger diameter downed logs.

The predicted spread rates were low with low flame lengths. However, this area had greater quantities of dead and down fuels of three-inch or larger limb wood that created a large load of dead material on the forest floor. Therefore, fire behavior in this fuel model produced greater intensities and prolific spotting.

Surface spread rates for this fuel model were less than five chains per hour with under three-foot flame lengths. However, the short-range spotting when the fire burned into this fuel type accelerated the average daily spread rate to approximately 10 to 15 chains per hour.

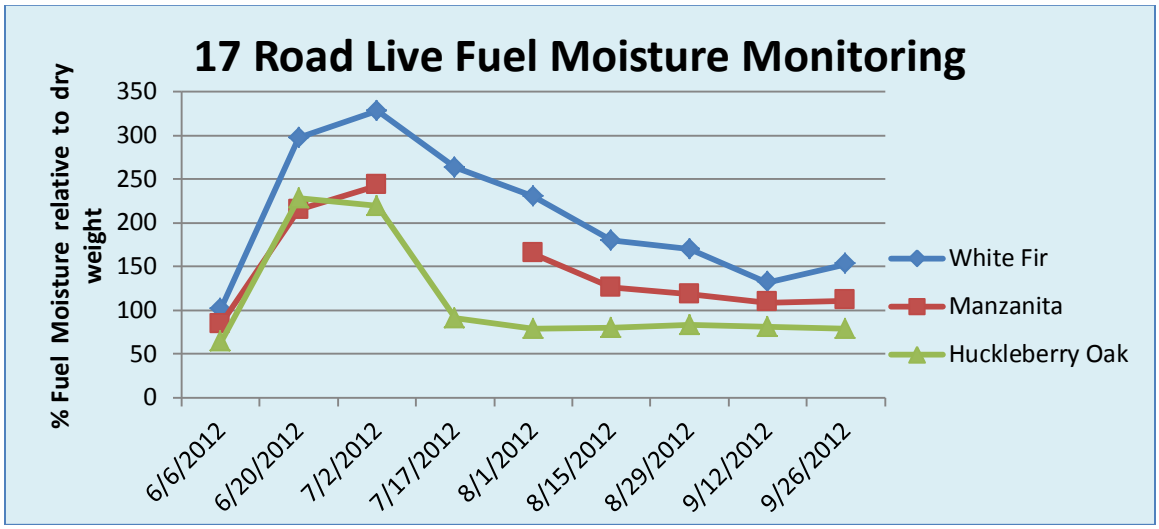
Throughout the duration of the fire, the fuel types remained a combination of red fir, lodgepole pine, and other mixed conifer species—classified as FBPS Fuel Model 8 and Fuel Model 10.

Fuel Moisture

Live fuels consist of conifer needles, twigs and leaves of shrubs (evergreen and deciduous), and green (live) grasses and forbs. Changes in live fuel moisture content are related to the physiological activity of the vegetation. This activity is greatly influenced by soil moisture and the soil and air temperatures. Live plants may either suppress combustion or contribute to it, depending on their moisture content and flammability of chemical compounds contained in the plant. Typically, moisture levels of conifer needles and brush species are lowest in the spring and peak during early summer. Surges in live fuel moisture may occur in some species in late summer or early fall, when significant precipitation occurs.

Several sampling locations exist within the vicinity of Lassen Volcanic National Park. The most representative site is the 17 Road on the Lassen National Forest (see graph below). This monitoring site is located at the 5,960-foot elevation on a south aspect. Fuels in this site's area are mixed conifer and brush.

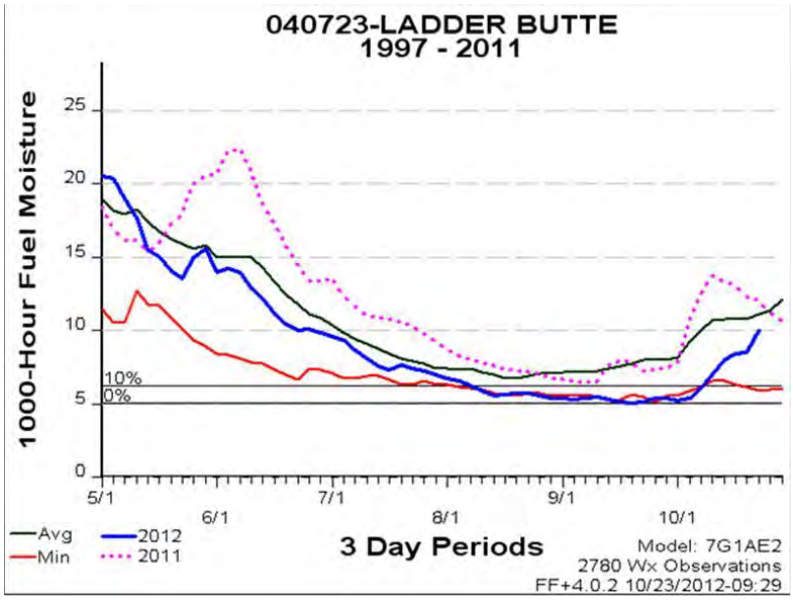
The live fuel moistures were sampled at this site on August 1—five days prior to when the Reading Fire made its first major run. The results of the samples show that the 2012 live fuels peaked growth around July 1 and declined in fuel moisture thereafter. During the beginning of August, the fuel moistures were not at their seasonal low, which did not occur until mid-September. However, the fuel moistures were declining. They were following the seasonal cycle during the summer months when there is little or no precipitation. This fuel moisture monitoring site has only been active for a few years. Therefore, historical averages for fuel moisture are not available for comparison.



The basis of live fuel moisture causes some confusion among fire practitioners. Specifically, how can fuel have more than 100 percent moisture? Moisture content of wildland fuels is expressed in relation to dry weight, not just the proportion of water in the fuel. It is the dry material that provides the heat to evaporate water so that the fuel will burn. The definition of moisture content used here is the ratio of the weight of the water compared to the dry weight of the material, expressed as a percentage.

Low Dead Fuel Moistures Contribute to Spotting Problems

Although the heavy dead fuels (1,000 hour) were not measured at the 17 Road fuel moisture measuring site, they have been measured in the general area. The 1,000-hour dead fuel moisture levels are computed from a seven-day average boundary condition composed of: day length, hours of rain, and daily temperature/humidity ranges. Fuel sizes range from three to six inches in diameter. Fuel moistures in all dead fuels size classes were very low during the 2012 fire season—approaching, or at, record levels.



Fuel moisture readings from the year-round Ladder Butte RAWS (Remote Automated Weather Station), located 17 miles north of the Reading Fire area, managed by the Lassen National Forest.

During the 2012 fire season, the 1,000 hour fuel percentages were about half of what they have averaged over the last 10 years. One of the reasons for these dry fuels was the lack of winter snowpack. While the area did receive some late winter precipitation in the form of rain, moisture from rain does not penetrate the dead forest litter as well as snow and has less of a dampening effect. The very low dead fuel moistures were a significant contributor to the spotting problems. (For more information on "General Exhibited Fire Behavior Based on Live Fuel Moisture Values," see Appendix E.)

Topography

Lassen Volcanic National Park has an extensive volcanic history, including volcanic eruptions occurring at Lassen Peak from 1914 to 1921. These and other eruptions significantly altered the surrounding landscape and topographic features. The western part of the Park features high elevation lava pinnacles, jagged craters, and sulphur vents.

Glaciers carved out the canyons and left high elevation meadows, lakes and streams. The eastern part of the Park is mainly a lava plateau with many small cinder cones throughout the landscape. The Park's dominant feature is Lassen Peak, which rises 2,000 feet above the surrounding terrain and is the southern-most volcano in the Cascade Range. The elevation of the Park ranges from 10,457 feet at Lassen Peak to generally 5,000 feet at its lowest areas.

The Reading Fire originated at the 7,100-feet elevation approximately 2.5 miles east of Lassen Peak and ¾ mile south of Dersch Meadows, south of the Lassen National Park Highway.

The terrain immediately around the point of ignition is best described as rolling to flat, with gradual elevation change. A gradual 500-foot decrease in elevation occurs from the fire's origin to the Lassen National Park Highway. No major elevation changes occur. A few small peaks are located in the fire area, but the majority of this area is flat with rolling topography—with an average slope of less than a 25 percent across all aspects.

Weather

Lassen Volcanic National Park uses one main Remote Automated Weather Station (RAWS) located at Manzanita Lake for weather information and an NFDRS indices calculation. This station, located on national forest lands, is managed by the Lassen National Forest.

Additionally, the Manzanita RAWS is the closest RAWS to the Reading Fire (seven miles away). At an elevation of 5,870 feet, this station most accurately represented the weather affecting the fire. Additional stations—which were used for the pocket card formulation—include Bogard and Chester RAWS, also located on the Lassen National Forest.

The general weather forecasts issued from the day of the Reading Fire ignition—from July 23 through July 29—were very similar. They predicted afternoon temperatures to be between 80 and 90 degrees, afternoon 20-foot winds out of the southwest five to ten mph, and relative humidity of 15-25 percent. No lightning or chance of wetting rain was predicted for this timeframe.

Beginning July 30, a six-day dry period began with minimum relative humidity decreasing slightly and predicted to be as low as nine percent. With this dry air mass, poor nighttime relative humidity recoveries also occurred. During this time period, the temperatures were predicted to be in the mid-eighties and winds southwest five to ten mph.

On August 4, a weather system bringing moisture and a significant increase in thunderstorm activity was beginning to move into the area. The Sacramento National Weather Service issued a Red Flag Warning for dry thunderstorms from midday August 4 to midday August 5. (On August 5, this warning came from both the National Weather Service's Sacramento and Reno stations.) During these days, the forecasted and actual temperatures were slightly cooler and more humid than the previous days. Temperatures ranged from the mid-70s to mid-80s, the relative humidity was 20 to 35 percent, and the winds were southwest 5 to 10. The Lightning Activity Level (a reference scale—from 1 to 6—that describes lightning activity) was up to "6"[2] during the night of August 4 and morning of August 5. The chance of wetting rain was 20 percent.

Date	Temp	Max Temp	RH	Min RH	Average Sustained Wind Speed	Wind Gust Speed	Wind Direction
7/30/2012	78	79	32	24	6	14	W
7/31/2012	79	80	26	26	6	14	SW
8/1/2012	81	81	24	22	5	17	W
8/2/2012	82	82	17	17	5	16	W
8/3/2012	84	84	23	15	5	15	W
8/4/2012	86	86	27	18	6	15	SW
8/5/2012	79	86	30	26	6	12	W
8/6/2012	79	80	29	17	8	18	SW
8/7/2012	79	79	21	16	7	19	SW
8/8/2012	82	82	18	14	6	18	SW
8/9/2012	85	85	13	13	5	14	W
8/10/2012	84	87	14	11	6	15	W

This table displays the actual weather recorded at the Manzanita Lake RAWS weather station (which served as the representative weather station for the Reading Fire) from July 30 to August 10.

On-site weather observations were also taken on the Reading Fire.

[2] Definition of a "Lightning Activity Level 6": *Dry lightning with the potential for extreme fire activity. Normally highlighted in fire weather forecasts with a Red Flag Warning.*

This thunderstorm system did produce numerous lightning strikes in the Park, starting two confirmed fires on Sunday, August 5.

By August 6, the temperatures were beginning to rise to the lower 80s and the relative humidity was dropping to between 12 and 20 percent. While the general wind remained the same, under 10 mph, the significant change was the prediction for local gusts to be up to 25 mph. This local gust forecast remained for the next three days—until August 8. The firefighters on the ground did confirm that the wind gusts amplified during these days. (For more information on localized wind influences, see Appendix F.)

The Three Main Contributing Weather Factors

The three main weather factors that contributed to and influenced the Reading Fire:

- The low relative humidity from July 31 to August 3.
- The seasonally high temperatures throughout the duration of the fire.
- The wind gusts that occurred from August 6 through August 8.

Whenever relative humidity drops below 20 percent—combined with winds and high temperatures—high rates of spread can be expected. While the winds were not strong enough to develop a classic wind-driven fire, they were sufficient enough to cause prolific spotting in a northerly direction—significantly contributing to the Reading Fire's growth.

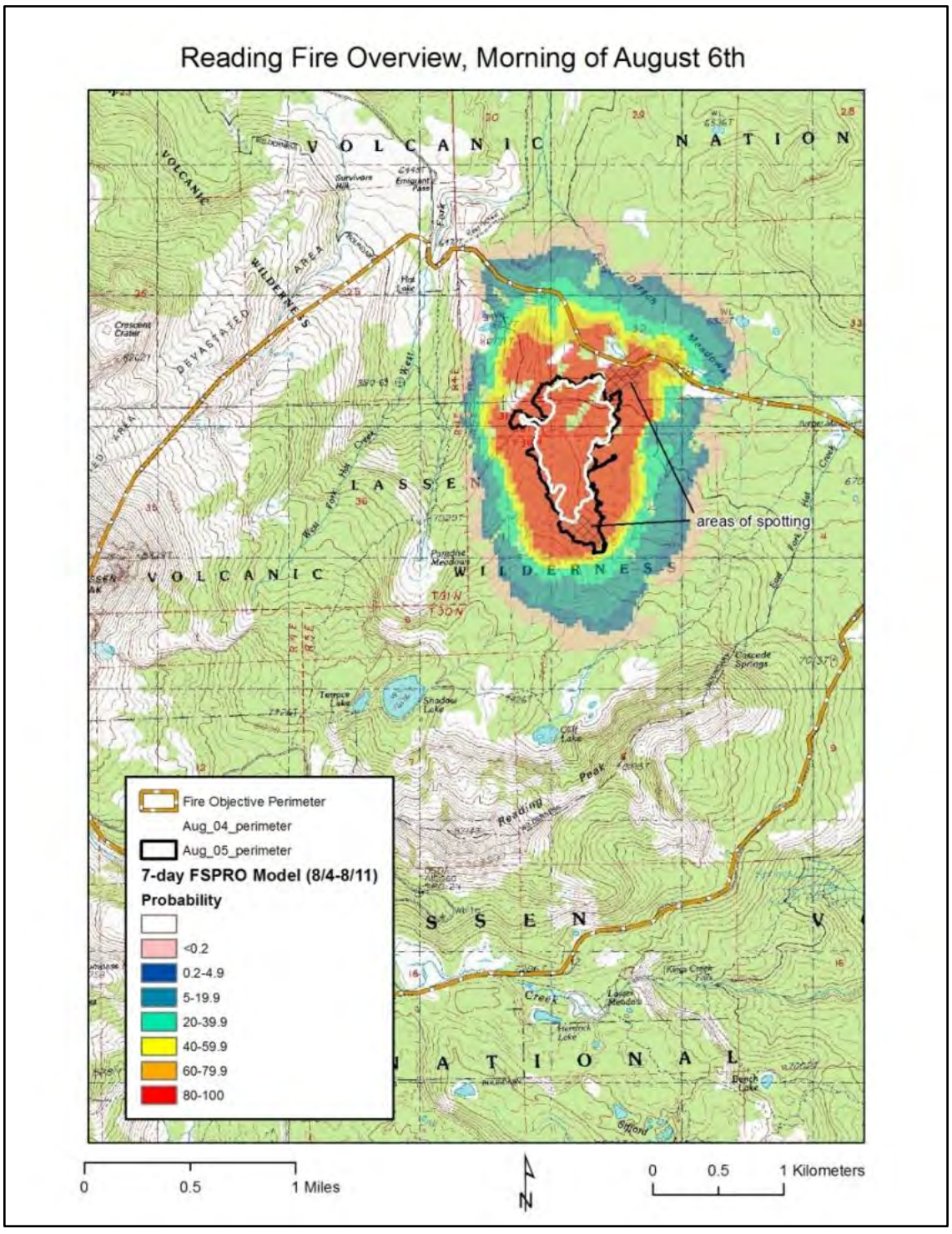
C. Fire Probability

Fire Spread Probability (FSPro) is a model that calculates the *probability* of fire sizes from a current fire perimeter or ignition point for a specified time period. FSPro is *not* a spatial fire spread or fire perimeter model. This modeling offers the capability to perform risk assessments for individual wildland fires based on short-term predicted weather and historical long-term weather.

Inputs to this application: surface fuel model, aspect, elevation, slope, and canopy characteristics. These landscape characteristics are used in conjunction with historical ERC and wind data from a representative remote automated weather station (RAWS) as key model inputs.

On the Reading Fire, no FSPro runs were completed during the first two weeks. The first run, completed on August 6, showed that the fire had a high probability of hitting the Lassen National Park Highway, but had a generally low probability of spread very far north of the highway by August 12.

Consequently, the two additional fire spread probability runs completed for the Reading Fire also under-predicted the fire spread during the course of the fire. During the summer of 2012, this under-prediction of fire spread occurred on the majority of the fires in the mixed conifer fuel type.



Caution

It is important to remember that the different colors in an FSPro map represent burn probability contours, **NOT** *fire perimeters or fire shapes.*

In addition, these burn probabilities are for the analysis time period (seven days), not until a season-ending event.

The FSPro run (illustrated above) is a seven-day run with 1,024 fire simulations with no barriers or suppression activities incorporated. The input used mostly defaults, with some adjustments to landscape based on prominent meadow/alder glade features and to adjust for high-elevation pinemat manzanita and subalpine woodlands.

The fire perimeter from August 4 was used as the ignition file, with no adjustments made for heat (there was active fire along most of the perimeter). The Manzanita Lake RAWS station was used for both the winds and ERC indices.

The graphic (on previous page) shows the burn probability contours and the calculated probability in the associated legend, assuming no suppression action is taken. Looking at the Lassen National Park Highway, the fire on August 5 (shown as a black polygon) has an 80-100 percent chance of burning to the highway during the seven-day simulation period. This simulation shows that the fire has an 80-100 percent probability to cross the road in two places; however, generally up to a 30 percent probability to burn very far north of the road within seven days.

One important item to note is that this fire probability simulation is only for seven days. It does not account for the fire probability for the duration of the fire season.

Therefore, this run could have been misinterpreted by underestimating the fire probability of the fire leaving the Park by not considering the long duration (post-seven day period) remaining in the fire season.

FSPro Probability of Reading Fire Sizes for the August 6, 2012 Run

FIRE SIZE	ACRES
Average Size	547
90th Percentile	838
70th Percentile	602
50th Percentile	486
30th Percentile	414
10th Percentile	348
Largest Fire	2,665

The fire size information table (above) serves as another piece of information associated with the FSPro analysis. The fire size information is shown for the seven-day FSPro analysis, showing the 90th percentile fire size at only 838 acres—meaning only 10 percent of the simulated fires got bigger than 838 acres, but not larger than 2,665 acres.

This data also tells us that the 10th percentile is 348 acres—meaning that 90 percent of the simulated fires grew larger than the 348 acres in the seven-day simulation.

6. Key Factors and Lessons Learned by the Participants

A. Planning

"It looked like something that could be managed easily."

Park Fire Staff

"We could do better on contingency planning next time."

Park Fire Staff

Contingency Planning Scenarios

Plan sufficiently for worst-case—or increased complexity and large fire—scenarios and fully consider what will happen if the fire does not behave as anticipated. Plan thoroughly for contingencies and establish Management Action Points (MAPs) for the worst-case scenario.

Work Closely with Cooperators

In areas where fire has a significant chance of spreading onto neighboring lands, such as in relatively small wilderness areas or near unit boundaries, working closely with cooperators is essential. Continue to work jointly to reduce the potential for wildfires to spread onto neighboring lands by reducing fuel loading and maintaining resilient ecosystems may help prevent or limit unintended outcomes.

The Challenge of Using WFDSS

The Wildland Fire Decision Support System (WFDSS) presents many challenges for smaller units with fewer personnel and infrequent large fires. Using the WFDSS program to document fire decisions requires significant staff and time for small units.

B. Fire Behavior

"It's dryer than last year. But last year was a wet year!"

"Observations and projections of this fire were based on last year's Summit Fire. We started to realize that there were some differences—especially in regards to the time of year. Even so, I was still relying on the 'visual slides' in my head from the Summit Fire the year before."

Type 4 Incident Commander Trainee

Experience with and Knowledge of Local Conditions

The fire behavior observed in the early stages of the Reading Fire appeared similar to the previous year's activity. However, basic conditions in 2012 were much drier. Fire personnel may have used previous experiences to inaccurately draw conclusions about the current fire activity potential. Or, their experience with local conditions may not have been comprehensive enough.

Fire Behavior Expectations

The fire behavior for the first two weeks was fairly low intensity and did not exhibit potential control problems. However, when the weather changed slightly and the fire moved into a heavier fuel type, spotting became a significant control problem. Because the fire managers were basing their decisions on the past fire behavior, they became complacent to the potential fire behavior that the fire could exhibit.

Fire behavior expectations based on persistence is adequate if there are no expected changes to the fuels, weather, or topography. However, once one of these three conditions changes, it becomes more important to use a fire modeling system as an additional tool to assist in the decision process.

Unexpected and Underestimated

The changing fuel conditions as the fire changed locations was unexpected. The change in behavior and change in fire potential was underestimated.

Potential for Long-Term Growth Overlooked

Considering the point in the season when the fire occurred, the potential for long-term growth may not have been fully considered. Managing potential long-duration fires is challenging. Low-activity, low rate-of-spread fire in the initial stages may have led to over-confidence.

C. Public Information

"We could have done more, earlier, with public information."

Agency Administrator

*"I should have had daily dialogue with the FMO from the beginning of the fire, determining **information trigger points**"*

Park Public Information Officer

"The most trouble we had was with the messaging. It wasn't a great hurdle. But we had some mixed messages."

Acting Forest Supervisor

Communication with Local Communities is Critical

Early and frequent communication with local communities, visitors, and partners is critical to reduce uncertainty, anxiety, and to quell rumors. Delays in getting fire information to the public can affect the public's perception of fire operations and hinder the ability to be timely and accurate with fire information. For example, during the Reading Fire, outreach and public information directed toward local communities regarding smoke and air quality affecting public health was overlooked until August 10. Even if a fire never leaves the Park, smoke impacts to neighboring communities need to be addressed and communicated early.

Fire education communications should also be a year-round function with regular and frequent endeavors to educate and inform the public about Lassen Volcanic National Park's fire program. This effort has the ability to gain trust and credibility for the Park. Further, fire information provides communities with an avenue to be a part of the Park's fire program.

"Terminology is inherently a problem in our agency. We don't do ourselves any favors because the terminology is confusing and misunderstood."

Type 3 Incident Commander

"Our terminology has changed so many times that people don't trust it."

Type 4 Incident Commander Trainee

Our Agency Fire Language Should Be Easily Understood

During the Reading Fire, the terms and labels "controlled burn," "let burn," prescribed fire," and others appeared in newspapers, other media reports, and blogs. These multiple descriptions—dated for various fire management options—opened Lassen Volcanic National Park to criticisms from elected officials, residents, and business owners.

The language and terminology used in public communications is tremendously important and must be consistent with national fire policy. To the greatest extent possible, the fire language used in communication to the public should be up-to-date, standardized, be easy-to-understand, and match national fire policy.

"It (the Reading Fire) moved pretty fast. We weren't quite ready to move (information out) that fast."

Park Management Staff

Importance of Public Meetings

The Type 2 Incident Command Team, representing Lassen Volcanic National Park and Lassen National Forest, held the first public meeting approximately three weeks into the Reading Fire. Public meetings enable individuals, business owners, and others in affected communities to express their concerns, needs, and issues to the Park and incident management team. The need for community meetings must be anticipated early. Skilled facilitation is extremely important as the audience may be angry and challenging. These emotions can become amplified when the public believes that these meetings have been delayed or are reactive rather than proactive to fire events.

D. Human Factors

[See definition of "Human Factors" on page 12.]

"I didn't 'what-if' enough. I should have painted a darker picture."

Park Fire Staff

Try to Avoid Tunnel Vision on Success

Beware of focusing too much on *confirming evidence*[3]: evidence that your plan *is* working. Look for reasons to suspect that your plan might not work. Have a *preoccupation with failure*. Try not to get tunnel vision on success.

[3] Definition of "Confirming-Evidence Trap": *The unintended practice that leads us to seek out information that supports our existing instinct or point of view while avoiding information that contradicts it. This not only affects where we go to look for evidence, but also how we interpret the information that we receive.*

Fire managers are often "salespeople" for what they think is the right thing to do. This includes what they've been trained and prepared to do: to allow fire to act on the landscape for multiple objectives. But fire managers need to find a balance between taking advantage of good opportunities to manage fire, and also playing "devil's advocate" and arguing against fire at times.

Factors that Contributed to Underestimating the Reading Fire's Potential

If people are being told that there is significant fire potential for a certain time period and no experience occurs to validate this information, people will soon become immune to the information. Additionally, on the Reading Fire, people were using the "slideshow" of experience of past fires in the Park, which were fairly benign and low intensity. These other fires were at different times of the year and different years. The fire potential for this fire was therefore underestimated.

E. Management and Coordination Concerns

"This fire will not negatively affect our working relationship. In fact, it will make it stronger."

Forest Management Staff

Be Prepared to Host Incident Management Teams

Units should prepare in advance for hosting incident management teams by having in-briefing materials ready (delegations of authority, leader's intent, mop-up and turn back standards, clarification on "Minimum Impact Suppression Techniques" (MIST), and resource protection guides, etc.). In-briefing and transition materials are extremely important. They will help teams get up-and-running quickly.

Parks or units that don't host fire management teams frequently should pre-identify locations for Incident Command Posts. Any necessary land use agreements should be prepared ahead of time. Parks should be aware that an incident management team will have an impact—but realize that these impacts can be mitigated and rehabilitated. When the team is preparing to closeout, give adequate consideration to what resources and infrastructure the unit will take ownership of; assuming a sizeable organization—including payment and fiscal packages—will have a larger workload and burden on Park staff than they may be able to accommodate without outside assistance.

Need to Resolve Confusion Regarding MIST

Confusion exists on what MIST (Minimum Impact Suppression Techniques)[4] means regarding minimizing resource damage. Some crews do not generally understand MIST. It is important for everyone to have the same perception and awareness of what tactics can be used to minimize resource damage.

[4] MIST: *The application of strategy and tactics that effectively meet suppression and resource objectives with the least environmental, cultural, and social impacts. (National Wildfire Coordinating Group [NWCG] Definition.)*

Need to Educate Personnel on Federal Wildland Fire Management Policy

Many fire personnel from various fire agencies, coordination centers, and on incident management teams do not have a broader understanding of federal wildland fire management, fire policy, and the role of fire. Increased efforts should be taken to educate all responders.

7. Key Factors and Lessons Learned by the Review Team

A. Planning

The Importance of Past Fire History and Fuel Treatments

Past Lassen Volcanic National Park fire history shows a strong likelihood that—under a given set of environmental conditions—fires burn from the southwest to northeast, with a potential to leave the unit boundary. This past fire history may not be fully understood by today's senior managers. Therefore, this history may not have been fully considered during planning and critical decision-making processes regarding the Reading Fire

Due to this strong tendency for fires to move southwest to northeast, the Park's fuel treatment strategy has been to treat its north and northeast boundary. In addition, the Park has successfully managed several landscape-scale fires in previous decades (including the 2004 Bluff Fire and the 2009 Fairfield Fire) under similar environmental conditions. (For more background information on Lassen Volcanic National Park's fire history, see Background section that begins on page 7.)

In addition, Park fire staff are aware that when the decision is made to manage a fire for one or more objectives, their strategy and tactics must be fairly aggressive due to the size of the Park in which they can manage wildland fire.

The future of having fire on the landscape at Lassen Volcanic National Park is dependent on managing natural ignitions at the right place at the right time.

Use of Existing Information

There were several previous fire reviews completed in the Park. In addition, a Technical Fire Management (TFM) project provided background information for the Park management and fire management concerning fire decisions and the associated risk. The utilization of existing data and learning from past experience is critical to the fire program progressing into the future regarding fire management in the Park.

"We might not get 'em, but order 'em anyway."

Type 3 Incident Commander

Order Firefighting Resources Early

Firefighting resources should be ordered early, even if it seems like they may not be available, or that the fire may not rank high enough in priority. There is no indication that Reading Fire resource orders would not have been filled if ordered, nor is there any indication that additional resources could have made a difference in the outcome—due to the intensity of the fire crossing the Lassen National Park Highway. It is important to note that any reluctance to order resources based on assumptions and perceptions about other large-fire activity and prioritization of fires in the area can be limiting.

Use of WFDSS

Lassen Volcanic National Park published a decision within the Wildland Fire Decision Support System (WFDSS) as directed by policy. Initial published decisions may not typically have a great deal of detail or supporting analysis due to the fire not exhibiting extraordinary burning conditions. Although, as the Reading Fire activity increased, additional WFDSS decisions—including Management Action Points—were published and provided to the incoming incident management teams.

B. Fire Behavior

"We didn't pay enough attention early on to weather and fire behavior."

Park Fire Staff

Fire Model Systems

Fully utilize FSPro probabilities, fire spread prediction systems, weather data, and other planning tools to anticipate and plan for potential fire behavior. A FSPro run was not completed until approximately two weeks after the start of the Reading Fire. Therefore, the information was not available to help with decisions until the fire was becoming active on August 6.

Although the FSPro system under-predicted the majority of the fires in the timber fuel types during the 2012 season, when calibrated correctly, this system can provide important information. Completing FSPro runs early in a fire can help inform decisions earlier in the process.

In the future, consider completing an FSPro run when Park management starts to commit resources to a fire. This will provide a tool for management regarding risk and probabilities. While output probabilities from these models should be an important part of managers' decisions, they should be used with caution—in a combination with other factors.

In addition, BEHAVE or Flammap (commonly used computerized fire modeling tools) runs could have been fairly helpful tools, especially in predicting the increased spotting potential in the heavier fuels. No BEHAVE fire behavior prediction system runs were completed for the Reading Fire until the Type 2 Incident Management Team started to manage the fire.

A fuel type change occurred as the Reading Fire moved downslope toward the Lassen National Park Highway. Fire behavior spread predictions would have been helpful to compare the fire behavior in the heavier fuel loading areas in lodgepole pine versus the lighter mixed conifer/manzanita fuels. As the fire grew, this could have been an indication of the potential for increased spotting and increased rate-of-spread.

Running these models can be achieved by ordering an analyst to help provide fire model information to assist in managers' decisions.

Changing Environmental Conditions

As the fire progressed, the fuel type transitioned from manzanita areas to more fir with moderate load dead/down fuels which were facilitating more spotting—that was more difficult to control. Additionally, during the two weeks between when the fire started and the first major run occurred, the NFDRS indices climbed significantly. The live fuel moistures were decreasing rapidly, the dead fuel moisture remained at—or approached—record lows.

Utilizing the NFDRS indices, predicted weather, measured live and dead fuel moistures, and fire behavior issues occurring on fires in the general vicinity are important pieces of information that need to be considered when making decisions locally. Paying attention to the changing environmental conditions through time is an important piece of the decision process when managing early and mid-season fires.

Using the Pocket Card

The pocket card is designed to brief local and incoming resources about current NFDRS conditions relating to historical conditions. These cards are utilized on a daily basis by the firefighter. The Park's pocket card (shown in Appendix D) is based on the average energy release component (ERC) indexes from three RAWS stations. The issue on the Reading Fire surrounded the fact that neither the dispatch center nor the Park fire staff were monitoring or communicating the daily average index for these three stations.

Therefore, while firefighters had the pocket cards, they did not have the information to be able to use them correctly. Having this additional piece of information could have helped support firefighter awareness of the increasing fire danger conditions in the Park.

Separately from the pocket card, the Fire Management Officer did keep track of the daily ERC index values for the Manzanita Lake RAWS station, which provided the Fire Management Officer situational awareness of the increasing fire danger.

C. Public Information

"Early fire information would have been helpful for background—before the media call."

Park Administrative Assistant

Messaging

Internal and external messaging was inconsistent and led to misrepresentation of the Reading Fire, sometimes with improper/outdated fire language.

The approval process of news release documents slowed fire information efforts. Delays in notifications to media, communities, and other interested parties led to mistrust and misinformation.

Fire information products (maps, updates, FAQ, etc.) need to be produced and provided early and frequently during a fire.

On the Reading Fire, once the fire information efforts got behind, it became difficult for the Park to catch-up with timely and accurate messaging.

Fire Information Delivery Systems

As the Reading Fire activity increased, information efforts also needed to increase. Ordering additional information officers would have added to the Park's information effort. Suggested trigger points to order additional resources include: increasing visible smoke and potential impacts to public health, employee and visitor concerns, and increasing media inquiries.

"Inciweb" and "Firenews" needed to be implemented earlier and updated daily to keep the public informed through maps, descriptions, increases in fire behavior and other factors.

Today's instant access to information through social media makes it imperative that accurate and timely information is provided to stakeholders early—perhaps utilizing the same technology.

Attention to Community Meetings

Close coordination and planning for public meetings is essential. Using a skilled facilitator is helpful.

D. Human Factors

[See definition of "Human Factors" on page 12.]

"We were working on a schedule at this point. But the fire wasn't working on that same schedule."

Module Crew Leader

When the Fire Urgency Changes

When the tempo or urgency of the fire changes, be willing to rapidly adjust and change any scheduled or structured logistical commitments, such as debriefings and feeding. Don't let what *seems* important trump what really *is* important.

New Fire Distractions

As the weather system came over the fire area on August 4-5, it added a level of complexity to the management of the Reading Fire. As anticipated new fires become a distraction, they remove the focus from the task at hand. It is recommended to first focus on the fire that currently exists and how the weather and winds are going to affect it.

E. Management and Coordination Concerns

Dialogue Between Administrative Units

Early and frequent dialogue between administrative units is a key factor, no matter the size or complexity of the fire. Agency concerns and opinions need to be shared, with approval and course of action still resting with the responsible agency official. Ideally, there should be no surprises in terms of what is being planned or actions being taken. Annual and pre- and post-season meetings are great opportunities for collaboration on fire response among cooperators.

Forest and Park Collaboration

The Lassen National Forest and Lassen Volcanic National Park are already working together on joint fuel reduction projects along their borders. The concept of someday achieving a landscape consistency—in terms of fuel loadings—looking similar regardless of jurisdiction is commendable. We encourage this collaborative work and urge this support for each other to continue.

Upcoming National Forest Plan Revision

It has been recognized that National Forest Land Management Plan policies regarding wildland fire need to be revisited and updated. Upcoming Forest Plan revision should provide the opportunity for this to occur. We encourage the Forest to look at using wildland fire, where appropriate, as another management tool.

The Need to Clarify Roles

Lassen Volcanic National Park clearly recognized the importance of assigning Resource Advisors at the early stages of the fire. Although, as the need for more Resource Advisors and coordination is required, it is important to maintain a clear understanding regarding the roles between the Incident Management Team and Resource Advisors. This role clarification will help to ensure that work assignments are well documented and communicated to prevent misunderstandings and or unnecessary resource damage.

8. Recommendations

- **Continue to Ensure Public Safety and Resource Protection through Collaboration**
  To ensure public safety and to provide for resource protection when managing wildfires, all units should continue to collaborate with other agencies, partners, neighboring communities, and the public. Ensure fire response dialog is included at annual operating plan meetings, during the fire season, and at after-season reviews.

- **Public Information Considerations**
  It is essential that fire information and education be community and stakeholder inclusive year round. Meaningful fire education opportunities occur at many levels and times and should be utilized to enhance partnerships *before* a crisis occurs.

  To help build public trust, a continuous and year-round Lassen Volcanic National Park community fire education outreach effort is suggested that matches national fire policy. Build off the Reading Fire long-term messaging plan document that was produced during the fire.

  Early public notification and outreach is suggested to local communities with any smoke impacts that could potentially affect public health.

  Develop a Lassen Volcanic National Park "Fire Information, Education and Outreach Guide" and information notebook, which would include information checklists, contacts, and yearly Park fire potential and talking points.

  Develop an internal Park fire information training program to expand knowledge and expertise with other employees.

- **Planning Based on Past Lessons Learned**
  Compile and refresh staff and managers on lessons learned from past fire reviews and risk assessments. Utilize these opportunities to refine decision criteria and risk assessments for future fires, including fire behavior analysis.

- **Develop and Train an Interdisciplinary WFDSS Group**
  Develop and train a Park or Park network-specific interdisciplinary Wildland Fire Decision Support System (WFDSS) support group to increase local capacity and competency. It is important for relative risk assessment and operational needs assessments to be completed in the WFDSS decisions for agency administrator approval.

- **Future Pocket Card Use Considerations**
  For future use, as a new Lassen Volcanic National Park pocket card is developed, ensure that it is simple and accessible. In addition, ensure that the current and forecasted Energy Release Component (ERC) is communicated through the dispatch center. Encourage fire personnel to keep track of the changing ERC throughout the season by documenting the daily ERC on the chart located in the pocket card.

- **Build a Resource Advisor Guide**
  All units should have a unit-specific Resource Advisor Guide.

9. Commendations

Positive Outcomes and Traits

While examining the lessons learned from the Reading Fire, the Review Team noted several key positive outcomes and traits.

- Firefighter and public safety was clearly the Reading Fire's primary objective. A strong commitment to minimizing exposure to risk resulted in no fatalities or serious injuries. Only two minor injuries occurred on this incident. This is a commendable achievement which must not be overshadowed by other outcomes.

- The Type 3 organization's Reading Fire medical response plan was tested. It was effectively utilized for firefighter treatment and evacuation.

- Trainees were used in key positions for developmental goals with appropriate mentoring and oversight.

- Relationships were—and continue to be—good between the Lassen Volcanic National Park and Lassen National Forest managers level. These beneficial relationships, for the most part, had been established prior to the Reading Fire's ignition.

- Lassen Volcanic National Park staff obtained outside assistance for Wildland Fire Decision Support System (WFDSS), Resource Advisor, the Type 3 Incident Commander, and various other efforts.

- The joint National Park Service and Forest Service Burned Area Emergency Response (BAER) Team was very successful. They developed an outstanding plan.

- An extensive information "trap line"—places where fire information is posted for the general public—was established over 187 miles with 35 stops.

- An information/education messaging plan and timeline was developed by the Park that provides a positive effort toward future outreach with affected communities.

10. Review Team Members

Kevin Hendricks, Team Leader
Chief Ranger, Sequoia and Kings Canyon National Parks

John Exline, USDA Forest Service Agency Representative
District Ranger, Hume Lake Ranger District
Sequoia National Forest

Christie Neill
Deputy Regional Fire Management Officer
Pacific West Region, National Park Service

Gary Wuchner
Fire Education and Information Manager
Yosemite National Park

Brent Woffinden
Deputy Regional Fire Management Officer
Intermountain Region, National Park Service

Jessica Wade, Fire Behavior Analyst
Assistant Regional Fire Management Officer
Pacific Southwest Region, U.S. Fish and Wildlife Service

Alex Viktora, Facilitated Learning Analysis Coach
Field Operations Specialist, Fire Use Training Academy

Paul Keller, Writer-Editor
Wildland Fire Lessons Learned Center

11. Appendices

Appendix A – Reading Fire Compliance with Wildland Fire Management Policy

Policy

The purpose of this addendum is to clarify adherence to implementation of federal wildland fire management policy. Management of wildland fires on land administered by the USDA Forest Service and the U.S. Department of Interior National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and Bureau of Indian Affairs is governed by a host of laws, regulations, and policies. The Review and Update of the 1995 Federal Wildland Fire Management Policy (January 2001) is the current Federal Wildland Fire Management Policy.

The policy itself has not been revised, changed, or updated since 2001. However, the way that federal agencies implement it has evolved over the years in efforts to enhance the safety of wildland firefighters and the public, restore fire to its natural role in ecosystems, and increase the cost-efficiency of wildland fire management.

The Federal Wildland Fire Management Policy has not changed, but the way that it is applied on federal lands has. The main goal of the Guidance for Implementation of Federal Wildland Fire Management Policy issued in 2009 is to ensure that the full range of strategic and tactical options are available and considered in the response to every wildland fire. These options are to be used to achieve objectives as described in agency land and resource management plans and/or fire management plans.

National Park Service policy (NPS Director's Order #18) requires that each park with burnable vegetation must have an approved Fire Management Plan (FMP) that will address the need for adequate funding and staffing to support its fire management program. Parks having an approved Fire Management Plan and accompanying National Environmental Policy Act (NEPA) compliance may utilize wildland fire to achieve resource benefits in predetermined fire management units.

Lassen Volcanic National Park has an approved Fire Management Plan (April 2012) that allows for management of unplanned ignitions for one or more objective. Public scoping and input was included in the Environmental Assessment completed with a Finding of No Significant Impact in 2005.

Lassen Volcanic National Park utilized the Wildland Fire Decision Support System (WFDSS) to develop, document, and publish their initial and subsequent course of actions for the Reading Fire. WFDSS provides a scalable decision support tool that assists agency administrators and wildland fire managers make informed decisions for all unplanned ignitions.

Using appropriate fire behavior modeling, economic principles, and information technology to support effective wildland fire decisions consistent with Resource and Fire Management Plans, WFDSS and its reporting components were designed to support the Federal Wildland Fire Policy implementation guidance.

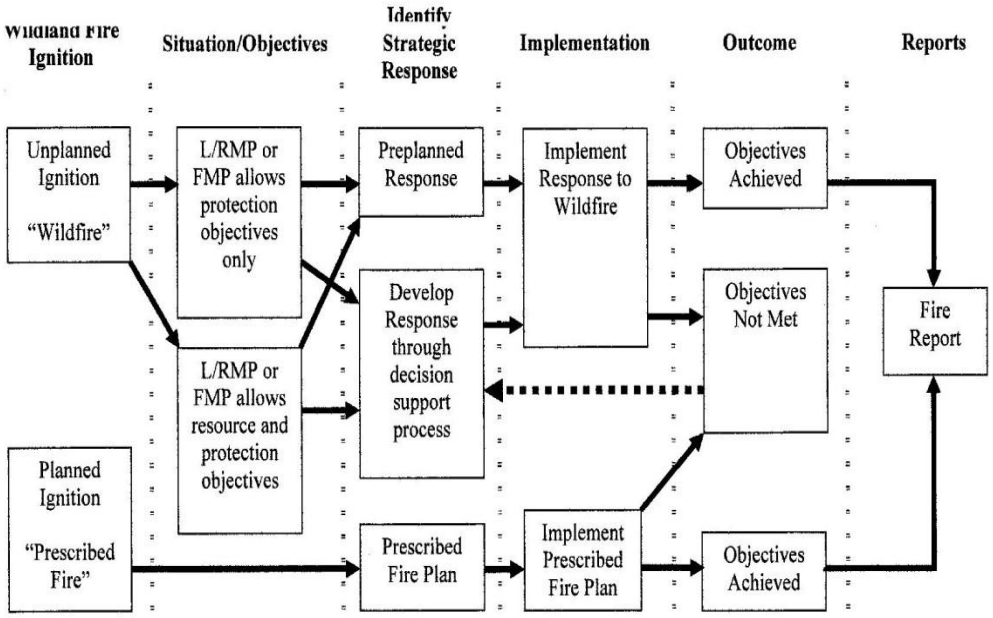
Every wildland fire will be assessed following a decision support process that examines the full range of potential responses. During the early stages of the Reading fire, an initial WFDSS analysis was completed. Three additional WFDSS decisions were subsequently published as

the course of action was modified. The park superintendent ensured these actions were completed as required by policy.

National Park Service Regional and National Office Fire Management Staff acknowledge that Lassen Volcanic National Park managers made their decisions and managed the Reading Fire within existing federal wildland fire management policy and authority.

Appendix B: Wildland Fire Flowchart

This chart depicts, in general, the process to be taken given an ignition, regardless of source. Management actions depend on the provisions in the approved Land, Resource and Fire Management Plan and/or Fire Management Plan for an area. This chart is generally applicable to most agencies' fire management programs. However, specific exceptions may exist.



Guidance for Implementation of Federal Wildland Fire Management Policy
Page 18

Appendix B – Review Team Delegation of Authority

NATIONAL PARK SERVICE
Pacific West Regional Office
333 Bush Street, Suite 500
San Francisco, California 94104

September 18, 2012

Memorandum

To: Chief Ranger, Sequoia and Kings Canyon National Parks

From: Regional Director, Pacific West Region

Subject: Delegation of Authority – Reading Fire Review September 25-28, 2012

This memorandum formalizes your appointment as Team Leader for the Reading Fire Review assigned to conduct a review of the Reading Fire in Lassen Volcanic National Park. The responsibility of the team leader includes:

1. Organizing, managing, and conducting the review in accordance with the Interagency Standards for Fire and Aviation Operations and RM-18.
2. Providing for in-briefings and out-briefings with affected personnel and agency officials, including the Lassen Volcanic National Park Superintendent and the Hat Creek District Ranger, Lassen National Forest.
3. Adhering as much as possible to Facilitated Learning Analysis guidelines in conducting the review.
4. Maintaining liaison with the affected Park, Forest and regional office representatives.
5. Approving requests and allocating funding for resources to assist with the review.
6. Requesting technical, logistical, or other support, as required to conduct the review.
7. Providing briefings to myself and others.

I understand that interviews and analysis will take up to a month to complete, given the demands of fire season and schedules. Please provide a draft review to the Deputy Regional Director, Martha Lee, 45 days after the interviews are completed.

This review should follow a Lessons Learned Review or Facilitated Learning Analysis format. Note that a Large Fire Cost Review will be conducted by the national office and will cover cost and business management of the incident.

Thank you for your willingness to accept this assignment, I know you will do a great job!

/s/ Patricia L. Neubacher
(signed original on file)
(for)
Christine S. Lehnertz

Appendix C – Reading Fire Comprehensive Chronology

July 23, 2012

- The Reading Fire, located in designated wilderness, is ignited by lightning.
- Fire is sized-up as a single-tree red fir top located at the 7000-foot elevation on a north-facing slope in patchy, discontinuous fuels.

Notes from size-up and Duty Officer:

> *Good location to manage. Sparse fuels, pinemat manzanita, north aspect. Lots of places to check fire spread, roads, ridges, creeks. Surface fuels patchy. Lots of natural barriers, sub-drainages.*

Northern California Geographic Area Coordination Center (North Ops) Fire Activity

New Lightning Fires (ranging in size from a spot to three acres):

Tahoe National Forest – 22 fires; Eldorado National Forest – 13 fires; Amador Eldorado Unit – 12 fires; Nevada Yuba Unit – 1 fire, Plumas National Forest – 4 fires.

July 24
National and Northern California Planning Level 3

- Two firefighters hiked into fire. The top had fallen out of the red fir "strike" tree. Fire described as small—three feet-by-five feet—and smoldering. At this time, fire is "barely alive".
- Unit Fire Staff starts scouting for containment lines, natural barriers, and identification of Management Action Points.
- Unit Fire Staff prepares to brief Park Superintendent and Park staff.

July 25

- Park Superintendent and staff briefed. Decision is made by the Park Superintendent—and documented in the Wildland Fire Decision Support System (WFDSS)—to monitor the fire and manage for resource/ecological objectives per Park's Fire Management Plan.

July 26
National and Northern California Preparedness Level 2

- The first WFDSS decision is published, with the decision to monitor the fire for resource and ecological objectives. Three Management Action Points are identified to contain fire south of Lassen National Park Highway and between two drainages in an area that is approximately 700 acres.

July 27

- Fire was monitored from the road and by West Prospect and Mt. Harkness fire lookouts.
- Later in the day, the Park receives public report to the Summit Lake Campground host that smoke is visible from the Lassen Peak Trail.
- 1730 – Harkness Fire Lookout reported seeing the smoke for the first time by calling in smoke report to Susanville Interagency Fire Center (SIFC). West Prospect Fire Lookout triangulated the smoke report and identified that it was the Reading Fire—which was increasing in activity. Duty Officer Div. 7 reported to SIFC that the Reading Fire is being monitored.
- 1800 – Fire is becoming visible by the public and lookouts. Unit staff will implement fire information plan and education plan during next operational shift. Park has Type 4 IC and IC trainee in place to manage the fire.

July 28

- 0940 – Crew Boss C7 checks the fire with squad of firefighters on their way to a fuels reduction project. Capt 7 reports to SIFC is that the fire has grown to 0.5 acres in size, has 80 percent active fire perimeter with creeping, smothering and open flame in the heavy dead and down fuels.
- 1000 – Patrol 701 to post fire information on large sandwich boards at both the Loomis Plaza and SW Visitor Center, small sandwich board at the Summit Lake North Campground and Lassen Peak Trail head, as well as on the Lassen National Park Highway pointing into Summit Lake North Campground. Fire info also posted at the Terrace Lakes trail head and Paradise Meadows Trail head at Hat Lake. In addition. fire information was given to both the SW and Manzanita Lake entrance stations.

July 29

- Local fire activity increasing: Chips Fire, 20 acres; Peak Fire, 200 acres; North Fire, 400 acres.
- 1500 – Reviewed incident objectives in WFDSS. Assigned trail signage duty to Information Officer. Firefighters will be checking the fire on the next day, with updates to the Regional Office.

July 30

- C-7 Squad Boss is on the fire. Gave update of fire at 3.3 acres with 60 percent active perimeter creeping and smoldering/backing and flanking to the north downslope.
- Fire Staff is fine-tuning objectives and Management Action Points in WFDSS

July 31

- Report from Crew 7 Captain is that the fire is 5.1 acres today with mostly creeping, smoldering and some surface fire which is creating occasional individual tree torching.
- 1745 – Order additional resources – wildland fire module and 10-person crew to work with C7 and E76 on prepping for holding the fire on Lassen National Park Highway.
- FMO makes notifications to neighboring agencies and Air Quality Management District.
- Crews initiated road prep.
- Local fire activity: Chips Fire is 1000 acres and Peak Fire is 780 acres.

August 1

- The Energy Release Component (ERC) is 66 (very high fire danger) in Lassen Volcanic National Park.
- The Reading Fire is now 24 acres. Park Fire Management Officer makes notifications that the fire is approaching the Management Action Point—the Lassen National Park Highway—identified in the WFDSS decision.
- 1500 – Crew 7 Captain reports the fire is 24 acres with a 70 percent active perimeter and isolated individual and group tree torching. There is a spot fire 2/10ths of a mile from the Lassen National Park Highway.
- 1515 – The fire has spread to the road—or will spread there during next operational shift. This is the Management Action Point for prepping the road.
- 1430 – Planning for next day shift, additional resources should be here tonight or in the morning.
- Weather forecast indicates 20 percent chance of wetting rain.

August 2
National and Northern California Preparedness Level 3

- By the end of this day, the Reading Fire will be 44 acres.
- A new WFDSS decision was recorded. New Management Action Points were added to the decision to reduce smoke impacts. These Management Action Points were interior to the earlier ones. The Park has a Type 3 Incident Commander and a Strategic Operational Planner (SOPL) in place—anticipating the fire getting to the road. The Park developed a Type 4 organization for the management of fire.
- 0800 – AM briefing with all resources assigned to the fire: BLM crew 3218, wildland fire module, SOPL (t), and local resources.
- 0900 – E76 out to check on the fire this morning and reports very little smoke impact to park road and Summit Lake area. Smoke seems to be headed down Hat Creek drainage

toward Old Station. Fire still a little ways from park road and fire activity is creeping and smoldering.

- 1414 – Reading Fire IC (Trainee) reports update on fire. It is currently 29 acres with 60 percent active perimeter—mostly creeping and smoldering with some active surface fire and occasional single-tree torching.

******Weather Forecast******

[influences decision as to burn or wait.]

8/3 – High pressure, warm and dry, winds light and terrain driven for next couple days. Low pressure approaching with threat of thunder storms Sat and Sunday.

8/4 – High pressure over the fire area changing today. A disturbance is moving in throughout the day. This system will bring isolated to scattered thunderstorms late this afternoon and into Sunday. Storms will start dry and transition to wet by Sunday.

Red Flag Warning for dry thunderstorms in effect from 5 pm Sat to 5 pm Sun. Weather today partly cloudy then becoming mostly cloudy with isolated thunderstorms in the afternoon.

8/5 – Red Flag Warning for dry thunderstorms until 5 pm this evening. Weak disturbance rotating through the area combined with monsoonal moisture will bring a chance or isolated thunderstorms in the afternoon. As the system moves north, scattered activity will persist. Little or no rain is expected and there may be a chance for downdrafts associated with passing thunderstorms. In the absence of thunderstorms, winds will be light. Mostly cloudy today with scattered showers and thunderstorms.

August 3

- Fire Incident Commander reported fire as being 50 acres with several small spot fires lower on the slope. Weather Forecast is for possible rain and or lightning over weekend for next 2 days. Smoke management plan sent to AQMD for approval.
- Resource Advisors are assigned to the fire.
- 1545 – Had medical on fire, one of the BLM employees received a bee sting. He is allergic to bees, so received a shot. An ambulance was ordered and he was taken to the Redding Hospital.

August 4

- The Reading Fire is currently 70 acres with active areas on the west, north and east flanks. Fire has some active surface fire with individual tree torching on the active areas of the fire. Pinemat manzanita is not burning.
- Crews were prepping the park road and a natural barrier to the north for burn out to contain fire.
- 1630 – IC Trainee reports that the fire is up to 94 acres and has been more active this afternoon.

- Local Fire Activity: Chips Fire is 6,814 acres, Dillion Fire is 230 acres and is 40 percent contained.

August 5

- 0830 – Two new fires—named P1 and P2—are reported in Lassen Volcanic Nation Park.
- 0900 – The Reading Fire is very calm this morning. The fire area appears to have received a little precipitation overnight, just enough to dampen soil. Fire grew only a little toward the road overnight.
- 1200 – Intent is to check fire spread to the northwest and carry fire down the slope to the road on the north to meet objective of holding fire on Lassen National Park Highway.
- *1230 – C7B on scene of the new fire P-1. Location 40 31.599 x 121 22.348 . Currently one acre in size, low to moderate rate-of-spread. Directed P-1 Fire IC to suppress the fire. Ordered a load of jumpers to take over the fire so C7B can return to the Reading Fire next shift.*
- *1400- Smoke jumpers on the ground for P-1 Fire.*
- *1607 – P-2 Fire contained at this time*
- *1700 – C7B being released from the P-1 Fire. Will be back to Summit Lake at 2000 hours and return to the Reading Fire next shift.*
- 1730 – Reading Fire IC Trainee reports increased fire activity on the northeast corner of the Reading Fire. It has multiple spots within 2/10 of a mile to the Lassen National Park Highway. FMO requests Law Enforcement Rangers to assist with traffic control if necessary.
- 1745 – Reading Fire IC now reports that the fire has come to the road in several locations on the northeast corner. Multiple spot fires across the road—all are lined and contained.
- *1720 – P-2 Fire IC putting fire in patrol status and returning to the Reading Fire. Personnel will need to return to the P-2 Fire to check it tomorrow.*
- 1825 – Reading Fire activity is calming down. Approximately eight to ten spot fires have been found across the road.
- *1830 – P-1 Fire update: Main fire is ¾ acre; fire has hand line around it. There are six spot fires that are lined. There are two large snags with fire that will need to come down tomorrow. They have requested a pump and hose to be para-cargoed in the morning at 0700.*
- The Reading Fire is now approximately 140 acres
- Due to the Park's two new fires and activity of the Reading Fire, two additional Type 3 engines and a 20-person hand crew are ordered. An incident complexity analysis was completed that recommends a Type 3 Incident Commander and organization which will be in place for next day shift.

- Local Fire Activity: The Northern California Geographic Area Coordination Center (North Ops) has received more than 150 lightning strikes resulting in 15 fires. All fires are one acre or less. The Chips Fire is now 10,387 acres.

August 6

Both National and Northern California Preparedness Levels Goes Back to a "3"

- 0700 – The Type 3 IC and organization put into place. Primary objective and priority is to burn out along main park road and improved natural barrier to the north. Will burn very slow. To prevent additional spots fires, crews are gridding for new spot fires. Wind has increased.
- *The new P-1 and P-2 fires are put into patrol status. 0745: P-1 Fire IC morning report: Fire looks good this morning. All lines held. Will be getting pump and doing heavy mop up for the next couple days.*
- *0850 – P-2 Fire IC reports resources are on scene. they will be mopping up all day. Fire held at .10 acres*
- 1130 – Operations normal. No new issues. Two groups of resources working the fire. One is located on the "Roadside" and the other group, called "Back Country", is working the heel and flank of the fire. Traffic plan is put into place for the main park road.
- All is going pretty good. Everyone is comfortable that they can hold the road.
- A new WFDSS decision is recorded. New Management Action Points are added to the decision to reduce smoke impacts. These were interior points to the earlier Management Action Points.
- 1300 – Fire activity picks up on southern portion of the fire. The Back County group of resources withdraw to the flanks because spots fires, multiple snags, and interior fire intensity has significantly increased. Firefighter resources are spread too thin trying to hold and check the fire spread.
- As fire activity significantly increases, crews take a "tactical pause" and withdraw to safer portions of the flanks.
- 1400 – IC orders a Type 2 Incident Management Team. The Reading Fire is 1,000 acres.
- Local Fire Activity: Lake Fire 1,500 acres, 10 percent contained; Lost Fire 8,000 acres, 0 percent contained; Chips Fire 13,867 acres, 10 percent contained; Dillon Fire 318 acres, 90 percent contained.

August 7

- The Type 3 Incident Command organization includes some CAL FIRE engines and crews. The Type 2 Incident Management Team shadows and assumes command at 1800.

August 12

- The Type 2 Incident Management Team times out. As fire threatens the Old Station community on the Lassen National Forest, complexity is increased to need a Type I Incident Management Team.

August 13

- The Type 1 Incident Command Team assumes command of the Reading Fire. This team will manage the fire through August 23.

August 24

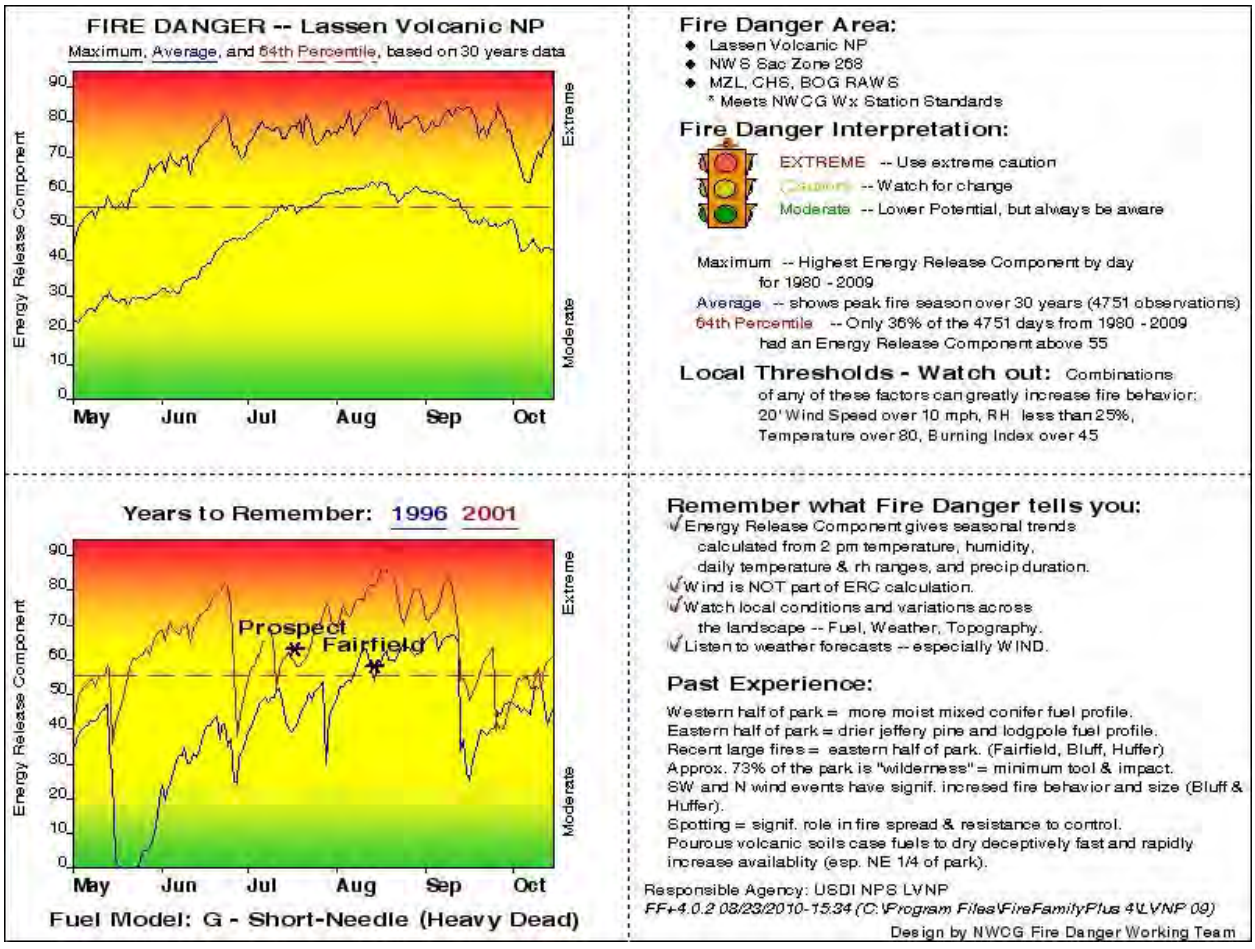
- A Type 3 Incident Management Team assumes command of the fire.

August 31

- The Reading Fire's management is returned to Lassen Volcanic National Park staff.

Appendix D – The Lassen Volcanic National Park Pocket Card

The purpose of the pocket card, a one-page standard template with local weather station information and thresholds shown graphically—usually printed small enough to fit into a pocket—is designed to brief local and incoming resources about current National Fire Danger Rating System (NFDRS) conditions relating to historical conditions, and identifying local weather thresholds for large fires. These cards are utilized on a daily basis by the firefighter.

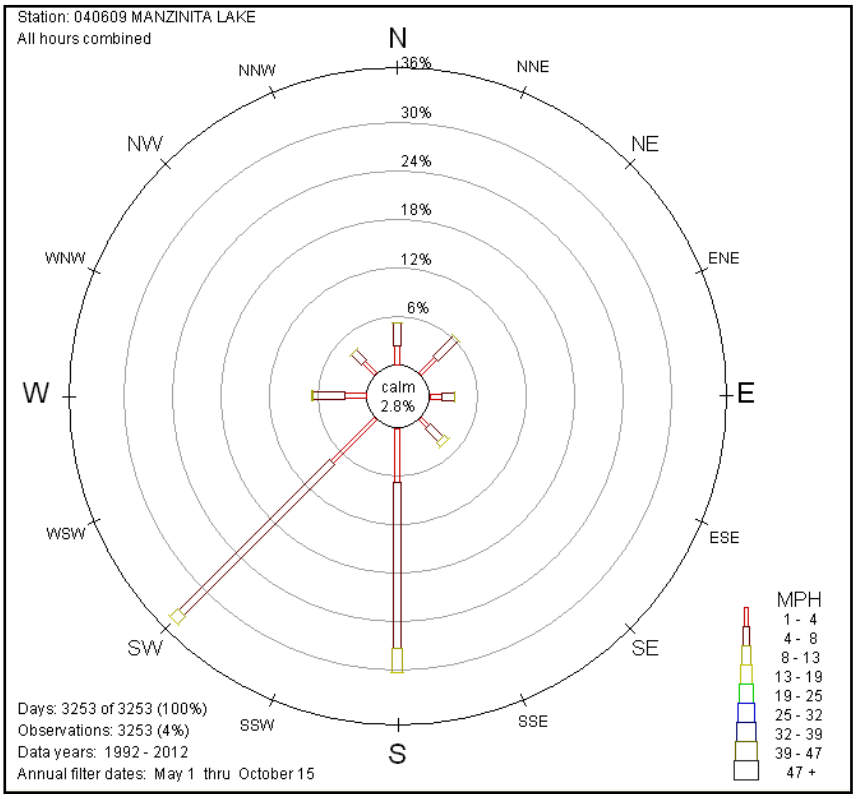


Appendix E – General Exhibited Fire Behavior Based on Live Fuel Moisture Values

General Exhibited Fire Behavior
Based on Live Fuel Moisture Values

181% and Higher	Fires will exhibit very low fire behavior with difficulty burning. Residual fine fuels from the previous year may carry the fire. Foliage will remain on the stems following the burn.
151% to 180%	Fires will exhibit low fire behavior with fire beginning to be carried in the live fuels. Both foliage and stem material up to ¼-inch in diameter will be consumed by the fire. Burns will be generally patchy with many unburned islands.
126% to 150%	Fires will exhibit moderate fire behavior with a fast continuous rate-of-spread that will consume stem material up to two inches in diameter.
101% to 125%	Fires will exhibit high fire behavior, leaving no material unburned.
75% to 100%	Fires will exhibit extreme fire behavior. Extreme rates-of-spread and moderate- to long-range spotting will occur.
74% and Below	Fires will exhibit advanced fire behavior with high potential to control their environment. Large acreages will be consumed in a very short time period.

Appendix F – Manzanita RAWS Wind Graph



As illustrated in this wind graph from the Manzanita RAWS station, the wind blows from a southwest direction 35 percent of the time, with the majority of the speed between four and eight mph, and from a south direction 30 percent of the time, generally at from four to eight mph. During the Reading Fire, this information was taken from the daily wind direction readings at 1300 hours.