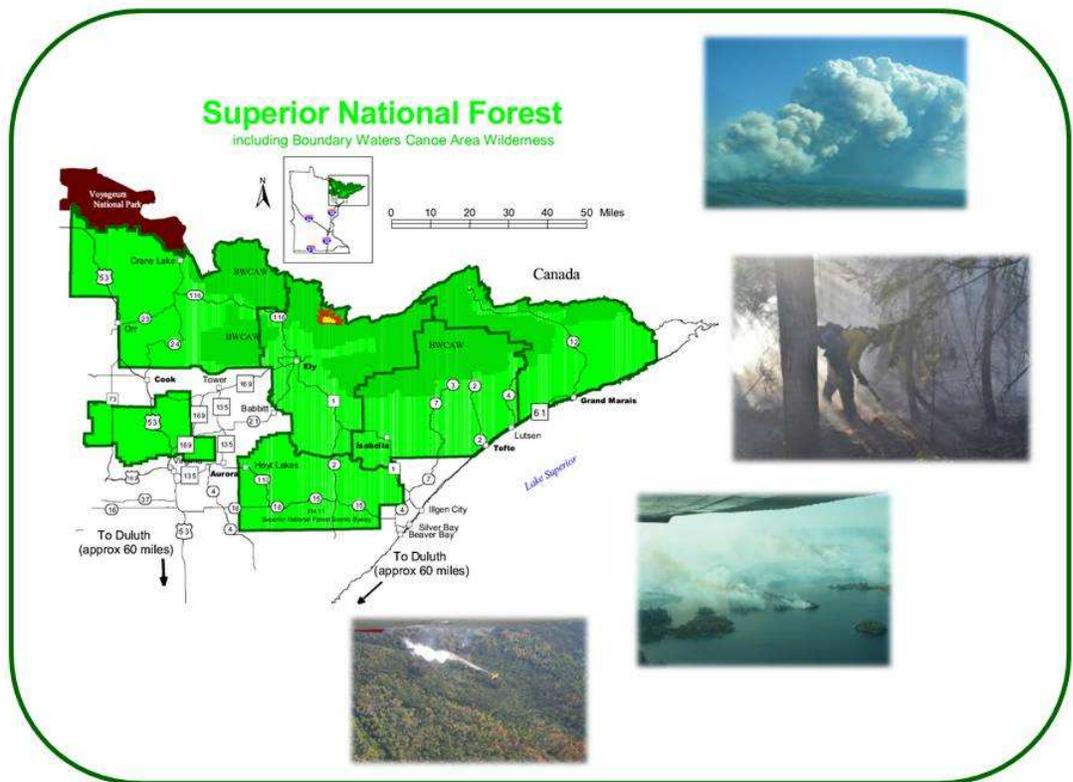




Pagami Creek Fire

Summary of Consistency with Policy and Procedures

December 27, 2011



Superior National Forest
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Table of Contents

INTRODUCTION	2
PURPOSE AND OBJECTIVES	3
REVIEW PROCESS	3
POLICY AND PROCESS FRAMEWORK FOR WILDLAND FIRE MANAGEMENT	5
SYNOPSIS OF PAGAMI CREEK FIRE ACTIVITIES AND CONSISTENCY WITH POLICY	16
SUMMARY.....	18
PREPARED BY	23

INTRODUCTION

The Superior National Forest is located in northern Minnesota between Canada and Lake Superior in the northern half of St. Louis, Cook, and Lake Counties. It contains over three million acres spread across five Ranger Districts: LaCroix, Laurentian, Kawishiwi, Tofte, and Gunflint Ranger Districts. The Boundary Waters Canoe Area Wilderness (BWCAW) is located in the northern portions of the forest and covers parts of four of the Ranger Districts. The three million acres of total area consists of over 445,000 acres of surface water with almost 2000 lakes. The Forest spans 150 miles along the United States-Canadian border. It is a rich and varied resource providing pulpwood and saw timber to the forest products industry; year-round recreation opportunities, including travel in the Boundary Waters Canoe Area Wilderness; and abundant fish habitat in more than 1,300 miles of cold water streams and 950 miles of warm water streams. The northern forest community thrives with pine, fir, and spruce trees that are home to numerous wildlife species including deer, moose, gray wolves, black bear, and Canada lynx.

Wildland fire is an ever present natural factor in the Superior National Forest. Historical records show that lightning caused fires account for about 30% of all fire occurrence with human caused fires accounting for the other 70% of ignitions. Nearly 66% of all fires and 50% of total acres burned occur in conifer forest types.

Fuels on the Superior National Forest can best be divided into five broad categories: conifer, mixed conifer/hardwoods, hardwoods, lowland and grasslands and slash or blow down. Forest types have been classified into "fire regimes," differentiated by types of historic fires and average fire-free intervals. On the Superior National Forest, five fire regimes are recognized. These are described in the following table (Table 1):

Table 1. Fire Regimes common to the Superior NF (Superior NF Fire Management Plan 2011).

Forest Type	Fire Regime
Red and white pine	Mixed regime; infrequent stand-killing fires (150-300 year fire interval), with frequent stand maintenance surface fires (20-40 year fire interval)
Jack pine, aspen, and black spruce	Frequent stand-killing fires (fire interval 50-100 years)
Aspen-birch, spruce, and fir	Frequent stand-killing fires (50-100 year fire interval)
White cedar, fir, black spruce, and paper birch	Infrequent stand-killing fires (>200 year fire interval); depends on sheltering topographic features or chance lack of fire in any of the previous three forest types
Lowland black spruce	Infrequent stand-killing fires (150-300 year interval)

Review of these fire regimes shows that surface fires occur most often, every 20-40 years, while more intense fires such as stand replacing wildfires, occur, dependent upon the forest type, at intervals ranging from 50 to 300 years. While these types of fires have a much lower frequency than surface fires, they burn at higher intensities, are driven by strong winds with a majority of fire spread occurring under rare conditions, result in changes to vegetation cover, and cause replacement or regeneration of the dominant forest cover.

PURPOSE AND OBJECTIVES

During 2011, a large, long-duration wildfire, the Pagami Creek Fire, occurred on the Superior National Forest. This wildfire was started by lightning on August 18, 2011 in the Boundary Waters Canoe Area Wilderness (BWCAN). It was initially managed as a natural process with protection objectives established for values within the Fernberg Corridor (approximately 2 miles to the north). During the course of the fire, combinations of weather and fuel conditions resulted in a rare fire spread event resulting in significant perimeter growth and an eventual, large fire size. The fire covered an area of 94,494 acres from its time of ignition until declared controlled on November 28, 2011.

Since this fire started, there has been considerable interest and concern over its duration, size, and management actions. As a result, the Forest Supervisor requested a review of planning and implementation actions that took place during this fire in terms of their consistency with national and local policy and procedures. Forest Service policy offers and in some cases, requires specific reviews in regard to safety concerns, accidents, near misses, analyses, and investigations. In the case of other kinds of analyses and assessments, such as requested here for the Pagami Creek Fire, *“the Forest Service endorses the position that we are a learning organization. Our basic doctrinal approach requests Agency Administrators to ask what must I learn because of this event and as a corollary, what must I do because of this event?”* (Forest Service 2011a).

The objectives for this report were developed from Forest Supervisor direction. The objectives were to:

- describe wildfire policy at various levels, procedural guidelines, and directions for the US Forest Service and the Superior National Forest,
- discuss the Pagami Creek Fire actions in reference to the bounds of policy,
- assist the Forest Supervisor in addressing the questions, “what must I learn because of this event, and what must I do because of this event?”

Other reviews and assessments were also being completed for conditions and management actions during the fire, and are available through the Superior NF.

REVIEW PROCESS

Although several reviews were being conducted for specific operational purposes, the Superior NF Forest Supervisor still desired to have the Pagami Creek Fire planning and management actions examined in comparison to established policy and directives. This report was completed to fulfill that request and was prepared by reviewing agency policy statements, manuals, directives, Forest level planning documents, and Pagami Creek Fire documentation and reports.

Documents reviewed include:

DOI-USDA. (2011). *A national cohesive wildland fire management strategy*.
http://www.forestsandrangelands.gov/strategy/documents/reports/1_CohesiveStrategy03172011.pdf.

U.S. Department of the Interior, U.S. Department of Agriculture, Washington, D.C., USA.

NWCG 2009. *Quadrennial Fire Review (2009). Final Report*.
<http://www.nifc.gov/PUBLICATIONS/QFR/QFR2009Final.pdf> National Wildfire Coordinating Group, National Interagency Fire Center. Boise, ID. 62 p.

NWCG. 2001. *Review and update of the 1995 federal wildland fire management policy*. National Interagency Fire Center, Boise, ID

NWCG. 2009. *Update on the Modifications to the Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy*, NWCG #001-2009, National Wildfire Coordinating Group, Boise, ID

Superior National Forest. 2004. *Land and Resource Management Plan. BWCAW Management Direction*. 40 p. US Forest Service, Superior National Forest. Duluth, MN.

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Superior National Forest. In Preparation. *Weather and Fire Behavior on the Pagami Creek Fire – September 10-12, 2011*. US Forest Service, Superior National Forest. Duluth, MN.

Superior National Forest. In Preparation. *Pagami Creek Decision Summary*. US Forest Service, Superior National Forest. Duluth, MN.

USDA Forest Service. 2005. *Fire Suppression: Foundational Doctrine*. USDA Forest Service. Washington, D.C.

USDA Forest Service. 2005. *Forest Service Manual 5100 - Fire Management*. USDA Forest Service. Washington, D.C.

USDA Forest Service. 2007. *Forest Service Manual 2300 – Recreation, Wilderness, and Related Resource Management. Chapter 2320 – Wilderness Management*. USDA Forest Service. Washington, D.C.

USDA Forest Service. 2008. *Forest Service Manual 5100 - Fire Management. Chapter 5140 – Fire Use*. USDA Forest Service. Washington, D.C.

USDA Forest Service. 2011a. *Interim guidance for wildfire response*. USDA Forest Service. Washington, D.C.

USDA Forest Service. 2011b *Forest Service Manual 5100 - Fire Management. Chapter 5130 – Wildland Fire Suppression*. USDA Forest Service. Washington, D.C.

USDA Forest Service. 2007. *USDA Forest Service Strategic Plan, FY 2007 - 2012*. FS-880. USDA Forest Service, Washington, D.C. July.

USDA-USDI. 2009. *Guidance for Implementation of Federal Wildland Fire Management Policy* (February 2009), http://www.nifc.gov/policies/policies_documents/GIFWFMP.pdf U.S. Department of Agriculture, U.S. Department of Interior, Boise, ID.

These documents are also referenced in applicable sections throughout this report.

Additional References cited in this report:

Noonan-Wright, Erin, T.S. Opperman, M. A. Finney, G.T. Zimmerman, R.C. Seli, L.M. Elenz, D. E. Calkin, and J.R. Fiedler. 2011. *Developing the US wildland fire decision support system (WFDSS)*. J. Combustion. Vol. 2011. Article Id. 168473. 14 p.

M. A. Finney, "Fire growth using minimum travel time methods," Canadian Journal of Forest Research, vol. 32, no. 8, pp. 1420–1424, 2002.

M. A. Finney, "FARSITE: Fire Area Simulator—model development and evaluation," Research Paper RMRS-RP-4, U.S. Department of Agriculture, Forest Service, 1998

M. A. Finney, I. C. Grenfell, C. W. McHugh et al., "A Method for Ensemble Wildland Fire Simulation," Environmental Modeling and Assessment, vol. 16, no. 2, pp. 153–167, 2011.

POLICY AND PROCESS FRAMEWORK FOR WILDLAND FIRE MANAGEMENT

A number of principles, rules, and processes direct the on-the-ground wildland fire management program. This set of directions begins at the coarsest scale and progresses through a fine scale, at the incident level. These directions represent a range of discretionary and non-discretionary types and include both decisional and non-decisional situations. Figure 1 shows the entire set of mission, doctrine, policy, and directions that influence wildland fire management.

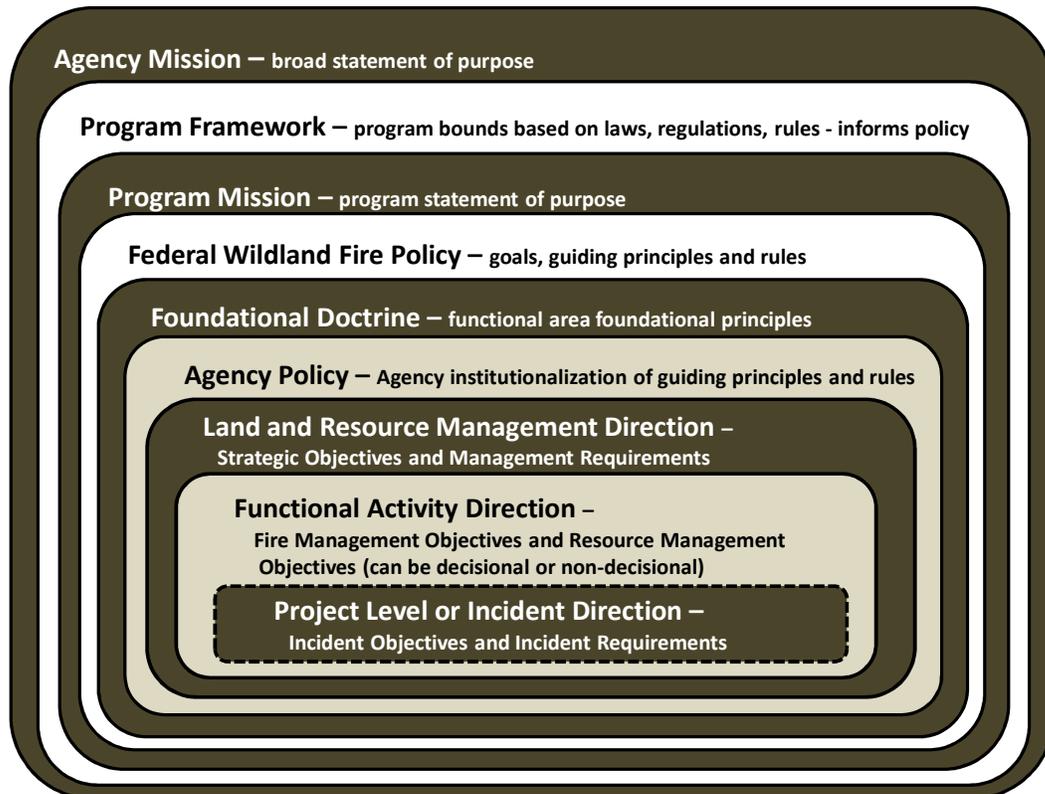


Figure 1. Policy and process framework for wildland fire management.

Explanation of this chart shows that the coarsest scale begins at the outer levels with the Agency Mission. This is where broad direction takes place which forms the basis for establishment of a work area. As the levels progress toward the Project or Incident Direction, precision and detail increase, and scale becomes finer. At this point, direction is focused on a site-specific incident and manager discretionary capability exists at this level (denoted by dashed line). Table 2 provides an explanation of each of these policy and guidance framework elements, and their relevance to wildland fire management.

Table 2. Policy and process framework elements influencing wildland fire management.

Policy Element	Source Reference	Applicability to Wildland Fire Management
Agency Mission	USDA Forest Service. 2007. <i>USDA Forest Service Strategic Plan, FY 2007 - 2012</i> . FS-880. USDA Forest Service, Washington, D.C. July.	Sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations.
Program Framework	<p>The following acts authorize and guide fire management program activities for the protection of National Forest System lands and resources:</p> <ul style="list-style-type: none"> • <u>Organic Administration Act, June 4, 1897 (16 U.S.C. 551).</u> • <u>Bankhead-Jones Farm Tenant Act, July 22, 1937 (7 U.S.C. 1010, 1011).</u> • <u>National Forest Management Act, October 22, 1976 (16 U.S.C. 1600 et seq.).</u> • <u>Granger-Thye Act, April 24, 1950 (16 U.S.C. 572).</u> • <u>Wilderness Act of September 3, 1964 (16 U.S.C. 1131, 1132)</u> 	<ul style="list-style-type: none"> • This act authorizes the Secretary of Agriculture to make provisions for the protection of National Forests against destruction by fire. • This act authorizes and directs the Secretary of Agriculture to develop a program of land conservation and land utilization to "assist in controlling soil erosion, reforestation, preserving natural resources, protecting fish and wildlife,...mitigating floods,...protecting the watersheds of navigable streams, and protecting the public lands..." • This act directs the Secretary of Agriculture to specify guidelines for land management plans to ensure protection of forest resources. Regulations at Title 36, Part 19 of the Code of Federal Regulations (36 CFR 219.27) specify that, consistent with the relative resource values involved, management prescriptions in forest plans must minimize serious or long-lasting hazards from wildfire. • This act authorizes expenditure of United State Department of Agriculture (USDA) and Forest Service funds to erect buildings, lookout towers, and other federal structures on land owned by states. It provides for the procurement and operation of aerial facilities and services for the protection and management of the national forests and other lands administered by the Forest Service. • Authorizes the Secretary of Agriculture to take such measures as may be necessary in the control of fire within designated wilderness.

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- National Forest Management Act of October 22, 1976 (16 U.S.C. 1600 et seq.)
 - Directs the Secretary of Agriculture to specify guidelines for land management plans to ensure protection of Forest resources. Implementing regulations at Title 36, Part 219 of the Code of Federal Regulations (36 CFR 219.27) specify that consistent with the relative resource values involved, management prescriptions in forest plans must minimize serious or long-lasting hazards from wildfire.

Program Mission

- USDA Forest Service. 2007. *USDA Forest Service Strategic Plan, FY 2007 - 2012*. FS-880. USDA Forest Service, Washington, D.C. July.

(Management Principles: Sustaining the Nation's Natural Resources, page 3)
- "To achieve sustainability—the capacity of forests and grasslands to maintain their health, productivity, diversity, and overall integrity—the agency will integrate environmental, social, and economic issues and values into its management decisions and actions while accounting for future as well as present needs.

We will continue our commitment to reducing threats to the Nation's forests and grasslands. These threats include (1) the risk of loss from catastrophic wildland fire caused by hazardous fuel buildup; (2) the introduction and spread of invasive species; (3) the loss of open space and resulting fragmentation of forests and grasslands that impairs ecosystem function; and (4) unmanaged recreation, particularly the unmanaged use of off-highway vehicles."
- NWCG 2009. *Quadrennial Fire Review (2009). Final Report*. <http://www.nifc.gov/PUBLICATIONS/OFR/OFR2009Final.pdf> National Wildfire Coordinating Group, National Interagency Fire Center. Boise, ID. 62 p.
- "The challenge of greater fire, larger fires, and longer fire seasons occurring irregularly within and across regions – asymmetric fire – will demand greater flexibility and more agile capabilities within fire management. Going forward will require revising overall fire suppression management strategy – moving beyond appropriate management response to Strategic Management Response (SMR). SMR is not a new fire management acronym, much less doctrine. Rather it should be viewed as a framework involving a multi-phased approach for addressing incident management. The phases include preparedness, response, strategic plans for fire on the landscape and a continual revision process."

Appropriate management response is often referred to as common sense fire management, but what may seem like common sense to one set of decision makers can easily run afoul of other stakeholders and decision makers with different missions, competing objectives,

and conflicting perspectives on situation information.”

- DOI-USDA. (2011). *A national cohesive wildland fire management strategy*. U.S. Department of the Interior, U.S. Department of Agriculture, Washington, D.C., USA.
- Addressing wildfire is not simply a fire management, fire operations, or wildland-urban interface problem — it is a larger, more complex land management and societal issue. The vision for the next century is to:
 - *Safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.*
- Three primary factors have been identified as presenting the greatest challenges and the greatest opportunities for making a positive difference in addressing the wildland fire problems to achieve this vision. They are:
 - *Restoring and maintaining resilient landscapes.* The strategy must recognize the current lack of ecosystem health and variability of this issue from geographic area to geographic area. Because landscape conditions and needs vary depending on local climate and fuel conditions, among other elements, the strategy will address landscapes on a regional and sub-regional scale.
 - *Creating fire-adapted communities.* The strategy will offer options and opportunities to engage communities and work with them to become more resistant to wildfire threats.
 - *Responding to Wildfires.* This element considers the full spectrum of fire management activities and recognizes the differences in missions among local, state, tribal and Federal agencies. The strategy offers collaboratively developed methodologies to move forward.

Federal Wildland Fire Management Policy

An inter-departmental set of guiding principles and rules that have been agreed upon by multiple governmental departments. Policy is the structure and procedures used to shape doctrinal principles. For detailed information on the policy, refer to the following document.

USDA-USDI. 2009. *Guidance for Implementation of Federal Wildland Fire Management Policy* (February

Provides guiding principles, policy statements, and guidance for implementation from the *Review and Update of the 1995 Federal Wildland Fire Management Policy (January 2001)*. These remain the foundational principles for Federal Wildland Fire Management Policy. Each of the departments or agencies as signatories to the policy document have adopted the *Guidance for Implementation of Federal Wildland Fire Management Policy* and used this as the basis for review and revision, as appropriate, of all manuals, handbooks, guidebooks, plans, agreements and other pertinent documents. Key guidance statements include:

2009),
http://www.nifc.gov/policies/policies_documents/GIFW_FMP.pdf U.S. Department of Agriculture, U.S. Department of Interior, Boise, ID

- Wildland fire management agencies will use common standards for all aspects of their fire management programs to facilitate effective collaboration among cooperating agencies.
- Agencies and bureaus will review, update, and develop agreements that clarify the jurisdictional inter-relationships and define the roles and responsibilities among local, state, tribal and federal fire protection entities.
- Responses to wildland fire will be coordinated across levels of government regardless of the jurisdiction at the ignition source.
- Fire management planning will be intergovernmental in scope and developed on a landscape scale.
- Wildland fire is a general term describing any non-structure fire that occurs in the wildland. Wildland fires are categorized into two distinct types:
 - Wildfires – Unplanned ignitions or prescribed fires that are declared wildfires
 - Prescribed Fires - Planned ignitions.
- A wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography; varying social understanding and tolerance; and involvement of other governmental jurisdictions having different missions and objectives.
- Management response to a wildland fire on federal land is based on objectives established in the applicable Land/ Resource Management Plan and/or the Fire Management Plan.
- Initial action on human-caused wildfire will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety.
- Managers will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions.

Foundational Doctrine

Doctrine provides broad guiding principles, not rules, and informs policy. Doctrine is the body of principles that set the moral or ethical standard, and forms the foundation of judgment, mode of action, decision, and

Provides a collection of principles and beliefs that form the foundational doctrine for fire suppression in the Forest Service. These principles and beliefs operate at multiple organizational levels, including agency-wide, the Fire and Aviation program, and the fire suppression functional area. While

behavior. It is authoritative but flexible, definitive enough guide specific operation, yet adaptable enough to address diverse and varied situations. Foundational Doctrine establishes a set of doctrinal principles which represent the reality of the agency work, the environment, and the mission. It is designed to describe the overarching guiding principles for each functional area.

USDA Forest Service. 2005. *Fire Suppression: Foundational Doctrine*. USDA Forest Service, Washington, D.C.

more specific to firefighting activities, this doctrine also presents some mission statements highly relevant to the Pagami Creek activities:

- Fire management is central to meeting the Forest Service mission – conserving natural resources, restoring ecological health, and protecting communities.
- The intent of wildfire suppression is to protect human life, property, and at risk lands and resources.

Agency Policy

Agency Policy is where the Federal Policy is explained by each agency, institutionalized through agency manuals, and where the program structure is defined. The following manual chapter and directives guide wildland fire management policy:

- USDA Forest Service. 2007. *Forest Service Manual 2300 – Recreation, Wilderness, and Related Resource Management. Chapter 2320 – Wilderness Management*. USDA Forest Service, Washington, D.C.
- Defines authority, objectives, and policy for management of fire in wilderness including:
 - Permit lightning caused fires to play, as nearly as possible, their natural ecological role within wilderness.
 - Reduce, to an acceptable level, the risks and consequences of wildfire within wilderness or escaping from wilderness.
- States the policy as:
 - Two types of prescribed fires may be approved for use within wilderness: those ignited by lightning and allowed to burn under prescribed conditions and those ignited by qualified Forest Service officers.
 - Fire ignited by lightning may be permitted to burn if prescribed in an approved plan.
- USDA Forest Service. 2005. *Forest Service Manual 5100 - Fire Management*. USDA Forest Service, Washington, D.C.
- Defines authority, objectives, and policy for management of fire including:
 - Forest Service fire management activities shall always put human life as the single, overriding priority,
 - Forest Service fire management activities should result in safe, cost-

- effective fire management programs that protect, maintain, and enhance National Forest System lands, adjacent lands, and lands protected by the Forest Service under cooperative agreement
- States Federal Wildland Fire Management Policy, 17 management policy areas and operational clarification of policy.

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- USDA Forest Service. 2011a. *Forest Service Manual 5100 - Fire Management. Chapter 5130 – Wildland Fire Suppression.* USDA Forest Service, Washington, D.C.
 - Defines authority, objectives, and policy for suppression of wildfires.
 - USDA Forest Service. 2008. *Forest Service Manual 5100 - Fire Management. Chapter 5140 – Fire Use.* U.S. Forest Service, Washington, D.C.
 - Defines authority, objectives, and policy direction on using fire to achieve land and resource management desired conditions, including, but not limited to:
 - To use fire from planned or unplanned ignitions in a safe, carefully planned, and cost-effective manner to benefit, protect, maintain, and enhance National Forest System resources.
 - To use wildland fire to protect, maintain, and enhance resources and, as nearly as possible, allow wildland fire to function in its natural, ecological role.
 - USDA Forest Service. 2011b. *Interim guidance for wildfire response.* USDA Forest Service, Washington, D.C.
 - Provides additional guidance for 2011 fire season, including:
 - All wildfires will have a protection objective. Incorporate the potential for threat to life and property in initial and subsequent courses of action on every fire.
 - A wildfire may be concurrently managed for more than one objective.
 - Unplanned natural ignitions may be managed to achieve Land and Resource Management Plan objectives when risk is within acceptable limits. Risk is elevated and uncertain on longer duration incidents.
-

Land and Resource Management Direction

Land and Resource Management Direction provides strategic objectives and management requirements for a specific unit relevant at that local area level only. This direction is derived directly from the Unit Land and Resource Management Plan and is decisional in nature.

Superior National Forest. 2004. *Land and Resource Management Plan. BWCAW Management Direction*. 40 p. US Forest Service, Superior National Forest. Duluth, MN.

The Superior NF Forest Plan guides all natural resource management activities for the Superior National Forest. It describes desired resource conditions, resource management practices, levels of resource production and management, and the availability of suitable land for resource management. (Forest plans are also referred to as 'land and resource management plans'.) The purpose of the Forest Plan is to provide management direction to ensure that ecosystems are capable of providing a sustainable flow of beneficial goods and services to the public.

A set of fundamental principles guides management on the Superior National Forest. Direction in the Forest Plan adds to and qualifies these basic principles.

- **Principle 1:** The Forest Service will follow laws and regulations as well as policies in Forest Service Manuals and Handbooks that relate to managing National Forest System land. In addition, numerous treaties and trust responsibilities, laws, regulations, and policies govern the use and protection of forest resources that may be of Tribal interest or covered under Tribal reserved rights. The Plan is designed to supplement, not replace, direction from these sources.
- **Principle 2:** The Forest Service will coordinate management activities with the appropriate local, State, or Tribal governments as well as with other federal agencies.
- **Principle 3:** The Forest Service will actively consult with Tribal governments and collaborate with interested organizations, groups, and individuals.
- **Principle 4:** The Forest Service will manage the Superior National Forest for multiple uses. The Superior National Forest is open for any legal public activity or management action, unless specially restricted in law, policy, or the Forest Plan. While allowed, such activities and actions may require administrative review and authorization before they are implemented.

Fire Management

- **Role in Ecosystem Management.** Since fire is an important factor in the Wilderness ecosystem and can reduce fuels buildup, lightning fires will be allowed to play a more natural role. The *BWCAW Fire Management Plan* lists specific objectives, standards, and conditions for application of prescribed fire.

The Forest Service will analyze and assess planned ignitions in the Wilderness.

- **Suppression.** Suppression activities in the BWCAW will be implemented in a manner that minimizes impacts. Of primary importance is to impart a "light hand on the land" policy (choosing methods and equipment which least alter the landscape or the wilderness resource).

The objective is to protect the integrity of the Wilderness without

relaxing safety standards.

Use of heavy equipment is generally unsuitable but may be used with Regional Forester's approval. If heavy equipment is used, rehabilitation of the affected area will be completed.

When deemed necessary by the Incident Commander, following existing preset management guidelines and/or Delegation of Authority, chemical retardants (including foam) may be used during fire emergencies. Both ground and aerial application of retardants is permitted when high to extreme fire danger indices exist. Fire danger thresholds and retardant (foam) use guidelines are pre-approved by the Forest Supervisor and documented in the Forest Fire Management Plan within the BWCAW matrix.

The Forest Supervisor must approve use of fire line explosives.

Fires that do not meet prescribed fire criteria will be suppressed.

During fire suppression, earth-disturbing activities, such as fire line construction, will not occur on known heritage resource sites or within 66 feet of the established boundary of a known heritage resource site; alternate methods such as water should be used.

Functional Activity Direction

Functional Activity Direction is found in Functional Activity Plans. These plans provide site specific direction for management of functional activities, such as fire management and resource management, etc. These plans direct implementation activities for these functional areas and provide non-decisional information. The applicable plan for the Superior NF is the Fire Management Plan.

Superior National Forest. 2011. *Fire Management Plan*. US Forest Service, Superior National Forest. Duluth, MN.

Provide fire management goals, objectives, standards, and guidelines. Fire management plan objectives include:

- Develop a fire management plans for all areas subject to wildland fire in compliance with Forest Service Manuals.
- Document fire management direction based on land and resource management plan direction and applicable policy documents.
- Present accurate, current fire management objectives, strategies and resource considerations in a consistent format for a full breadth of fire management program activities, including, but not limited to, organizations, facilities, equipment, pre-suppression, wildland fire response, timing, locations, activities, budget, fuels management, and wildland fire situation.

Incident Level Direction

- Superior National Forest. 2011. *Fire Management Plan*. US Forest Service, Superior National Forest. Duluth, MN.
 - USDA Forest Service. 2011b. *Interim guidance for wildfire response*. USDA Forest Service, Washington, D.C.
 - Provides guidance for using the Wildland Fire Decision Support System (WFDSS) to evaluate and document wildland fire management decisions.
 - Provides additional guidance for 2011 fire season, including:
 - All wildfires will have a protection objective. Incorporate the potential for threat to life and property in initial and subsequent courses of action on every fire.
 - A wildfire may be concurrently managed for more than one objective.
 - Unplanned natural ignitions may be managed to achieve Land and Resource Management Plan objectives when risk is within acceptable limits. Risk is elevated and uncertain on longer duration incidents.
 - WFDSS will be used for decision support documentation. All wildfires must be reported in WFDSS, including fires which come onto agency lands that have not been previously entered into the system. WFDSS involves a process of fire documentation and analysis for the agency administrator to describe the basic fire situation, create incident objectives and requirements, develop a course of action, validate key dependencies, and evaluate risks. WFDSS allows the display of the fire situation, quantify values at risk, perform fire behavior predictions, and develop management strategies. Combined, these features allow the agency administrator to make informed decisions for management of the incident considering safety, complexity, risk and economics.
 - Periodic assessments throughout the duration of the fire incident will be completed in WFDSS, which evaluate response strategies and other factors for wildfires managed by the agency.
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SYNOPSIS OF PAGAMI CREEK FIRE ACTIVITIES AND CONSISTENCY WITH POLICY

Table 3 describes Superior NF planning activities associated with wildland fire management and specific Pagami Creek Fire actions in terms of their consistency with defined policy and process elements.

Table 3. Pagami Creek Fire actions and consistency with policy and process framework elements.

Policy Element	Consistent with policy and process framework elements	Planning Activities and Specific Pagami Creek Actions
Agency Mission	Yes	Superior NF Forest Plan and Fire Management Plan reflect the agency goals of sustaining health, diversity, and productivity of national forests. The Pagami Creek Fire was managed with multiple objectives including management of a natural ignition for resource benefits and management for protection needs.
Program Framework	Yes	Superior NF Forest Plan and Fire Management Plan are consistent with the applicable laws, regulations, and rules framing the fire management program.
Program Mission	Yes	The Pagami Creek Fire response decision focused on managing wildfire to restore it as a natural process, including reducing threats to at risk ecosystems, to restore and maintain resilient landscapes, and utilized the full spectrum of fire management activities including strategic management response.
Federal Wildland Fire Management Policy	Yes	Superior NF Fire Management Plan specifically describes all guiding principles and policy element from the Federal Wildland Fire Management Policy. The Pagami Creek fire planning and implementation actions were consistent with the nine policy guiding principles and the 17 policy areas of the Federal Wildland Fire Management Policy.
Foundational Doctrine	Yes	Fire suppression doctrine was inherent in all actions; doctrinal principles were followed as the foundation for fire management activities.
Agency Policy	Yes	Superior NF Forest Plan and Fire Management Plan specifically recognize that lightning ignited fires can be managed in the wilderness to play, as nearly as possible, their natural ecological role. The Pagami Creek Fire was ignited by lightning and initially managed to accomplish this objective. Safety was stated as the highest priority. A protection objective was established for the Pagami Creek Fire at its onset as well as a management objective. Appropriate actions were taken to assess risk, base actions on sound risk management, and determine potential harm.

Land and Resource Management Direction	Yes	The Superior NF complies with the requirement to have a Land and Resource Management Plan and has an approved and current Forest Plan. This plan provides strategic objectives and management requirements that guide all fire management activities. The plan states that lightning fires will be allowed to play a more natural role. The Pagami Creek Fire actions were consistent with this direction.
Functional Activity Direction	Yes	<p>The Superior NF complies with this requirement and has an approved and current Fire Management Plan. This plan formally documents the fire management program found in the respective Land and Resource Management Plan (Superior NF Forest Plan) and provides fire management program direction in accordance with federal and agency policy. Operational guidance in the FMP directly follows decisions made in the Forest Plan and translates them into actions and limitations specific to fire management.</p> <p>The FMP is not a decisional document, but an implementation document that provides fine scale information related to the fire management program based on Fire Management Units (FMUs). Three FMUs are defined on the Forest and include: Wilderness, Non-Wilderness, and Non-Wilderness General Forest.</p> <p>For the Wilderness FMU, the FMP describes safety characteristics, the fire environment, potential and historic fire behavior, fire regimes, standards and guidelines, suppression guidelines, and limiting factors to fire management. These were considered and described in the Pagami Creek Fire response decisions.</p>
Incident Level Direction	Yes	<p>The Pagami Creek Fires was managed in accordance with incident level direction from the 2011 Interim Guidance for Wildfire Response and the FMP.</p> <ul style="list-style-type: none"> • WFDSS was utilized to document decisions, access decision support tools and acquire analyses, and develop long-term implementation actions. • Fourteen different decisions were published in WFDSS from August 20 to October 24, 2011. During this time, the fire ranged in relative risk between moderate and high and the organizational needs ranged from a T3, local organization to a national T1 Incident Management Team. • All Line Officers were actively engaged in this fire with the Forest Supervisor, Deputy Forest Supervisor, and three District Rangers involved in preparing and publishing decisions. • Decisions clearly reflected matching the response decisions to the complexity of the fire and on-the-ground actions both escalated and lessened in response to changing conditions. • Periodic Assessments were completed to document if the latest decision remained valid or needed revised. • The fire was concurrently managed for more than one objective. • Even though the fire was managed as a natural ignition for resource benefits, it also had a protection objective. • Risk was evaluated and determined to be within acceptable limits, although a rare event occurred and resulted in dramatic fire spread during the course of the fire.

SUMMARY

The Superior NF planning and preparation for wildland fire management appear consistent with all levels of policy and process direction. The Pagami Creek Fire was implemented under management decisions and actions that are both responsive and in accordance with the Federal Wildland Fire Management Policy, Agency Policy, Fire Management Program Mission, the Forest Plan, Fire Management Plan, and Incident Direction. The Wildland Fire Decision Support System was utilized throughout the management of the fire and available analysis tools were used to complete analyses in support of decision making. Specific areas of note include:

Land and Resource Management Plan: The Superior NF Forest Plan describes land use decisions and provides strategic objectives and management requirements for fire management across the Forest and, specifically, the Wilderness. Strategic objectives are broad statements, specified in land and resource management plans that identify changes in water, soil, air, or vegetation from the present to proposed conditions. They can also describe an existing resource condition that should be maintained. Objectives deal with large areas over long time periods and project intended outcomes of management activities that contribute to the maintenance or achievement of desired conditions. Associated with strategic objectives are management requirements. These are statements contained in land and resource management plans and may be stated as standards and guidelines. They represent recommended technical and scientific specifications for management activities and/or potential actions to help achieve objectives. They provide the foundation, framework, and limitations/challenges for potential management activities. They are important in that they help managers frame constraints and limitation to management actions.

Both strategic objectives and management requirements are critical elements in developing management response decisions and their importance is referenced in the Federal Wildland Fire management Policy as, "*Fire Management Plans, programs, and activities support land and resource management plans and their implementation.*" All Pagami Creek Fire management response decisions were considered and were linked to the Superior NF Land and Resource Management Plan strategic objectives and management requirements. This information is included in WFDSS documentation.

Fire Management Plan: The Superior NF has a completed Fire Management Plan that was updated in 2011. The Superior FMP specifically addresses the policy implementation statements (USDA-USDI 2009) of:

- *Every area with burnable vegetation must have an approved Fire Management Plan. Fire Management Plans are strategic plans that define a program to manage wildland fires based on the area's approved land management plan. Fire Management Plans must provide for firefighter and public safety; include fire management strategies, tactics, and alternatives; address values to be protected and public health issues; and be consistent with resource management objectives, activities of the area, and environmental laws and regulations.*
- *Management response to a wildland fire on federal land is based on objectives established in the applicable Land/ Resource Management Plan and/or the Fire Management Plan.*
- *Fire Management Plans, programs, and activities support land and resource management plans and their implementation.*
- *Fire Management Plans and activities are based upon the best available science.*

Incident Level Planning and Implementation: Incident level decision and actions on the Pagami Creek Fire were documented in WFDSS. These activities accomplished goals of decision documentation, decision support analysis use, and long-term implementation planning and documentation. Included in WFDSS are sections describing fire information, situational assessment, objectives, course of action, validation, decisions, periodic assessments, and reports.

These WFDSS sections cover:

- **Incident Information.** This is where a fire start is documented. Location, size, date, and responsible agency are documented here for administrative fire reporting purposes.
- **Situation Assessment.** Maps, reference data layers, and applicable assessments are collected here for use by decision makers. Values, fire potential, and hazards help develop a relative risk for the incident. If fire complexity is high or escalates, managers can move from a relative risk assessment to a very quantitative risk assessment process and obtain a more complete overview of the fire situation to better focus decisions.
- **Objectives.** This area automatically populates pre-loaded, spatially relevant, fire management objectives from land, resource, and fire management plans to help managers develop and refine specific incident objectives. Includes descriptions of strategic objectives, management requirements, incident objectives, and incident requirements. Incident objectives provide site specific guidance and direction necessary for the selection of appropriate strategy(s) and the tactical direction of resources on an incident. Incident requirements are developed by the local unit and provide specific technical and scientific specifications for incident management activities and frame the range of tactical options available for a site-specific area and defined time period.
- **Course of Action.** Managers define operational actions here to meet specific incident objectives. These actions can be short or long-term, depending on the fire situation. Actual locations of planned operational tactical actions and contingency actions can be established using the geospatial data and maps. Also, costs, operational resources, and an organization necessary to manage the fire are described here.
- **Validation.** This allows managers to review the Situation Assessment, Incident Objectives, and Course of Action and confirm that the objectives and actions are achievable and comply with land management guidance. If managers are unable to confirm this, the COA Validation page directs them to the development of a new course of action.
- **Decision.** Managers document the decision, rationale for it, stipulate a timeframe for reassessing the decision, and approve the decision with an electronic signature.
- **Periodic Assessment.** This component provides a process for a recurring review of the current decision to evaluate effectiveness of selected strategies and tactics, and, if warranted, initiate a new decision.

Pagami Creek incident level planning and implementation actions are consistent with direction provided in the following directives:

- Federal Wildland Fire Management Policy Implementation Guidance (USDA-USDI 2009):
 - *A wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography; varying social understanding and tolerance; and involvement of other governmental jurisdictions having different missions and objectives. The Pagami Creek Fire was managed for multiple objectives concurrently.*
 - *Management response to a wildland fire on federal land is based on objectives established in the applicable Land/ Resource Management Plan and/or the Fire Management Plan*
 - *Managers will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions.*
 - *Firefighter and public safety is the first priority in every fire management activity.*
 - *The role of wildland fire as an essential ecological process and natural change agent will be incorporated into the planning process.*
 - *Fire Management Plans, programs, and activities support land and resource management plans and their implementation.*
 - *Sound risk management is a foundation for all fire management activities.*
 - *Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives.*
 - *Fire Management Plans and activities are based upon the best available science.*
 - *Fire Management and Ecosystem Sustainability – The full range of fire management activities will be used to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social components.*
 - *Use of Wildland Fire – Wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role. Use of fire will be based on approved Fire Management Plans and will follow specific prescriptions contained in operational plans.*

- Interim Guidance for Wildfire Response (USDA Forest Service 2011a):
 - *All wildfires will have a protection objective. Incorporate the potential for threat to life and property in initial and subsequent courses of action on every fire.*
 - *A wildfire may be concurrently managed for more than one objective.*
 - *Unplanned natural ignitions may be managed to achieve Land and Resource Management Plan objectives when risk is within acceptable limits. Risk is elevated and uncertain on longer duration incidents.*
 - *Agency Administrators must approve a decision analysis (and subsequent courses of action) and issue delegations of authority to the incident commander.*
 - *Make risk assessments of potential undesirable outcomes;*
 - *Develop suppression strategies for protection of life and property from low probability/high consequence events;*
 - *Complete up-to-date decision analyses and document using the Wildland Fire Decision Support System (WFDSS);*
 - *Identify hazards and risk assessments to inform decisions;*
 - *Determine resource capacity and availability to meet realistic expectations;*
 - *Manage smoke impacts to maintain social support for using wildfire to meet resource objectives*
 - *On all wildfires, but especially on long duration wildfires, develop specific protection objectives and suppression strategies to keep the fire from crossing property lines where it is unwanted.*
 - *Periodic assessments throughout the duration of the fire incident will be completed in WFDSS, which evaluate response strategies and other factors for wildfires managed by the agency.*

Risk assessment activities: Decision analysis tools found in WFDSS were used on the Pagami Creek Fire to assess risk and support managers’ decisions. Available tools (adapted from Noonan-Wright et al., 2011) are listed in Table 4.

Table 4. Decision analysis tools included in WFDSS; informational area, available models or information source, and use.

Informational Area	Model or source	Use
Fire weather	Tabular data from Weather Information Management System (WIMS) using hourly data from Remote Automated Weather Stations (RAWS)	Fire danger products, weather data for fire behavior analyses, and data for air quality analyses. In WFDSS, National Weather Service fire weather forecasts from applicable fire weather forecast zones are available.
Fire danger	National Fire Danger Rating System (NFDRS)	Fire danger trend information that provide managers indications of relative fire danger and provide input to relative risk assessments. In WFDSS, Energy Release Component (ERC) graphs for closest Remote Automated Weather Station.
Fire behavior. Project fire size probabilities, forecast fire progression, predict fire behavior characteristics such as rate of spread, crown or surface fire occurrence, and fire intensity, and spotting distances from torching trees	Basic Fire Behavior	Basic fire behavior characteristics of the flaming front (spread rate and flame length) for short term situations - up to one week
	Short Term Fire Behavior	Simulates fire growth for a particular ignition source and forecasted weather using the Minimum Travel Time method (Finney 2002).
	Near Term Fire Behavior	Fire growth simulation up to 7 days using hourly forecasted weather (Finney 1998).
	Long Term Fire Behavior	Address fire growth beyond time-frames of reliable weather forecasts as probabilities because they are obtained from ensemble fire growth simulations (Finney et al., 2011). The Fire Spread Probability simulator (FSPro) is used to produce these probabilities in WFDSS.

- Many of these tools were used during the Pagami Creek Fire. Fire Weather Forecasts and National Fire Danger Rating ERC charts were obtained, and three of the fire behavior tools were

extensively utilized: three Short Term Fire Behavior (STFB) analyses were completed on 9/12/2011; 32 Near Term Fire Behavior (NTFB) analyses were completed between 8/30 and 9/1/2011; and 15 FSPRO analyses were completed between 8/30 and 9/11/2011.

Evaluation, Reviews, and Lessons Learned: The Forest Service endorses the position that it is a learning organization. The basic doctrinal approach requests Agency Administrators to ask "what must I learn because of this event?" and "what must I do because of this event?" In deciding the appropriate type of incident review, Agency Administrators should consider opportunities for learning to prevent a recurrence and/or address Congressional and media interest, scope of public interest (local or national), and limit agency liability. To address the multiple objectives of the Forest Service, Agency Administrators can consider supporting multiple coordinated (even concurrent) reviews. Follow-up actions on the Pagami Creek Fire are consistent with this direction. The Superior NF Forest Supervisor elected to convene multiple reviews to evaluate specific situations and outcomes on this fire.

In terms of consistency with national policy and procedures, the Pagami Creek Fire actions were consistent and remained so during the duration of the fire. As a result, there are few lessons to learn for the Superior NF but the Pagami Creek Fire and its planning and implementation actions should be useful to other Forest Service units as an example of how to plan and implement wildfire management consistent with agency policy and direction.

Key Points:

- Given the amount of historic weather data available, the analyses completed for the Pagami Creek Fire were valuable and supported decisions.
- A rare spread event occurred that was a result of a combination of conditions that rarely occur and therefore, did not provide information of sufficient weight to affect fire spread probability simulations and fire behavior predictions. These circumstances also did not represent precedents previously experienced and observed. The responses to this significant fire spread event were within policy and process directives stated in this report.
- Policy documents were followed and important points include the following statements from policy directives and Pagami Creek Fire actions:
 - hazards and risk will be used to inform decisions – *Pagami Creek Fire managers utilized available risk assessment tools and hazard identification processes in WFDSS;*
 - circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected dictate the appropriate management response to the fire - *Pagami Creek Fire managers conducted situational assessment and continually maintained awareness of circumstances under which the fire was burning;*
 - wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role. Use planned and unplanned ignitions to achieve land and resource management goals. Fire management is one tool in the restoration process and should be integrated with other land management activities - *Pagami Creek Fire managers utilized a naturally ignited wildfire in its natural ecological role consistent with Forest Service Manuals 2320 and 5140;*
 - a wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography; varying social understanding and tolerance; and involvement of other governmental jurisdictions having different missions and objectives - *Pagami Creek Fire managers utilized multiple objectives during the course of this fire and shifted emphasis between managing for resource benefits and protection as conditions changed;*
 - managers will use a decision support process to guide and document wildfire management decisions - *Pagami Creek Fire managers made decisions as conditions*

warranted, that is, as conditions changed and a decision was no longer valid, a new decision was completed. All decisions were documented in WFDSS and supported through use of its available tools. The decision process practiced during the Pagami Creek Fire clearly followed and illustrated how to match decisions, decision analysis, and response to changing fire complexity and conditions.

- Some areas in WFDSS can serve as lessons learned and, while meeting the needs of this fire, could be improved in the future:
 - Incident Objectives and Incident Requirements can be stated in clearer terms and requirements should be separated from objectives.
 - Management Action Points could include more detailed descriptions of actions to be taken.
 - Contingency planning that augments Management Action Points can be completed. If MAPs have sufficient detail, there is little need for additional contingency action statements.

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Professional experience: assignments with multiple federal land management agencies, including the Bureau of Land Management, National Park Service, and US Forest Service. Permanent positions include: Forester, Fire Control Officer, Fire Management Officer, State Fire Management Planning Specialist, Regional Fire Management Officer, Fire Technology Specialist, Fire Science and Ecology Program Leader, Regional Director of Fire and Aviation Management, and Wildland Fire Management RD&A Program Manager. Assignments include experience at all administrative levels (field, state, regional, station, and national offices) and service in management operations and research and development.

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Training experience: actively involved in training and served as instructor, unit leader, steering committee member, and steering committee chair of local, regional, and national training courses; has conducted training in the United States, China, Canada, and India, and presented papers, either in person or virtually, at conferences in the United States, Canada, Italy, South Africa, and Cyprus.

Incident management experience: over 30 years of involvement in incident management team operations including service as an Incident Commander and Area Commander on wildland fire incidents, prescribed natural fire, wildland fire use events, and all hazard emergency responses.

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