National Park Service



MISSISSIPPI NATIONAL RIVER AND RECREATION AREA



FIRE MANAGEMENT PLAN

Mississippi National River and Recreation Area Fire Management Plan

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1.0 INTRODUCTION, LAND MANAGEMENT PLANNING, and COMMUNICATION

This Fire Management Plan (FMP) for the Mississippi National River and Recreation Area (Mississippi NRRA) aims to set long-term goals and standards regarding human safety, ecosystem management, and management partnerships relating to the use of prescribed fire and the suppression of wildland fire across the Park. Due to the proximity of NPS holdings to land maintained by several other agencies, cooperation will be essential for successfully achieving safety and fire management goals. The Mississippi NRRA will use this plan for prescribed burns on the Coldwater Spring property. These burns will be used for site restoration and maintenance purposes on the restored prairie, savanna, and forest. Throughout the rest of the Mississippi NRRA corridor, other federal, state and local fire management agencies will be responsible for fire related activities on their lands (see Appendix R, Figure R-1 for Mississippi NRRA land ownership). The Mississippi NRRA does not have the capabilities to respond to fires on non-NPS owned lands.

As it stands, the plan will satisfy policy requirements for National Parks in the U.S. according to Director's Order 18 (DO18), which states that:

"As an important part of fulfilling its mission, the National Park Service manages wildland fire to protect the public; park communities and infrastructure; conserve natural and cultural resources; and maintain and restore natural ecosystems and processes. The risks and expenses associated with planning and implementing fire management activities require exceptional skill and attention to detail. The highest priority under all circumstances is firefighter and public safety. All plans, project implementation, and responses to wildland fire must demonstrate this commitment."

DO18 continues, stating:

"Each park with burnable vegetation must have an approved Fire Management Plan 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. Parks lacking an approved Fire Management Plan may not use resource benefits as a primary consideration influencing the selection of a suppression strategy, but they must consider the resource impacts of suppression alternatives in their decisions."

According to the Natural Resource Condition Assessment (Kraft et al. 2014), the distribution of vegetation types at Mississippi NRRA are outside of their natural historic ranges, and the Park is at high risk for invasion by noxious exotic species. Eradication efforts in several areas are underway, but without a systematic approach to both controlling the invasive species and surveying their spread, it is unknown what effects efforts to control are having. At Mississippi NRRA, controlling the invasive plant species will require the use of prescribed fire, in addition to mechanical and chemical resources.

The Mississippi NRRA Fire Management Plan is a strategic plan that defines a program of work to manage wildland fire, (includes prescribed fire and wildfire), and non-fire fuel treatments, and

is based on direction contained in existing park unit planning documents. This Mississippi NRRA Fire Management Plan provides for firefighter and public safety, and includes strategies for managing wildland fire. The Mississippi NRRA Fire Management Plan addresses values to be protected and is consistent with Mississippi NRRA resource management objectives and environmental laws and regulations such as the National Environmental Policy Act, the National and State Historic Preservation Acts, the Clean Air Act, etc.

"Park units with vegetation capable of burning will prepare a fire management plan that is consistent with federal law and departmental fire management policies, and that includes addressing the need for adequate funding and staffing to support the planned fire management program." (Section 4.5, NPS Management Policies, 2006)

1.1 Program Organization

Great Lakes Zone

The following organizational chart is subject to change, depending on funding and the availability of individuals to fill positions (Table 1).



Table 1: Hierachy of Fire Program Administrators

1) Park Superintendent: Agency Administrator

This position is responsible for providing oversight to all fire management activities at Mississippi NRRA, including compliance with various agencies.

- Take necessary and prudent actions to ensure firefighter and public safety.
- Ensure the Fire Management Officer (FMO) is fully qualified as identified in the *Interagency Fire Program Management Qualification Standards*.
- Annually provide a written DOA to individuals to include but not limited to the Fire Management Officer responsible for wildland fire management activities (Currently VOYA).
- Ensure applicable park resource management objectives are included in Fire Management Plan (FMP). Ensure FMP is annually reviewed and valid.
- Ensure protection and fire use standards and constraints are in compliance with agency fire policies.
- Ensure use of fire funds is in compliance with Department and Agency policies.
- Ensure fire and fire aviation preparedness reviews are conducted each year.
- Ensure a Regionally approved burn plan is followed for each prescribed fire project, including technical review and Go/NoGo checklists, follow-up monitoring, and documentation to ensure management objectives are met.
- Ensure post-fire reviews are conducted on all fires that escape initial attack or are managed as long term incidents.
- Provide incident management objectives, written Delegations of Authority, and Agency Administrator briefings to Incident Management Teams.
- Attend appropriate level of *Fire Management Leadership Course*. (M581)
- Ensure appropriate investigations are conducted for incidents, entrapments, and serious accidents.
- For all unplanned human-caused fires where liability can be determined, ensure actions are initiated to recover cost of suppression activities, land rehabilitation, and damages to the resource and improvements.
- Ensure compliance with National and Regional Office policy and direction for prescribed fire activities and ensure that periodic reviews and inspections of the prescribed fire program are completed.
- Reference Chapter 3 of Interagency Standards for Fire and Fire Aviation Operations (Red Book) for full list of responsibilities.
- 2) Chief of Resource Management
 - Assures preparedness reviews and annual updates of agreements are complete.
 - Reviews all obligations made or proposed for emergency preparedness.
 - Ensures through coordination with Zone FMO that Division personnel comply with appropriate level fitness standards for their fire position and timely certification.
 - Briefs the Superintendent on current fire management activity.
 - Ensures the fire management program is an integral part of the resource management program. Collaborates with other Division Chiefs within the park to include their personnel in the fire program.
 - May serve as Resource Advisor during wildland fire suppression operations, as assigned.

- Provides input concerning threatened and/or endangered species.
- Provides oversight for prescribed fire planning activities.
- Recommends and reviews prescribed fire and hazard fuel reduction projects.
- Reviews fire management plans and other planning documents, as appropriate.
- Supports the fire management program with staff as appropriate.
- Coordinates with Zone FMP as appropriate.
- 3) Great Lakes Zone Fire Management Office
 - The FMO is directly supervised by the Chief of Resource Management and is overseen by the Regional Fire Management Officer in Omaha, NE.
 - Ensures that a comprehensive fire management program for is adequately planned and implemented and that the Fire Management Plan is reviewed annually and revised as necessary.
 - Ensures the proper preparation and approval of individual hazard fuel reduction and prescribed fire plans.
 - Consults with Chief of Resource Management and Superintendent on any fire-related research proposals or recommendations.
 - Responsible for development of rehabilitation programs resulting from wildfires
 - Maintains a public awareness program for all aspects of fire management, and ensures that positive relationships are maintained with cooperators, other agencies and adjacent landowners.
 - Ensures cooperative fire agreements with adjacent federal, state and local agencies and municipalities are in place and assists as needed.
 - Coordinates with the Midwest Regional Fire/Aviation Manager and staff.
 - Ensures an adequate, effective fire prevention program is implemented.
 - Maintain safety first as the foundation for all aspects of fire and fire aviation management.
 - Ensure work / rest and length of assignment guidelines are adhered to.
 - Ensure that only trained and qualified personnel are assigned to fire and fire aviation duties.
 - Ensure fire and fire aviation policies are understood, followed, and coordinated with other agencies as appropriate.
 - Conduct and participate in fire management related reviews and investigations.
 - Provide for and personally participate in periodic site visits to individual incidents and projects.
 - Utilize the incident complexity analysis to ensure the proper level of management is assigned to all incidents.
 - Ensure a WFDSS is initiated, completed and approved for all wildfires according to policy.
 - Monitor fire season severity predictions, fire behavior, and fire activity levels.
 - Provide fire personnel with adequate guidance and decision making authority to ensure timely decisions.
 - Ensure a written / approved burn plan exists for each prescribed fire project.
 - Ensure fiscal responsibility and accountability in planning and expenditures for prescribed burns

- Ensure compliance with National and Regional policy and direction for prescribed fire activities
- 4) Indiana Dunes National Lake Shore Fire Program Management Assistant
 - Tracks expenditures against fire accounts for prescribed fire operations, suppression actions, mechanical fuel treatment projects, and preparedness activities
 - Reports status of funds/expenditures to the FMO.
 - Ensures Individual Fire Reports (DI-1202) are entered into WFMI within ten days of being declared out.
 - Makes all entries in the Incident Qualification Computer System (IQCS) for the Qualifications System, including training, experience, employee information, and task books; prints red cards
 - Requests accounts be opened, assist in logistical needs as needed.
 - Requests account code from region. Makes notification calls.
 - Maintains a file of paper copies of all DI-1202's
- 5) Fire coordinator Biologist/Land Manager GS-9
 - Coordinates the prescribed fire of Coldwater Spring, and coordinates with the Great Lakes Zone FMO on fire management issues, qualifications, and medical standards.
 - Assists St. Croix National Scenic Riverway with prescribed fire operations when possible. Helps to recruit fire responders from other divisions within the park to assist with Rx Fire program.
 - Negotiates and coordinates Interagency Fire Management Agreements.
- 6) FFT2 Biotech GS-5
 - Maintains fire qualifications and assists with prescribed fire at Coldwater Spring and St. Croix National Scenic Riverway when possible.

Numerous partnerships exist between municipalities and other federal agencies and the Mississippi NRRA. Many city and county governments along the 72 river miles work collaboratively with Mississippi NRRA for activities like invasive species removal, paddling expeditions, and other public activities. The prescribed fire use at Mississippi NRRA involves the Coldwater Spring area. This area includes property owned by the U.S. Veterans Administration, the Minnesota DNR, and the Minnesota Historical Society. Memoranda of Understanding (MOUs) exist or are being developed with these management partners.

Metropolitan Airports Commission (MAC)

Due to concerns with the flight path for Runway 22 at the MSP International Airport, prescribed burns will be coordinated with the Metropolitan Airports Commission (MAC) to work on creating burn plans that mitigate and limit smoke impacts to the runway and incoming and outgoing flights. The MAC provides coordinated aviation services specifically for the MSP International Airport, including the control of runway and flight operations.

Interagency Coordination, Contacts, and Agreements

Mississippi NRRA currently has no coordinated agreements with other agencies. For a full list of contacts that Mississippi NRRA references for fire related subjects and prescribed burns notifications, reference Table 8.

1.2 Environmental Compliance

This plan will comply with the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act (NHPA), Section 7 of the Endangered Species Act (ESA) and other applicable environmental laws and regulations. An Environmental Assessment for this FMP has been prepared in accordance with these policies and procedures. The Environmental Assessment is currently under review. This plan will be updated with the findings of the final environmental review when completed.

Park Unit Resource Management Planning

The Mississippi NRRA, as a National Park, spans approximately 72 river miles (115.9 km) of the Mississippi River as it flows through the Minneapolis-St. Paul metropolitan area. Approximately 65 acres (26.3 ha) of land is owned by Mississippi NRRA, which includes land at Coldwater Spring and nine extant islands (a tenth was lost to flooding in 1997). The River Corridor has a rich historical, natural, and economic history in both the Midwest and throughout the U.S., and, therefore, requires effort to manage for the diverse anthropogenic and ecological conditions in the metro area.

This FMP outlines the actions that Mississippi NRRA must and will take to meet fire management and use goals. After being established in 1988, this park has become increasingly active in the management of river and cultural resources. With the recent acquisition of non-island land that is being restored to native prairie (Coldwater Spring), the application of - and preparedness for - fire across all Park territory is ideal. Lands adjacent to the Park area have either been developed (as with Fort Snelling and the surrounding roadways), or are mixed mesic forests of various types (ash-elm and maple-basswood, for example). For these reasons, as well as logistical issues, fire preparedness actions will be taken for all Park areas, regardless of their historical propensity for fire. Management in the areas surrounding the Park ranges from the maintenance of park-like conditions to areas with no active management. Areas surrounding the Park that are not being actively managed are contributing to the spread of invasive plant and animal species in the area, further necessitating active mechanical and fire-based management on various areas throughout the Park.

The Mississippi NRRA congressionally authorized park boundary encompasses 54,000 acres (figure R-1). The National Park Service (NPS) has full management authority over land at Coldwater Spring and nine islands in the river corridor, totaling approximately 65 acres. The Coldwater Spring Unit is located near the confluence of the Mississippi and Minnesota Rivers (Figure 2) and within Fort Snelling unincorporated area of Hennepin County.

The Coldwater Spring Unit encompasses approximately 83 acres (Figure R-2). The NPS owns approximately 40 acres and has or will have memoranda with the U.S. Veterans Affairs (22 acres) and the Minnesota Historical Society (21 acres) to manage these properties as part of the Coldwater Spring Unit.

The use of prescribed fire at Coldwater Spring Unit will assist managers with the restoration and subsequent preservation of the site, and the use of prescribed fire will be aimed at achieving the objectives of management in the prairie, savanna, and woodland areas outlined in this document. Every park with vegetation capable of sustaining wildland fire will prepare a fire management plan to guide a fire management program responsive to the park's natural and cultural resource objectives and to safety considerations for park visitors, employees, and developed facilities (DO-18, 1998). The Wildland and Prescribed Fire Management Policy (NWCG 1998) directs federal agencies to achieve a balance between suppression to protect life, property, and resources, and fire use to regulate fuel and maintain healthy ecosystems. This plan describes actions necessary to carry out fire management policies and objectives.

Mississippi NRRA was founded along the Mississippi River corridor to serve three main purposes: (1) to protect, preserve and enhance the significant values of the waters and land of the Mississippi River Corridor within the Saint Paul-Minneapolis Metropolitan area; (2) to encourage adequate coordination of all governmental programs affecting the land and water resources of the Mississippi River Corridor; and (3) to provide a management framework to assist the State of Minnesota and its units of local government in the development and implementation of integrated resource management programs for the Mississippi River Corridor in order to assure orderly public and private development in the area consistent with the findings of [the enabling legislation] (Public Law 100-696, 1988). Developing a fire management plan for Mississippi NRRA brings these directives together in a single project.

Several key resources were examined for the entire Mississippi NRRA corridor by the Natural Resources Condition Assessment (NRCA) team (Kraft et al. 2014). Resources examined included forest density and morphology, vegetation characteristics (a comparison of current vegetation to pre-settlement conditions, invasive species presence), and the use of the corridor by bird species. While the presence of several permanent and migratory bird species was determined to be good at the park, the forest cover and vegetative components were determined to be problematic and declining in quality. In the tallgrass prairie and oak savanna areas at Coldwater Spring, the use of fire will help restore upland areas by excluding invasive species and promoting native forbs and trees (like bur oaks). It is possible that more bird species will be attracted to the area, as the prairie composition will be unique to the area. Ecological burn goals at Coldwater Spring are two-fold:

- 1) To encourage native plant and animal species dominance and persistence, while:
- 2) Controlling invasive plant species.

There is not an active Resource Management Plan at Mississippi NRRA – management goals are outlined in the NRCA. Thus, this FMP reflects a standalone document for active land management throughout Mississippi NRRA. An FMP provides a detailed reference and doctrine

for the implementation of fire management policy and objectives. This particular plan will outline how to address wildland fire in instances of wildfire or escape, and how to apply prescribed fire for land management, in safe, efficient ways.

1.3 Collaborative Planning

Mississippi NRRA will not be involved in wildland fire operations outside of the prescribed fire being conducted at Coldwater Spring. Other agencies will be responsible for their own planning efforts as it refers to fire management.

1.4 Communication and Education

A comprehensive communication and education program emphasizes the entire scope of wildland fire management activities, particularly the role of fire in ecosystems. Mississippi NRRA' communication/education plan is based on RM 18, Prevention chapter, and RM 18, Communication and Education chapter. NWCG's Best Practices in Communication Planning was also used as a reference.

Prior to planned ignitions, the Superintendent's office will contact surrounding land managers and businesses, and post signs and distribute fliers to the public, as well as issue a press release. It will be very important to reach dog owners at this time, to ensure that pets do not wander into unsafe areas. Trail closing signs should be placed well in advance, depending on weather.

On the day chosen for actual ignitions, all Mississippi NRRA staff is to be notified, as well as partnering agencies. All trails and roads leading into Coldwater should be closed for pedestrian traffic, for at least two hours before burning, and monitored to ensure that no trail users or dogs pass barricades. This can be done in conjunction with Minneapolis police officers to ensure compliance. In using this intense method of intercepting the public, the park is doing its best to make firing operations safe for both firefighters and the public, as well as reducing the likelihood that the fire will cause a blockage of emergency lines due to people reporting the fire.

Post-burn, Mississippi NRRA's Resource Management Division will assess how local public and partnering agencies felt about the fire efforts by reaching out to individuals via professional networking (such as phone calls and email) and social media. Feedback will be used to inform future plans, procedures, and education efforts. Public comments will be kept by the park's chief of resource management or biologist.

Communication and education will only work if interpretive staff is knowledgeable about the use of prescribed fire at Coldwater. Thus, natural resource and fire staff will be in charge of making sure information is properly disseminated within the agency and park so all staff can provide proper information to the public.

1) Program Capabilities

Disseminating information about the natural role of fire at Coldwater is important for establishing public support for the burn program at Coldwater. Fire management for

Coldwater will be accurate and deliverable to a broad audience. Guidelines followed for the development of the program include:

- A Public Information Officer (PIO) will be designated and assigned to the burn plan to provide a press release to local media, which is meant to inform the public about reduced visibility and air quality due to smoke.
- A media event should be planned for the first several burns planned. This will give the media and opportunity to help tell the story of the importance in conducting a prescribed fire, and will possibly limit smoke calls and concerns.
- The IC, in the event of an unplanned ignition, is responsible for evacuating visitors and others at Coldwater or in the burning area.
- Smoke mitigation tactics will be initiated in cases where visibility becomes a significant risk; local law enforcement will be contacted by the IC or delegate to guide traffic.
- Ecological concepts will be incorporated into interpretive programs.
- The fire management program will also be incorporated into interpretive programs.
- Adjoining land management agencies and cooperating entities will be provided with fire management information, especially during active fire.
- Mississippi NRRA employees will be made aware of, and knowledgeable on, the prescribed fire program, and fire at Coldwater, in general.
- Wildland fire management techniques and the Mississippi NRRA program will be discussed informally with a broad range of groups, including staff at Mississippi NRRA, visitors, and local neighbors.
- a) Contact List

See Appendix G.

- b) Materials
 - Road and trail signs warning the public about area closures, smoke, and detours around Coldwater or wildfire areas will be used for each event, as there is heavy traffic at most sites.
 - Pamphlets explaining the fire management program will be used and periodically updated to reflect the changing character at Coldwater Spring. These can be handed out at the Visitor Center, if desired, or available at Coldwater.
- c) Online Resources
 - National Wildfire Coordinating Group, <u>http://www.nwcg.gov/index.htm</u>
 - National Park Service Fire, <u>http://www.nps.gov/fire/</u>
 - GeoMac Wildland Fire Support, http://www.geomac.gov/index.shtml
 - Firewise, <u>http://www.firewise.org/</u>

- National Interagency Fire Center, <u>http://www.nifc.gov/fireInfo/fireInfo_main.html</u>
- Eastern Area Coordination Center, https://gacc.nifc.gov/eacc/
- Minnesota Interagency Fire Center and MNICs, <u>http://mnics.org/wpress/header-menu/about-mifc/</u>
- 2) Communications Step-Up Plan

When fire danger reaches high or extreme levels, information about fire danger and restrictions will be disseminated by fliers, interpretation, and signs at Coldwater Spring and other areas at Mississippi NRRA.

2.0 WILDLAND FIRE PROGRAM MANAGEMENT GOALS, OBJECTIVES, and MANAGEMENT ACTIONS

The content of this section will specify Coldwater Spring Unit as a specific Fire Management Unit (CSFMU) and provide guidance on Mississippi NRRA island units as it pertains to fire management.

Coldwater Spring Fire Management Unit (CSFMU) Specific Information

Coldwater Spring is primarily an immediate post-disturbance, mid-restoration prairie area, with savanna and areas along the borders of the property. Based on the National Fire Danger Rating System (NFDRS), which assigns fuel types and fuel models to areas within the continental U.S. for predicting fire severity (Bradshaw et al. 1978, Burgan 1988), Coldwater Spring is designated predominantly as Fuel Model L (western perennial grasses and forbs, few shrubs and trees, and fuel loading is relatively stable from year to year). The Anderson Fire Behavior (FBO) Model best fit to the area is Fuel Model 1 (surface fires that burn fine fuels, in areas where little shrub or timber is present); this model describes fire behavior for certain fuel types (Anderson 1982). Three burn units at Coldwater (Appendix R, R-5, Burn Units A, E, G) have a higher hardwood component than the others, but overall the site is still functionally prairie and savanna; therefore, the unit as a whole is predominantly Fuel Models L and 1, but has some areas that are modeled as Fuel Model E (hardwood litter in the fall or dormant season) and 9 (closed canopy, quicker surface fires, and longer flame lengths). This will change over time as we return fire to the landscape on a consistent basis. The understory composition in Unit E will also change as we completely remove common buckthorn (Rhamnus cathartica) and return the understory to a native woodland plant community. Prescribed fire will only be required infrequently in Unit E, but should not be excluded as a management tool to control invasive species and reduce fuel loads when necessary. As the understory restoration progresses there is likely to be a higher accumulation of perennial plant litter, especially when the herbaceous layer becomes well established. This higher litter accumulation rate could increase the need for prescribed fire to maintain a diverse plant community, but that will ultimately be decided by Mississippi NRRA biologists based on yearly field assessments.

A newer method that predicts soil surface temperatures and PM_{25} particulate emissions based on fuel load characteristics – the Fuel Loading Model (FLM) – estimates that Coldwater Spring prairie falls under Fuel Loading Model 15, meaning PM_{25} particulate emissions are low (< 75 Mg km⁻²) and soil surface temperature remains < 100°C (Sikkink at al. 2009). This model is particularly useful at Coldwater Spring, as the area is surrounded by urban development, and air quality issues are important for fire planning. Burn Units A and E are mostly savanna and mesic woodland areas but, as understory grasses and forbs are still dominant, the area remains within FLM 15.

The wetland areas embedded in the Coldwater Spring prairie and savanna areas are small, and do contain some amounts of emergent plants throughout. Thus, these areas are treated the same as the surrounding landscape, and are represented by NFDRS model L, FBO model 1, and the FLM model 15 (Appendix R, R-5).

The forested areas surrounding Coldwater Spring are not included in any currently determined prescribed fire units at Mississippi NRRA; however, NFDRS models for the area include Fuel Model E and Fuel Model R (summertime or growing season hardwood litter). The FBO models that correlate with the NFDRS models are Fuel Models 8 and 9, respectively. The FLMs for the forested areas surrounding Coldwater Spring have yet to be determined, and this document will be amended as soon as this is done. Historically, these floodplain and mesic forests would have experienced fires only infrequently, on the order of decades to hundreds of years between fires, due to the vegetation and topographical features (soil moisture, aspect) belying such areas. The use of prescribed fire as a management tool to reduce invasive species and reduce fuel loads will not be excluded from the forest, especially as plant communities evolve with climate change and are consistently pressured by invasive species. Yearly assessments of all burn units will be conducted to determine if prescription is needed.

The spring house at Coldwater Spring is beneath a flight path (for Runway 22) at the Minneapolis-St. Paul International Airport. Special permits may be required to conduct burn operations in the spring house area. Mississippi NRRA has worked with the Metropolitan Airports Commission (MAC) to determine smoke impacts on flights and the permitting process for burn plans.

In terms of bedrock geology, Coldwater Spring overlies Middle and Upper Ordovician shale, dolomite, and sandstone. While examining the archeological history of the site, researchers primarily uncovered erosion-resistant Platteville Limestone, which is underlain by Glenwood Shale and St. Peter Sandstone. Due to glacial activity, bedrock at Coldwater Spring is covered by the Eastern St. Croix Moraine, which was deposited by the Superior Lobe during the Wisconsonin Glacial Period. Moraines created by the subsequent Des Moines Lobe, called the Owatonna Moraine Area, lay to the west of the St. Croix Moraine. In the Twin Cities area, the till deposited by these lobes is at least 30.5m (100 ft) thick (Jones 2011).

At the Coldwater Spring site, several soil types exist, including urban land-Anthropic and artifact anthosols (soil from cut-and-fill practices), Sandberg loamy coarse sand (a glacial outwash soil), Forada sandy loam (glacial outwash formed in swales), Urban land-Hubbard bedrock substratum complex (excessively-drained loamy sand glacial outwash soils underlain by bedrock), and Dorset bedrock substratum-Rock outcrop complex (glacial outwash soil formed above limestone

bedrock). In several areas at Coldwater Spring, natural soils (those derived glacially) are missing entirely from the profile due to construction at the site (Jones 2011).

Coldwater Spring falls along the transition from Eastern Deciduous Forest to Tallgrass Prairie, with a climate consisting of cold winters and relatively mild summers. At the Minneapolis-St. Paul International Airport, which is approximately 0.8km (0.5 mi) from Coldwater Spring, monthly normals show that the mean temperature in January (lowest of the year) is -9.1°C (15.6 °F), while the mean high (July) is 23.2°C (73.8 °F). Mean daily precipitation ranges from a low of 2.3cm (0.90in) in January to a high of 10.9cm (4.30 in) in August. Annual mean precipitation is 77.7 cm (30.6 in) (National Climate Data Center 2014).

On and in the vicinity of Coldwater Spring the following native plant communities are present: southern mesic prairie (Ups23), southern mesic oak savanna (UPs24), bur oak-pin oak woodland (FDs37b), southern wet mesic hardwood forest (MHs49), southern terrace forest (FFs59), southern floodplain forest (FFs68), and southern wet ash swamp (WFs57) (Minnesota Department of Natural Resources 2005a, 2005b). Currently, the mesic hardwood and floodplain forests have persisted, but are heavily degraded due to disturbances involving development by the U.S. Bureau of Mines. From the 1820's to the mid-1900's European settlement eradicated native prairie from the site. Prairie and oak savanna, along with the mesic hardwood forest is currently being restored at Coldwater Spring by the National Park Service. The majority of forested areas surrounding Coldwater Spring are owned and maintained by other agencies, including the Veterans Affairs, Minnesota Historical Society, Minneapolis Parks and Recreation, and the Minnesota Department of Natural Resources. Prescribed fire, in addition to other management techniques, will be required to fully restore and preserve the prairie and oak savanna vegetation. One state endangered plant species, woolly milkweed (Asclepias lanuginosa Nutt.), has been located on the property, but this has not been confirmed. A multitude of fish, amphibian, reptile, arthropod, and fungi species are found at Coldwater Spring. There are eight designated wetland areas at Coldwater Spring, named A-H (Appendix R, Figure R-3). Wetland A was classified as a palustrine, unconsolidated bottom, semipermanently-flooded area. This wetland is located close to Coldwater Spring and the reservoir, and is fed primarily by groundwater and surface runoff. Wetlands B, F, and G are considered disturbed herbaceous wetlands, with several types of emergent plants. Wetlands B and F contain standing water, and are fed primarily by a pipe below the ground. Wetland H was created after the buildings at Coldwater Spring were demolished, and is fed mostly by surface runoff and underground sources.

Islands 101, 102, 108, 111, and 112 (Appendix R, Figure R-1)

The islands owned by Mississippi NRRA are spread throughout the 72 miles of river encompassed by the Park, and two of the nine islands are now accreted to adjacent uplands. Four primary vegetation types are represented across the islands: Midwestern Cottonwood – Black Willow Forest, Riverine Mud Flats, Riverine Sand Flats, and Silver Maple – Elm forest. These particular habitats are all fluvial and riparian, characterized by regular soil erosion and deposition cycles caused by seasonal flood patterns. There is typically little to no leaf litter, and any herbaceous understory layer present would be patchy at best, filled mostly with annual herbs and grasses. In many cases there is a heavy presence of coarse woody debris, in the form of driftwood and other sticks and branches left behind after receding floods.

Ecologically, fire plays little to no role in the above forests and flats. Islands are isolated and, though fire can spread from mainland areas to islands, there is no fuel that would readily burn enough to carry flame through the area for islands of these vegetation types. Thus, no fire will be used to manage these areas, but this FMP will include the islands in the event of an escaped fire or unplanned ignition.

Cultural and Historical Resources and Structures

Coldwater Spring

Coldwater Spring itself is fed by groundwater in the limestone bedrock, and is located approximately 1.6km (1mi) upstream from where the Mississippi and Minnesota Rivers meet. After Fort Snelling was settled in the early 1800s, Coldwater Spring was used to supply water to the Fort and surrounding areas; a pumping facility connecting the Spring to Fort Snelling was built in 1879, and was in operation until the 1920s, after which it was shut down (Clouse 2001, Jones 2011). Active military operations at Fort Snelling ended in 1946, and, after being transferred to the U.S. Veterans Administration, Coldwater Spring landed in the hands of the U.S. Bureau of Mines. At that time, the area was 11.05 ha (27.32 ac). Buildings were first erected at the site in 1959. In 1995, the U.S. Bureau of Mines was eliminated by the federal government. The Coldwater Spring site was closed, with management to be conducted by the U.S. Fish and Wildlife Service.

After site acquisition by Mississippi NRRA, the abandoned Bureau of Mines buildings were removed in order to prepare the land for ecological restoration. Of the buildings, foundations from one still exist in one of the prairie sites; the remainder of the original spring house and reservoirs below Coldwater Spring were left, as well. Paved and gravel walking and biking trails, as well as a gravel parking area, have been installed for public use. The use of prescribed fire in this area needs to avoid the parking area, as well as avoid damage to the spring house and remaining reservoir structures.

Special Considerations

Coldwater Spring is located proximally to the Minneapolis-St. Paul International Airport whose flight patterns are looked after by the Metropolitan Airports Commission (MAC), with whom Mississippi NRRA has a working relationship regarding smoke management and other operations at the Coldwater Spring site. Coldwater Spring is also adjoined by properties owned by several other public agencies. Although the threat of fire spread and danger to these properties is low to nonexistent, due to vegetation types and physical boundaries at Coldwater Spring, precautions due to smoke production, both in terms of reducing local visibility and reducing air quality, must be considered when applying fire. The Spring area is located in an urban setting in which air quality is poor to begin with, meaning that the addition of natural fire particulates may exacerbate poor quality when burn conditions are not appropriate (for example, if smoke is unable to lift out of the area due to lacking transport winds). According to Environmental Protection Agency air quality standards, which require the measurement of fine particles, ozone, sulfur dioxide, and carbon monoxide, the Twin Cities have been undergoing a slow increase in the number of days with moderate levels of air pollutants but a decrease in unhealthy levels from 2003-2012 (Minnesota Pollution Control Agency 2014). It is possible that burning may cause a moderate air quality day to become unhealthy.

Islands 101, 102, 108, 111, and 112

There are no special considerations to be made for the islands. No prescribed fire will be used on them; only wildfire prevention and attack measures will apply.

Coldwater Spring Historic Vegetation (Appendix R, Figures R-1,2,3)

Located along the western edge of the Eastern Deciduous Forest, Coldwater Spring, an area historically associated with Fort Snelling, falls within a transitional zone between mesic broadleaf forest and tallgrass prairie. According to historical records, the Coldwater Spring area was once dominated by tallgrass prairie vegetation (Clouse 2001), mixed with bur oak (*Quercus macrocarpa* Michx.) savannas (O'Brien et al. 2006, Jones 2011). Tall grasses, including big bluestem (*Andropogon gerardii* Vitman) and Indian grass (*Sorghastrum nutans* [L.] Nash), gave way to the forested Mississippi River floodplain to the northeast, along the western bank of the river (O'Brien et al. 2006). Tallgrass prairies and savannas are both fire-prone and fire-adapted ecosystems (Helzer 2010, Smith et al. 2010, Minnesota Department of Natural Resources 2005b). Vegetation and wildlife native to prairie and savanna ecosystems, including invertebrates, are responsive to direct and indirect effects of fire on the landscape (Tester 1996, Panzer 2002, Au et al. 2008).

At Coldwater Spring, fire likely spread easily over the prairie, but did not persist long enough to penetrate the floodplain forest along the river's edge (Jones 2011). The topography of the area strongly influenced the historical spread of fire. Glacial moraines and drumlins interrupted the openness of the prairies and oak savannas. Wooded areas along the floodplain were dominated by ash (*Fraxinus* L.) and maple (*Acer* L.) species. Other hardwoods were also present in mixed forests, including oaks (*Quercus* L.), maples, basswood (*Tilia americana* L.), and hickory species (*Carya* Nutt.) (Jones 2011). As fire-adapted and predominantly understory-intolerant species, oaks and hickories typically persist best in areas that experience some fire (Minnesota Department of Natural Resources 2005a, 2005b), although the effects of fire intensity and frequency differ between sites.

There have been several studies discussing the continued occurrence of fire across vast landscapes in the Eastern Deciduous Forest and the Midwestern tallgrass prairies. Such broadscale fire events took place for thousands of years prior to European-American settlement (Pyne et al. 1996, Delcourt 2004, Burton et al. 2011). Wildfires did occur, especially in the tallgrass prairie areas, but in the Eastern Deciduous Forest, fires were overwhelmingly of anthropogenic (Native American) origin (Abrams 1992). Although several travelers along the river passed near the Coldwater Spring site, there are no direct references to the fire history of the area, and little physical evidence of a heavy presence or use by Native Americans (Henning 2002, O'Brien et al. 2006). Being near the confluence of two major waterways, however, the site has cultural value to several Native American tribes (O'Brien et al. 2006). A U.S. military contingent first arrived to settle near the confluence of the Minnesota (then called the St. Peter) and Mississippi rivers in 1819-1820. From then on, Fort Snelling and surrounding areas became increasingly inhabited by several groups of settlers, fur traders, government officials, and businesspeople. The Coldwater Spring vicinity remained relatively open and trees were sparse until after 1935 (Henning 2002), most likely due to active harvesting and clearing by the area's inhabitants (O'Brien et al. 2006). In most areas in the eastern U.S., the occurrence of widespread fire declined rapidly after Euro-American settlement (McEwan 2007, Hutchinson et al. 2012). What timber remained in the area was harvested to feed the demands of inhabitants of Fort Snelling. Prairies and savannas were converted to pasture, which, in combination with timber harvest, maintained openness at Coldwater Spring for some time. Overall, there is little evidence supporting the purposeful use of fire for cultural or ecological purposes at Coldwater Spring, or even around Fort Snelling in general; however, given the original predominance of prairie and oak savanna areas, it is clear that fire played an important historical role in maintaining the openness of the prairie area prior to Euro-American settlement.

A prolonged lack of active native land management at Coldwater Spring, in combination with recent disturbance from the removal of structures on the property, has resulted in the inundation of the prairie area with ruderal invasive grasses and forbs, including smooth brome (*Bromus inermis* Leyss.), yellow sweet clover (*Melilotus officinalis* L. Lam.), red clover (*Trifolium pretense* L.), white clover (*Trifolium repens* L.), garlic mustard (*Alliaria petiolata* [M. Bieb.] Cavara & Grande), and garden yellowrocket (*Barbarea vulgaris* W.T. Ait.). Native grasses and forbs have been broadcast and frost seeded on the Coldwater Spring prairie and savanna, and those species are beginning to establish the area. Without fire and the active clearing of invasive species, however, the native grasses and forbs are less likely to persist and reproduce, as they will be outcompeted by the faster-growing, non-native pioneer species.

In light of management and ecological needs, the purpose of the reintroduction of ecological fire at Coldwater Spring is two-fold:

- 1) to encourage native plant and animal species dominance and persistence, while
- 2) controlling invasive plant species.

Since there are no explicit records or data available to determine the fire frequency at Coldwater Spring specifically, it can be assumed that the area burned with intervals short enough to create an open, prairie setting while maintaining oak savannas and mixed and mesic and floodplain forests. Depending on the exact area, then, the return interval was likely between 3 and 20 years (Panzer 2002, Minnesota Department of Natural Resources 2005b). In order to keep fuel loads to a minimum, annual field assessments will be conducted and prescription of fire will be recommended accordingly.

Islands 101, 102, 108, 111, and 112

There is no strong historic role, either culturally or ecologically, of fire on the islands owned by Mississippi NRRA. Most of these islands are inundated by floodwaters yearly, during seasonal

flood events, and are either too wet or lack enough fuel to carry fire across the islands. For these reasons, there are no plans to use fire on the islands.

2.1 Goals

The specific fire management goals at Mississippi NRRA are to:

- 1) Protect human life, communities, and resources from the adverse effects of wildfire, without compromising safety.
- 2) Maintain and restore fire adapted tallgrass prairie and oak savanna, using appropriate tools and techniques, in a manner that will provide sustainable, ecological, and social benefits.
- 3) Integrate knowledge generated through fire and natural resource research into fire management priorities, decisions, and actions.
- 4) Communicate and coordinate with other agencies and stakeholders to pursue common fire-use and suppression goals, programs, and projects.
- 5) Build and promote organizational effectiveness by building program capacity, leadership, and effective management practices.
- 6) Manage planned and unplanned ignitions according to federal, state, and local regulations.
- 7) Promote public understanding of fire management programs and objectives.

Plans for Achieving Management Goals

Goal 1: Protect human life, communities, and resources from the adverse effects of wildfire, without compromising safety.

- Ensure that both firefighter and public safety are the first priority for every action taken regarding wildfire.
- Manage an organization that is ready to respond with appropriately qualified personnel to wildland fire events according to planned protocols and guidelines to prevent, detect, and act on wildfire incidents.
- Use preventative, risk management based actions to reduce the risk of injury or property loss from the occurrence of a wildfire event.
- Use preventative fuel reduction methods, either through prescribed fire or mechanical removal, to reduce the likelihood of fire escapes and reduce fire intensity of wildfire events on lives and property.

Goal 2: Maintain and restore fire adapted tallgrass prairie, using appropriate tools and techniques, in a manner that will provide sustainable ecological and social benefits.

- Provide fire management tools to restore and maintain a mosaic of tallgrass prairie and savanna vegetation across the Coldwater Spring area.
- Emulate the intensity and severity of natural fires in the tallgrass prairie and savanna areas historically believed to have burned at Coldwater Spring.
- Improve and restore ecosystem health and resiliency provided to the area by native prairie vegetation and fauna that will return to the site during restoration.

Goal 3: Integrate knowledge generated through fire and natural resource research into fire management priorities, decisions, and actions.

- Continue adapting the use of prescribed burns, through fire effects monitoring, to meet fire-use objectives as situations change and arise.
- Integrate fire use into management and project planning, at all levels, to holistically address ecological, economic, and social needs.
- Ensure that the continued use of prescribed fire is responsive to resource management objectives set by Mississippi NRRA and other agency partners.

Goal 4: Communicate and coordinate with other agencies and stakeholders to pursue common fire-use and suppression goals, programs, and projects.

- Maintain a fire program at Coldwater Spring that allows for safe, efficient, and ecologically beneficial prescribed fire use.
- Build and grow an understanding of and appreciation for fire use at Coldwater Spring with Mississippi NRRA staff, coordinating agencies, park visitors, and community members, through interpretation, media, and public forums during which individuals are allowed to experience prescribed fire operations in a safe learning environment.

Goal 5: Build and promote organizational effectiveness by building program capacity, leadership, and effective management practices.

- Instigate the practice of safe, goal- and objective-oriented use of prescribed fire by identifying and training staff members in fire management, including maintaining staff at various levels of firefighting and fire support qualifications and experiences.
- Promote leadership and skill development among staff and volunteers.
- Utilize the Risk Management Process to mitigate the risks posed by wildland fire management.
- Manage the cost of prescribed fire at Coldwater Spring by using a full range of cost reducing options from local staffing to equipment when restoring natural resources in the area.

Goal 6: Manage planned and unplanned ignitions according to federal, state, and local regulations.

- Address Go/No-Go situations for all prescribed fire activities.
- Ensure that all air quality objectives are met for each burn event, by writing each objective into the burn plan.
- Develop and enact smoke impact mitigation measures for prescribed fire plans, and wildfire response plans, as possible.
- Evaluate and continue taking advantage of alternative methods of management, besides the use of prescribed fire (mechanical, chemical, or biological removal and control).

Goal 7: Promote public understanding of fire management programs and objectives.

- Create and implement formal and informal programs for the interpretation of fire on the landscape, emphasizing the benefits of prescribed fire.
- Ensure that fire prevention methods are not confused with the ecological objectives of the fire program.
- Work with other key agencies to address the continued use of fire at Coldwater Spring to create a consistent theme and message for the fire program.

2.2 Objectives

Fire Management Objectives for Coldwater Spring

Ecological Objectives:

- 1) Reduce invasive plant species cover by 25% in the first five years of the burn program.
- 2) Reduce invasive plant species richness by 50% in the first five years of the burn program.
- 3) Increase native species richness by 25% in the first five years of the burn program.
- 4) Increase native species cover by 15% in the first five years of the burn program.
- 5) Reduce woody species encroachment upon prairie by 75% in the first five years of the burn program.
- 6) Reduce wildland fuel accumulation which reduces the risk of wildfire occurrence.

Objectives 1-5 will be monitored using a vegetation sampling program that quantitatively assesses prairie plant cover and species change over time, after periodic burning. The sampling will also measure litter layer to help monitor fuel accumulation in order to meet objective 6.

Educational/Interpretive Objectives:

Implement a full fire education program for up to 20 participants at Coldwater Spring within five years of creating active implementation for the prescribed fire program.

This objective will be met by training interpretive rangers to interface with the public about the fire management program and goals at Coldwater Spring.

Partnership/Leadership Objectives:

Extend the current vegetation sampling program to University of Minnesota students.

Mississippi NRRA will begin a post-prescribed burn vegetation monitoring program that is an extension of the aforementioned program conducted yearly at Coldwater Spring. This program will engage University of Minnesota undergraduate students currently studying at the College of Food, Agriculture, and Natural Sciences. Mississippi NRRA staff will work with these select students to gain knowledge and understanding of post fire prairie management. The data collected by these students will be used to guide future management decisions by Mississippi NRRA biologists.

2.3 Approved Wildland Fire Management Actions

The Mississippi NRRA will use this plan for prescribed burns on the Coldwater property. These burns will be used for site restoration and maintenance purposes on the restored prairie. Throughout the rest of the Mississippi NRRA corridor, other federal, state and local fire management agencies will be responsible for wildland fire management actions and suppression on their lands (see Appendix R, Figure R-1 for Mississippi NRRA land ownership, see Figure R-2 for neighboring land ownership). Mississippi NRRA does not have the capability to respond to fires.

3.0 WILDLAND FIRE OPERATIONAL GUIDANCE

3.1 Response to Wildfire

Local emergency responders will be responsible for conducting initial responses to wildland fires. In all cases, the highest qualified individual will be utilized for each reported incident.

3.1.1 Expected Fire Behavior

Grass

Fire Behavior Model 1 (Anderson, see section 3.1) is the overarching model that represents fire behavior of western perennial grasses, like those at the CSFMU. This model indicates that flame length and rate of spread could be low to high, depending on weather conditions such as relative humidity (RH) and wind speed.

Timber Litter

Fire Behavior Models 8 and 9 represent the hardwood leaf litter that surrounds the CSFMU prairie restoration area. The difference between these models involves the type of litter present, how much there is, and how compact the litter is. Model 8 involves a low number of fine and coarse fuels with compact litter, while Model 9 has a moderate load of less compacted litter than Model 8. Spread rate in both models is moderate, with low to moderate flame lengths.

Minimum Impact Strategy and Tactics

When managing wildland fire, utilization of Minimum Impact Strategy and Tactics (*MIST*) as described in RM 18 – Chapter 2 is the policy of the National Park Service. MIST are a National Park Service requirement, applicable to all fire management activities on NPS lands. All fire management activities at Coldwater Spring will be carried out in a way that minimizes fire impacts on natural and cultural resources. Interdisciplinary teams (interpretive and resource management staff) will meet to address the potential impacts of both prescribed burning and wildfire at Coldwater Spring. Suppression forces will use practices and equipment suited to the needs of the incident, and a strategy that causes the least alteration to resources. Immediate references for MIST guidelines are available to all personnel in the Incident Response Pocket Guide (IRPG). Formal MIST guidelines are available in the USDA Forest Service Northern Region MIST Guidelines, included in the NWCG Fireline Handbook. These are included in Appendix A. NOTE: not all guidelines are relevant to fire management at Coldwater Spring, but are included as a point of reference.

3.1.2 Wildfire Response Objectives

Mississippi NRRA is not equipped to respond to or take action on any unplanned wildfires. All emergency situations will be reported immediately to emergency responders by calling 911 and Great Lakes Zone FMO. Mississippi NRRA does not have staff that are qualified to handle unplanned ignitions. If staffing is hired that can expand this area into an operational status, this entire section will be amended.

3.1.3 Wildfire Response Procedures

Decision Support

Current direction on Decision Support information pertaining to the NPS can be found in the Interagency Standards for Fire and Fire Aviation Operations (Red Book) in Chapters 3 and 11.

Wildland Fire Decision Support System (WFDSS)

Strategic Objectives and Management Requirements for WFDSS are placed in Appendix K for Decision Makers to use if a wildfire occurs on the park unit.

Initial Response Procedures

A full suppression response will be utilized for all unplanned ignitions that include Initial Attack and Extended Attack at Mississippi NRRA while providing for firefighter and public safety. Utilization of Minimum Impact Suppression Tactics (MIST) will be employed where appropriate and safe. A qualified Initial Attack Incident Commander (ICT5, ICT4) or local agency equivalent will determine the best strategy and tactics to employ to contain and suppress the fire and communicate that to park management and incoming resources. The incident commander should utilize a size up card and/or incident organizer to assist in ensuring proper information is relayed to dispatch as well as assist in organizing the incident and documentation. The incident commander is responsible for briefing all incoming resources, prior to their engagement on the incident. The use of size up cards and incident organizers is recommended for documentation to record incoming resources and determine complexity analysis. At a minimum, the briefing should include the following:

- The fire environment situation
- The mission at hand, and the planned method of execution
- Communication plans
- Logistics and support information
- Risk management methods and hazards

The IRPG (Incident Response Pocket Guide, NFES 1077) contains a checklist that should be used during a briefing, to ensure that all key components are addressed adequately.

The incident commander on scene is to remain in command of the incident through all phases of the incident, from the initial size-up of the fire to control of the fire, unless relieved by a more qualified individual. Changes of command are to be documented and relayed to all forces, the dispatch center, and all fire management and park management staff. The Initial Attack incident commander (ICT5, ICT4) will determine the need for and frequency of After Action Reviews (AAR) during the extent of the incident. At a minimum one should be conducted post incident. The incident commander is responsible for ensuring the completion all required fire documentation and mapping.

Transition to Extended Response

- 1) Criteria for Transition
 - a) Extended attack occurs when objectives have not been met, in the case of initial fire response, and/or where a prescribed fire requires resources beyond those initially invested in the activity. The use of WFDSS is necessary for extended attack, in order to provide a structured decision process to ongoing suppression operations. If the incident commander is an employee at Mississippi NRRA, the fire management officer will assist the incident commander with documenting incident events in accordance with the WFDSS. If the incident commander is from a partnering agency, the command section will complete the assessments, to be reviewed by Mississippi NRRA staff.
 - b) Mississippi NRRA staff will be in a support role only, unless staff possesses the appropriate level of fire qualifications to serve in Command and General Staff positions as part of a Type 3 organization.
- 2) Extended Attack Plan Requirements and Responsibilities

a) The WFDSS will be used to develop and document decisions and support extended response needs, and its use is the responsibility of the incident commander and The Great Lakes Zone FMO for Mississippi NRRA.

Complexity Decision Process for Incident Management Transition

The Fire Complexity Analysis is a checklist used to guide agency administrators while determining when it is necessary to begin a transition from an extended attack to bringing in a more highly qualified incident management team. This analysis is to be completed prior to the order of additional resources, and becomes part of the fire record. If, after analysis, it appears that the fire complexity has exceeded or is going to exceed the capabilities of the current management, the Incident Commander will initiate a resource order, and the Chief of Resource Management and Superintendent will each be notified. Incoming managers will be expected to sign the Delegation of Authority (Appendix F) prepared for them and signed by the Superintendent.

WFDSS Re-Evaluation

Situations that could require selection of a new strategy through the WFDSS analysis include, but are not limited to,

- Exceeding assessment criteria such as trigger points or air quality
- Risks to firefighter safety or natural or cultural resources becomes unacceptable
- Fire spreads beyond the boundary of Mississippi NRRA property or is threatening to
- Forecasted weather is for continued hot, dry, and/or windy conditions.
- Fire behavior and spread is exceeding the capability of onsite resources
- The fire exceeds the planning and logistics capability of the local unit
- Agency administrator prerogative

Records and Reporting

The Superintendent is the individual ultimately responsible for fire reporting and fiscal accounting. Documents to be completed as part of the reporting process are identified below (Table 2), and each are to be filed as soon as is reasonable given the time demands of the incident.

• Delegation of Authority: An example draft of the Delegation of Authority document is included in Appendix F.

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Table 2:Documents to be completed, wildfire reporting, frequency of reporting and responsibility

Wildland Fire Document Checklist						
Document	Revision Frequency	Individual Responsible for Completion				
DI-1202, Individual Fire	For each incident, within	Incident Commander (IC) or park				
Reports	five days of fire being	fire coordinator if IC is from				

	declared out.	outside the park	
ICS-201, Incident Briefing	Each incident	IC	
ICS-214, Activity Log, with narrative	Each incident, for each operational period	IC and/or Unit Leaders	
Resource Orders	Each incident	IC and Fire Dispatch	
Fire Map	Each incident	IC	
Archived Photographs	Each incident		
WFDSS (including periodic review)	As needed	IC and/or FMO, along with Mississippi NRRA management staff	
Spot Weather Forecast	Each operational period, as needed	IC	
Fire Monitoring Reports (includes smoke emission and transport observations)	Required for Rx	FEMO	
ICS-209, Incident Status Summary	Each operational period, as needed	IC and FMO	
Fire Behavior Predictions	Each operational period, as needed	IC and FMO	
Incident Complexity Analysis	Each operational period, as needed	IC and FMO	
Incident Action Plan (IAP)	Each operational period, as needed	IC or Planning Section Chief	
After Action Review (AAR)	Each incident	IC	
Cost Tracking	Each incident or monthly	IC/FMO/FPMA	

3.2 Fuel Treatments

Fuels management at Mississippi NRRA, including Coldwater Spring, is meant to supplement the natural role of fire in the ecosystem. Prescribed fire can be used to reduce fuel loads, which in turn can reduce potential negative impacts on firefighter safety and cultural/natural resources, in the case of both prescribed and wildfire.

3.2.1 Fuels Planning

The fuels management program at Mississippi NRRA will implement fire management policies and help achieve resource management and fire management goals as defined in:

- Federal Wildland Fire Management Policy and Program Review;
- Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resources in Fire Adapted Ecosystems – A Cohesive Strategy (USDOI/USDA); and
- A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan.

General Fuels Management Implementation and Procedures

1) Guidance

Prescribed fire planning and implementation will be in accordance with RM 18 Chapter 7, Fuels Management chapter.

2) Annual Actions

See Table 3 (below).

3) Implementation Standards

The activities proposed in the Fire Management Plan will be planned and implemented in accordance with RM 18, Fuels Management chapter, and the Interagency Standards for Fire and Fire Aviation Operations.

4) Planning and Reporting Requirements

The Great Lakes Zone FMO for Mississippi NRRA is responsible for NFPORS entries, according to the timelines provided by the national office each year in coordination with the Regional Fuels Specialist. Fire effects reports are the responsibility of the individual who conducted the sampling, in addition to the park biologist and regional fire ecologist, as necessary.

5) Monitoring

Monitoring effects are primarily visual, and sampling efforts will include using established vegetation sampling protocols. Photographs of Coldwater Spring will be taken before and after fire, as well.

Multi-year Fuels Treatment Plan

Prescribed fire, at Coldwater Spring should be conducted every 2-5 years, to reflect the typical fire regime of a tallgrass prairie area, and to allow for the organization of resources between prescribed burns. Assessment of the prescribed fire program will occur yearly, so that adjustments may be made depending on the results of repeated prescribed fire use.

Staffing at Mississippi NRRA will be integrated with other agencies to achieve best fire management results. Resource management staff at the park is encouraged to receive and maintain firefighter training (firefighter type 2, FFT2). As per NPS policy, only qualified or certified trainee individuals, meeting required training elements, are allowed to be present on a prescribed burn or wildfire. Additional training for positions including, but not limited to firing boss(FIRB) and fire effects monitoring (FEMO) are encouraged for personnel, although these specialized tasks may be done by individuals from outside the park. Biological science technicians may be hired that specialize in prescribed fire; however, it is more likely that, at Mississippi NRRA, the existing biologists or biological technicians will perform those tasks or fire effects monitors will be ordered in from other parks within the region.

According to the prescribed fire frequency (2-5 years) and staffing needs, the annual fire planning appears as below (Table 3).

Task	Completed By	Responsibility
Off-Year Planning Meeting	January 30 th	FMO, Fire Coordinator
Off-Year Project Proposals Submitted to NFPORS	March 15 th	FMO
Off-Year Project Verification	March 15 th	FMO, Superintendent
Prescribed Fire Seasonal AAR	May 15 th	FMO
 Annual Fuels Treatment Planning Meeting Review burn unit objectives Determine burn unit overhead Assess compliance needs Evaluate implementation needs 	July 15 th	FMO, Fire Coordinator
 Twice-Yearly Prescribed Fire Operations Meeting Assess preparation needs, progress Verify organization/responsibilities Set priorities/timelines 	August 1 st and December 1 st	FMO, Fire Coordinator
Complete Burn Plans	As needed	FMO
Review and Approve Burn Plans	As required	Superintendent

Table 3: Annual fire planning tasks and responsibilites

1) Identify Participants

Key members of the group developing fuels treatment plans are the Mississippi NRRA Superintendent and the Chief of Resource Management, the Natural Resource Program Manager, lead biological science technician or term biologist, GIS coordinator, and possibly one other biological science technician. The regional FMO also has input on treatment plans.

2) Identify Candidate Projects

The chief of natural resources, FMO, in conjunction with the biological science technicians and staff biologists, are responsible for developing fuel management plans at Mississippi NRRA. All hazards and risks are evaluated, and considerations made for areas which have not experienced a typical fire regime, such as the prairie at Coldwater.

3) Project Prioritization Criteria

Projects for fuels treatment at Coldwater Spring are prioritized using the following criteria:

- Extent of departure of treatments from natural processes
- Needs of native tallgrass prairie species
- Degree of hazard involved in treatment
- Proximity to values at risk (such as the spring house)
- Coordination efforts with adjacent land-managing agencies
- Maintenance requirements
- 4) Updating the Fuels Treatment Plan

The fuel treatment plan is to be updated annually. New projects can be added and old projects revised or removed, depending on previous years' results. Each update will become part of the annual revision to the fire management plan, as part of an adaptive management strategy. Adjustments to the fuels treatment plan will require approval by the superintendent, to ensure that changes made follow compliance.

Non-Fire Fuel Treatment

At Coldwater, non-fire treatments include mowing, whipping, and manual removal of invasive species.

1) Guidance

Planning and implementation of non-fire fuels management projects will be in accordance with RM 18, Chapter 7, Fuels Management.

2) Planning

All planning for non-fire fuel treatments is based on RM 18, Chapter 7, section 6: non-fire fuel treatment requirements.

3) Treatment Review

The format for post-treatment reviews is included in section 5, on adaptive management practices.

3.3 Preparedness

Fire preparedness is the state of being ready to provide an appropriate response to wildland fires based on identified objectives. Preparedness is the result of activities that are planned and implemented prior to fire ignitions. Preparedness requires identifying necessary firefighting capabilities and implementing coordinated programs to develop those capabilities.

Preparedness requires a continuous process of developing and maintaining firefighting infrastructure, predicting fire activity, implementing prevention activities, identifying values to be protected, hiring, training, equipping, pre-positioning, and deploying firefighters and equipment, evaluating performance, correcting deficiencies, and improving operations. All preparedness activities should be focused on developing fire operations capabilities and on performing successful fire operations.

3.3.1 Preparedness Activities

Preparedness activities include a wide range of readiness activities and program elements, each essential to dealing with unplanned ignitions and fuel treatments.

• Delegation of Authority: Letters for Incident Commander (Appendix F)

If fire activity or complexity warrants the ordering of an Incident Management Team, a Delegation of Authority from the Park Superintendent is required to confer management authority to the Team. An example of this can be found in Appendix E. As part of preparedness planning ensure that on annual basis a DOA for the Zone FMO is signed by Superintendent and given to the FMO.

• Step-up Staffing Plan

Throughout the year, preparedness activities are based on up-to-date fire danger ratings determined by the National Fire Danger Rating System (NFDRS). Staffing levels are determined based on predicted fire behavior for a given day. Combinations of fire behavior indices, including the Burning Index, Ignition Component, Energy Release Component, and the Spread Component, can be used to determine staffing levels for any specific day. The Minnesota Department of Natural Resources releases fire risk forecasts daily; these can be used to determine staffing levels, according to the table in Appendix F, and are available at http://www.dnr.state.mn.us/forestry/fire/maps/fdi_grass.html. NOTE: these forecasts are for NFDRS Fuel Model L (perennial grasses and forbs) ONLY. Thus, these forecasts only apply to the Coldwater Spring tallgrass prairie and savanna areas.

• Fire Size-up Procedures for Full Suppression Only

The Incident Commander (IC) (Likely from Minneapolis Fire Department as first responders) is responsible for conducting the size-up of the fire, which includes reporting to dispatch the size up report found on the inside on the IRPG cover, determining the point of origin, protecting the point of origin, determining the cause if possible, and sharing other pertinent information with dispatch personnel, Assistant and/or Fire Management Officer and Park Management. The AFMO/FMO/Park management will report up the chain of command to the park Superintendent and progress toward containment. Any pertinent information from park management will be relayed back to the IC and relay this back to the initial attack Incident Commander on-scene.

This communication loop ensures that appropriate actions are initiated to address the fire situation; however, it should be acknowledged that escaped prescribed burns and wildfire conditions may change rapidly, and that the IC should use whatever advantage they have to

maximize firefighter safety and opportunities toward containment of the fire or escape. The nature of these fires being time-sensitive means that, although the IC should be in communication with individuals off-scene, the primary goal is to keep firefighters and the public safe, and to quickly address problems at hand; therefore, it is important to understand that the chain of command may, at times, be secondary to immediate threats to life or property.

• Fire Weather and Fire Danger

Weather Station: Minneapolis-St. Paul International Airport (MSP)

Zip Code: 55417 Latitude: 44.95°N Longitude: 93.28°W Elevation: 840ft

Spot weather forecasts are available at: <u>http://www.crh.noaa.gov/mpx/fireWx.php#Spot.</u>

National Fire Danger Rating System (NFDRS): this system uses the burn index (BI) to track short-term fire danger for various areas. Danger levels are determined primarily as a reflection of the difficulty of suppressing a fire should one occur. Fuel Model L (western perennial grasses) is representative of the Coldwater Spring area. The Minnesota Department of Natural Resources tracks fire weather conditions for Fuel Model L across the state, which can be accessed daily at http://www.dnr.state.mn.us/forestry/fire/maps/fdi_grass.html.

• Job Hazard Analyses

A general Job Hazard Analysis (JHA) for fire operations is located in Appendix F and more specific JHA's are located on the park shard drive Y:\shared files\Coldwater\Safety\JHA's.

• Mississippi NRRA's Environmental Management Plan

For goals and objectives regarding incident management, reference the above document.

• Structure Protection

The spring house and bridge at Coldwater Spring are the main structures that require protection from fire, which can be done by mechanically removing fuel from around the areas before burn activities are conducted. We will also have a water pump and hose lay directly next to these structures. The ore bins located in Burn Unit B (see Figure R-4) will not be significantly impacted by fire because fuel will be removed from the base before prescribed fire activities.

• Annual Training

Annual fireline safety refresher training, firefighter medical screenings, and work capacity tests ("pack tests") are required for all personnel involved in fire activities, planned or otherwise. This training is available in various locations throughout Minnesota and Wisconsin, and is required to use or fight fire on any federally-owned lands. Fire medicals are completed through the contactor Comprehensive Health Services (CHS) and medicals will be arranged and tacked by the Zone FMO.

• Readiness

<u>January 1^{st} – April 1^{st} </u>: maintain and update employee training and qualification records, review interagency and intra-regional cooperation agreements, review burn plans for currency and planned ignitions taking place the coming burn season, conduct trainings as required to keep personnel up-to-date. Inspect equipment. Prepare CSFMU burn unit as able, depending on weather and labor availability.

<u>April 1^{st} - November 30^{th} </u>: maintain fire preparedness levels in order to be able to respond to wildfires and to complete prescribed burns. Inventory and replace supplies as needed.

<u>November 30th - December 31st</u>: Review fire season, begin making notes for following year. Recommend personnel to trainings as necessary. Review and update Fire Management Plan as needed.

Coordination and Dispatch

The National Park Service is a member of the Minnesota Interagency fire community. Dispatching is accomplished through the Minnesota Interagency Fire Center and the <u>Eastern Area Coordination Center</u> and locally through the 911 system. Currently the jurisdiction responsible for the Coldwater Spring Area is the Minneapolis Fire Department. When calling 911 for a response to this area the caller must specifically request Minneapolis Fire Dispatch when the 911 operator answers. This has been confirmed through coordination with Minneapolis Fire Department, Assistant Fire Chief of Operations.

Duty Officer

The superintendent or the designee is responsible for providing duty officer (DO) coverage during any period of predicted incident activities. DO's responsibilities may be performed by any individual with a signed Delegation of Authority from the Superintendent. The required duties for all DOs are:

- Monitor unit incident activities for compliance with NPS safety policies.
- Coordinate and set priorities for unit suppression actions and resource allocation.
- Keep Agency Administrators, suppression resources and Information Officers informed of the current and expected situation.
- Plan for and implement actions required for future needs.
- Document all decisions and actions.

DOs will provide operational oversight of these requirements as well as any specific duties assigned by fire managers through the fire operating plan. DOs will not fill any ICS incident command functions connected to any incident. In the event that the DO is required to accept an incident assignment, the Superintendent will ensure that another authorized DO is in place prior to the departure of the outgoing DO.

3.4 Post Fire Programs and Response

Mississippi NRRA biological staff will closely monitor park land for any post fire degradation of life, property, or natural and historic resources. Although unlikely, damages caused by wildfires will be addressed using four steps:

• Wildfire Suppression Activity Damage Repair: planned actions to repair damages to resources, lands, facilities resulting directly from suppression activities.

Wildfire Suppression

Repairing suppression damages is the responsibility of the incident commander in conjunction with park management and is paid for through wildfire suppression funding.

Emergency Stabilization

The stabilization and rehabilitation of burned areas is only necessary in the case of severe fire, and the situation can be ameliorated by active management. Park resource management staff should play a role in the application of suppression activities, to inform best management; Delegation of Authority is an important step in this process. This activity is paid for through Emergency Stabilization Funds.

Stabilization activities that may be performed at Mississippi NRRA include:

- Flush-cutting stumps
- Installing water bars in areas of high potential erosion
- Removing berms or other materials from along firelines
- Removing garbage or abandoned equipment from the area

Depending on the area burned, re-seeding or re-planting may be necessary. At Coldwater Spring, it would be ideal to spread prairie species in open areas, especially perennial grasses, or to plant trees according to pre-fire natural communities. It is not expected that any wooded areas would experience a significant burn warranting any emergency response or stabilization tactics, due to a lack of continuous fuels and other localized factors.

Rehabilitation

Detailed directions for the rehabilitation of land damaged by significant wildfire events are outlined in the Interagency Burned Area Rehabilitation Guidebook (10/2006) and the Burned Area Emergency Response Treatments Catalog (12/2006). This stage takes place one to three

years after the wildfire is out, and involves the repair or replacement of facilities damaged, and the short-term restoration of natural and cultural resources. At Mississippi NRRA, areas likely to experience wildfire would benefit from either reseeding, in the case of Coldwater Spring, or potentially replanting tree seedlings of impacted species. If the wildfire occurs at the Coldwater Spring tallgrass prairie area or savanna, in only extremely severe cases would the area need to be replanted. Although potentially beneficial, reseeding may not be necessary, depending on how well native plants were doing prior to the wildfire event.

A special consideration should be given to invasive species management when rehabilitating Mississippi NRRA land. Many exotic invasive species benefit from fire on the landscape, which can stimulate germination, reduce competition, and provide a nutrient boost that exotic invasive plants (typically early-pioneering species) are capable of using to their advantage. Thus, burned areas will need to be carefully monitored and exotic invasives controlled as soon as possible during the first few years post-fire. This activity is paid for through Burned Area Rehabilitation (BAR) funds.

Restoration

The plant communities within Coldwater Spring and the surrounding land are fire dependent and are being managed as such. The entire Coldwater Spring site is technically a restoration area in its current state and could likely sustain an unplanned wildfire that occurred outside of the prescribed fire regime. Should rehabilitation be needed, the restoration efforts initiated with BAR would be a continuation of the existing restoration work that has been accomplished.

3.5 Air Quality/Smoke Management

3.5.1 Air Quality Issues

National Park Service wildland fire activities resulting in the emission of air pollutants are subject to all local, state, and federal air pollution control requirements. Federal requirements are outlined in Section 118 of the Clean Air Act (42 USC 7418). As smoke is a natural and inevitable byproduct of fire, a prescribed burn or wildfire are not considered to be point sources of air pollutants. Impacts are temporary, and are expected as part of the burn process – therefore, mitigation efforts take place to lessen impacts on air quality and visibility due to smoke.

In addition, individual burn units at Coldwater fall into a low particulate emissions category of fuel loading, in which a fire would release fewer than 75mg km² PM₂₅, or particulates >2.5 μ m in aerodynamic diameter. Fuel load models are outlined in Sikkink et al. (2009). Each burn unit is small, and smoke should clear quickly on burn days.

3.5.2 Smoke Management Activities

Coldwater Spring is located in a highly-urbanized area. Emissions from automobile and air traffic in the area are relatively high, as throughout the Minneapolis-St. Paul metro area, and industrial emissions are also an issue. When conducting burns, Mississippi NRRA firefighters will be cognizant of wind and lift patterns on burn days, and will work to minimize the impact of smoke from a burn at Coldwater or from unplanned ignitions, and requisite burn permits will be attained.

Due to concerns with the flight path for Runway 22 at the MSP International Airport, prescribed burns will be coordinated with the Metropolitan Airports Commission (MAC) to work on creating burn plans that mitigate and limit smoke impacts to the runway and incoming and outgoing flights. The MAC provides coordinated aviation services specifically for the MSP International Airport, including the control of runway and flight operations.

Burn plans will have clear, attainable objectives and goals, including the monitoring of smoke impacts surrounding the Coldwater Spring area. When burns are conducted, weather forecasts are crucial in determining smoke mitigation plans, especially in conjunction with the use of test fires.

The burn programs at Mississippi NRRA will be in compliance with Air Quality – Smoke Management Guidelines, as outlined in RM-18, and the fire management program will comply with local and state air pollution regulations, as well as the Clean Air Act.

At Coldwater Spring, smoke management concerns include:

- Reduced visibility along Highways 55 and 62, Hiawatha Ave., Minnehaha Ave., E 54th and E 54th St., and potentially the MSP International Airport.
- Smoke impacts on individuals using trails, those at Minnehaha Park, the Minnehaha Off-Leash Dog Park, and at Fort Snelling facilities.
- Potential impacts of settling smoke on river traffic, in the case of high atmospheric pressure or low-wind days.
- National Ambient Air Quality Standards within the Coldwater Spring area and adjacent air sheds.
- Inbound and outbound flights using Runway 22 at MSP.
- Smoke impacts on the VA Medical Center located west of Highway 55 from Coldwater.

Tactics for managing and mitigating the impacts of smoke at Coldwater Spring are as follows:

- 1) Planning
 - Smoke management plans will be included in all burn plans.
 - Smoke trajectory maps outlining the potential pathways of smoke, depending on wind patterns, will be developed, and sensitive targets identified in each scenario. This is especially relevant to the use of Runway 22 and the VA Medical Center.
 - Mitigation measures will be defined in burn plans, as well as instructions on how to instigate mitigation should the need arise.
 - Spot weather forecasts will be taken before and during all prescribed fires.
 - Weather will be monitored during prescribed fires.
 - Local fire districts will be notified of all burn activities prior to ignition.
- 2) Avoidance
 - Planned ignitions will not be initiated unless conditions outlined in the burn plan wind speed and direction, fuel loads, and distance to areas sensitive to smoke are within prescription.
- 3) Reduction
- If emissions conditions are outside of prescription, it is up to the burn boss to either reduce the size of the burn area or wait until conditions improve.
- Use aggressive mop-up tactics, if necessary.
- Fuel breaks can be established inside the burn area, if necessary, to limit the spread of the prescribed burn.
- Mechanical fuel reduction methods can be implemented if and when needed.

4) Dilution and Other Reduction Methods

- All prescribed fires at Coldwater Spring will be done under appropriate smoke dispersion conditions.
- Operations during dry fuel and low-humidity conditions (though not in extreme drought conditions) will reduce emissions, as well.
- 5) Traffic Management and Public Safety
 - Prescribed fire plans contain specific monitoring requirements for nighttime monitoring of smoke on roads surrounding Coldwater Spring, as appropriate.
 - If smoke reduces visibility on roads, thereby creating a safety hazard, NPS rangers or police will be asked to respond to address public safety.
 - Law enforcement personnel will determine what traffic controls are necessary; additional forces can be dispatched, as needed.

3.6 Data and Records Management

Considerable time and effort are dedicated to acquiring and managing fire program information and data. Information is used by the park, regions, and national offices for a variety of purposes.

Data and recordkeeping represent a significant investment, must be well managed to be readily available for use when needed, and must be safeguarded from damage or destruction.

Business practices at Mississippi NRRA are based on the Interagency Incident Business Management Guide.

The Great Lakes Zone FPMA is responsible for

• budget tracking and management of Mississippi NRRA fuels, monitoring, and prescribed fire projects;

The biological science technician and/or park biologists are responsible for preparing and planning fuel management projects at Coldwater Spring, and are expected to assist and update the 5-year burn plan.

Other administrative paperwork for both prescribed and wildfires are the responsibility of the Great Lakes Zone for Mississippi NRRA, along with management staff.

4.0 PROGRAM MONITORING and EVALUATION

4.1 Monitoring

NPS Management Policies, Section 4.5 (2006), states

"Naturally ignited and human-ignited fires managed to achieve resource management and fuel treatment objectives... will also include monitoring programs that record fire behavior, smoke behavior, fire decisions, and fire effects to provide information on whether specific objectives are met and to improve future fire management strategies."

Fire monitoring plans include wildland fire, prescribed fire, and non-fire fuels treatments, as outlined in the NPS Fire Monitoring Handbook (2003) and RM-18, chapter 8.

All fires at Coldwater Spring and anywhere else at Mississippi NRRA will be monitored to determine their effects on the ecosystems in which they occur. Continuous monitoring of fire effects is necessary to make informed decisions on keeping future fires within prescription, when to use suppression tactics, and how best to protect life and property.

Short- and long-term monitoring of fires at Mississippi NRRA includes

- documenting the fire environment (weather, fuels, topography);
- describing fire behavior (manner and rate of spread and flame length, for example); and
- documenting fire effects (consumption of fuels, changes in plant and animal community composition, landscape structure, etc.).

The fire monitoring plan at Mississippi NRRA will follow vegetation and fuel sampling protocols outlined in the NPS Fire Monitoring Handbook (2003). Fire effects monitoring includes the installation of permanent vegetation plots and fuels transects, used to measure trees of all sizes, ground cover, dead and down fuels, litter, and duff. These plots also include photographic evidence of changes, presumably brought about by the use of prescribed fire. Plots are monitored before any burns take place, then 1, 2, 5, and 10 years post-burn – since the burn regime at Mississippi NRRA is a 3-5yr rotation, however, most plots will not be left unburned for 10 years. Results of monitoring are provided to resource management staff, which will allow them to provide feedback on the success and/or desired adaptations of the fire management program. Determining successes will depend on how data reflect the objectives outlined in section 2.1.

Permanent vegetation monitoring plots will be established at Coldwater Spring; these areas can be used, if necessary, to indefinitely monitor vegetation changes pre- and post-fire at Coldwater Spring. Impermanent vegetation sampling will also occur, which would prove valuable in providing pre- and post-fire vegetation changes throughout a single season, as these are sampled more than once every year or two. Additionally, every 5 years, and potentially post burn years, the park conducts a Bio-blitz at Coldwater Spring which measures species diversity through identification of every plant and animal species present. In theory, the utilization of prescribed fire in a fire dependent plant community should increase or maintain species diversity. Areas of high diversity generally are an indicator of a healthy ecological system. Thus, comparing the Bio-blitz data from pre and post burn years (and over time) should give park biologists a good measure for how prescribed fire is affecting ecological health.

4.2 Science and Climate Change

Science

Mississippi NRRA will utilize research findings to refine goals and objectives, and modify management actions and/or treatment objectives.

Since there was no burn program established at Mississippi NRRA prior to this fire management plan, no current fire research is being conducted, and there is little historical mention of prescribed or wildfire in the area. There is a strong body of evidence, however, emphasizing the importance and role of fire in tallgrass prairie and other ecosystems. The installation of fire effects plots will be the beginning of data collection at Mississippi NRRA, and subsequent data can be used to inform adaptive management practices.

Implementation of the fire plan will be based on best available science about ecosystems similar to that at Mississippi NRRA, and will be in accordance with RM-18, chapter 18.

Climate Change

As climate change progresses, Minnesota's weather is generally expected to get warmer and wetter. This could potentially benefit more mesic forest ecotypes in the long term. As such, Mississippi NRRA will monitor the effects climate change is having on local ecosystems and adopt best management practices as they are developed.

4.3 Annual Program Evaluation and Fire Management Plan Review Process

A significant component of the adaptive management process is bringing new knowledge to bear on actions performed by the fire management program. New knowledge can come from recent research, monitoring results, evaluation of the programmatic accomplishments, and operational evaluations, such as After Action Reviews and more. Evaluation can be useful at several levels, including at the shift level (AARs and shift reports), at the project/event level (post project/event reviews), and for annual programmatic assessments.

RM-18, chapter 4 requires that the park annually incorporate new knowledge, and adjust as needed. Every year, parks are required to conduct a substantial review – defined as bringing in a larger community of knowledgeable parties, such as regional and national fire management staff, university scientists, and others. The five year review is intended to reinforce park perceptions, or challenge them, as needed, with the objective of continuous improvement and excellence in fire management. Regional offices may also initiate external program reviews for a variety of reasons, including the occurrence of significant fire events or changes in Mississippi NRRA fire staff.

All fire events at Mississippi NRRA will be reviewed to ensure that decisions are being made correctly; to adjust tactics, as needed; to improve fire programs; and, ultimately, to determine the effectiveness of the fire program. Incident reviews follow the guidelines laid out in RM-18, chapter 17, and *Interagency Standards for Fire and Fire Aviation Operations*; annual reviews will follow procedures outlined in RM-18, chapter 4.

Reviews to complete at Mississippi NRRA are described below (Tables 4 and 5).

Review	Responsible Party	Timeframe
Hotline Review	Incident Commander	During incident
IMT Closeout and Review	Park Superintendent	During transfer of command
Park Level Review	Park Superintendent or designee	After incident
Regional Level Review	Regional FMO	After incident
National Level Review	National FMO	After incident
Entrapment and Fire Shelter Deployment Review	Regional FMO	ASAP after incident or deployment
Fire Readiness Review	Fire Management Officer	Annual
Prescribed Fire Plan Technical Review	Qualified Burn Boss	Each plan
After Action Review (AAR)	Incident Commander, Burn Boss	Immediately post event
Escaped Prescribed Fire Review	FMO, Regional FMO, National Fire Director	After incident
Fire Management Plan Review	Park Superintendent, Deputy Superintendent, FMO	Annual review update

Table 4: Incident-related reviews at Mississippi NRRA

Table 5: Annual revision schedule

Item	Responsible Party	Recommended Revision
Annual Revision Documents	FMO	January
Step-Up Plan	FMO and Fire Coordinator	January
Long-term Fuel Treatment Plan	Chief of Resource Management and Superintendent	January
Cooperative Annual Operating Plan	Superintendent	January
Initial Scoping FMP/EA Update	Superintendent	As needed
EA Update	Superintendent	As needed
FMP Update	FMO	January
FMP Update Approved	Superintendent	January/February

Appendix	Re qui re d	Co ndi tio nal *	Re co m me nd ed
A. References and Literature Cited	X		
B. Definitions and Acronyms	X		
 C. Compliance for Fire Management Plan List individuals and organizations consulted during plan development. List contributors (authors) and reviewers of the plan; identify their role in the Fire Management Plan. NEPA - Include copy of Decision Document ((Memo-to-File, CE, FONSI, ROD) for FMP NHPA (Section 106) - Include copy of response from SHPO for FMP; include the signed Programmatic Agreement if applicable. ESA (Section 7) - Include copy of response from FWS for FMP; document informal consultation, or include the FWS-issued Biological Opinion if consultation was formal 	X		
D. Multi-Year Fuels Treatment Plan		X	
E. Fire Monitoring Plan		X	
F. Preparedness Planning Documents	X		
Annual delegation of Authority from Mississippi NRRA Superintendent	x		
Initial Response Plan Strategic fire size-up procedures Notification Procedures	X		
 Agreements Step-up Plan/Staffing Plan Status and location of Fire Danger Rating Operations Plan Status and location of Job Hazard Analyses for wildland fire and fire aviation operations. 		X X	X
 List of current wildland fire qualified park unit personnel Structure protection inventory and needs Transfer of Command Package, including a sample Delegation of Authority from Park Unit Superintendent to 			X X

incoming incident commanders, burn bosses, and/or incident management team			X
G. Communication and Education Plan		X	
H. Fire Prevention Plan		X	
I. Duty Officer Manual			X
J. Cooperative and Interagency Agreements		X	
 K. WFDSS Objectives and Requirements Strategic Objectives Management Requirements 			X
L. Contracts for Wildfire and Prescribed Fire and Suppression Resources		X	
M. Standards for BAER, BAR and ES	+		X
N. Serious Injury or Death Procedure	X		
O. Safety Program/Plan	X		
P. Smoke Management Plan	+	X	
Q. Minimum Impact Suppression Tactics (MIST) – Supplemental Guidelines	-	-	X
R. Maps of Coldwater and Mississippi NRRA	X		

Appendix A

References

Aids to Determining Fuel Models for Estimating Fire Behavior, Anderson, Apr 1982

Burned Area Emergency Response Treatments Catalog, Dec, 2006

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan, Aug 2001

Clean Air Act, Section 118, 42 USC 7418

Cultural Resource Management Guideline, NPS-28, 1997

Department of Interior Department Manual 620, Chapter 1, Apr 1998

Department of Interior Department Manual 620, Chapter 3 Burned Area Emergency Stabilization and Rehabilitation, May 2004

Federal Wildland Fire Management Policy and Program Review, Dec 1995

Fire and Aviation Management Web Applications (FAMWEB)

http://fam.nwcg.gov/fam-web/

Eastern Area Coordination Center

http://gacc.nifc.gov/eacc/

Fire Monitoring Handbook, 2003

Fire Program Analysis (FPA)

http://www.fpa.nifc.gov/

Fireline Handbook, PMS410-1, March 2004

Fire Regime Condition Class (FRCC)

https://www.frames.gov/partner-sites/frcc/frcc-home/

Glossary of Wildland Fire Terminology, PMS205, Nov 2008

Guidance for Implementation of Federal Wildland Fire Management Policy, Feb 2009

Incident Qualifications and Certification System (IQCS)

https://iqcsweb.nwcg.gov/

Incident Response Pocket Guide, PMS461, Jan 2006

Interagency Burned Area Rehabilitation Guidebook, Oct 2006

Interagency Fire Program Management Qualifications Standards and Guide (IFPM)

https://www.ifpm.nifc.gov/default.htm

Interagency Helicopter Operations Guide (IHOG), 2006

Interagency Incident Business Management Handbook, PMS902, May 2009

Interagency Preparedness Review Checklists, NPS, 2014

Interagency Standards for Fire & Aviation Operations, 2017

Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resources in Fire Adapted Ecosystems – A Cohesive Strategy, USDOI/USDA, 2002

Minimum Impact Suppression Tactics Guidelines, Jan 2003

Modification of Federal Wildland Fire Management Policy Guidance, May 2008

Natural Resource Management Guideline, NPS-77, 1989

NEPA Guideline, Director's Order 12 and Reference Manual 12, 2000

NFDRS Weather Station Standards, PMS426-3, May 2005

NPS Director's Order 18: Wildland Fire Management, Jan 2008

NPS Management Policies, 2006

NPS Reference Manual 18: Wildland Fire Management, Jan 2008

Public Law 100-696, Title VII, Mississippi National River and Recreation Area, 1988

Resource Advisor's Guide for Wildland Fire, PMS313, Jan 2004

Resource Ordering and Status System

http://ross.nwcg.gov/

Smoke Management Guide for Prescribed and Wildland Fire, PMS 420-2, Dec 2001

Weather Information Management System User Guide, Dec 2011

Wildland and Prescribed Fire Management Policy, NWCG, 1998

Wildland Fire Decision Support System (WFDSS)

http://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml

Wildland Fire Qualifications System Guide, PMS310-1, June 2009

Literature Cited

Abrams, M.D. 1992. Fire and the development of oak forests. BioScience 42(5): 346-353.

- Au, L., Andersen, D.E., and Davis, M. 2008. Patterns in bird community structure related to restoration of Minnesota dry oak savannas and across a prairie to oak woodland ecological gradient. *Nat Area J* 28(4): 330-341.
- Bradshaw, Larry S.; Deeming, John E.; Burgan, Robert E.; Cohen, Jack D., compilers. The 1978 National Fire-Danger Rating System: technical documentation. General Technical Report INT-169. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1984. 44 p.
- Burgan, Robert E. 1988. 1988 Revisions to the 1978 National Fire-Danger Rating System. Res. Pap. SE-273. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 144 p.
- Burton, J.A., Hallgren, S.W., Fuhlendorf, S.D., and Leslie, D.M. Jr. 2011. Understory response to varying fire frequencies after 20 years of prescribed burning in an upland oak forest. Plant Ecol. 212: 1513-1525.
- Clouse, R.A. 2001. Archaeological research at the former Twin Cities Bureau of Mines Testing Facility, Minnesota. Minnesota Historical Society. 108pp.
- Delcourt, H.R. and Delcourt, P.A. 1997. Pre-Columbian native American use of fire on southern Appalachian landscapes. Cons Bio 11: 1010-1014.
- Helzer, C. 2010. The ecology and management of prairies in the Central United States. The Nature Conservancy. University of Iowa Press: Iowa City, IA. 216pp.
- Henning, B.J. 2002. Historical study: former U.S. Bureau of Mines property, Twin Cities research center. Final report. 68pp.
- Hutchinson, T.F., Long, R.P., Rebbeck, J., Sutherland, E.K., and Yaussy, D.A. 2012. Repeated prescribed fires alter gap-phase regeneration in mixed-oak forests. Can. J. For. Res. 42: 303-314. doi:10.1139/X11-184.
- Jones, R. 2011. Archaeological inventory at the former U.S. Bureau of Mines Twin Cities Research Center main campus, Hennepin County, Minnesota. Great Lakes Archaeological Research Center, Project No. 11-064. 52pp.
- Kraft, G.J., Mechenich, C., Mechenic, D.J., Cook, J.E., and McNelly, J.L. 20174. Natural Resource Condition Assessment: Mississippi NRRA. In progress.
- McEwan, R.W., Hutchinson, T.F., Long, R.P., Ford, R.D., and McCarthy, B.C. 2007. Temporal and spatial patterns of fire occurrence during the establishment of missed-oak forests in eastern North America. J. Veg. Sci. **18**(5): 655-664. doi:10.1111/j.1654-1103.2007.tb02579.x.

- Minnesota Department of Natural Resources. 2005a. Field guide to the native plant communities of Minnesota: the Eastern Broadleaf Province. Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. MNDNR St. Paul, MN.
- Minnesota Department of Natural Resources. 2005b. Field guide to the native plant communities of Minnesota: the Prairie Parkland and Tallgrass Aspen Parklands provinces. Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. MNDNR ST. Paul, MN.
- Minnesota Pollution Control Agency. 2014. Minnesota air quality index trends: 2003-2013. Minnesota Pollution Control Agency, aq1-46. 7pp. Available at http://www.pca.state.mn.us/index.php/view-document.html?gid=19493.
- National Climate Data Center. 2014. Data tools: 1981-2010 normals. National Oceanic and Atmospheric Administration. Accessed 05 Sept 2014. http://www.ncdc.noaa.gov/cdo-web/datatools/normals.
- O'Brien, M.M., Rucks, P., Terrell, M.M., and Vermeer, A.C. 2006. The cultural meaning of Coldwater Spring: Final ethnographic resources study of the former U.S. Bureau of Mines Twin Cities Research Center property, Hennepin County, Minnesota. GSA RFQ No. 71599. 228pp.
- Panzer, R. 2002. Compatibility of prescribed burning with the conservation of insects in small, isolated prairie reserves. *Conserv Biol* 16(5): 1296-1307.
- Pyne, S.J., Andrews, P.L., and Laven, R.D. 1996. Introduction to wildland fire. Wiley, New York.
- Sikkink, Pamela G.; Lutes, Duncan C.; Keane, Robert E. 2009. Field guide for identifying fuel loading models. Gen. Tech. Rep. RMRS-GTR-225. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 33 p.
- Smith, D., Williams, D., Houseal, G., and Henderson, K. 2010. The Tallgrass Prairie Center guide to prairie restoration in the upper Midwest. University of Iowa Press: Iowa City, IA. 301pp.
- Tester, J.R. 1996. Effects of fire frequency on plant species in oak savanna in east-central Minnesota. *B Torrey Bot Club* 123(4): 304-308.

Appendix B

Definitions

Also see the Glossary of Wildland Fire Terminology at: <u>http://www.nwcg.gov/pms/pubs/glossary/pms205.pdf</u>

- **Burning Index (BI)** A numerical index related to the contribution of fire behavior to the effort of containing a fire. BI divided by 10 roughly equates to anticipated flame length at the head of a fire.
- **Decision criteria checklist (Initial Go/No-Go Decision)** A set of standard evaluation criteria to determine if the current wildland fire meets criteria to be managed for resource benefits. The completion of these criteria will lead to a decision to "Go/No-Go" with management of the fire for resource benefits.
- Detection The act or system of discovering and locating fires.
- **Expected weather conditions** those weather conditions indicated as common, likely, or highly probable based on current and expected trends and their comparison to historical weather records. These are the most probable weather conditions for this location and time. These conditions are used in making fire behavior forecasts for different scenarios (one necessary scenario involves fire behavior prediction under "expected weather conditions").
- **Disturbance** any relatively discrete event, either natural or human induced, that causes a change in the existing condition of an ecological system.
- **Confine** the strategy where a fire perimeter is managed by a combination of direct and indirect actions and use of natural topographic features, fuel, and weather factors.
- **Ecosystem management** the careful and skillful use of ecological, economic, social, and managerial principles in managing ecosystems to produce, restore, or sustain ecosystem integrity and desired condition over the long term.
- **Escaped fire** a fire which has exceeded or is expected to exceed initial attack capabilities or prescription.
- **Fire complexity analysis** A process for assessing wildland fire organizational needs and relative complexity in terms of ICS types (I, II, III etc.).

- **Fire Management Unit** any land management area definable by objectives, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regimes, etc., that sets it apart from management characteristics of an adjacent unit. FMUs are delineated in Fire Management Plans (FMP). These units may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.
- **Fire dependent or fire maintained ecosystems** an ecosystem can be called fire dependent or fire maintained if periodic perturbations by fire are essential to the functioning of the system.
- Fire evaluation the process of examining and appraising fire monitoring information.
- **Fire monitoring** the act of observing a fire to obtain information about its environment, behavior, and effects for the purpose of evaluating the fire and its prescription.
- **Fire prescription** a written statement defining the objectives to be attained, and the conditions of temperature, humidity, wind direction and speed, and fuel moisture, under which a fire will be allowed to burn. Generally expressed as an acceptable range of the various indices, and the limit of the geographic area to be covered.
- **Fire regime** a description of the fire type characteristics for an area. It includes the fire size, frequency and severity. Fire regimes result from a unique combination of climate and vegetation.
- **Fire return interval** the number of years between two successive fires occurring in a designated area.
- Fire use the combination of wildland fire use and planned ignitions to meet resource objectives.
- **Fuel** All material (whether in the ground, on the surface, or in the air) that may be burned, including duff, logs, branches, needles and twigs. Fuel is divided into four size classes:

1-hour time lag - < 1/4 inch (grass, litter, duff)

10-hour time lag - 1/4 inch - 1 inch (twigs and small stems)

100-hour time lag - 1 inch - 3 inches (branches)

1000-hour time lag - > 3 inches (large branches and stems)

Hazard fuels – excessive live and/or dead wildland fuel accumulations (either natural or created) having the potential for the occurrence of uncharacteristically intense wildland fires.

- **Holding actions** planned actions required to achieve wildland and prescribed fire management objectives. These actions have specific implementation timeframes for fire use actions but can have less sensitive implementation demands for suppression actions. For wildland fires managed for resource benefits, a Maximum Management Area (MMA) may not be totally naturally defensible. Specific holding actions are developed to preclude fire from exceeding the MMA. For prescribed fires, these actions are developed to restrict the fire inside the planned burn unit. For suppression actions, holding actions may be implemented to prohibit the fire from crossing containment boundaries. These actions may be implemented as firelines are established to limit the spread of fire.
- **Incident Commander Type 3 (ICT3)** The Incident Commander Type 3 is responsible for incident activities of multiple resources including the development and implementation of strategic decisions, and for approving ordering and releasing resources. Depending on the size of the incident, jobs such as operations and logistics may be delegated to other personnel.
- **Incident Commander Type 4 (ICT4)** The Incident Commander Type 4 is responsible for incident activities of single resources during the initial attack stage of an incident, including the development and implementation of strategic decisions, and for approving, ordering and releasing resources.

Initial Action (Initial Attack) – The actions taken by the first resources to arrive at a wildfire.

- **Preparedness** Activities that lead to a safe, efficient and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. This term replaces pre-suppression.
- **National Fire Danger Rating System (NFDRS)** A system that uses weather, fuel, lightning and human-caused fire occurrence to formulate several indices. It relates only to the potential of the initiating fire. Fire danger is rated from a worst-case approach. It provides guidance for short-range planning.

Natural ignition – a wildland fire ignited by a natural event such as lighting or volcanoes.

Planned Ignitions – See prescribed fire

Prescription – a set of measurable criteria that guides the selection of appropriate management strategies and actions. Prescriptions criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

- **Prescribed fire** any fire ignited by management actions to meet specific objectives. Prescribed fires are conducted in accordance with prescribed fire plans (also called Planned Ignitions).
- **Prescribed fire plan** a plan required for each prescribed fire. Plans are documents prepared by qualified personnel, approved by the agency administrator, and include criteria for the conditions under which the fire will be conducted (a prescription).
- **Strategic fire response (SFR)** the response to a wildland fire is based on an evaluation of risks to firefighter and public safety, the circumstances under which the fire occurs, including weather and fuel conditions, natural and cultural resource management objectives, protection priorities, and values to the protected. The evaluation must also include an analysis of the context of the specific fire within the overall local, geographic area, or national wildland fire situation. This evaluation process uses the WFDSS decision support system.
- **Value** In terms of fire prevention, it is defined as natural or developed areas where loss or destruction by wildfire would be unacceptable.
- **Wildfire** Any fire (natural or human caused) burning in wildland fuels; Synonymous with wildland fire.
- **Wildland Fire Decision Support System (WFDSS)** A strategic fire management assessment and documentation process (program) used to determine the appropriate response to wildfires. This process is replacing the previously used WIFP and WFSA analysis processes.
- **Wildland fire management** all activities related to the prevention, control or use of fire burning through vegetation under specific prescriptions for the purpose of achieving fire management objectives.

Acronyms

AAGCIM: Agency Administrator's Guide to Critical Incident Management (NFES 1356)				
AAR: after action review				
AFMO: Assistant Fire Management Officer				
ATVs: all-terrain vehicles				
BAER: burned area emergency response				
BI: burn index				
CSFMU: Coldwater Spring Fire Management Unit				
DNR: Department of Natural Resources				
DO 18: Director's Order 18 (Department of the Interior)				
FBO: Anderson Fire Behavior Model (Anderson 1982)				
FFT2: firefighter type 2.				
FLM: Fuel Loading Model.				
FMO: Fire Management Officer.				
FMP: Fire Management Plan				
FMU: Fire Management Unit				
FPMA: Fire Program Management Assistants				
IAP: Incident Action Plan.				
IC: Incident Commander				
ICS: Incident Command System				
IQCS: Incident Qualification and Certification System				
IRPG: Incident Response Pocket Guide				
JHA: job hazard analysis				
MAC: Metropolitan Airports Commission				
Mississippi NRRA: Mississippi National River and Recreation Area				
MIST: Minimum Impact Suppression Tactics				
MOU: Memorandum of Understanding				

MSP: Minneapolis - St. Paul International Airport **MWR:** Midwest Region of the National Park Service **NEPA:** National Environmental Policy Act **NFDRS:** National Fire Danger Rating System **NFES:** National Fire Equipment System **NFPORS:** National Fire Plan Operations and Reporting System **NPS:** National Park Service NRCA: Natural Resource Condition Assessment **NWCG:** National Wildfire Coordinating Group **PIO:** Public Information Officer **PM**₂₅: particulate matter with a diameter below 2.5 microns **PPE:** personal protective equipment USDA: United States Department of Agriculture USDOI: United States Department of the Interior **UTVs:** utility task vehicles **VA:** Veterans Administration **VRP:** Visitor and Resource Protection WFDSS: Wildland Fire Decision Support System **WFMI:** Wildland Fire Management Information **WUI:** wildland – urban interface

Compliance for FMP to be completed

Individuals and Organizations consulted during FMP development

Organization	Contact	Contact Information
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National Park Service GLEPMT	Isaiah Messerly	Isaiah_Messerly@nps.gov
National Park Service Great Lakes Zone FMO	Mary Ellen Whitenack (Mel)	Mary_Ellen_Whitenack@nps.gov
National Park Service MWRO	Scott Beachum	Scott_Beachum@nps.gov
National Park Service MWRO	David Niemi	David _Niemi@nps.gov
City of St. Paul	Adam Robbins Environmental Coordinator	651-632-2457 Adam.Robbins@ci.stpaul.mn.us
St. Paul Department of Safety and Inspection (DSI)	Jim Terucca Lead for Fire Permit Process	651-266-8996
Minneapolis Park and Recreation Board	Marcia Holmberg Natural Resources Coordinator	612-313-7723 MHolmberg@minneapolisparks.org
Minnesota Department of Natural	Anton Benson Regional	651-259-5746
Resources	Specialist Tod Stoid	anton.benson@state.mn.us
Department of veterans Affairs	Maintenance Supervisor	theodore.steidl@va.gov
Minneapolis Police Department	Bryan D. Tyner Fire Marshall	612-673-3270

Minneapolis Fire Department	Minneapolis Fire	612-673-3270
	Department	
Metropolitan Airports Commission/Federal	John Ostrom	612-726-5780
Aviation Administration	Manager, Airside	John.Ostrom@mspmac.org
	Operations	
Minneapolis-St. Paul Airport Police	Nathan Kreye	612-467-0675
	Assistant Chief - Fire	nathan.kreye@mspmac.org
	Marshall	
Minnesota Department of Transportation	Ken Graeve	651-366-3613
	Roadside Veg.	kenneth.graeve@state.mn.us
	Mgmt/Presc Fire	

Contributors to the Fire Management Plan

- MWR AFMO
 - Update FMP
- MWR FMO
 - Conduct annual review of FMP
- Chief of Resource Management Mississippi NRRA
 - Conduct annual review of FMP
- Superintendent Mississippi NRRA
 - Provide annual approval of FMP
- Authors
 - Christine Steinwand, Biological Science Technician
 - Neil Smarjesse, Biologist
 - •

NEPA Impact Statement

The Environmental Assessment document is in progress and under public reviews at the time of this FMP's publication.

NHPA (Section 106)

Review of this project will follow procedures outlined under Section 106 of National Historic Preservation Act and related coordination at the time of this FMP's publication.

ESA Section 7

Coordination with the US Fish and Wildlife Service as required by Section 7 of the Endangered Species act has been undertaken and was included in preparation of the Environmental Assessment.

Multi-Year Fuels Treatment Plan

Discussed in section 3.2.1

Fire Monitoring Plan

Discussed in section 4.0

Preparedness Planning Documents

DELEGATION OF AUTHORITY FOR MISSISSIPPI NATIONAL RIVER AND RECREATION AREA

FIRE

As of ______ on _____, I have delegated authority to you, ______, as Incident Commander for the management of the ______ Fire. You have full authority of fire management activities within the framework of Agency policies, Federal law, and direction provided by the Fire Management Plan, by the Mississippi National River and Recreation Area of the National Park Service.

Your primary responsibility is to organize and direct your assigned resources for safe and effective management of this fire. You are accountable to the Agency Administrator or their designated representative.

My specific considerations for management of this fire are:

- 1. Provide for firefighter and public safety using aggressive risk management.
- 2. Manage the fire with multiple objectives as determined by natural/cultural resource values at risk.
- 3. Manage the fire in terms of the course of action as identified in Wild Fire Decision Support System.
- 4. Maintain Park and public awareness of the fire by working with Park Public Information Officers.
- 5. Manage the fire costs effectively based on values at risk from the fire and natural resource values.
- 6. Minimize disruption of residential access to private property, and visitor use consistent with public safety.
- 7. Restrictions for suppression actions include no earthmoving equipment (dozers, plows) without approval from Superintendent or the Fire Management Officer.
- 8. Provide training opportunities for National Park Service personnel as requested to strengthen our organizational capabilities.

John O. Anfinson

Superintendent, Mississippi National River and Recreation Area

XXXXXX

Incident Commander, (organization XXXXX)

Date

Date

All previous delegations of authority are hereby rescinded. This delegation will remain in effect until ______.

Staffing Level	NFDRS Safety Rating	Ignition Component	Burning Index	Spread Component	Energy Release Component
Ι	Low	0-5	0-13	0-17	0-1
II	Medium	6-15	14-27	18-39	2
III	High	16-29	28-41	40-83	3
IV	Very High	30-45	42-53	84-109	4
V	Extreme	46+	54+	110+	5+

Table 6: Relevant staffing levels for preparedness

Staffing Level	Actions
	Prevention: fire danger signs are to be posted.
I	Preparedness: Mississippi NRRA personnel will carry on with normally assigned duties.
	Management: Fire weather and indices will be monitored as usual. Increase one staffing class if two of the three fire behavior components increase, if special events in the Coldwater Spring or island areas warrant more protection, or there is an uncontrolled fire in the Coldwater Spring or island vicinity.
	Prevention: fire danger signs are to be posted.
п	Preparedness: Mississippi NRRA personnel will carry on with normally assigned duties.
	Management: same as Staffing Level I.
	Prevention: fire danger signs are to be posted, and interpretive staff will be asked to include a message about fire prevention in their programs.
III	Preparedness: firefighter-qualified staff will be available to assist as needed on fires occurring on NPS administered lands during normal work hours
	Management: in addition to previous actions, increase staffing level if the time includes a Federally-mandated 3-day weekend.
	Prevention: in addition to previous staffing levels, Mississippi NRRA is encouraged to contact local media.
IV	Preparedness: in addition to previous staffing levels, available Mississippi NRRA employees will patrol the Coldwater Spring or island area; work hours may be extended to 1800 hours.
	Management: in addition to previous staffing levels, the Chief of Resource Management, the Superintendent's Office, the Great Lakes Zone FMO, and the Regional FMO are to be notified of the situation. An emergency preparedness account should be opened.
	Prevention: in addition to previous staffing levels, Mississippi NRRA will impose
	fire restrictions and consider closing trails and visitor areas that may be at-risk.
V	Preparedness: same as Staffing Level IV.
	Management: same as Staffing Level IV.

Table 7: Prevention, preparedness and management actions

Strategic Size-Up Procedures for Full Suppression Only

The Incident Commander (Likely from Minneapolis Fire Department as first responders) is responsible for conducting the size-up of the fire, which includes reporting to dispatch the size up report found on the inside on the IRPG cover, determining the point of origin, protecting the point of origin, determining the cause if possible, and sharing other pertinent information with dispatch personnel, Assistant and/or Fire Management Officer and Park Management. The AFMO/FMO/Park management will report up the chain of command to the park Superintendent and progress toward containment. Any pertinent information from park management will be relayed back to the IC and relay this back to the initial attack Incident Commander on-scene.

This communication loop ensures that appropriate actions are initiated to address the fire situation; however, it should be acknowledged that escaped prescribed burns and wildfire conditions may change rapidly, and that the IC should use whatever advantage they have to maximize firefighter safety and opportunities toward containment of the fire or escape. The nature of these fires being time-sensitive means that, although the IC should be in communication with individuals off-scene, the primary goal is to keep firefighters and the public safe, and to quickly address problems at hand; therefore, it is important to understand that the chain of command may, at times, be secondary to immediate threats to life or property.

AVIATION MANAGEMENT

Retardant Use

- During initial attack, fire managers must weigh the non-use of retardant with the probability of initial attack crews being able to successfully control or contain a wildfire. If it is determined that use of retardant may prevent a larger, more damaging wildfire, then the manager might consider consequences of larger firefighting forces' impact on the land. The Superintendent will give the final approval.
- Consider impacts of water drops versus use of foam/gel/retardant. If foam/gel/retardant is deemed necessary use even in sensitive areas. This decision must take into account all values at risk and if necessary, consider use of foam or gel before retardant use. The Superintendent will give the final approval.

HAZARDOUS MATERIALS

Flammable/Combustible Liquids

• Store and dispense aircraft and equipment fuels in accordance with National Fire Protection Association (NFPA) and Health and Safety Handbook requirements. Avoid spilling or leakage of oil or fuel, from sources such as portable pumps, into water sources or soils.

• Store any liquid petroleum gas (propane) downhill and downwind from fire camps and away from ignition sources.

Flammable Solids

• Pick up residual fusees debris from the fireline and dispose of properly.

Fire Retardant/Foaming Agents

- Do not drop retardant or other suppressants near surface waters.
- Use caution when operating pumps or engines with foaming agents to avoid contamination of water sources.

Fireline Explosives

• Remove all undetonated fireline explosives from storage areas and fireline at the conclusion of the incident and dispose of according to Bureau of Alcohol, Tobacco and Firearms (BATF) and Fireline Blaster Handbook requirements. Properly dispose of all packaging materials.

FIRE REHABILITATION

Rehabilitation is a critical need. This need arises primarily because of the impacts associated with fire suppression and the logistics that support it. The process of constructing control lines, transport of personnel and materials, providing food and shelter for personnel and other suppression activities has a significant impact on sensitive resources regardless of the mitigating measures used. Therefore, rehabilitation must be undertaken in a timely, professional manner.

During implementation, the resource advisor should be available for expert advice and support of personnel doing this work as well as quality control.

Rehabilitation Guidelines

- Pick up and remove all flagging, garbage, litter, and equipment. Dispose of trash appropriately.
- Clean fire pit of unburned materials and fill back in.
- Discourage use of newly established trails created during the suppression effort by covering with brush, limbs, small diameter poles, and rotten logs in a naturally appearing arrangement.
- Replace dug-out soil and/or duff and obliterate any berms created during the suppression effort.
- If impacted trails have developed on slopes greater than six percent, construct water bars according to the following water bar spacing guide:

Trail Percent Grade Maximum Spacing Ft.

• Where soil has been exposed and compacted, such as on user-trails and pump sites, scarify the top 2-4 inches and scatter with needles, twigs, rocks, and dead branches. It is unlikely that seed and fertilizer for barren areas will be appropriate, in order to maintain the genetic integrity of the area. It may be possible, depending on the time of year and/or possibility of a rainy period, to harvest and scatter nearby seed, or to transplant certain native vegetation.

- Where trees were cut or limbed, cut stumps flush with ground, scatter limbs and boles, out of sight in unburned area. Camouflage stumps and tree boles using rocks, dead woody material, fragments of stumps, bolewood, limbs, soil and fallen or broken green branches. Scattered sawdust and shavings will assist in decomposition and be less noticeable. Use native materials from adjacent, unimpacted areas if necessary.
- Remove newly cut tree boles that are visible from trails or meadows. Drag other highly visible woody debris created during the suppression effort into timbered areas and disburse. Tree boles that are too large to move should be slant cut so a minimal amount of the cut surface is exposed to view. Chopping up the surface with an axe or pulaski, to make it jagged and rough, will speed natural decomposition.
- Leave tops of felled trees attached. This will appear more natural than scattering the debris.
- Tear out sumps or dams, where they have been used, and return site to natural condition, Replace any displaced rocks or streambed material that has been moved. Reclaim streambed to its pre-disturbed state, when appropriate.
- Walk through adjacent undisturbed area and take a look at your rehab efforts to determine your success at returning the area to as natural a state as possible. Good examples should be documented and shared with others.

DEMOBILIZATION

Because demobilization is often a time when people are tired or when weather conditions are less than ideal, enough time must be allowed to do a good job. Choose the most efficient and least impacting method to both the landscape and the fire organization mission. An on-the-ground analysis of "How Things Went" will be important.

U.S Department Of Interior	WORK PROJECT	LOCATION: MISSISSIPPI NATIONAL RIVER	NEW REVISED
JOB HAZARD	ACTIVITY: Fire Suppression	AND RECREATION AREA	PAGE 1 OF 1
ANALYSIS			DIVISION:
	NAME OF ANALYST:	JOB TITLE:	FIRE /resource management
			DATE PREPARED:
TASK/PROCEDURES	HAZARDS	SAFE JOB PROCEDURES	
Travel to and from an incident	Motor vehicle accidents	Drive defensively. Use seat bel	ts.
	Slippery road surfaces, soft shoulders, narrow roadways, weather, darkness,	Use both redights and sireh, of Traveling through an intersection Sirens and lights are to be used Exercise common sense when u around schools, hospitals, and c permits full control of vehicle. Thighways.	on shall not exceed 10 mph. by authorized drivers only. using redlights and sirens crowds. Drive at a speed that Never exceed 65 mph on
Engine and vehicle placement	smoke	Provide traffic control if necess enforcement if needed. Park as If dealing with a vehicle fire po distance. Position engine to pro tactical operations.	ary and request law far off the roadway as possible. sition equipment at safe tect firefighters and optimal
Attack/Extinguishment	Traffic, blind curves, weather, fire threat, smoke, hazardous materials	Wear PPE. Establish LCES, ad be aware of the 18 watchout sit working around powerlines. Us tanks. Remember additional wa triage for the wildland-urban in possible.	here to the 10 fire orders and uations. Use caution when e caution around propane ttchout situations structure terface. Avoid heavy smoke if
Secure Scene and Scene Safety	Burns, explosives, smoke, toxic fumes, traffic, cuts, and abrasions.	Establish crowd control. Isolate emergency workers. Encourage enforcement to control by stand if needed.	e and deny entry except for by standers to leave. Use law lers and traffic. Barricade area
Holding/Mop UP/Patrol crew	Explosives, Smoke, toxic fumes, traffic, and by	Wear PPE. Establish LCES, ad be aware of the 18 watchout sit prior to beginning work.	here to the 10 fire orders and uations. Receive safety briefing

	standers		
	Injuries and death, falls, snags, bees, snakes, smoke, and burns		
FMO SIGNATURE:		í	DATE:

TASK/PROCEDURES	HAZARDS	SAFE JOB PROCEDURES
1. Ignition Operations	A. Proximity to intense heat and erratic fire behavior.	A. Use Personal Protective Equipment (PPE), maintain close supervision, and lookouts. Thorough briefing on expected fire behavior. Adjust ignition patterns as needed to reduce exposure and fire behavior.
	B. Noise of fire obscures verbal warnings.	B. Handheld radios for all ignition personnel.
	C. Ignition sources.	C. Use only qualified personnel for ignition operations. Igniters stay alert to location of torch flame. Close air vent when not igniting. Make sure that target area is clear before using hand flares or very pistols. Wear proper PPE.
	 D. Incorrect ignition locations. Careless ignition use. E. Poor footing, heavy fuels accumulation. F. Poor visibility due to smoke. 	 D. Thorough briefing of ignition plan. Follow Burn Boss's instructions. Know location of other igniters and personnel. Radios for all igniters. Close supervision. E. Be constantly aware; identify hazard area; slow down. F. Post lookouts on roads to gauge visibility. Stage emergency vehicles with headlights and emergency lights on along roads to alert traffic. Use law enforcement to control traffic.
	A. General operations and public traffic.	A. Defensive driving techniques. Observe posted speed limits and obey all driving laws and regulations. Use spotter when backing.
2. Motor Vehicle Operation	B. Secure loads.	B. Check loads for security before departing – use tie downs.

C. Hauling flammable substances.	C. Use appropriate containers for hauling drip torch fuels and gasoline. Secure containers on vehicle.
D. Transporting sharp tools.	D. Use guards and secure tools in engine compartments or on vehicles.
	E. Use of proper lifting techniques.
E. Loafing Vehicles.	
F. Trailer use.	F. use safe loading and operation procedures. See Standard Operating Procedures on trailer use.

TASK/PROCEDURES	HAZARDS	SAFE JOB PROCEDURES
3. ATV/UTV Operation	A. Operation accidents.	A. Proper ATV/UTV procedures. See JHA on ATV/UTV operations for more detail.
4. Holding Operations	A. Proximity to intense heat and erratic fire behavior.	A. Use PPE, maintain close supervision. Thorough briefing on expected fire behavior. Use appropriate tactics to ensure personnel are not subjected to unnecessary heat.
	B. Fatigue.	B. Rotate personnel on different tasks. Limit smoke exposure. Take adequate breaks. Drink plenty of water.
	C. Excessive Smoke Exposure.	C. Rotate personnel so that one group is not always in the smoke.
	D. ATV/UTV Operations.	D. Stay alert and watch for ATV/UTV traffic on fireline.
	E. poor visibility due to smoke.	E. Stay alert. Watch for tripping and overhead hazards, sudden drop-offs, and ATV/UTV traffic.
5. Mop-up Operations	A. Poor footing.	A. Be constantly aware; identify hazard areas; slow down.
	B. Falling snags.	B. Be alert, post lookouts when necessary. Flag off dangerous areas. Watch for strong winds.
	C. Fatigue.	C. Rotate personnel on different tasks. Take adequate breaks. Drink plenty of water.
6. Monitoring Operations	A. Possibility of entrapment.	A. Stay in communication and relay location to Burn Boss and Firing Boss.
	B. Proximity to intense	B. Use PPE, maintain close supervision. Thorough briefing on expected fire behavior. Use appropriate tactics to ensure

	heat and erratic fire behavior.	personnel are not subjected to unnecessary heat.
7. Drip Torch Fueling	A. Flammability.	A. Mix fuel in well-ventilated area away from ignition source. No smoking in fueling area. Any person who spills fuel on their clothing will be removed from the burn unit until contaminated clothing is replaced.
	B. Contamination.	B. Use funnel and spout when filling torches from cans. No filling in riparian areas.
	C. Poisoning.	C. MSDS available for diesel and gas.
FMO SIGNATURE:	·	DATE:

Location of Agency Administrator's Guide to Critical Incident Management

The Agency Administrator's Guide to Critical Incident Management, NFES 1356, is located at the following location on the shared drive at Mississippi NRRA:

shared files\administration\Manuals, Laws, Plans, Misc\AdministratorGuideCriticalIncidentManagement_NFES1356.doc

Wildland Fire Qualified Personnel at Mississippi NRRA

Neil Smarjesse, 651-293-8480

Cody McLean, 651-293-8480

Appendix G

Communication and Education Plan

From Section 1.5

A comprehensive communication and education program emphasizes the entire scope of wildland fire management activities, particularly the role of fire in ecosystems. Mississippi NRRA' communication/education plan is based on RM 18, Prevention chapter, and RM 18, Communication and Education chapter. NWCG's Best Practices in Communication Planning was also used as a reference.

Prior to planned ignitions, the interpretation program will contact surrounding land managers and businesses, and post signs and distribute fliers to the public, as well as issue a press release. It will be very important to reach dog owners at this time, to ensure that pets do not wander into unsafe areas. Trail closing signs should be placed well in advance, as can be done depending on weather.

On the day chosen for actual ignitions, all Mississippi NRRA staff are to be notified, as well as partnering agencies. All trails and roads leading into the CSFMU should be closed for pedestrian traffic, for at least two hours before burning, and monitored to ensure that no trail users or dogs pass barricades. This can be done in conjunction with Minneapolis police officers to ensure compliance. In using this intense method of intercepting the public, the park is doing its best to make firing operations safe for both firefighters and the public, as well as reducing the likelihood that the fire will cause a blockage of emergency lines due to people reporting the fire.

Post-burn, Mississippi NRRA will assess how local public and partnering agencies felt about the fire efforts by reaching out to individuals via professional networking (such as phone calls and email) and social media. Feedback will be used to inform future plans, procedures, and education efforts. Public comments will be kept by the park's chief of resource management or biologist.

Communication and education will only work if interpretive staff is knowledgeable about the use of prescribed fire at Coldwater. Thus, natural resource and fire staff will be in charge of making sure information is properly disseminated within the agency and park so all staff can provide proper information to the public.

A. Program Capabilities

Disseminating information about the natural role of fire at the CSFMU is important for establishing public support for the burn program there. Fire management for Coldwater will be accurate and deliverable to a broad audience. Guidelines followed for the development of the program include:

- A Public Information Officer (PIO) will be designated by the Superintendent's office to provide a press release to local media, which is meant to inform the public about reduced visibility and air quality due to smoke. The PIO can also host media events that promote positive outreach to the community.
- The IC, in the event of an unplanned ignition, is responsible for evacuating visitors and others at the CSFMU or in the burning area.
- Smoke mitigation tactics will be initiated in cases where visibility becomes a significant risk; local law enforcement will be contacted by the IC or delegate to guide traffic.
- Ecological concepts will be incorporated into interpretive programs.
- The fire management program will also be incorporated into interpretive programs.
- Adjoining land management agencies and cooperating entities will be provided with fire management information, especially during active fire.
- Mississippi NRRA employees will be made aware of, and knowledgeable on, the prescribed fire program, and fire at Coldwater, in general.
- Wildland fire management techniques and the Mississippi NRRA program will be discussed informally with a broad range of groups, including staff at Mississippi NRRA, visitors, and local neighbors.

1. Contact Lists

Organization	Contact	Contact Information	Notification Required	Permit Required
City of St. Paul	Adam Robbins Environmental Coordinator	651-632-2457 Adam.Robbins@ci.stpaul.mn.us	Notify when burn takes place	No
St. Paul Department of Safety and Inspection (DSI)	Jim Terucca Lead for Fire Permit Process	651-266-8996	Notify when burn takes place	No
Minneapolis Park and Recration Board	Marcia Holmberg Natural Resources Coordinator	612-313-7723 MHolmberg@minneapolisparks.org	Notify when burn takes place	No
Minnesota Department of Natural Resources	Anton Benson Regional Specialist	651-259-5746 anton.benson@state.mn.us	Notify when burn takes place	No
Department of Veterans Affairs	Ted Steidl Maintenance Supervisor	612-467-2646 theodore.steidl@va.gov	Notify when burn takes place	No

Table 8: Contact list for fire management staff

Minneapolis Police Department	Bryan D. Tyner Fire Marshall	612-673-3270	Notify when burn takes place	No
Minneapolis Fire Department	Minneapolis Fire Department	612-673-3270	Notify when burn takes place	No
Metropolitan Airports Commission/Federal Aviation Administration	John Ostrom Manager, Airside Operations	612-726-5780 John.Ostrom@mspmac.org	Notify when burn takes place	No
Minneapolis-St. Paul Airport Police	Nathan Kreye Assistant Chief - Fire Marshall	612-467-0675 nathan.kreye@mspmac.org	Notify when burn takes place	No
Minnesota Department of Transportation	Ken Graeve Roadside Veg. Mgmt/Presc Fire	651-366-3613 kenneth.graeve@state.mn.us	Notify when burn takes place	No
Hennepin County Sheriff's Department	Lt. Kent Vnuk Patrol Support Div Sup	612-596-9800	Notify when burn takes place	No
Minnesota Historical Society	John Crippen Dir of Hist Sites & Museums	651-259-3472 john.crippen@mnhs.org	Notify when burn takes place	No
Airside Operations Center (MSP)	N/A	612-726-5111	Notify when burn takes place	No

2. Materials

Road and trail signs warning the public about area closures, smoke, and detours around Coldwater or wildfire areas will be used for each event, as there is heavy traffic at most sites.

Pamphlets explaining the fire management program will be used and periodically updated to reflect the changing character at Coldwater Spring. These can be handed out at the Visitor Center, if desired, or available at Coldwater.

3. Online Resources

National Wildfire Coordinating Group, http://www.nwcg.gov/index.htm

National Park Service Fire, http://www.nps.gov/fire/

GeoMac Wildland Fire Support, http://www.geomac.gov/index.shtml

Firewise, http://www.firewise.org/

National Interagency Fire Center, http://www.nifc.gov/fireInfo/fireInfo_main.html

B. Communications Step-Up Plan

When fire danger reaches high or extreme levels, information about fire danger and restrictions will be disseminated by fliers, interpretation, and signs at Coldwater Spring or other areas at Mississippi NRRA.

Fire Prevention Plan

No Plan Currently

Duty Officer Manual

No Park Manual Currently
Appendix J

Cooperative and Interagency Agreements

Cooperative and interagency agreements could be developed as needed for Mississippi NRRA.

Appendix K

WFDSS Objectives and Requirements

1. The protection of human life is the single, overriding priority. Setting priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources will be done based on the values to be protected, human health and safety, and the costs of protection. Once people have been committed to an incident, these human resources become the highest value to be protected (Guidance for Implementation of Federal Wildland Fire Management, February 2009, pg. 11).

2. Minimize risk to firefighters and public through application of the risk management process. Reduce the risk of the fire negatively impacting communities, residences, businesses and other infrastructure located within the planning area through strategic planning and effective tactical response. Document measures used to mitigate those risks. Actively brief on known and emerging risks and hazards. Where you commit people, you must provide for their reasonable protection and follow all guidance including that related to the Dutch Creek mitigation measures (NWCG Memo: NWCG#025-2010).

3. Suppress the fire using direct and indirect strategies to confine the fire within the Mississippi NRRA owned land boundary.

4. Identify, develop, disseminate and coordinate timely & accurate information with any directlyaffected state or federal agencies, jurisdictional agencies, local cooperators, residents, park visitors, media, elected officials, evacuees, incident personnel, or any other identified stakeholders.

5. The Incident Management Team along with personnel assigned to the incident will be accountable for effective cost management.

6. Maintain the highest degree of personal and ethical conduct as guests within the communities of the Mississippi NRRA.

7. Coldwater Spring is approximately 29 acres. In this area Minimum Impact Strategy and Tactics will be utilized. Minimum impact strategy and tactics are defined as the application of those techniques which effectively accomplish wildland fire management objectives with the least cultural and environmental impact, commensurate with public and firefighter safety (RM-18, February 2014, Chapter 2 pg. 2). Coordinate suppression planning and actions with resource advisors to identify and protect natural and cultural resources.

8. Educate employees and the public about the scope and effect of wildland fire management, including fuels management, resource protection, fire prevention, hazard/risk assessment, mitigation and rehabilitation, and fire's role in ecosystem management.

9. Initial action on trespass and human-caused wildfires will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety. If the initial action is not successful and an updated decision is made to manage the fire, that decision will be documented as part of the official record. The updated strategy will be commensurate with firefighter and public safety, risk management, and values to be protected, with consideration for cost efficiency (RM-18, February 2014, Chapter 2 pg. 9)

10. Appropriate management responses for all wildland fires (regardless of ignition source) will be rapid containment and suppression to protect the public, check fire spread onto private property, and protect the natural, cultural and historic resources of the Trail.

11. Initiate fire management operations only after all personnel involved receive a safety briefing describing known hazards and mitigating actions (LCES), current fire season conditions and current and predicted fire weather and behavior.

12. Evacuate visitors from incident and potentially affected areas. Prevent visitors from entering the affected area (close access, close Trail / communicate with partners, sign / barricade Trail Head Access points).

13. Assign, for the duration of the incident, a qualified Information Officer if the incident is projected to last longer than one operational period.

14. During suppression actions a qualified Resource Advisor(s) (READ) will be assigned to all incidents projected to last longer than one operational period. READ will coordinate concerns regarding federally protected species, cultural and natural resource issues, and to serve as a liaison between the park Superintendent and the Incident Commander (IC)/Incident Management Team (IMT). They will be briefed on the intended suppression actions for the fire, and will provide input on which Conservation Measures are appropriate, within the standard constraints of safety and operational procedures. The IC has the final decision-making authority on implementation of Conservation Measures during fire suppression operations.

15. Use best management practices to minimize smoke impacts to the public.

16. Implement Best Management Practices for invasive weed prevention.

17. Park closures or restrictions will be at the discretion of the Superintendent.

18. Superintendent approval required for retardant use on NPS lands.

19. No off road vehicle traffic is permitted without approval of the Superintendent.

20. Use the least intrusive BAER actions to mitigate actual or potential damage caused by wildland fire.

Appendix L:

Contracts for Wildfire and Prescribed Fire Resources

There are no contracts at this time.

Standards for BAE, BAR, and ES

Burned Area Emergency Response

Procedures and guidelines for the short- and long-term rehabilitation of burned areas are based on those outlined in RM-18, Ch. 19. The National Park Service has Burned Area Emergency Response (BAER) technicians that assess damage and addresses ways to stabilize the post-fire environment and restore the area, while accounting for the safety of people and structures nearby. BAER assessments are only done after extremely degrading fires, the likes of which are probably not possible at Mississippi NRRA due to the discontinuity of fuels; regardless, BAER is an important tool available to Mississippi NRRA in the case of a severe wildfire event. In any case, the natural regeneration of burned areas is preferable, and can be managed by biological science and biologist staff at Mississippi NRRA.

Emergency Stabilization

The stabilization and rehabilitation of burned areas is only necessary in the case of severe fire, and the situation can be ameliorated by active management. Park resource management staff should play a role in the application of suppression activities, to inform best management; Delegation of Authority is an important step in this process.

Stabilization activities that may be performed at Mississippi NRRA include:

- Flush-cutting stumps
- Installing water bars in areas of high potential erosion
- Removing berms or other materials from along firelines
- Removing garbage or abandoned equipment from the area

Depending on the area burned, re-seeding or re-planting may be necessary. At Coldwater Spring, it would be ideal to spread prairie species in open areas, especially perennial grasses, or to plant trees according to pre-fire natural communities. It is not expected that any wooded areas would experience a significant burn warranting any emergency response or stabilization tactics, due to a lack of continuous fuels and other localized factors.

Although unlikely, damages caused by wildfires will be addressed using four steps:

- Wildlife Suppression Activity Damage Repair: planned actions to repair damages to resources, lands, facilities resulting directly from suppression activities.
- Emergency Stabilization: planned actions to prevent unacceptable damages to resource and to minimize threats to life and property.
- Rehabilitation Efforts: actions within 3 years of the containment of a wildfire to repair or improve damaged lands unlikely to recover naturally. This also includes the repair or replacement of minor facilities.

• Restoration: continuing rehab efforts beyond the first three years, or the repair or replacement of significant facilities damaged by wildfire or suppression activities. **Burned Area Rehabilitation**

Detailed directions for the rehabilitation of land damaged by significant wildfire events are outlined in the Interagency Burned Area Rehabilitation Guidebook (10/2006) and the Burned Area Emergency Response Treatments Catalog (12/2006).

Burned area rehabilitation takes place one to three years after the wildfire is out, and involves the repair or replacement of facilities damaged, and the short-term restoration of natural and cultural resources. At Mississippi NRRA, areas likely to experience wildfire would benefit from either reseeding, in the case of Coldwater Spring, or potentially replanting of tree seedlings of impacted species. If the wildfire occurs at the Coldwater Spring tallgrass prairie area or savanna, in only extremely severe cases would the area need to be replanted. Although potentially beneficial, reseeding may not be necessary, depending on how well native plants were doing prior to the wildfire event.

A special consideration should be given to invasive species management, when rehabilitating Mississippi NRRA land. Many exotic invasive species benefit from fire on the landscape, which can stimulate germination, reduce competition, and provide a nutrient boost that exotic invasive plants (typically early-pioneering species) are capable of using to their advantage. Thus, burned areas will need to be carefully monitored and exotic invasives controlled as soon as possible during the first few years post-fire.

The following are examples of BAER tactics for rehabilitation.

Objectives

Based on actions identified in approved resource and fire management plans:

- To evaluate actual and potential long-term post-fire impacts to critical cultural and natural resources and identify those areas unlikely to recover naturally from severe wildfire damage.
- To develop and implement cost-effective plans to emulate historical or pre-fire ecosystem structure, function, diversity, and dynamics consistent with approved land management plans, or if that is infeasible, then to restore or establish a healthy, stable ecosystem in which native species are well represented.
- To repair or replace minor facilities damaged by wildland fire.

Priorities

- To repair or improve lands damaged directly by a wildland fire; and
- To rehabilitate or establish healthy, stable ecosystems in the burned area. If it becomes necessary to prioritize, this will be done by the Department of the Interior National Burned Area Rehabilitation (NBAR) coordinators based on relative values to be protected, commensurate with rehabilitation costs. All burned area rehabilitation plans and actions must reflect these priorities.

Allowable Actions

Repair or improve lands unlikely to recover naturally from wildfire damage by emulating historical or pre-fire ecosystem structure, function, diversity, and dynamics consistent with existing land management plans.

Chemical, manual, and mechanical removal of invasive species, and planting of native and nonnative species, consistent with 620DM3.8F, restore or establish a healthy, stable ecosystem even if this ecosystem cannot fully emulate historical or pre-fire conditions.

Tree planting to reestablish burned habitat, reestablish native tree species lost in fire, prevent establishment of invasive plants.

Repair or replace wildfire damage to minor operating facilities (e.g. interpretive signs and exhibits, shade shelters, fences, etc.). Rehabilitation may not include the planning or replacement of major infrastructure, such as visitor centers, residential structures, administration offices, work centers and similar facilities. Rehabilitation does not include the construction of new facilities that did not exist before the fire, except for temporary and minor facilities necessary to implement burned area rehabilitation efforts.

Fire managers should ensure that rehabilitation activities do not result in the spread of invasive plant propagules. Vehicles, equipment, and firefighters should be cleaned before entering the rehabilitation area. Any materials brought in to prevent erosion, such as organic mats or lumber should be free of unwanted seeds. Before spreading any cut materials from the fire line check to be sure you will not be introducing invasive plant material to the newly burned area.

Serious Injury or Death Procedure Serious Injury or Death Procedure AAGCIM

Each notification is unique, as a result of the individuals and circumstances surrounding the death or serious injury, and will garner different reactions. Your alertness to the needs of the family will assist in maintaining a rapport with next of kin at the time of their greatest need. Your personal actions and words in this sensitive task will reflect on the agency's image, as well as instill confidence in the agency, with the survivors. Line Officers are usually responsible to make the notification; however, other personnel may be called to assist in this task.

Selection of Notification Officers

The Agency Administrator/Line Officer or a person designated by agency leadership is the appropriate individual to make a notification and must be accompanied by at least one other person. Depending upon the situation, a coworker, close friend of the deceased or injured, a chaplain or other member of the clergy, or a law enforcement officer may be appropriate.

Notification should always be made by at least two or even three people and always in person. It is a good idea to consider taking separate cars in case one person needs to pick up a family member who is not home or perhaps accompany a family member to the hospital.

Preparing for the Notification

Key information will need to be gathered prior to making a fatality/serious injury notification, such as:

- The circumstances surrounding the death or injury (be clear what is fact and what is not verified), information on the survivors, medical status if the employee is injured, where the injured/deceased person is located.
- Verify the address of the next of kin. Decide ahead of arrival who will speak first.
- If notification must be made at the next of kin's workplace, ask for a supervisor and a quiet private room to talk with the next of kin.
- If notification is made at the hospital, the same rules apply. Find a quiet private place for the notification and next of kin's questions and reactions.
- Bring Next of Kin Follow-up Worksheet with you.

Determining Primary Next of Kin

The following order is usually the order to use in notifying the primary next of kin.

- Spouse
- Parents
- Adult children
- Brothers and sisters, to include step-siblings and those acquainted through adoption
- Grandparents

- Persons granted legal custody of the individual by a court decree or statutory provision
- Other relatives in order of relationship to the individual according to civil laws
- If no other persons are available, the county coroner or medical examiner will provide information on who can officially act on the behalf of the deceased.
- The most important issue here is to make absolutely sure that the correct persons are notified!

REMEMBER: Family relationships can be very complicated. Fiancés and significant others, whether or not they live with the injured or deceased person, are not legal next of kin. If you are aware of such an individual, ask the primary next of kin if they want to call/visit the significant other.

Inability to Locate the Primary Next of Kin

If the next of kin is not home, contact neighbors, the police department or local postmaster for information on the next of kin's location (work, out of town, etc). Take care not to disclose (other than a family-related emergency) the purpose of your contact except to the next of kin. If the next of Kin's absence is temporary, you may await their return or go in search of them as appropriate. If the next of kin is out of town and not expected to return shortly, determine their exact location. IF it is within reasonable distance, attempt to contact them in person. If NOT, immediately contact the nearest Agency Administrator to the next of kin's physical location, brief him/her and request notification actions.

Secondary Next of Kin

If primary next of kin is not available, contact the secondary next of kin as identified on the Emergency Notification Information sheet.

Never make any notification on the doorstep of the house!

Do not drag on with the process

Do not promise anything that cannot be delivered.

Do not discuss matters that you are not qualified to discuss.

Do not take the victim's personal effects on the first notification.

Follow-up on the status of the remains and keep the next of kin informed.

Do not wait for the next of kin to ask the status.

Personal Effects

Personal effects should be gathered from the incident site and/or the home unit immediately. Items should not be delivered until later, perhaps days later when the family can deal with it. The items should be delivered in a clean, unmarked box. All clothes should be cleaned, made presentable, or disposed of at a later date. Anticipate delays due to accident or criminal investigations.

Follow-Up Contact

The agency Administrator/notifier should make contact as previously agreed upon to check on next of kin's welfare. Key points include the following:

- Expressing concern
- Offering assistance
- Answering questions, particularly unresolved questions from first visit [e.g., visiting the site, making travel arrangements to hospital (if a distant location), when remains may be returned]
- Allowing next of kin time to talk
- Follow up on promises and obligations

Staying in touch with next of kin is an important Agency Administrator responsibility. Sometimes this can last years and span multiple Agency Administrators.

Agency Administrator Notification to Coworkers

Take care of family first, but do not neglect the notification of coworkers who may have had close relationships with deceased or seriously injured employee(s). The same guidance and sensitivities apply as with notifying the family. It is essential that this be done in person and not by voice mail or email.

- Efforts will be made to notify employees at the current workstation and prior workstation, applicable.
- Notification of family members must never be delayed, pending coworker notification.
- Consideration should be given to temporarily relieving affected coworkers from duty.
- Ensure employees are afforded access to CISM, EAP, or other counseling as appropriate.
- Continue to monitor employees' well-being and provide appropriate follow-up.
- Proved opportunity for employees to attend funeral(s)/memorials(s). Many agencies provide administrative leave for this purpose.

Notification for Members of the Public or Contractors

When victim is a member of the public, notification should be made by law enforcement. If the victim is an employee of a contractor, notification should be made directly to the contractor's home office (refer to contract specifications).

Safety Program/Plan

Health screening

All personnel who want to participate in fire management and be red carded must complete the annual fire health questionnaire. Personnel must be active in the fire program, get approval from their supervisor, and then contact the Mississippi NRRA administrator in charge of IQCS records to get put into the system. All personnel must take and pass the federally-mandated physical prior to completing the arduous work capacity test.

Wellness/fitness training and testing

Collateral fire fighters are allowed up to 3 hours a week of physical training if approved by their supervisor. Each firefighter must be able to complete the national standards of fitness (light, moderate or arduous) that pertain to their red card.

Safety training

All personnel that desire to be red carded must complete the 8 hour annual wildland firefighter refresher.

Job hazard analysis

All personnel that take part in prescribed and wild fire activities on an annual basis must review, follow, and sign the job hazard analyses that are included and referenced in appendix F of this document. Additional, more job specific JHA's are found in the park share drive Y:\shared files\Coldwater\Safety\JHA's.

After Action Review (AAR) Process

All personnel that are involved in prescribed and wildland fire activities at Coldwater Spring or across Mississippi NRRA will actively participate in the AAR process (see IRPG for outline).

Work/rest standards

All red carded personnel will adhere to the national work/rest guidelines and standards found in the Interagency Standards for Fire and Fire Aviation Operations.

Right of refusal of assignment

All red carded personnel have the responsibility of knowing their rights and being up-to-date on their right to refuse an assignment based on the guidelines in the IRPG.

Smoke Management Plan

Coldwater Spring is located in a highly-urbanized area. Emissions from automobile and air traffic in the area are relatively high, as throughout the Minneapolis-St. Paul metro area, and industrial emissions are also an issue. When conducting burns, Mississippi NRRA firefighters will be cognizant of wind and lift patterns on burn days, and will work to minimize the impact of smoke from a burn at Coldwater or from unplanned ignitions, and requisite burn permits will be attained.

Burn plans will have clear, attainable objectives and goals, including the monitoring of smoke impacts surrounding the Coldwater Spring area. When burns are conducted, weather forecasts are crucial in determining smoke mitigation plans, especially in conjunction with the use of test fires.

The burn programs at Mississippi NRRA will be in compliance with Air Quality – Smoke Management Guidelines, as outlined in RM-18, and the fire management program will comply with local and state air pollution regulations, as well as the Clean Air Act.

At Coldwater Spring, smoke management concerns include:

- Reduced visibility along Highways 55 and 62, Hiawatha Ave., Minnehaha Ave., E 54th and E 54th St., and potentially the MSP International Airport.
- Smoke impacts on individuals using trails, those at Minnehaha Park, the Minnehaha Off-Leash Dog Park, and at Fort Snelling facilities.
- Potential impacts of settling smoke on river traffic, in the case of high atmospheric pressure or low-wind days.
- National Ambient Air Quality Standards within the Coldwater Spring area and adjacent air sheds.

Tactics for managing and mitigating the impacts of smoke at Coldwater Spring are as follows:

- 1. Planning
 - Smoke management plans will be included in all burn plans.
 - Smoke trajectory maps outlining the potential pathways of smoke, depending on wind patterns, will be developed, and sensitive targets identified in each scenario.
 - Mitigation measures will be defined in burn plans, as well as instructions on how to instigate mitigation should the need arise.
 - Spot weather forecasts will be taken before and during all prescribed fires.
 - Local fire districts will be notified of all burn activities prior to ignition.
- 2. Avoidance

- Planned ignitions will not be initiated unless conditions outlined in the burn plan wind speed and direction, fuel loads, and distance to areas sensitive to smoke are within prescription.
- 3. Reduction
 - If emissions conditions are outside of prescription, it is up to the burn boss to either reduce the size of the burn area or wait until conditions improve.
 - Use aggressive mop-up tactics, if necessary.
 - Fuel breaks can be established inside the burn area, if necessary, to limit the spread of the prescribed burn.
 - Mechanical fuel reduction methods can be implemented if and when needed.
- 4. Dilution and Other Reduction Methods
 - All prescribed fires at Coldwater Spring will be done under appropriate smoke dispersion conditions.
 - Operations during dry fuel and low-humidity conditions (though not in extreme drought conditions) will reduce emissions, as well.
- 5. Traffic Management and Public Safety
 - Prescribed fire plans contain specific monitoring requirements for nighttime monitoring of smoke on roads surrounding Coldwater Spring, as appropriate.
 - If smoke reduces visibility on roads, thereby creating a safety hazard,
 - NPS rangers or police will be asked to respond to address public safety
 - Law enforcement personnel will determine what traffic controls are necessary; additional forces can be dispatched, as needed.

A specific smoke management plan for Coldwater Spring is currently being developed and will be added upon completion.

Appendix Q

Minimum Impact Suppression Tactics (MIST)

(Excerpt from USDA Forest Service Northern Region Minimum Impact Suppression Tactics Guidelines- NWCG Fireline Handbook)

Concept of MIST:

The concept of MIST is to use the minimum amount of force necessary to effectively achieve the fire management protection objectives consistent with land and resource management objectives. It is a mind set on how to suppress a wildfire yet minimize the long-term effects of the suppression action on the land. MIST may also require greater rehabilitation efforts than previously practiced.

Minimum Impact Suppression Tactics Implementation Guidelines:

Following is a list of considerations for each fire situation.

Hot-Line/Ground Fuels

- Allow fire to burn to natural barriers.
- Use cold-trail, wet line or combination when appropriate.
- If constructed fireline is necessary, use only width and depth to check fire spread.
- Consider use of fireline explosives for line construction.
- Burn out and use low impact tools like swatter or 'gunny' sack.
- Minimize bucking and cutting of trees to establish fireline; build line around logs when possible.
- Use alternative mechanized equipment such as excavators; rubber tired skidders, etc. rather than tracked vehicles.
- Use high pressure type sprayers on equipment prior to assigning to incident to help prevent spread of noxious weeds.
- Constantly re-check cold trailed fireline.

Hot-Line/Aerial Fuels

- Limb vegetation adjacent to fireline only as needed to prevent additional fire spread.
- During fireline construction, cut shrubs or small trees only when necessary. Make all cuts flush with the ground.
- Minimize felling of trees and snags unless they threaten the fireline or seriously endanger workers. In lieu of felling, identify hazard trees with a lookout or flagging.
- Scrape around tree bases near fireline if it is likely they will ignite.
- Use fireline explosives for felling when possible to meet the need for more natural appearing stumps.

Mop-up/Ground Fuels

- Do minimal spading; restrict spading to hot areas near fireline.
- Cold-trail charred logs near fireline; do minimal tool scarring.
- Minimize bucking of logs to extinguish fire or to check for hotspots: roll the logs instead if possible.
- Return logs to original position after checking and when ground is cool.
- Refrain from making bone yards; burned and partially burned fuels that were moved should be returned to a natural arrangement.
- Consider allowing large logs to burnout. Use a lever rather than bucking to manage large logs which must be extinguished.
- Use gravity socks in stream sources and/or a combination of water blivets and fold-a-tanks to minimize impacts to streams.
- Consider using infrared detection devices along perimeter to reduce risk
- Personnel should avoid using rehabilitated firelines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehab work, i.e. water bars.

Mop-up/Aerial Fuels

- Remove or limb only those fuels which if ignited have potential to spread fire outside the fireline.
- Before felling consider allowing ignited tree/snag to burn itself out. Ensure adequate safety measures are communicated if this option is chosen.
- Identify hazard trees with a lookout or flagging.

- If burning trees/snag pose a serious threat of spreading fire brands, extinguish fire with water or dirt whenever possible. Consider felling by blasting when feasible. Felling by crosscut or chainsaw should be the last resort.
- Align saw cuts to minimize visual impacts from more heavily traveled corridors. Slope cut away from line of sight when possible.

Appendix R



Figure R-1: Mississippi NRRA Boundary and Highlighted Ownership



Figure R-2: Coldwater Spring Unit Property Management



Figure R-3: Coldwater Spring Adjacent Property Ownership



Figure R-4: Wetland Areas at Coldwater Spring



Coldwater Spring Burn Units

Figure R-5: Burn Units at Coldwater Spring

Coldwater Spring Fuel Models



Figure R-6: Fuel Models at Coldwater Spring





As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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