



## **MISSOURI NATIONAL RECREATIONAL RIVER ENVIRONMENTAL ASSESSMENT FOR FIRE MANAGEMENT PLAN 2009**

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APPENDIX D OF THE 2009 FIRE MANAGEMENT PLAN

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## Appendix D to Fire Management Plan 2009

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## Chapter 1 -- Purpose of and Need for Action

National park system units are established by Congress to fulfill specified purposes. A park's purpose, as established by Congress, is the fundamental building block for its decisions to conserve resources while providing for the "enjoyment of future generations."

### 1.1 Establishment and Significance

Missouri National Recreational River (MNRR or Missouri NRR) was added to the National Wild and Scenic Rivers System in 1978 (*Public Law 95-625*) by an amendment to the Wild and Scenic Rivers Act. Fifty-nine miles of river downstream of Gavins Point Dam to Ponca, Nebraska, (the [59-mile District](#)) was included in the first boundary for MNRR. The National Park Service (NPS) has undertaken resource management and park interpretation, and the U.S. Army Corps of Engineers ([USACE](#)) retains management of most water issues. The purpose of this river segment is summarized as:

- to preserve the river in a free-flowing condition and protect it for the enjoyment of present and future generations
- provide stream bank protection compatible with the river's significant natural and cultural resources
- preserve the significant recreational, fish and wildlife, and historic and cultural resources of the Missouri River corridor
- provide for a level of recreation and recreational access that does not adversely affect the river's significant natural and cultural resources.

In 1991, three river segments were added to the Wild and Scenic Rivers Act by amending Public Law 90-542 (Niobrara Scenic River Designation Act, Public Law 102-50, 16 U.S.C. 1271 et seq.): 39 miles of Missouri River below Fort Randall Dam to Running Water, South Dakota, 20 miles of the lower Niobrara River, and the last eight miles of Verdigre Creek before its confluence with Niobrara River. The purpose of these river segments is virtually the same as for the original section. This became known as the [39-mile District](#).

Missouri NRR contains about 34,159 acres of land. The entire area is managed by a complex patchwork of private property owners and local, state, tribal, and federal agencies. Rivers in the Wild and Scenic Rivers system are classified as wild, scenic, or recreational based on the amount of access and development existing at the time of designation. The 59-mile District and 39-mile District are considered recreational rivers because of their ready access by road and development on the shorelines. The two districts are managed under two different General Management Plans ([GMPs](#)), although the management implementation is similar because of their shared recreational designation.

### 1.2 Purpose and Need for Wildland Fire Planning

Wildland fire management within National Park Service units is conducted to support resource management objectives. The full range of strategic options is available to managers provided selected options do not compromise firefighter and public safety, cost-effectiveness, benefits, and values to be protected. Suppression of unwanted, potentially environmentally damaging wildland fires is guided by the Fire Management Plan ([FMP](#)).

Prescribed fire activities may include using fire as a natural process or as a management tool. The objectives include, but are not limited to: restoring, mimicking, or replacing the ecological influences of natural fire, maintaining historic scenes, reducing hazardous fuels, eliminating exotic/alien species, disposal of vegetative waste and debris, and preserving endangered species. The FMP serves as a detailed program of action by providing specific guidance and procedures for accomplishing wildland fire management objectives.

Missouri NRR has 250 acres of fee-simple land ([parkland](#)) that falls under Director's Order 18, Wildland Fire Management ([DO-18](#)), which requires an FMP that includes environmental documentation under the National Environmental Policy Act 1969 ([NEPA](#)). Missouri NRR boundary contains a mix of private property and local, federal, and state jurisdictions. Agencies currently work together by consulting with each other on specific programs and actions.

In concert with other bureaus, the NPS takes responsibility for the fire management planning and develops policies, guidance, and standards for fire management on its own parkland. The purpose of federal action to develop an FMP is to provide a long-range program, using the benefits of fire to achieve desired natural resource conditions while protecting human lives, park resources, and surrounding lands and property from unwanted wildland fire.

### **1.3 Need for Fire Management Plan**

The FMP will satisfy the need to address the management requirements and assess the environmental impacts of managing wildland fire within the MNRR. The Environmental Assessment (EA) developed in support of the FMP will consider impacts on air quality, water quality, health and safety, and natural and cultural resource management objectives. Until an FMP is approved, parks must aggressively suppress all wildland fires, taking into account the resources to be protected, firefighter, and public safety.

### **1.4 Goals of Fire Management Planning**

Wildland fire once maintained the prairies of Nebraska and South Dakota and prevented the succession of prairie and oak-hickory savanna to deciduous forests. Forest cover occurred in floodplains, where moisture content usually excluded wildland fire, but forest did not persist in areas of the floodplain that were subject to long periods of flooding or frequent perturbation by ice jams and scouring. Prairie and savanna or upland forest predominated in the upland landscape during the 8,000 years prior to settlement by Euro-Americans in the mid-1800s. A succession of sedges and grasses occurred on the lowest bench along the river, because of the frequent disturbance from fluvial activity. Cottonwoods, willow, and other wet site tolerant species grew in the riparian where ice scouring was not a frequent occurrence.

Human activities have caused ecological change to the Missouri River over the past century. The amount of natural habitat, and the native species abundance and diversity have decreased in the main channel and floodplain. These changes began in the 1800s with habitat disturbance and introductions of non-native fish and game. They have culminated with structural changes to ensure navigation and for flood control (Committee on Missouri River Ecosystem Science 2002). On the landscape level, other changes have had a subtle effect on the river and its ecosystems. These changes include land use, population growth, and suppression of fire.

Natural disturbance in a river floodplain is an unpredictable event that disrupts structure or function at the ecosystem, community, or population level (Sparks, et al. 1990). It can

result in changes in community makeup or shifts of ecosystems from one type to another. Seven dams, Gavins Point being the last downstream dam, have nearly eliminated the river's natural disturbance from the annual floods. Additionally, these dams have contributed to the degradation of the river by interrupting the accretion of sediments that occurs with floods. This removal of natural processes and lowering of the water table have resulted in extreme, irreparable alteration to the riparian ecosystem.

The long-range goals of MNRR FMP are

- Reduce hazard fuels and manage them in the long-term,
- Ensure the health and safety, and protect property within and adjacent to MNRR, and
- Create a sustainable native vegetation community that is compatible with the setting, MNRR purposes, the cultural landscape, and the surrounding land uses in an area where the natural processes have been altered.

#### **1.4.1 Missouri National Recreational River Goals for Fire Management**

Principal, parkwide considerations in the MNRR fire management program include:

- protection of human life, both employee and public
- protection of facilities and cultural resources
- perpetuation of natural resources and their associated processes

These considerations apply to MNRR parklands, other properties within MNRR, and properties adjacent to MNRR. The presence of people and human development in and around MNRR, require that protection of life and property be a primary concern in fire management.

The FMP will set goals in fire management implementation. These goals would include:

- Make firefighter and public safety the highest priority of every fire management activity.
- Manage fires in concert with federal, state, and local air quality regulations.
- Suppress all unwanted wildland fires regardless of ignition source to protect the public, to check fire spread onto other agency and private property, and to protect the natural and cultural resources within the MNRR boundary.
- Manage wildland fires so that resources (natural, cultural, and improvements) are protected from damage by suppression actions and fire.
- Facilitate reciprocal fire management activities through the development and maintenance of cooperative agreements and working relationships with pertinent fire management entities.
- Reduce wildland fire hazard around developed areas, along interface boundary areas, and adjacent to values to be protected.

Goals to be considered within the alternatives presented in this EA include:

- Use prescribed fire where and when appropriate as a tool to meet resource management objectives consistent with NPS policies.
- Maintain or restore the primary natural resources of the riparian and upland, and
- Provide natural processes that replace the disturbance regime by which land cover was maintained.

This process will be completed such that firefighters will take Appropriate Management Response to unwanted wildland fire. The process remains a collaborative and inclusive forum for fire management to accommodate the needs and concerns of MNRR partners, cooperators, private land stewards and owners, and local fire departments.

#### **1.4.2 Director's Order 18, Wildland Fire Management**

The National Park Service's policy on wildland fire is expressed in the NPS Management Policies 2006 and [DOI18](#). Supplemental policy regarding coordination and responsibilities for wildland fire operations is found in the [Interagency Standards for Fire and Fire Aviation Operations](#). Director's Order 18 requires each park with vegetation capable of sustaining fire to develop an FMP. An approved FMP is required before a wildland fire management program can be fully implemented. The use of either prescribed fire or wildland fire for resource benefits can only be done under an approved FMP that states the parameters for its use.

The NPS manages wildland fire to protect the public, communities, and infrastructure, conserve natural and cultural resources, and restore and maintain ecological health. Parks must ensure that wildland fire management is fully integrated into land management planning. Fire may be used to achieve desired conditions for natural systems, while protecting lives and property. The NPS policy recommends an annual review of the FMP and revision every five years to accommodate both minor and major changes in resource condition.

### **1.5 Public Involvement**

Compliance under the [NEPA](#) requires federal agencies to invite public involvement prior to decision-making on proposed actions that may affect the environment. [Scoping](#) is an early and open process to determine the scope of environmental issues and alternatives to be addressed in an EA. Input from scoping helps shape the direction that the NEPA analysis of impacts takes, helping planners and analysts decide which issues merit consideration.

Internal scoping is a preliminary process involving a core group of [stakeholders](#), who can help to focus the project on primary elements that will be brought into the external scoping process. Internal scoping will allow planners to

- eliminate issues that are not important
- allocate assignments among MNRR IDT members or other participating agencies
- find/read any other NEPA documents related to this one
- identify any other permits, surveys, or consultations required by other agencies
- create a schedule that allows plenty of time to do NEPA well before a decision on the proposal is required

External scoping allows the public to play an integral role in planning and external, or public, scoping is required for any EA. Scoping is a process, not an event or a single meeting. Parks are encouraged to use public scoping sessions as well as other means to gather early input on EAs. Examples are direct mailings to park visitors, interested organizations, or park neighbors. Public input from this process helps in the development of alternatives to the proposed action, which is an integral part of NEPA.

Internal scoping occurred at MNRR in the Gavin's Point Dam visitor center, USACE, on December 4, 2007. The [Consultation Section](#) of this document lists participants.



External scoping began March 11, 2008 at a Landowner's Meeting for landowners within the MNRR boundary.

Based on the above scoping process, the following issues have been identified and will be addressed in the EA:

- Degradation of the river has irrevocably altered the dynamics of the riparian ecosystem and flood control has eliminated the annual disturbance regime.
- Fire is a natural process and may be helpful in managing and maintaining vegetation in an area that was subject to frequent disturbance.
- Fire events may adversely affect archeological resources.
- A Cultural Landscape Report has not been prepared, and cultural resources have not been identified within MNRR. Therefore, there is no clear reference for landscape restoration.
- The slow attrition of floodplain forest has opened opportunity for eastern red cedar (*Juniperus virginiana*) invasion. Stands of eastern red cedar (cedar) reduce access to shorelines and scenic values from the water.
- Cedar presents a significant hazard fuel threat and can become highly volatile ladder fuels.

## **1.6 Impact Topics Included in the EA**

Under this NEPA process, consultation with local and federal agencies was conducted to identify issues and/or concerns related to natural and cultural resources within MNRR. Additionally, concerns and issues were raised by the landowners during scoping. The following impact topics were identified from the issues brought forward by both agencies and individuals.

### **Air Quality**

The Federal Clean Air Act (42 U.S.C. 7401 et seq, as amended) stipulates that Federal land managers have an affirmative responsibility to protect a park's air quality from pollution. Missouri National Recreational River is designated a Class II area under the Clean Air Act and meets national ambient air quality standards for specified pollutants. Air quality would be affected to various degrees by smoke and particulates generated by fire events within MNRR. Direct, indirect, and cumulative air quality impacts are analyzed in this EA.

Relevant laws, regulations, or policies: Clean Air Act, as amended; National Wildlife Refuge System Improvement Act of 1997; NPS Organic Act; NPS *Management Policies 2006*; Fish and Wildlife Service Manual and Handbooks; Nebraska and South Dakota state law

### **Threatened, Endangered, or Species of Special Concern**

The Endangered Species Act of 1973 requires that federal agencies protect federally listed threatened and endangered species and their habitats. Potential impacts of all federal actions on these species must be disclosed. Habitat for federally listed endangered and threatened wildlife species is also found within MNRR. Missouri NRR supports at least 14 federally and state-listed sensitive species. Impacts on threatened and endangered species will be addressed in this EA. Only species that could be impacted by fire or fire activities at the proposed locations will be considered.

Relevant laws, regulations, or policies: Endangered Species Act; National Wildlife Refuge System Improvement Act of 1997; NPS Organic Act; Migratory Bird Treaty Act;

Fish and Wildlife Coordination Act; Bald and Golden Eagles Protection Act; Fish and Wildlife Service Manual and Handbooks; NPS *Management Policies* 2006.

Several Threatened or Endangered species, or Species of Management Concern are not documented as occurring in MNRR although they are in the region. They are not evaluated in this document, because they do not occur in the vicinity and they are mobile and would not be impacted by the alternatives. These species are:

- Blanding's turtle (*Emydoidea blandingii*)
- Lined snake (*Tropidoclonion lineatum*)
- River otter (*Lutra canadensis*)

Species that have potential for being affected by the alternatives will be evaluated. Potential for being affected has been broadly interpreted because these species may occurrence on partners' lands within the greater MNRR boundary. The species evaluated in this document are:

- Ginseng (*Panax quinquefolium*), which is documented as being present within the MNRR boundary, where fire fighting techniques can mitigate impacts.
- Western prairie fringed orchid (*Platanthera praeclara*), which although not documented within MNRR, will have impacts mitigated.
- American Bald Eagle (*Haliaeetus leucocephalus*), Osprey (*Pandion haliaetus*), and Peregrine Falcon (*Falco peregrinus*), which will have impacts mitigated.
- Interior Least Tern (*Sterna antillarum athalassos*) and Piping Plover (*Charadrius melodus*), for which mitigation is recommended. Whooping Crane (*Grus americana*) and other bird migration stop-overs will be mitigated.
- American burying beetle (*Nicrophorus americanus*), which is not documented on NPS managed lands, but for which impacts will be mitigated.
- Pallid sturgeon (*Scaphirhynchus albus*), Sturgeon chub (*Macrhybopsis gelida*), Sickie chub (*Macrhybopsis meeki*), Topeka shiner (*Notropis Topeka*), which receive brief treatment relative to water quality, because of the indirect nature of potential impacts on highly mobile species.
- False map turtle (*Grapte-mys pseudogeo-graphica*), which does not generally use areas that carry fire.
- Butterflies listed in South Dakota include Dakota skipper (*Hesperia dacotae*), regal fritillary (*Speyeria idalia*), and tawny crescent (*Phyciodes batesii*), and impacts to them will be mitigated

A full list of Threatened, Endangered, and Species of Concern within both states and the likelihood of them sustaining fire effects is located in Appendix D2.

## **Vegetation Community**

Implementation of any of the alternatives will have an immediate and direct impact on the vegetation of MNRR. The direct effects of fire on the vegetation of an area can be profound and evaluating the effects of fire on vegetation at MNRR is one of the stated goals of the FMP. Impacts to vegetation will be evaluated in this assessment.

Relevant laws, regulations, or policies: National Wildlife Refuge System Improvement Act of 1997; NPS Organic Act; NPS *Management Policies* 2006; Fish and Wildlife

Service Manual and Handbooks; Executive Order 13112 of 1999 *Invasive Species*; NPS Director's Order 77-7, *Integrated Pest Management*.

### **Water Quality and Water Resources**

NPS policies require protection of water resources consistent with the Clean Water Act. The quality of the water in lakes, rivers, and streams is directly related to the condition of the watersheds they drain. Erosion-inducing activities, such as burning and firefighting in areas adjacent to streams and rivers, can affect the quality of the water resources. This impact topic will be addressed in this assessment.

Relevant laws, regulations, or policies: Clean Water Act; Safe Drinking Water Act; Executive Order 12088; Fish and Wildlife Coordination Act; National Wildlife Refuge System Improvement Act of 1997; National Park Service Organic Act; Fish and Wildlife Service Manual and Handbooks; *NPS Management Policies 2006*.

### **Wildlife Community (including insects)**

Implementation of the actions identified in the alternatives would result in changes in vegetation communities within MNRR. This may indirectly affect wildlife populations that utilize these habitats. The direct effects of fire on wildlife will also be evaluated in the EA.

Relevant laws, regulations, and policies: NPS Organic Act; Fish and Wildlife Coordination Act; Executive Order 13186, Migratory Birds; Migratory Bird Treaty Act; *NPS Management Policies 2006*.

### **Archeological Resources**

Laws and NPS policy require consideration of archeological resources when planning actions. Because of a known archeological site within the proposed area for fire activities, this topic will be evaluated in this EA.

Relevant laws, regulations, or policies: Section 106, National Historic Preservation Act, as amended in 1992 (16 U.S.C. 470 et seq); Archeological Resources Protection Act of 1979 (Public Law 96-95; 16 U.S.C. 470aa-mm); Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001 et seq. [Nov. 16, 1990]; *NPS Management Policies 2006*.

### **Health and Safety**

Fires can be hazardous, even life threatening, to employees, visitors, and firefighters. Current federal fire management policies emphasize that firefighter and public safety is the first priority; all FMPs must reflect this commitment (National Interagency Fire Center 1998).

Any wildland fires would be fought by local rural volunteer fire departments. Wildland fires are most likely to begin on private land, at public campgrounds, or along highway rights-of-way and then spread within MNRR. Much of the land is agricultural row-crop, which tends either to act as a buffer to wildland fires or to contain them unless the crops are senescent. Hayfields and pastures may carry fire if conditions are dry and grass is long. Floodplains, wetlands, rivers, and highways act as natural firebreaks. No fires have been documented within MNRR in available reference materials. It is believed that fires have occurred, but were suppressed or contained quickly enough to be inconsequential.

Except for preparation and cleanup operations, there is no capability for MNRR to do prescribed fire or to fight wildland fire. Missouri NRR would rely on an experienced NWCG certified fire coordinator and crews to come to MNRR for the preparation and execution of a prescribed fire. Assistance may be requested from other federal, state, and local certified firefighters.

Relevant laws, regulations, and policies: U.S. DOI Manual, Part 620, Wildland Fire Management (USDI 1998); Director's Order #18; Federal Wildland Fire Management Policy 2001; Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy 2003; NPS *Management Policies* 2006.

### **Recreational Waterway**

The MNRR river corridor provides high-quality outdoor recreation, including high-quality fishing, hunting, trapping, and boating. Opportunities for bird watching and other wildlife observation abound. The river valley provides scenic vistas of a variety of natural landscapes.

Relevant laws, regulations, or policies: The Wild and Scenic Rivers Act of 1968; National Wildlife Refuge System Improvement Act of 1997; NPS Organic Act; Fish and Wildlife Service Manual and Handbooks; NPS *Management Policies* 2006.

#### **1.6.1 Impact Topics considered, but not evaluated**

The *Northern Great Plains Exotic Plant Management Plan 2005* ([NPS 2005](#)) included an EA that addressed many topics that would be impacted by an Integrated Pest Management (IPM) program that included use of prescribed fire as an invasive plant control. If all impact topics have been analyzed in site-specific detail, and there are no changes to the proposal or in impacts to environmental resources from those previously analyzed, then no further environmental analysis is required. Therefore, this EA can focus on very specific topics related to in hazard fuel treatment and prescribed fire in vegetation community restoration beyond exotic and invasive plant control. Use of prescribed fire for control of exotic species has been assessed with a finding of no significant impact, but implementation must wait until an FMP is approved and in place. All topics already evaluated in the *Northern Great Plains Exotic Plant Management Plan 2005*, where the impacts do not differ in the FMP alternatives, will be disregarded in this EA.

### **Adjacent Lands**

The entire MNRR is a mosaic of different land use and demographics. The principle issues that could directly or indirectly affect these properties and their respective land uses are addressed in other impact topics, such as Air Quality, Water Resources, and Recreational Waterway. Impact findings within MNRR for those topics will apply similarly to adjacent lands. Therefore, this topic will not be further evaluated in this EA.

### **Cultural Resources**

Cultural resources outside of archeological resources have not been identified in MNRR, although many are sure to occur. Therefore, not enough is known on this subject to evaluate impacts. It is believed that no significant cultural resources exist in the areas proposed for fire activities or where fire management is under other land-steward jurisdiction. No cultural landscapes have been designated. Regular fire management procedures protect known cultural resources and the reduction of hazard fuels protects against unwanted wildland fire risks. Cultural resources are also protected by state statute, when they occur on public lands. Other land stewards will determine their own

priorities for resource management that comply with applicable laws, regulations, policies, and custom. Therefore, this topic will not be further evaluated in this EA. Archeological resources will be evaluated in this EA.

### **Environmental Justice/Protection of Children**

Presidential Executive Order 12898 requires Federal agencies to identify and address disproportionate impacts of their programs, policies, and activities on minority and low-income populations. None of the alternatives would result in disproportionate health or environmental effects on minorities or low-income populations as defined in the Environmental Protection Agency Environmental Justice Guidance. Therefore, this topic is not further addressed in this EA.

Executive Order 13045 requires Federal actions and policies to identify and address disproportionately adverse risks to the health and safety of children. Since none of the alternatives involve disproportionate risks to the well-being of children, this topic is also excluded from additional analysis.

### **Ethnographic Resources and Indian Trust Resources**

Three local Indian tribes (the Yankton Sioux, the Ponca of Nebraska, and the Santee Sioux) have a strong interest in management of the recreational rivers and have trust land in the area. The relationship of the tribes to the federal government is one of government-to-government. The tribes have been consulted in the planning process. The Yankton Sioux tribe owns more than 13 miles of the 39-mile District shore in South Dakota.

Most of the trust land is agricultural. The areas proposed for prescribed fire are on NPS parkland in the 59-mile District and on other properties in jurisdiction of partner agencies and cooperating land stewards that accept this FMP. The tribes do not currently claim the proposed areas as ethnologically significant properties, nor are they adjacent to Indian Trust land or land that the tribes seek to acquire in the near future. Therefore, this topic will not be further evaluated in this EA.

### **Noise**

Noise is defined as an unwanted sound. Wildland fuels reduction, prescribed fires, and fire suppression can all involve the use of noise-generating equipment such as chainsaws, trucks, and aircraft. Each of these fire management tools, especially chainsaws and helicopters, is quite loud (in excess of 100 decibels) and operators are required to use hearing protection equipment. Noise would be quickly dissipated in the open environment of MNRR and would have a no impact affected by the alternatives. Further, the use of such equipment would not be frequent enough to interfere substantively with human activities in the area or with wildlife behavior. Nor would such infrequent noise chronically impair the enjoyment of the recreational rivers. Residences and businesses are a quarter mile or more from MNRR parkland or other proposed treatment sites and would not be subjected to high decibel levels of sound. Therefore, this impact topic is dismissed from further analysis in this EA.

### **Lightscape**

In accordance with National Park Service Management Policies 2006, MNRR strives to conserve natural landscapes including limiting the use of nighttime lights. No effects on the natural lighting are anticipated from any of the alternatives. Therefore, this impact topic is dismissed from further analysis in this EA.

## **Prime and Unique Agricultural Lands**

Prime farmland has the best combination of physical and chemical characteristics for sustainable production of food, feed, forage, fiber, and oilseed crops. Unique land is land other than prime farmland that is used for production of specific high-value food and fiber crops. Both categories require that the land be available for farming uses. Land uses within MNRR will not be decided in the FMP and the alternatives will not alter the use of prime and unique agricultural lands. Therefore, this topic will receive no further consideration.

## **Socioeconomic**

The NEPA compliance requires an analysis of impacts to the human environment, which includes the economic, social, and demographic elements of the affected area. Wildland fire management and fire fighting activities may bring short-term demands to the local Rural Fire Districts (RFD) as they suppress unwanted fire, but this is within the realm of normal business for the departments. The potential for initiating agreements with RFDs through this FMP may make the RFDs eligible for grants associated with wildland firefighting, but the potential for grants does not depend on the alternative selected. The alternatives will not affect this topic and so it will not receive further evaluation.

## **Soils**

The actions proposed in the alternatives may result in short-term disturbance of soils in areas where there are fire events. The potential for increases in erosion is considered to be low due to the relatively level topography on the bluff tops and on the floodplain terraces. Areas with slope are wooded and if fire were used in those areas, tree canopy would limit erosion while the understory was bare. Understory cover is relatively sparse and is not a major factor in holding soils. Soils will be addressed as they affect water quality in the water resources section. No soil disturbance is expected with the use of prescribed fire, since burn units would have surface fuel breaks created by removing fuels from the soil surface. Therefore, this impact topic will not be addressed in this assessment.

## **Transportation**

None of the alternatives will substantively affect road, water-based, or aerial transportation in and around MNRR. The only potential exception is the impact of smoke on boaters on the river or automobile traffic on a state highway, but this will be addressed under Air Quality. The potential for road closure during fire suppression activities exists for both alternatives. This closure would be infrequent and of very short duration. The alternatives do not affect transportation and so the topic will not be evaluated in this EA.

## **Visitor Experience**

Visitors would be kept out of areas where hazard fuel mitigation was being done. Since both alternatives suggest the use of mechanical methods, visitor experience is the same under the alternatives. Treatment of the areas would be infrequent and of such short duration that the rare visitor to the site would be unaware of the activity. Therefore, this topic will not be further evaluated.

## **Wetlands and Floodplains**

Flood control has contributed to the loss of wetland habitat in both the 39-mile District and the 59-mile District. It has also caused a loss of connectivity between the floodplain and the river. The alternatives will not affect the occupancy and modification of

floodplains and direct or indirect support of floodplain development as described in Executive Order 11988, Floodplain Management. The alternatives will not affect wetland or floodplain function. The proposal is in concert with NPS policies relating to floodplains and wetlands. Therefore, this topic will not be directly evaluated in this EA.

**Wilderness**

No wilderness exists or is proposed within MNRR and so this topic will not be evaluated.

## Chapter 2 -- Alternatives Considered for the Proposed Action

EAs must fully describe the proposal, no action, and a range of reasonable alternatives that meet objectives as laid out in the purpose section. If managers have a preferred alternative at the time an EA is released for public review, it should be identified. Normally, an EA should fully analyze a range of reasonable alternatives. However, environmental impacts of an action may already have been fully examined in a previous NEPA analysis. If all impact topics have been analyzed in site-specific detail, and there are no changes to the proposal or in impacts to environmental resources from those previously analyzed, then no further environmental analysis is required. This is the case for MNRR relative to invasive species treatment, which has been approved ([NPS 2005](#)).

Prescribed fire was analyzed as one of the treatments for invasive species. In that context, prescribed fire was found to have no significant impact. This EA addresses fire in a somewhat different context. It accepts the findings of the *Northern Great Plains Exotic Plant Management Plan 2005* in use of fire for invasive species treatment, but it recommends the use of prescribed fire for the restoration of vegetation communities and as a hazard fuel treatment. For this reason and because prescribed fire can create controversy, this EA will address the No Action Alternative as the current implementation of *Northern Great Plains Exotic Plant Management Plan 2005* without prescribed fire and manual or mechanical reduction of hazard fuels. There is no comprehensive restoration action included in this alternative. The Preferred Alternative is the No Action Alternative *with* the addition of fire for hazard fuel treatment and for vegetation community restoration.

### 2.1 Alternative 1, No Action

This alternative represents a continuation of current management actions as implemented in the absence of an approved FMP; it does not mean an absence of active management of fire and fuels. The NPS would not initiate prescribed fire on its lands for the purpose of hazard fuel mitigation. Other agencies within MNRR use prescribed fire on their lands and would continue to do so. The fire management program would consist of suppressing unwanted wildland fires as quickly as possible. Individual agencies and landowners conducting prescribed burning and hazard fuel mitigation projects would not integrate their actions across the landscape or with the NPS.

All wildland fires will be suppressed using Initial Attack actions. Suppressing wildland fires (initial attack) is accomplished by depriving a fire of additional fuels (e.g., building a fire line that is cleared down to mineral soil) or by cooling the fire sufficiently to prevent further combustion (e.g., applying water to the flaming front). Management response to specific wildland fires will be determined through evaluation of public and firefighter safety, fire behavior, values at risk, potential suppression damage, and availability of fire management resources. In this Alternative, fire would not be used as a means of combating wildland fire.

The [Northern Great Plains Exotic Plant Management Plan 2005](#) selected an IPM approach to control exotic plants at 15 parks, including MNRR. Integrated Pest Management is a decision making process that coordinates knowledge of pest biology, the environment, and available technology to prevent unacceptable levels of pest (including invasive plants) damage, by cost-effective means, while posing the least possible risk to people, resources, and the environment.

An EA for the *Northern Great Plains Exotic Plant Management Plan 2005* considered issues associated with the combined use of several treatments:



- Cultural
- Manual/Mechanical
- Biological
- Chemical
- Prescribed Fire

Although fire treatment was assessed within the EA, it is stated that fire can only be used on those parks that have an approved FMP that allows for the use of fire.

Policy directs MNRR to identify, manage, and reduce where appropriate, accumulations of hazardous fuels. Hazard fuel treatment is not an objective of the *Northern Great Plains Exotic Plant Management Plan 2005* and its activities could increase the availability of dead and dry plant materials for ignition. At this time, MNRR does not generally remove plant debris that could become hazard fuels from NPS lands.

Mechanical treatment for hazard fuel mitigation and resource protection would be used by MNRR to

- clear vegetation away from structures, archeological resources, and other high value resources to reduce fire spread potential and increase defensible space, and
- reduce the possibility of a high intensity fire extending from wildlands to adjacent lands;

Typical mechanical fuel reduction techniques may include limbing trees, removing trees in overstocked areas, removing brush, and mowing.

Restoration projects may overlap hazard fuel mitigation and involve thinning woody plants to

- restore mesic bur oak forests,
- reduce the number of woody stems per acre,
- reduce the prevalence of cedar, and/or
- reduce the brushy component of plant communities.

Individual implementation plans would direct these actions.

## 2.2 Alternative 2, Prescribed Fire Option

### **Preferred alternative for hazard fuel treatment and vegetation restoration**

The preferred alternative would incorporate all the features of Alternative 1, suppression of all wildland fires, and hazard fuel mitigation, including mechanical and manual treatment. It also would add the use of prescribed fire to meet resource management objectives and hazard fuel mitigation. This Alternative allows for the use of prescribed fire as part of an IPM program outlined in the *Exotic Plant Management Plan 2005*. Slash piles could be burned as a means of disposal. In the case of wildland fire, [\*Appropriate Management Response\*](#) would be implemented.

Appropriate Management Response provides for the full range of suppression strategies for management of wildland fires. Under this scenario, managers may choose to utilize natural or fabricated barriers in a confine strategy to lower cost, increase firefighter safety, or minimize the impacts of suppression actions. [\*Minimum Impact Suppression Techniques\*](#) (MIST) would be employed. Fire could be used to create fire barriers.

Missouri NRR managers would use fire for hazard fuel mitigation within MNRR parkland as needed and would cooperate with partners in fuel reduction activities. Prescribed fire would be a tool to meet objectives for hazard-fuel management outside of developed areas, while maintaining the disturbance dependency of the ecosystems treated.

Managers may select mechanical/manual removal of hazard fuel in areas with excess fuel loads and in areas outside of those areas designated as appropriate for prescribed fire. This program would reduce hazard fuel to levels that limit the probability of accidental ignition of fuels and that enable wildland fire suppression forces to control fires with minimal loss of values to be protected.

Hazard fuel mitigation projects would be documented with a written plan approved by the MNRR superintendent when occurring on parkland. Each treatment would involve developing an implementation plan (Prescribed Fire Burn Plan for prescribed fire) and obtaining appropriate permits and approvals. Each plan would describe the fuel hazard and the values at risk. The plan would specify proposed mitigation actions with scope of work to be completed, and cost breakdown associated with the mitigation. Prescribed fire and mechanical treatments may be used individually or in combination (mechanical treatment followed by burning) to achieve natural resource and fuel management objectives.

All prescribed fires for partners participating in this FMP would be planned and approved consistent with the method and format required by the jurisdictional agency or entity, and NPS policy. Firefighter, public, and visitor safety associated with private property, public use areas, and travel corridors would be of highest priority, followed by protection of public and private property.

Prescribed fire would be used in support of vegetation management to maintain and restore plant communities, increase plant diversity, cycle nutrients, and reduce or remove exotic and invasive plants. Resource managers intend to maintain open areas and meadows where they were formerly maintained by natural processes, but were altered by human activities.

With this alternative, the use of prescribed fire may be coordinated among certain principals agreeing to this FMP. Cooperative or shared staffing, planning, funding, and implementation would be encouraged. If agreed among the affected partners, prescribed burns would be designed to take advantage of natural and fabricated barriers without regard to jurisdictional boundaries, thus reducing costs and reducing risks to firefighters.

Unplanned wildland fire used for resource benefit would not be permitted.

## **2.3 Mitigation as a Part of Both Alternatives**

Mitigations for both alternatives will focus primarily on threatened and endangered species, archeological resources, and management constraints. The discussion below focuses on activities on [federal lands](#) or projects undertaken with federal funding. The mitigations and constraints may not be applicable on State and private lands within the MNRR.

### **Threatened and endangered species**

Ginseng (*Panax quinquefolius*) has not been well studied for the effects of fire on its survival or propagation, and it does not appear in Brown and Smith 2000, Wildland Fire

in Ecosystems: effects of fire on flora. Anecdotal information<sup>1</sup> indicates that ginseng is sensitive to fire and may be temporarily suppressed. It evidently rebounds in two to three years in most cases. Consequently, fire will be restricted in areas where ginseng is present with fire frequency no more than once in five years at those locations. At this time, no ginseng has been reported in the areas recommended for prescribed fire.

Generally, no mitigation is needed for western prairie fringed orchid, because it flourishes in a fire dependent ecosystem. Young, et al. 2007 suggests that timing of prescribed fire, coupled with other factors, such as weather, may have an impact of flowering. Fire after late April during drought years may suppress flowering, but does not appear to kill plants. Therefore, under drought conditions, prescribed fire will be used before May 1 or after orchids have produced seed, usually August.

Although delisted, special protections are in place for the American Bald Eagle through the [Migratory Bird Treaty Act of 1918](#) (as amended) and the [Bald and Golden Eagle Protection Act](#). Mitigation for the American Bald Eagle would consist of avoiding fire management activities within one half mile of roost trees during the period of occupation by eagles. Similar precautions would be used with Osprey. Fire management activities would not be used within one mile of nesting trees for Bald Eagle and Osprey or within a mile of documented nesting cliffs for Peregrine Falcon. Currently no Peregrine Falcon nests are documented within MNRR.

Interior Least Terns and Piping Plovers nest on sandbars throughout the MNRR. Fire management activities will not occur on these habitats. However, since the potential exists for workers to access land from the water, all firefighters will receive a briefing on where Interior Least Tern and Piping Plover nests maybe located and will be instructed to avoid all sandbar areas being utilized by either species. Scheduling will also mitigate potential impacts to migrating birds, such as the Whooping Cranes.

American burying beetle is not documented in MNRR, but MIST will be used during unwanted wildland fire. Thus, all controllable measure would be taken to protect the beetle.

Monitoring and constant vigilance will be maintained to ensure that absence of threatened or endangered species does not change during the life of this FMP. No further mitigation is anticipated for any of these species, until their presence is suspected or known.

Water quality will be maintained during fire management activities. This will also mitigate indirect impacts to aquatic species.

Reptiles and amphibians could be affected by prescribed fire, because of their slow movement during cool weather and inability to detect escape routes. Reptiles, such as false map turtle utilize sandy substrates for nesting and these areas typically will not carry fire. Timing of fire will avoid the periods when reptiles and amphibians are most vulnerable to fire management activities. Fire management activities will be carried out before spring emergence or after air temperatures are adequate to allow cold-blood animals to have full mobility. In addition, if wetlands are included for prescribed fire, then only small sections of these habitats will be burned during an annum.

Butterflies listed by the state of South Dakota include Dakota skipper (*Hesperia dacotae*), regal fritillary (*Speyeria idalia*), and tawny crescent (*Phyciodes batesii*). Only small sections of parkland will be burned in prescribed fire, thus allowing recolonization of butterflies from neighboring areas. With the improvement in prairie community

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<sup>1</sup> Discussion thread on native plant list serve; IOWA-NATIVE-PLANTS@LIST.UIOWA.EDU

vegetation, these butterflies might colonize in the proposed treatment areas. Managers will remain vigilant as to the occurrence of these insects and will plan fire timing and location to avoid damage to populations, if they do colonize.

### **Cultural Resources -- Archeology**

Archeology on parkland will be protected from the effects of wildland fire and suppression by (Vawser, written communication):

- Cultural inventories should be conducted as soon as possible to identify all significant resources requiring protection during wildland fire
- Inventories of cultural resources should be completed and documented in approved NPS inventories, such as the List of Classified Structures (LCS), Archeological Sites Management Information System (ASMIS), and the CLI (Cultural Landscapes Inventory). The location of the resources should also be included in Historic Base Maps (HBM) for MNRR in a Geographic Information System (GIS).
- With significant resources identified in the GIS, park personnel can work directly with cultural resource specialists and fire managers to help protect and avoid these resources during any suppression efforts.
- Areas in mixed grass, grass/mixed conifer with no logs or litter, or riparian with grass or small willows can be safely burned if archeological sites with no standing structures are identified. Historic structures determined to be significant will need to be protected from fire by buffers or other methods.
- All other fuel types can be burned once archeological sites have been identified so they can be avoided during burns by buffers or other methods.
- If mechanical removal of cedars or other vegetation is conducted prior to burning, all archeological sites must be avoided by the use of heavy equipment (driving of trucks or equipment over the site), any ground disturbing activity (uprooting of vegetation or disking) and from the location of burn piles for removed vegetation. The impact of heavy equipment can damage surface or buried resources, uprooting vegetation or disking can remove or displace buried deposits, and the intensity of heat from burn piles can have a significant negative impact on archeological materials. Care should also be taken when conducting mechanical removal or pile burning in any identified cultural landscapes, ethnographic resources, or near historic structures.

Cultural resources have not been identified fully within MNRR. Mitigation to ensure avoidance of impact to archeological and/or unidentified cultural resources under both alternatives includes:

- Use of rubber-tired vehicles involved in fire suppression, prescribed burning, and mechanical fuel reduction projects to minimize the potential of disturbing archeological and/or archeological sites.
- Vehicle traffic could be restricted in known artifact-bearing areas associated with a wildland fire, prescribed fire, and mechanical removal of hazard fuels. In order to preserve these resources, consultation with the assigned resource manager regarding placement of fire lines and their construction specifications will take place during fire suppression operations on MNRR parklands and may be employed on other federal, state, and private lands. Post fire archeological

surveys will be encouraged throughout MNRR to identify potential artifact-bearing areas, and habitations and structures.

- Use of water and/or natural barriers to control fire progression, rather than construction of hand lines to contain wildland and prescribed fires is preferred to minimize the potential disturbance of archeological sites.

A suite of mitigation actions will be strongly recommended either individually or in combination to reduce the potential effect of wildland fires and suppression actions on cultural resources where they exist off NPS parklands. Rural Fire Districts in partnership with NPS and recognizing this FMP will be offered and encouraged to accept MIST training through the [Rural Fire Assistance](#) program. Minimum Impact Suppression Tactics will be implemented wherever feasible.

Disposal of slash should occur in areas lacking cultural, archeological, or ethnographical sites, avoiding ground disturbance or heating.

Federal lands will be monitored during fire management activities and work will be halted if previously unknown resources are located. These resources will be protected and recorded as newly discovered resources. The associated SHPO and/or Midwest Archeological Center will be notified of the site.

Personnel will be briefed about protecting archeological and cultural resources before suppression, prescribed fire, and hazard fuel mitigation activities begin. Opportunities for MIST training will be provided to all local firefighters and land stewards.

### **Additional management constraints**

Additional management constraints, which would further mitigate the potential adverse impacts of wildland fire suppression under both alternatives, include:

- If management objectives are not met, the selected treatments may be modified, or alternative treatments may be considered through adaptive management. [Adaptive Management](#) [516 *Departmental Manual (DM)* 4.16] is a system of management practices based on clearly identified outcomes; monitoring to determine if management actions are meeting outcomes; and if not, facilitating management changes that will best ensure that outcomes are met. Management outcomes may also be reevaluated if they are deemed unreasonable after experience with the system. Adaptive Management recognizes that knowledge about natural resource systems is sometimes uncertain and it is the preferred method of management in these cases.
- Minimum Impact Suppression Tactics would be employed in all tactical operations on federal lands. Suppression tactics on private lands would be determined by the land manager and RFDs, but MIST would be encouraged.
- Suppression, prescribed fire, and hazard fuel personnel would be briefed about protecting natural, cultural, and archeological resources and values at risk.
- Fire retardant, if used on federal lands, must be on the approved list of retardants used by the U.S. Forest Service and USDI Bureau of Land Management.
- Off-road use of motorized equipment, such as all-terrain vehicles and wildland fire engines, may be authorized on federal lands by the agency administrator; on private lands, the landowner will determine the appropriateness of off-road travel.

- All extended attack and prescribed fire operations on federal lands would have an employee designated and available to assist suppression operations as a resource advisor. If qualified employees are not available, a resource advisor would be ordered through the interagency dispatch system.
- Helicopters may be used to transport personnel, supplies, and equipment at the discretion of the agency administrator. Improvement of landing sites on federal lands would be kept to a minimum and would include consultation with the assigned resource advisor. Helibases and landing sites would be rehabilitated to pre-fire conditions to the extent reasonably possible.
- Suppression actions would avoid aerial and ground applications of retardant or foam within 300 feet of identified water sources. Use of retardant or foam should be approved by the agency administrator or principal land steward affected by the action, unless public or firefighter safety necessitates action.
- Modifications to roadways, trails, water sources, or clearings would generally not be made. All sites where modifications are made or obstructions removed would be rehabilitated to pre-fire conditions to the extent reasonably possible and in accordance with agency policy. Private landowners would determine the extent of modifications and rehabilitation appropriate on private lands at their own expense.
- Earth moving equipment such as tractors, graders, bulldozers, or other tracked vehicles would generally not be used for fire suppression or prescribed fire. If special circumstances warrant use of heavy equipment to ensure protection, the agency administrator or principal land steward may authorize the use of such heavy equipment.
- Fire line location would avoid sensitive areas wherever possible.
- Fire management activities will not be scheduled on days with an air pollution alert. They will not be carried out during meteorological inversions or when air is stagnant.
- Following fire suppression activities on federal lands, fire lines would be contoured and water-barred; private landowners would determine the desirability and extent of such activities on private lands at their own cost.
- As a matter of practice, burned natural areas on federal lands will be rehabilitated with native species and will occur according to a plan with the agency administrator's prior approval. On private lands, the landowner would determine the appropriateness and extent of any rehabilitation.

### **2.3.1 Additional Mitigation as Part of Alternative 2**

Smoke management techniques, as presented in the Smoke Management Guide for Prescribed and Wildland Fire, 2001 ed. (Hardy et al. 2001), will be used to avoid nuisance conditions and traffic hazards. The smoke management actions will ensure that air quality meets all federal, state, and local regulations. Smoke management will include ensuring that the correct meteorological conditions exist to reduce, redistribute, or disperse smoke emissions. Emission reduction methods will be employed.

Prescribed fire can produce eye and nose irritation at distances of one mile from the fire line (Sandberg and Dost 1990) and public within this sensitivity area will be informed through the media of plans to perform prescribed fire. Cumulative impacts

on human health and safety and on visibility will be avoided by obtaining burning permits.

- Burn Permits for Nebraska

In accordance with State Statute 81-520.01 “(1) There shall be a statewide open burning ban on all bonfires, outdoor rubbish fires, and fires for the purpose of clearing land.” The State Fire Marshal’s office requires an Open Burn Permit. The state’s fire departments issue permits in accordance with state law. Before any open burning is done, a permit must be obtained from the local fire chief or his/her designee on a form prescribed by the State Fire Marshal. When obtaining a burn permit, MNRR would also contact the [Department of Environmental Quality](#) regarding their requirements affecting open burns and any additional required forms.

- Burn Permits for South Dakota

Under §34A-1-18, the State Board of Minerals and Environment established emission control and open burning requirements to control air pollution. The requirements vary from area to area and are administered locally. Prescribed fires to manage ecosystems are open burning and fall under the jurisdiction of the local government. The state cedes jurisdiction for control of open burning to the National Park Service, State Park Service, National Forest Service, or State Forest Service for public lands.

- Even though the state cedes authority for burning on NPS parkland to the NPS, MNRR will obtain any permit required by the local jurisdiction. This will ensure that NPS sponsored prescribed fire does not have a cumulative impact on air quality.
- The website <http://www.state.sd.us/DENR/DES/AirQuality/openburn.htm> provides detailed guidelines for open burning. The state requires government and private entities conducting wildland or prescribed fires to develop a Smoke Management Plan to minimize air quality impacts. Both Nebraska and South Dakota have an open burning permitting system.

Hazard fuel mitigation using prescribed fire around cultural resources on state and federal lands would reduce the potential for impacts from wildland fires. Agency staff will complete Section 106 consultation with the Nebraska State Historic Preservation Officer (NESHPO) or South Dakota State Historic Preservation Officer (SDSHPO), as appropriate, prior to implementing wildland fuel mitigation projects around historic and prehistoric resources.

Other standard cultural resource mitigation measures may include the following: prior to doing treatment work on federal lands, conduct an appropriate inventory of areas not yet surveyed using an archeologist who meets the Secretary of the Interior’s standards; dispose of slash in areas lacking cultural sites; avoid ground disturbance in areas containing known cultural sites; prior to implementation of work, protect character-defining elements of potential cultural landscapes.

For prescribed fires on federal lands, mitigations would be included in the prescribed fire burn plan. Unless prior agreements exist, the appropriate SHPO will be further consulted during preparation of the prescribed fire burn plans.

## 2.4 Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that “the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA’s Section 101” (Forty Most Asked Questions Concerning Council on Environmental Quality’s National Environmental Policy Act Regulations, 1981.) The CEQ goes on to interpret the preferred alternative in Section 101 with the statement, “this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources.”

The Preferred Alternative as determined in this EA is Alternative 2 -- Prescribed Fire Option for Hazard Fuel Treatment and Vegetation Restoration. Alternative 1, although not causing a significant impact to resources, does not enhance resources as well as Alternative 2. Nor does it protect the resources from unwanted wildland fire as well as Alternative 2. Alternative 2 allows the EPMT to implement all of the tools for invasive plant control that were made available through the *Northern Great Plains Exotic Plant Management Plan 2005*. Several vegetation communities in MNRR are regarded as fire dependent and would not be as effectively maintained under Alternative 1 as under Alternative 2.

The No-Action Alternative may also expose firefighters to somewhat elevated risks and potentially increase costs of fighting an unwanted wildland fire, since it does not allow for use of the full range of Appropriate Management Responses, nor a full range of hazard fuel management options. It does not recommend a means of slash disposal and would allow accumulation of slash in piles. Therefore, this alternative would not result in the same level of protection for resources and people over the long-term, as would occur with the preferred alternative.

Alternative 2 provides the greatest flexibility in responding to wildland fire and further provides the greatest opportunities for effective management of hazardous fuels. It results in the lowest risk to firefighters, who may use an Appropriate Management Response (i.e., the full range of suppression strategies) to fight wildland fires. The fuel reduction program ultimately would provide for health and safety of visitors and employees and protection of resources for succeeding generations. This alternative would allow prescribed fire treatments on a landscape scale intended to contribute to the maintenance of long-term stability and diversity of fire-dependent vegetation communities. It restores a community dynamic that has been absent for a century. Therefore, this alternative effectively enhances resources by restoring natural processes to the landscape.

## 2.5 Alternatives Considered and Rejected

Three additional alternatives were identified and considered in the scoping process. Neither was regarded as reasonable within the context of NPS (Director’s Order 12) and NPS Management Policies 2006; both were therefore eliminated from further analysis. Section 2.7B of the *NPS Management Policies 2006* identifies as unreasonable alternatives those that could not be implemented if they were chosen, that cannot be implemented for technical or logistical reasons, that do not meet federal mandates, that are not consistent with management objectives, or that may have severe environmental impacts.



Alternative 3 was called the Wildland Fire Use Alternative. This alternative would employ the full range of available fire management strategies including suppression using an Appropriate Management Response, wildland fire use, and prescribed fire. Mechanical fuel reduction methodologies would be the same as under Alternative 2. This alternative differs from other alternatives in its authorization of wildland fire use (e.g., wildland fire used for resource benefit). This alternative was rejected for three reasons. First, wildland fire use would not be politically or economically acceptable on the majority of lands, public and private, within MNRR. The NPS parklands are relatively small areas, bounded by private lands. Private land owners would be concerned about the potential for wildland fire escape onto their lands. Managing wildland fire for resource benefits requires personnel with specialized skills and qualifications. It is unlikely that qualified personnel would be readily available within the time periods required by federal policy.

Alternative 4, the No Management Alternative, would discontinue all hazard fuel and vegetation restoration. No other manipulative activities would be permitted, but fire would be immediately suppressed or controlled by [\*Initial Attack\*](#). This alternative was rejected because it compromises public and firefighter safety by allowing fuel build up that could result in extremely hazardous conditions. This alternative also fails to protect values on site (e.g., archeological deposits subject to high temperatures) and surrounding properties, where fire may escape. It is inconsistent with federal policy and regulations with regard to firefighter and public safety and protection of property and resources.

Alternative 5 would include all of the aspects of Alternative 1, but would also allow prescribed fire for exotic plant control. This use of fire was analyzed in the *Northern Great Plains Exotic Plant Management Plan 2005* and a finding of no significant impact resulted. If MNRR has an approved fire management plan that includes the use of prescribed fire, it would be able to use prescribed fire treatments to manage exotic plants under the *Northern Great Plains Exotic Plant Management Plan 2005*. Exotic plant management objectives for each prescribed fire treatment would be defined in a project-specific prescribed fire plan. The use of prescribed fire for purposes other than exotic plant management would be outside the scope of the EPMP/EA. Alternative 5 would be similar to Alternative 2, except that hazard fuels could never play a role in the planning of prescribed fire. This would negate one of the principle reasons for using prescribed fire (removal of hazard fuels) without providing any additional benefits or protections over Alternative 2 and it has already been evaluated by Northern Great Plains Exotic Plant Management Plan 2005. Therefore, this alternative was dropped from further consideration.



**Table D1: The degree to which each Alternative meets objectives**

Objectives taken from FMP	Alternative 1, No-Action	Alternative 2, Prescribed Fire Option for Hazard Fuel Treatment and Vegetation Restoration, Preferred Alternative
Ensure all wildland fire and prescribed fire operations cause no injuries to the public and limit injuries to firefighters to be consistent with NPS Strategic Plan goals for employee safety.	No prescribed fire would occur for hazard fuel treatment or vegetation restoration. At this time, few RFDs have <a href="#">NWCG</a> qualified firefighters and this would be unlikely to change without Rural Fire Assistance. The RFDs generally do not implement <a href="#">LCES</a> , 10 Standard Firefighting Orders, and 18 Watch Out Situations. Using temporary closures would increase public and firefighter safety, during suppression of wildland fires. Safety messages would be carried to the public and educational programs would be implemented.	Integrated management (prescribed fire and mechanical fuel reduction) would decrease danger to visitors, neighbors, facilities, and employees by reducing the likelihood of intense wildland fires. The FMP would provide opportunity to work closely with RFDs to achieve NWCG standards. Having RFDs trained through the Rural Fire Assistance program would lead to implementing LCES, 10 Standard Firefighting Orders, and 18 Watch Out Situations. Appropriate Management Response would allow flexibility in ensuring firefighter and public safety. Objective is best met.
Ensure air quality thresholds for National Ambient Air Quality Standards are not exceeded and visual quality is not reduced in adjacent air sheds due to fire use activities.	Wildland fire may be more intense without frequent prescribed fire. Unwanted wildland fire does not pick the opportune air quality times to start, nor can smoke be effectively managed. Slash left after mechanical fuel and exotic treatments would contribute to smoke production. Manual/mechanical methods add negligible amounts to air pollution, but lack of prescribed fire means lower overall pollution during fire management activities than in Alternative 2.	The likelihood of wildland fire is less than for Alternative 1. This reduces overall potential air pollution. Prescribed fire will contribute more pollution than mechanical /manual removal alone. Prescriptions are written to include smoke management and safety on surrounding highways. Objective is best met.



Objectives taken from FMP	Alternative 1, No-Action	Alternative 2, Prescribed Fire Option for Hazard Fuel Treatment and Vegetation Restoration, Preferred Alternative
Contain 95% of wildland fires at less than 50 acres in size on NPS parkland and 80 acres on other agency and private lands within or adjacent to the MNRR boundary, wherever suppression will not result in compromising public and firefighter safety or fire suppression will not result in damage that would exceed potential fire damage.	The full range of techniques cannot be used and so resources may not have full protection. Fuel treatment may not be as complete without use of prescribed fire. Fuels would build, even though they may not reach hazard levels.	Suppression actions would be prioritized and AMR used, reducing damages and potentially costs. Fuel treatment would be effective. Hazard fuels and general fuel loads would be low. Potential fire threats would be effectively mitigated. The use of prescribed fire would improve working relations between RFDs and MNRR as they cooperate on prescribed fires. Objective is best met.
Manage suppression actions so that rehabilitation costs are less than 10% of suppression costs.	To date, no agreements or relationships have developed between RFDs and MNRR. There is no reason to think that will change without establishing common goals, such as prescribed fire use as fuel mitigation. Therefore, RFDs are unlikely to take <a href="#"><i>MIST</i></a> training or be aware of resource issues. Burning a fire line during suppression can be efficient, effective, and a minimal disturbance, but burning a fire line would not be an option.	Prescribed fire will provide a means of collaborating with local RFDs. With a very active fire management program, it is likely that MNRR would make MIST training available to staff and to RFD firefighters. Firefighters would be more aware of the resources on site and would work effectively with the resource advisor. Having full use of techniques will allow firefighters to use the most effective and efficient controls that create the least disturbance to resources. Objective is best met.
Annually review and modify, as necessary, agreements with the organizations responsible for wildland fire suppression and collateral public safety duties.	Coordination would be less effective than if prescribed fire was regularly used, bringing collaborating agencies and RFDs together for planning and implementation.	Collaboration, coordination, and cooperation would be effective within a group that became used to working together. Prescribed fire provides the opportunity to work together. Objective is best met.



Objectives taken from FMP	Alternative 1, No-Action	Alternative 2, Prescribed Fire Option for Hazard Fuel Treatment and Vegetation Restoration, Preferred Alternative
<p>Focus the use of fire to target specific restoration issues within MNRR (e.g., woody plant control, cool season grass control, rejuvenation of grasslands, etc.); return disturbance regime to ecosystems dependent on disturbance.</p>	<p>Prescribed fire is often an effective way to improve health in fire dependent vegetation communities. Without restoring this natural process to fire dependent communities, the need for chemicals and labor to restore the communities will increase. Even with increased costs and efforts associated with chemical treatment and manual removal, the communities are not well maintained without reestablishing natural processes. Additionally, one disturbance has been removed from the riparian – annual flooding, which maintained wet meadows through disturbance. This alternative does not offer a disturbance regime that will maintain meadows and open areas in the riparian.</p>	<p>Prescribed fire restores a natural process to a fire dependent community. It achieves resource objectives in accordance with NPS Management Policies 2006, Chapter 4.4. Fire effects monitoring contributes information to managers so that adaptive management can be effectively implemented beyond the use of fire. Additionally, although flooding will not occur as a disturbance in the riparian that maintains open woodlands and meadows, fire may be able to perform a similar role in preserving meadows and open woodlands along the shore. Objective is best met.</p>
<p>Ensure fire does not destroy development, nor incur costly damage (rehabilitation costs greater than \$10,000) to structures or landscape. Ensure that fire does not escape from NPS parklands and damage other lands within or adjacent to MNRR boundary. Cooperate in the protection of values within and adjacent to partners' jurisdictions.</p>	<p>Fire-wise landscaping and manual/mechanical fuel treatment will occur. Without prescribed fire, the fuel treatment will not be proactive, but rather reactive.</p>	<p>In addition to the benefits of Alternative 1, prescribed fire allows the exhaustion of fuels on a regular basis before they become hazards. It is a proactive treatment. Having a range of prevention and control techniques allows the best most effective control of unwanted wildland fire. A proactive approach to fuel management ensures that fires will be manageable. Objective is best met.</p>



Objectives taken from FMP	Alternative 1, No-Action	Alternative 2, Prescribed Fire Option for Hazard Fuel Treatment and Vegetation Restoration, Preferred Alternative
<b>Summary of objectives</b>	Alternative 1 will not do as complete a job in preventing unwanted wildland fire. It is not proactive in fuel management. It prevents use of a full toolbox of techniques to fight unwanted wildland fire, disregards disturbance regime to disturbance-dependent ecosystems, and has no basis for developing a working relationship with RFDs. Native community restoration and hazard fuel mitigation will require more labor and greater use of chemicals than in Alternative 2.	Alternative 2 provides the managers with a complete toolbox of techniques for accomplishing both hazard fuel mitigation and native plant community restoration in tandem. It is proactive in approach to fuel loading. The full toolbox is available for prevention and suppression of unwanted wildland fire. The use of fire accomplishes all major goals and objectives with the least cost, labor, and exposure to potential dangers. It is the best alternative to protect the public and firefighters from incidents related to unwanted wildland fire. Objective is best met.



**Table D2: Summary Comparison of Alternatives and Impacts**

Impact Topic	Alt. 1 – No-Action	Alternative 2, Prescribed Fire Option for Hazard Fuel Treatment and Vegetation Restoration, Preferred Alternative	Impacts of Wildland fire on resources.
<b>Air Quality</b>	Hazard fuel reduction could result in direct adverse impacts of short-term and minor intensity on a local scale and nearly negligible on a regional scale. Cumulative impacts do not exist for fire management actions under this alternative. This alternative would not result in impairment of air quality.	Impacts of Alt. 1 apply. Direct adverse impacts of prescribed fire would be short-term and minor on a local scale and nearly negligible on a regional scale. Mitigation may reduce impacts to negligible locally. Cumulative effects would be mitigated through the open burning permit process. This alternative would not result in impairment of air quality.	The occurrence of wildland fire could result in short- to long-term adverse impacts on a local to regional scale. There could be moderate direct and indirect impacts. Cumulative impacts of wildland fire would be regional, of short to long duration, and minor to major.
<b>Threatened, endangered, or sensitive species</b>	Hazard fuel reduction activities could cause direct and indirect adverse impacts that are negligible, localized, and short-term. There may be beneficial, long-term minor impacts to species experiencing severe competition or poor habitat conditions. Cumulative effects would be localized and negligible. In the context of the Endangered Species Act, the impacts on threatened or endangered species would be: <i>May affect-not likely to adversely affect</i> . This alternative would not result in impairment of threatened, endangered, or sensitive species.	The direct impacts would be beneficial, localized, long-term, and minor to moderate. Cumulative effects would be beneficial, long-term, minor to moderate, and localized. In the context of the Endangered Species Act, the impacts on threatened or endangered species would be: <i>May affect-not likely to adversely affect</i> , given stated mitigations. This alternative would not result in impairment of threatened, endangered, or sensitive species.	Direct and indirect impacts are adverse, moderate to major, short- to long-term, and localized to regional. Regional fires would constitute a cumulative impact, which would result in the worst case for adverse, major, long-term, and regional impacts. It could result in impairment.



Impact Topic	Alt. 1 – No-Action	Alternative 2, Prescribed Fire Option for Hazard Fuel Treatment and Vegetation Restoration, Preferred Alternative	Impacts of Wildland fire on resources.
<b>Vegetation Community</b>	The adverse direct impacts would be localized, short-term, and minor. Reduction in plant competition would be indirect, beneficial, moderate, localized, and long-term. Cumulative effects would be a buildup of hazard fuels. Over a period of years, fire exclusion in fire-dependent communities would be moderately adverse. This alternative would not result in impairment of vegetation.	The adverse direct impacts would be localized, short-term, and negligible. Indirect effects would be beneficial, localized, long-term, and moderate to major. Cumulative effects would be localized, and major, and beneficial in an ecological context. This alternative would not result in impairment of vegetation.	Direct adverse impacts would be localized, long-term, and could be major. Wildland fires with extreme behavior can have stand-replacing impact. Therefore, they could cause impairment.
<b>Water Quality and Water Resources</b>	There would be no direct adverse impacts. Some impacts would be beneficial, localized, short-term, and negligible to minor. Cumulative effects do not exist. This alternative would not result in impairment of water resources.	The adverse indirect impacts would be localized, short-term, and negligible. Indirect beneficial, localized, long-term, and minor impacts based on terrestrial ecology are expected. Cumulative effects do not exist. This alternative would not result in impairment of water resources.	The adverse impacts would be indirect, localized, short-term, and minor. It would not result in major adverse impacts or impairment unless fire was regional.
<b>Wildlife</b>	The direct impacts would be adverse, negligible, localized, and short-term to long-term (loss of nesting cavities). Indirect impacts would be beneficial, localized, short-term, and minor. Cumulative impacts would be localized and negligible to minor. This alternative would not result in impairment of wildlife.	Fire management actions cause some beneficial impacts in habitat improvement that are minor, long-term, while adverse impacts are negligible, localized, and short-term.	The direct impacts would be adverse localized, short-term to long-term, and minor to major. Indirect adverse impacts would be long-term and moderate.



Impact Topic	Alt. 1 – No-Action	Alternative 2, Prescribed Fire Option for Hazard Fuel Treatment and Vegetation Restoration, Preferred Alternative	Impacts of Wildland fire on resources.
<b>Archeological Resources</b>	Direct impacts are negligible, localized, and short-term. Cumulative effects have not been identified as long as mitigation is implemented. There will be no impairment.	The adverse direct impacts would be localized, short-term, and negligible. Beneficial results may come from locating previously unknown sites after burn. This indirect benefit is long-term and localized. Cumulative effects would be mitigated. This alternative would not result in impairment of cultural resources.	Wildland fire has potential for resource impairment. Because of the nature of artifacts, any damage is forever. Direct impacts could range from negligible to major in a localized area.
<b>Recreational Waterway</b>	The indirect impacts would be adverse, localized, short-term. Beneficial indirect impacts are long-term, minor, and localized. Cumulative impacts were not identified. This alternative would not result in impairment of the recreational waterway.	The indirect adverse impacts are as for Alternative 1. Indirect impacts would be beneficial, long-term, localized, and moderate from an ecological perspective. Cumulative beneficial impacts would be moderate, localized, and long-term.	Adverse impacts resulting from visual effect would be moderate, localized, and long-term.
<b>Health and Safety</b>	Direct and indirect adverse impacts could be negligible, localized, and short-term. Cumulative impacts would be localized, short-term, and negligible.	Direct impacts could be localized, negligible, and short-term. Cumulative adverse impacts are mitigated.	Adverse impacts are short-term to long-term, major, and localized, unless fire is regional.





## Chapter 3 – Affected Environment

Fifty-nine miles of Missouri River downstream of Gavins Point Dam to Ponca, Nebraska (referenced as the 59-mile District) was included in the first boundary for MNRR. Thirty-nine miles of Missouri River below Fort Randall Dam to Running Water, South Dakota, 20 miles of the lower Niobrara River and the last eight miles of Verdigre Creek before its confluence with Niobrara River were added to MNRR (referenced as the 39-mile District).

MNRR collectively encompasses approximately 69,000 acres. The entire area is managed by a complex patchwork of private property owners and local, state, tribal, and federal agencies. The NPS currently owns approximately 250 acres, which includes two separate tracts (Mulberry Bend Overlook and Bow Creek Recreation Area). The majority of the recreational river area is privately owned. See the main body of the Fire Management Plan for complementary information.

Missouri NRR is located between the glaciated and unglaciated portions of the Missouri Plateau, in the Great Plains Province of the Interior Plains (See Figure 3). Covering much of the Northern High Plains are sand dunes and windblown silt deposits (loess). The extensive cover of loess has created MNRR's fertile agricultural land. The floodplain consists of sandy soils deposited since the Pleistocene. This area is part of America's Corn Belt.

The area combines nearly flat to gently rolling glaciated till with hilly loess. Sloping bluffs bound the north side of the river, while steep bluffs rise on the south. Exposed bedrock consists of limestone of the Niobrara Formation and shale of the Pierre Formation derived from Mesozoic Era deposition. Elevation is approximately 1,250 feet (381 meters).

Eastern Nebraska has a continental climate with average annual precipitation of 30 inches. The mean annual temperature is 51.6 degrees Fahrenheit (10.9 deg C). The average number of frost-free days is 188. Eastern Nebraska experiences occasional drought years with annual precipitation below 19 inches (480 mm).

**Table D3. Temperatures – in degrees Fahrenheit**

YEAR	MAX	MIN	AVERAGE MONTHLY	DEPARTURE FROM NORM	EXTREMES HIGH	LOW
2000	56.9	34.2	45.5	0	99	-19
2001	57.1	35.9	46.5	PLUS 1.0	97	-19
2002	58.2	35.6	46.9	PLUS 1.8	101	- 5
2003	57.3	34.9	46.1	PLUS 1.0	97	-16
2004	57.5	35.8	46.6	PLUS 1.5	91	-18
2005	58.6	37.1	47.9	PLUS 2.8	99	-19
2006	59.3	37.7	48.5	PLUS 3.4	100	-11
NORMAL	57.2	33.0	45.1			

### 3.1 Two Currently Proposed Prescribed Fire Sites

Bow Creek Bottoms Reserve in the 59-mile District, NPS:

Bow Creek Recreation Area is located along Bow Creek and the Missouri River near Wynot, Nebraska in Cedar County. The NPS purchased the property north of Bow Creek in 2004 and acquired the southern tract in 2008.

The north portion occupies approximately 125 acres plus accretions and is bounded by water on all sides, except the western edge bordering privately, owned farmland. Several



wetlands are found throughout the north unit, along with a mix of open meadow, smooth brome pasture, and riparian forest comprised of cottonwood, boxelder, mulberry, eastern red cedar, and peachleaf willow. The south portion includes approximately 95 acres plus accretions and borders private upland mesic-bur oak forest on all sides with the exception of the northern boundary neighboring Bow Creek or the Missouri River.

Management activities have focused on the north portion and have included converting 30 acres of farmland into native prairie in fall 2004. In addition to the prairie restoration, Russian olive trees were cut and treated in 2004 and the majority of eastern red cedars, which were widely spread throughout property, were mechanically removed during 2004 through 2007. Treatment of noxious weeds is ongoing with Canada, bull, and plumeless thistle, leafy spurge, Russian olive, and purple loosestrife the focus. Planned restorations include converting the smooth brome pastures into native prairie and utilizing prescribed fire in the management regime. In 2008, the NPS cleared approximately six acres of eastern red cedars on the south portion of the property, where they have encroached on prairie.

Mulberry Bend in the 59-mile District, NPS:

Mulberry Bend is located along the Missouri River in Dixon County, Nebraska near the Vermillion-Newcastle Bridge. The property was acquired by Nebraska Department of Roads as mitigation for the new bridge construction impacts and subsequently transferred to the NPS in 2003.

Nebraska Highway 15 bisects the parkland with a lowland area on the west and a maintained scenic overlook to the east. The overlook area is bounded on the west by Highway 15, county gravel road on the north, and private bur oak forest on the east and south. The overlook includes approximately eight acres of maintained landscape consisting of native plantings, wayside exhibits, and associated concrete sidewalks. The remaining 20 acres of the overlook consist of mesic bur oak forest and associated species.

The parkland west of the highway includes approximately five acres and is predominantly a smooth brome pasture with sporadic eastern red cedar and deciduous trees along the north and south border. A county gravel road borders on the north and west sides; Nebraska Highway 15 borders on the east; and private woodland that includes a building borders the south. Ground disturbance on the lowland area has been limited because of a registered archeology site along the northern boundary. A registered archeology site is located along the northern boundary where vegetation transitions from pasture to scrub.

Treatment of noxious weeds, select thinning of encroaching eastern red cedars, and establishment of native plantings have been the primary management activities at the Mulberry Bend area. Future vegetation management will include expanding the mechanical treatment of eastern red cedar and may include the restoration of the non-native, smooth brome pasture.

Other areas as they become available:

The NPS would like to add any properties that come under their jurisdiction to the proposed sites for fire management. The analysis in this document broadly covers the entire MNRR.



### 3.2 Air Quality and Visual Resources

Federal regulation of air quality began with the 1990 Clean Air Act. This legislation sets requirements for attaining National Ambient Air Quality Standards (NAAQS) and protects areas where air quality is better than the standards from significant deterioration of air quality. The NAAQS are established for carbon monoxide, lead, sulfur dioxide, particulate matter less than 10 microns in diameter (PM<sub>10</sub>), particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>), ozone, and nitrogen dioxide. The standards are expressed as ambient air concentrations averaged over a specific period of time that is relevant to the pollutant being measured.

Parks will meet the air quality conditions as specified in the NAAQS for specified pollutants; the CAA prevents and controls air pollution to prevent degradation and encourage cooperative pollution control programs; and the *NPS Management Policies 2006*, which state that current air quality be maintained, and deterioration avoided.

In general, the area in and around MNRR is in attainment of NAAQS and is classified as a Class II air quality area (limited amounts of new air pollution emissions are allowed). Yankton has a countywide Air Quality Index<sup>2</sup> below or near 50, in the GOOD range. The contribution of pollutants from distant locations, such as large cities to the west, is unknown. The principle concern is that local air quality does not deteriorate significantly from its current levels.

Because of the rural nature of this region, chemical pollutant levels (CO, NO<sub>2</sub>, ozone, sulfur oxides) are very low. Visibility and particulate concentrations are the two areas of concern, although no problems exist at this time. Smoke can greatly affect air quality by raising concentrations of particulates, which in turn affects visibility. The Class II designation of this area determines the maximum allowable increase in concentrations of pollutants, such as particulates, as established in the 1963 Clean Air Act.

### 3.3 Threatened and Endangered Species, Species of Management Concern<sup>3</sup>

Habitat within the river corridor supports at least 44 federal- and state-listed species of management concern, including the endangered pallid sturgeon, Interior least tern, and the threatened piping plover.

Both the American bald eagle and osprey have been sighted in MNRR, but they have not been located at the Bow Creek or Mulberry Bend sites. They are year-round residents and nest in large trees, usually cottonwoods. Currently no peregrine falcon nests are documented within MNRR, but nesting opportunities are available.

Interior least terns and piping plovers nest throughout the MNRR and prefer inter-channel, sparsely vegetated sand bars. Fire management activities would not occur on these habitat types. Whooping cranes and eskimo curlews (*Numenius borealis*) have not been documented in MNRR. Neither would be expected to breed in MNRR, but only have potential as migrants. Adult birds are mobile and could escape fire at any season.

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<sup>2</sup> The Air Quality Index (AQI) is a standardized indicator of the air quality in a given location. It measures mainly ground-level ozone and particulates (except the pollen count), but may also include sulfur dioxide, and nitrogen dioxide.

<sup>3</sup> Nebraska Natural Heritage Program, 2002 and South Dakota Natural Heritage Program, 2002.



American burying beetle is not documented in MNRR. Their preferred sites do not coincide with areas proposed for fire management activities. .

In 2007, pallid sturgeon spawning was documented in the 59-mile District of the Missouri River ([US. Geological Survey Fact Sheet 2007-3053](#)). Aquatic species are not in a habitat where management actions will cause a direct effect. They can be affected by water quality changes. As long as water quality is maintained, the sturgeon and other fish will not be adversely impacted. There is a potentiality that restoration of native vegetation communities would reduce water turbidity by reducing erosion, but fish species adapted to the Missouri River are well adapted to turbid water, shifting substrate, and a balance of accretion and degradation in the channel.

Monitoring and constant vigilance will be maintained to ensure absence of these species does not change during the life of this FMP. No further mitigation is anticipated for any of these species, until their presence is suspected or known.

NPS policy affords state-listed species and candidates for federal listing similar protection to that of federally listed species. The states of Nebraska and South Dakota have listed threatened and endangered species, a few of which have been documented as occurring in MNRR ([see Table D6](#) in Appendix D3). There is overlap in the state lists. Many of these species do not occur in MNRR. Others are mobile and would not be affected by hazard fuel mitigation and restoration activities within MNRR, particularly on NPS parkland.

Butterflies listed by the state of South Dakota are not documented as occurring in MNRR. The Dakota skipper requires large expanses of high quality remnant prairie, which does not exist in MNRR. The regal fritillary also requires quality tallgrass prairie or wet meadows. The tawny crescent is often found where woodlands meet native prairie, especially prairie containing bluestem grass. With the improvement in prairie community vegetation, these butterflies might colonize on the proposed treatment areas.

### 3.4 Vegetation

MNRR's *General Management Plan, Environmental Impact Statement* (NPS 1999a:73,74,83) describes vegetation resources and the *Northern Great Plains Exotic Plant Management Plan 2005* updates some of that information. Plant communities have been mapped and include agricultural lands, upland forest, and floodplain forest. The woody draws, cottonwood forest floodplains, and remnant prairie patches are among the best of the last large river natural resources remaining in conjunction with a free-flowing reach of the Missouri River. <sup>4</sup>

Natural vegetation along the river is composed of two major plant communities, the floodplain forest of willow and cottonwood, and the elm and oak (*Quercus* spp.) woodland typical of the bluffs that border the floodplain. Varying stages of floodplain succession are evident throughout MNRR.

Vegetation, upland: Upland vegetation is a combination of pasture/hay field, small areas of restored prairie, mesic bur oak, and mixed deciduous forest. Cedar is competing with all natural vegetation cover types in the uplands, except where haying occurs. Potential exists for conversion of abandoned fields to high quality tallgrass (in 59-mile District) or mixed-grass (in 39-mile District) prairie. The present potential vegetation in the uplands

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<sup>4</sup> Species lists are too long to include in this document, but can be found on NPSpecies, <http://science.nature.nps.gov/im/apps/npspp/index.cfm> and in NPS 2005a.



includes fire-adapted communities, based on prior existing vegetation communities reported by Lewis and Clark's descriptions and numerous studies (Kuchler 1975).

Bluffs support hardwood forests, but many of the species are at the western extent of their range (Weaver 1960). The slopes of the bluffs support dense stands of oak, ash, mulberry (*Morus alba*), and walnut (*Juglans* spp.), with bur oak as the dominant species. There is a stable understory of shrubs with species of dogwood (*Cornus* spp.) and sumac (*Rhus* spp.), where grazing has been limited. The bur oak community is usually, but not always bordered by a more or less continuous community of shrubs, which separate it from the grasslands (Weaver 1960). This shrub region is often dominated by cedar. Near hilltops, the soil contains less moisture and the forest is replaced by native grass mixed with yucca (*Yucca glauca*) on south and west exposures.

Vegetation, floodplain: The floodplain forest of cottonwoods occurs on the highest banks and islands, but is on the decline. Riparian cottonwoods are tolerant of, and dependent upon, occasional physical disturbance for population rejuvenation (Rood, et al. 2007). It is also possible that flood control and channel degradation has deprived young cottonwoods of nutrient deposition and a shallow source of water (Wilson, personal communication). The understory of the mature cottonwood communities includes dogwood, sumac, and wild grape (*Vitis vulpina*), and poison ivy (*Toxicodendron rydbergii*), but is being replaced by cedar.

Riparian vegetation has been severely reduced by agricultural clearing. Although remnant groves remain, mature cottonwood forest on the high banks adjacent to the river has been generally replaced with pasture and cropland. Clearing for agriculture has reduced riparian vegetation. Kentucky bluegrass, smooth brome, and other exotic plants dominate riparian grasslands. Agricultural conversion of wetlands and riparian forests has eliminated more than 60 percent of the natural areas within 0.6 miles of the river.

One-half of the remaining indigenous vegetation of the 59-mile District is forest dominated by cottonwood some green ash, elm (*Ulmus* sp.), cedar, Russian olive (*Elaeagnus angustifolia*), mulberry, and box elder (*Acer negundo*). Observation by park managers lead to anecdotal evidence that cottonwood is declining and being replaced by cedar. Wilson (1970) found that cottonwood reproduction ceases once the trees reach 15-25 years of growth. Green ash and box elder take on added importance in the resulting community.

The regeneration of cottonwood forests has been further restricted by stream degradation, because this species requires a moist, bare substrate for establishment (Reily and Johnson, 1982). Cottonwood forest regeneration currently appears largely restricted to narrow shoreline zones or the upstream end of deltas. The decreased frequency of over bank flooding, perhaps compounded by lowered water tables, is probably causing the reduced vigor and high mortality observed in mature riparian forests of this area.

The sparse herbaceous layer of the woodlands consists mostly of scouring rush (*Equisetum variegatum*), Kentucky bluegrass, smooth brome, and switchgrass (*Panicum virgatum*) where cedar does not dominate the cover. Riparian grasslands are dominated by Kentucky bluegrass, smooth brome, and other invasive grasses and weeds.

The river corridor contains sand dune habitat. Distribution of vegetation ranges from areas with no vegetation to areas with considerable grass and forb cover to areas of all cottonwoods with an understory of willows, or more recently, cedar. The natural sequence is for sandbars to be stabilized by willows (*Salix* spp.), which are later replaced



by cottonwoods, peachleaf (*Salix amygdaloides*), and black willow (*Salix nigra*). After about 20 years, the sandy surface soils that support a very sparse herbaceous layer become a moist soil surface with shrubby and herbaceous cover (Wilson 1970).

Vegetation, exotic: Leafy spurge (*Euphorbia esula*), spotted knapweed (*Centaurea biebersteinii*), Canada thistle (*Cirsium arvense*), plumeless thistle (*Carduus acanthoides*), and musk thistle (*Carduus nutans*) are widely distributed and are designated as noxious weeds by the State of Nebraska. Purple loosestrife (*Lythrum salicaria*) is also designated, and is spreading rapidly throughout MNRR where it forms dense stands on several hundred acres of wetlands found on the bottomlands and islands. Tamarisk (*Tamarix* spp) has recently been documented in MNRR and, while not found in large patches, it is being found throughout MNRR. Hybrid cattails (*Typha xglauca*) are widespread in the wetlands. Eastern red cedar is spreading into grassland and developing dense thickets because of the suppression of fire. In the uplands, other woody species, including green ash (*Fraxinus pennsylvanica*), slippery elm (*Ulmus rubra*), and smooth sumac (*Rhus glabra*), are encroaching onto native grassland. Smooth brome is widespread in both the upland and bottomlands. Russian olive has invaded many of the scrubland and bottomland forests, especially those subject to heavy grazing.

### 3.5 Water Resources

Human activities have resulted in significant changes to the Missouri River ecosystems, both aquatic and terrestrial. There are substantial reductions in native communities, natural habitat, and abundance and diversity of native species. The hydrology of a river that a century ago would flood a mile-wide floodplain has been stabilized. The greatest geomorphic action is degradation of the main channel. The Missouri River ecosystem depended on a disturbance regime that has been removed through a series of dams. The river and its tributaries have been impounded and channelized, and their hydrographs, sediment and organic matter dynamics, and floodplain connectivity have been altered, adversely affecting native fish and wildlife and leaving many species with an uncertain future (Hesse and Miestl 1993). Riparian areas are particularly sensitive to variation in the hydrological cycle and serve as good indicators of the environmental change caused by flow regulation (Weeks, et al. 2005).

The Gavins Point Dam, located at the upstream point of the 59-mile District, was designed to provide a steady flow of water for navigation on the lower Missouri River, flood control, hydroelectric power generation, and irrigation ([U.S. Army Corps of Engineers website](#)). The Fort Randall Dam also provides hydroelectric power generation and flood control. Channel degradation caused by each dam has isolated the river from its floodplain and wetlands.

The Missouri River is no longer the “Big Muddy.” Prior to damming, the river carried large amounts of sediment, which created the dynamic of accretion, and erosion that created meanders. Erosion is no longer a function of meander, but of channel bed deepening. Water clarity has improved since dam completion. Water quality effects are derived mostly from cool-water releases from reservoirs and are most pronounced immediately below dams (Committee of Missouri River Ecosystem Science 2002).

Although water quality in the three rivers is generally good, the river carries some agricultural chemicals and fecal-indicator bacteria. Both Districts are designated as Class A for water quality standards. Missouri NRR water-quality screening by the National Park Service (1998) found 21 groups of parameters exceeded Environmental Protection Agency (EPA) criteria at least once within their study area and period (Weeks et al.



2005). Dissolved oxygen, pH, chlorine, antimony, cadmium, copper, lead, mercury, selenium, zinc, and heptachlor epoxide exceeded their respective EPA criteria for the protection of freshwater aquatic life. Fecal-indicator bacteria concentrations (total coliform and fecal coliform) and turbidity exceeded the NPS-Water Resources Division (WRD) screening limits for freshwater bathing and aquatic life, respectively. The occasional high levels of fecal coliform have not limited the river's recreational uses.

### 3.6 Wildlife

Terrestrial wildlife and resource descriptions are taken directly from MNRR's *Final General Management Plans, Environmental Impact Statement and Northern Great Plains Exotic Plant Management Plan 2005*. Wildlife is plentiful in and along the MNRR. Surveys have identified 48 species of mammals. Small mammals, including mice (Muridae), voles (Muridae), bats, moles, rats (Muridae), and ground squirrels, made up roughly 60 percent of represented species. White-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) are the only large mammals in the MNRR. Coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and badger (*Taxidea taxus*) are common. Other small, fur-bearing animals include raccoon (*Procyon lotor*), mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), plains spotted skunk (*Spilogale* spp.), beaver (*Castor canadensis*), rabbit (*Sylvilagus floridanus*), and bobcat (*Lynx rufus*). For mammals as well as reptiles, this species composition has not changed significantly from early historic times, except for the loss of the grizzly bear and large herbivores like buffalo and elk.<sup>5</sup>

The number of species of birds that occur in MNRR varies seasonally. The river's bottomland serves as wintering, feeding, breeding, and staging grounds. The river corridor is home year-round to 25 species. An additional 58 species commonly nest in the area, while another 15 species are common winter residents. The Missouri River is a significant pathway for migratory birds. More than 115 species regularly use the corridor during migration. Loss of habitats has affected bird numbers.

The mainstem dams have controlled flooding, and development has encroached into the old erosion zone near the river, where habitat was best for wildlife. Agriculture, industry, and private dwellings have largely replaced the forest-grassland community.

### 3.7 Archeological Resources

Cultural resources in MNRR include historic and prehistoric archeological sites, historic architectural and engineering features and structures, and resources of significance to American Indians. Important cultural resources include the Indian Hill, Schulte, and Wiseman archeological sites, ethnic settlements and farms, sunken steamboats, and landscape features noted by Lewis and Clark (e.g., Spirit Mound and Old Baldy) along what is now the Lewis and Clark National Historic Trail.

A comprehensive inventory of cultural resources has not been completed for MNRR, and an archeological site located near the Mulberry Bend Overlook is the only archeological site currently documented as occurring on NPS parkland. The site is a Central Plains Tradition, St. Helena phase habitation site with several house depressions. It was recorded in 1994 prior to the road realignment and bridge construction, and has been recommended as eligible to the National Register of Historic Places by the Nebraska State Historical Society (Bozell and Ludwickson 1994)

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<sup>5</sup> Species lists can be found at NPSpecies, <http://science.nature.nps.gov/im/apps/npspp/index.cfm>.



### 3.8 Wild and Scenic Rivers – Recreational River

As a result of wild and scenic designation many great rivers vital to our nation's history are guaranteed to be preserved in our future. The Missouri River is protected by this visionary law, which sets aside free flowing rivers to protect them from development or use that would degrade their Outstandingly Remarkable Values. The designation is reserved for rivers that contain remarkable scenic, geologic, fish and wildlife, cultural or similar qualities. The Recreational River designation applies to those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment in the past.

Current laws and policies require that conditions be maintained such that these selected rivers with their immediate environments are preserved as free-flowing rivers. These rivers and their surrounding environments are protected for the benefit and enjoyment of present and future generations. *NPS Management Policies 2006* require that adverse affects on the values that qualify a river for the national wild and scenic rivers system be avoided.

Missouri NRR corridor provides high-quality outdoor recreation, including fishing, hunting, trapping, and boating. Opportunities for bird watching and other wildlife observations abound. The river valley provides scenic vistas of a variety of natural landscapes. A desired condition for visitor experience depends on maintaining vistas reminiscent of those that Lewis and Clark encountered on their exploration west.





## Chapter 4 – Environmental Consequences

### 4.1 Methodology for Assessing Impacts

Applicable and available information on known natural and cultural resources was compiled. Alternatives were evaluated for their potential for affecting resources and values during the scoping process. The impact analyses were based on professional judgment using information provided by MNRR, relevant references and technical literature, and subject matter experts. Potential impacts are described in terms of type (beneficial or adverse), context (range, local, regional, or national), duration (short-term or long-term), and intensity (negligible, minor, moderate, and major). Direct, indirect and cumulative effects are discussed in each impact topic. A statement on the potential for effects to constitute impairment of the resources or values finishes the analysis. A table (Table D5) presents the definitions for type, context, duration, and intensity for each impact topic. When appropriate, mitigation measures, beyond those cited in Chapter 2, may be employed to offset or minimize potential adverse impacts that have been identified.

The broad definitions of intensity were applied:

- *Beneficial:* A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
- *Adverse:* A change that moves the resource away from a desired condition or detracts from its appearance or condition.
- *Direct:* An effect that is caused by an action and occurs in the same time and place.
- *Indirect:* An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.
- *Short-term:* An effect that within a short period of time would no longer be detectable as the resource is returned to its pre-disturbance condition or appearance. Short-term impacts, depending on impact topic, may range from a few hours up to five years (see table below).
- *Long-term:* A change in a resource or its condition that does not return the resource to pre-disturbance condition or appearance, and for all practical purposes is considered permanent.
- *Local Effect:* An effect that is spatially restricted to a relatively small area, though that area may vary in size by the type of effect. For example, a localized impact to vegetation would be confined to the area of the immediate project but a localized effect on air quality may extend for several miles.
- *Regional Effect:* An effect that is spatially restricted to a larger area such as north-central Nebraska and southern South Dakota. The area might extend through the plains states for some resource impacts (e.g. air quality).
- *National Effect:* The effect of a project action would extend spatially to areas outside the Midwest.



**Table D4. Impact threshold definitions**

<b>Impact Topic<sup>6</sup></b>	<b>Negligible</b> No laws, regulations, or policies would be violated.	<b>Minor</b> No laws, regulations, or policies violated. No mitigation measures would be necessary.	<b>Moderate</b> Mitigation measures necessary and likely effective.	<b>Major</b> Mitigation measures are necessary and success of mitigation is not assured.	<b>Impairment</b>	<b>Duration of Impact</b>
<b>Air Quality</b>	There would be no perceptible visibility impacts (less than 50 tons/year for each pollutant). Maximum emissions fall below NAAQS.	Impact is measurable but localized and little consequence (less than 100 tons/ year per pollutant). Maximum emissions fall below NAAQS.	Impacts would be measurable (greater than 100 tons/year for any pollutant), but effects would remain localized. Visibility impacts from cumulative emissions would be likely. Maximum emissions would be greater than NAAQS.	Impacts would be easily detected and observed. Response would be outside the normal range of expected fire effects. Maximum emissions would be greater than NAAQS.	Actions have major adverse effects on park resources and values; contribute to deterioration of park air quality, so that park purpose could not be fulfilled; affect resource integrity or opportunity for enjoyment; or affect resource conservation established in GMP or other planning	Short-term would be restricted to the period of fire management activity. Long-term would refer to impacts lasting substantially beyond the duration of the activity.

<sup>6</sup> Detailed descriptions can be found in Environmental Impact Methodologies and Thresholds, Examples. March 23, 2006. [http://www1.nrintra.nps.gov/eqd/DO12Site/pdf/EQDImpactThresholds%20\\_March2006.pdf](http://www1.nrintra.nps.gov/eqd/DO12Site/pdf/EQDImpactThresholds%20_March2006.pdf)



Impact Topic <sup>6</sup>	<b>Negligible</b> No laws, regulations, or policies would be violated.	<b>Minor</b> No laws, regulations, or policies violated. No mitigation measures would be necessary.	<b>Moderate</b> Mitigation measures necessary and likely effective.	<b>Major</b> Mitigation measures are necessary and success of mitigation is not assured.	<b>Impairment</b>	<b>Duration of Impact</b>
<b>Threatened, Endangered, or Sensitive species; and Wildlife</b>	There would be no observable or measurable impacts to these species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.	<b>Adverse Impacts</b> on species, habitats, or natural processes sustaining them would be detectable, but not outside the natural variability. Occasional disturbance could be expected, but without interference population levels. Small changes to local population numbers or structure might occur. Impacts during critical reproduction periods would not result in injury or mortality. Sufficient habitat in the park would remain to maintain the viability of the species in the park. <b>Beneficial Impacts</b> on species, habitats, or natural processes would be detectable, but not outside the natural range of variability. Improvements to key characteristics of habitat in the park would sustain or improve existing population levels or structure and maintain the viability of the species.	<b>Adverse Impacts</b> on species, their habitats, or natural processes sustaining them would be detectable and could be outside the natural variability. Frequent disturbance could be expected, with some negative impacts to factors affecting local population levels. Some impacts might occur during reproduction or in habitats and result in harassment, injury, or mortality to one or more individuals. However, sufficient population numbers or habitat remains functional to maintain viability in the park. <b>Beneficial Impacts</b> on species, habitats, or the natural processes would be detectable and outside the natural range of variability. Changes to characteristics of habit during reproduction would minimize or prevent harassment or injury and improve the viability of the species in the park.	<b>Adverse Impacts</b> on species, their habitats, or the natural processes sustaining them would be detectable, permanent, and outside natural range of variability. Frequent would be expected with negative impacts resulting in decrease in park population levels. Impacts would occur during reproduction or in key habitats and result in direct mortality or loss of habitat affecting viability. Local population numbers and structure might experience large declines. <b>Beneficial Impacts</b> on species, habitats, or natural processes would be detectable, permanent, and expected to be outside the natural range. Changes during reproduction or in key habitats would prevent mortality or habitat loss and would result in notable increases in park population levels.	The action would contribute substantially to the deterioration of federal or state listed or special status species to the extent that they would no longer function as a part of the natural system. In addition, some of these adverse major impacts on park resources and values would result in violation of NPS policies or state or federal regulations.	Short-term refers to a period of one to three years. Long-term refers to a period longer than three years.



Impact Topic <sup>6</sup>	<b>Negligible</b> No laws, regulations, or policies would be violated.	<b>Minor</b> No laws, regulations, or policies violated. No mitigation measures would be necessary.	<b>Moderate</b> Mitigation measures necessary and likely effective.	<b>Major</b> Mitigation measures are necessary and success of mitigation is not assured.	Impairment	Duration of Impact
<b>Vegetation (native vegetation communities; noninvasive plants)</b>	Impacts would have no measurable or perceptible changes in plant community size, integrity, or continuity.	Impacts would be measurable or perceptible but would be localized within a relatively small area. The overall viability of the plant community would not be affected and it would recover without intervention.	Impacts would cause a change in the plant community (e.g. abundance, distribution, quantity, or quality); however, the impact would remain localized.	Impacts to the plant community would be substantial, highly noticeable, and permanent. The impact is severely adverse or exceptionally beneficial.	The action would contribute substantially to deterioration of park vegetation to the extent that it would no longer function as a natural community. In addition, these adverse major impacts would contribute to deterioration of resources so that the park's purpose could not be fulfilled; affect resources key opportunities for enjoyment; or affect fundamental resources identified in park planning documents.	Short-term refers to a period of less than 10 years. Long-term refers to a period longer than 10 years.



Impact Topic <sup>6</sup>	<b>Negligible</b> No laws, regulations, or policies would be violated.	<b>Minor</b> No laws, regulations, or policies violated. No mitigation measures would be necessary.	<b>Moderate</b> Mitigation measures necessary and likely effective.	<b>Major</b> Mitigation measures are necessary and success of mitigation is not assured.	<b>Impairment</b>	<b>Duration of Impact</b>
<b>Water Resources – water quality, floodplain/wetland connectivity, and aquatic communities</b>	Impacts would not affect, or impact would be slightly detectable at the lowest levels of detection and would not be long-term. Population abundance and community structure would be influenced by evolutionary processes biogeographical characteristics, rather than implementation of the actions proposed. Water quality would remain stable with no detectable variation from the baseline levels that could be attributed to inputs from the action area.	Impacts would be measurable, although small and localized. Minor changes in community structure would potentially occur. Changes would not be expected to be outside the natural range of variability and would not be expected to have any long-term effects on the hydrograph, water quality, or related natural processes. Water quality would remain stable with little detectable variation attributable to inputs from the action area.	Impacts would be measurable but relatively localized. Moderate changes in community structure and functional group composition would potentially occur. Populations eventually would recover from impacts. Water quality and hydrology impacts would remain localized and mitigation measures may be necessary with the measures successful.	Impacts would be measurable and have substantial local consequences, and would be noticed on a regional scale. Significant changes in community structure would potentially occur, as would changes in dominant taxa and functional feeding group composition. Recolonization might not occur for an extended period without active intervention. Water quality and quantity would be impacted as seen by actual changes in river conditions attributable to local actions or by the morphological changes to the surficial drainage in the action area.	The activity would contribute substantially to the deterioration of park water resources to the extent that they no longer function as a natural system or would be significantly degraded. In addition, these adverse major impacts contribute to deterioration of park resources and values to the extent that the park's purpose could not be fulfilled; affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or affect the fundamental resources identified in park planning documents.	Short-term would refer to recovery in less than five years.  Long-term would refer to recovery, following treatment, requiring more than five years.



Impact Topic <sup>6</sup>	<b>Negligible</b> No laws, regulations, or policies would be violated.	<b>Minor</b> No laws, regulations, or policies violated. No mitigation measures would be necessary.	<b>Moderate</b> Mitigation measures necessary and likely effective.	<b>Major</b> Mitigation measures are necessary and success of mitigation is not assured.	<b>Impairment</b>	<b>Duration of Impact</b>
<b>Archeological Resources</b>	The impact would be at the lowest levels of detection or barely measurable, with no perceptible onsequences, either adverse or beneficial, to archeological resources. For purposes of section 106, determination of effect would be <i>no adverse effect</i> .	<b>Adverse Impact</b> would affect site with potential to yield important information for prehistory or history. The context would be local or disturbance would be confined to small area with little or no loss of information potential. For purposes of section 106, determination of effect would be <i>no adverse effect</i> . <b>Beneficial impact</b> would be a site preserved in its natural state. For purposes of section 106, determination of effect would be a <i>no adverse effect</i> .	<b>Adverse Impact</b> would affect site with the potential to yield important information to prehistory or history. Disturbance of a site would not result in a substantial loss of important information. The historic context of the affected site would be statewide. For purposes of section 106, determination of effect would be <i>an adverse effect</i> . <b>Beneficial impact</b> would stabilize site. For purposes of section 106, the determination of effect would be <i>no adverse effect</i> .	<b>Adverse Impact</b> would affect site with the potential to yield important information about human history or prehistory. The historic context of the affected site would be national. For purposes of section 106, effect would be <i>an adverse effect</i> . <b>Beneficial impact</b> results in an active intervention to preserve site. For purposes of section 106, effect would be a <i>no adverse effect</i> .	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents.	This is complicated in archeological resources, where there is no recovery of a deteriorated resource. Any adverse impact must be viewed as Long-term. Beneficial impacts may be short- or long-term. A threat may be deemed as a short-term impact that can be mitigated. Short-term refers to transitory impacts that disappear over a period of days or months. Long-term effects are essentially permanent, given the nature of archeological resources.



Impact Topic <sup>6</sup>	<b>Negligible</b> No laws, regulations, or policies would be violated.	<b>Minor</b> No laws, regulations, or policies violated. No mitigation measures would be necessary.	<b>Moderate</b> Mitigation measures necessary and likely effective.	<b>Major</b> Mitigation measures are necessary and success of mitigation is not assured.	<b>Impairment</b>	<b>Duration of Impact</b>
<b>Recreational River -- Special Legislative Designation</b>	The impacts in recreational river characteristics would be so small as to be immeasurable. There would be little or no change in recreational opportunities or visitor safety. Few visitors would be affected.	There would be a change in recreational opportunities or visitor enjoyment; however, it would affect relatively few visitors. Impacts in visitor activities or aesthetic resources would be small and localized.	There would be substantial changes in recreational opportunities or visitor enjoyment; however, these changes would not affect the majority of visitors.	There would be substantial changes in recreational activities or visitor enjoyment that would affect opportunities for the majority of one or more user groups.	The action would permanently affect opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources (Outstandingly Remarkable Values) found in the NRR.	Short-term refers to duration up to one year. Long-term refers to duration in excess of one year.
<b>Health and Safety</b>	The impact to visitor safety would not be measurable or perceptible. Impacts from smoke and exhaust fumes are not detectable at the lowest level of detection within safe zones. Danger to firefighters and public remains stable at a very low probability of incident.	The impact would be measurable or perceptible, and it would be limited to a relatively small number of visitors at localized areas. Impacts to visitor safety could include a minor increase in the potential for visitor conflicts in current active areas. Danger to firefighters and public remains stable at a low probability of incident.	The impact to visitor safety would be sufficient to cause a potential for visitor conflicts in areas where action is occurring and in surrounding areas. Smoke causes mild distress to those with respiratory difficulties in the immediate vicinity. Visibility is not diminished. Danger is moderate.	The impact to visitor safety would be substantial either through the elimination of potential hazards or the creation of hazards during implementation. Smoke causes distress for those with normal lung function. Visibility is diminished. Danger is above expectations with the local public at risk. Evacuation may be the only reasonable mitigation.	The impact causes the permanent deterioration of a safe and healthful environment for visitors and employees. The impact is likely to result in accident or injury above the level set by the NPS fire management policies.	Short-term impacts exist during the activity and for one day afterwards. Long-term impacts last for more than one day.



## Cumulative Effects Methodology

From CEQ regulations (1508.7), a “cumulative effect” is the effect on the environment that results from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such action. Cumulative impacts will be determined by combining the impacts of each alternative with other past, present, and reasonably foreseeable future actions. Therefore, it is necessary to identify other ongoing or reasonably foreseeable future projects on MNRR lands and, if applicable, the surrounding area.

**Other Past, Ongoing, and Proposed Projects in the Area:** Land uses and actions vary greatly within MNRR, because of the mosaic of private, state, county, and other federal stewardship. Much of the land is agricultural.

Some land is developed for residential, municipal, or private business uses. Privately held land is not under the direct jurisdiction of NPS, although cooperative relationships may be established with private owners. Projects planned on this land are not known by MNRR managers. Cooperative measures may be most effective with other governmental agencies. These agencies will work together to minimize cumulative impacts of plans and actions whenever possible.

River use and other tourism activities contribute to impacts on local resources. As the vegetation communities are improved, NPS parkland at Bow Creek Recreation Area may become an attractive tourist stop on the river. At this time, the FMP precedes all other planning for this site. Other agencies may have plans to improve or alter visitor areas or managed lands. These plans must be taken into account before that agency adopts any aspect of the MNRR FMP.

The *Northern Great Plains Exotic Plant Management Plan 2005* will work in tandem and synergistically with the FMP to meet desired resource conditions for vegetation communities. The IPM approach to exotic/invasive plant control may result in added fuels in the form of chemically treated plants or slash. This must be accounted for in hazard fuel analysis and treatments. These two plans will complement each other, resulting in beneficial impacts to the resources.

The cumulative impacts can be summed up by saying that NPS has no additional plans or activities that would result in cumulative impacts to resources. Managers at MNRR do not know of any plans or actions by other land/water stewards that would result in cumulative impacts.

## Impairment Methodology

*National Park Service Management Policies 2006* require analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values, unless a particular law directly and specifically provides otherwise.





The impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, or cause irreparable harm to the resource. An impact to any park resource or value may constitute impairment, particularly for resources:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's GMP or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. A determination on impairment is made in the Environmental Consequences section by impact topic.

### **Firefighter and Public Safety**

Fire fighter and public safety have the highest priority in all fire management activities. Wildland fire and prescribed fire operations will cause no injuries to the public and will limit injuries to firefighters to be consistent with NPS Strategic Plan goals for employee safety. Appropriate Management Response for all unplanned wildland fires 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 MNRR. This goal is separately evaluated because of its extreme importance as the focus of fire management activities.

### **Compliance with Section 106, National Historic Preservation Act**

In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the NHPA (36 CFR Part 800, *Protection of Historic Properties*), impacts to cultural resources will be identified and evaluated by (1) determining the area of potential effects, (2) identifying cultural resources present in the area of potential effects . . . , (3) applying the criteria of adverse effect to affected cultural resources . . . and (4) considering ways to avoid, minimize, or mitigate adverse effects.

CEQ regulations and the NPS's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, for example, reducing the intensity of an impact from major to moderate or minor. However, any reduction in intensity of impact resulting from mitigation is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* also must be made for affected cultural resources. A cultural resource inventory has not been completed, but archeological resources at Mulberry Bend are the only known cultural resources on NPS parkland. Other resources exist within the MNRR boundary. All partners will be asked to comply with Section 106.



## 4.2 Air Quality and Visual Resources

Air quality is fundamentally important to the preservation of healthy ecosystems ([NPS 2004](#)). Visual resources of the MNRR valley include several scenic vistas of a variety of natural landscapes such as bottomlands, cottonwood forests, wooded draws, forested hills, sand dunes, high-bank islands, tallgrass prairie, wetlands, and chalkrock bluffs. These vistas include the Spirit Mound Historic Prairie, Old Baldy, Ionia Volcano, Calumet Bluff, and Mulberry Bend Overlook. There are development zones in MNRR ranging from cities to seasonal cabins. In addition, while some of the land inside MNRR boundary is in a somewhat natural state, agricultural practices and influence from the mainstem Missouri River reservoirs (Fort Randall Dam and Gavins Point Dam) have altered the landscape in the historic floodplain.

The particulate matter (or particles) produced from wildland fires can be a nuisance or safety hazard to people who encounter the smoke – whether the contact is directly through personal exposure, or indirectly through visibility impairment. *Nuisance smoke* is defined by the US Environmental Protection Agency as the amount of smoke in the ambient air that interferes with a right or privilege common to members of the public, including the use or enjoyment of public or private resources (Clean Air Act 1990).

Complaints about loss of visibility, odors, and soiling from ash fallout from wildland fire are common. Reduced visibility from smoke has caused fatal collisions on highways in several states, from Florida to Oregon. Carbon, tars, liquids, and different gases in smoke are likely to cause eye and nose irritation for distances up to a mile from the fire (Sandberg and Dost 1990). The abatement of nuisance or problem smoke is one of the most important objectives of any wildland fire smoke management plan (Shelby and Speaker 1990).

### Impacts from Wildland Fire

Smoke intrusions and nuisance- or safety-related episodes may happen during the course of wildland fire. Most frequently, they occur near sunset, as air cools near the ground and wind speeds decline. High concentrations of smoke accumulate near the ground and tend to carry through drainages. If the drainages are wet, smoke can assist the formation of local fog. This can cause hazardous conditions where a drainage crosses a road or bridge or above and beside the Missouri River.

Visibility reduction may also result from the direct impact of the smoke plume. Fine particles (less than 2.5 microns in diameter) of smoke are usually transported to the upper reaches of the atmospheric mixing height, where they are dispersed. Wildland fire smoke may also be a nuisance to the public by producing a regional haze.

Wildland fire can be characterized by different combustion stages. The efficiency of combustion is distinct for each stage, resulting in a different set of chemical compounds and thermal energy being released at different rates into the atmosphere (Sandberg et al. 2002). During smoldering, which occurs predominantly after unwanted wildland fire, combustion efficiency is low, resulting in more particulate emissions than during the flaming stage. This contributes to air pollution, poor visibility, and impacts on human health.

Cumulative impacts would result in the worst case of a wildland fire, if many fires are burning regionally. The result may be direct and indirect, adverse, regional and moderate, lasting from a short-term to long-term.



### Alternative 1, No Action

Treatment of exotic plants has been assessed in a separate EA and will not be covered here. Treatment of hazard fuels by removing ladder fuels and stacking in piles must be assessed for its impact on air quality and visual resources. The use of power tools, such as chain saws, is integral to this process. These tools produce exhaust fumes with the generally inefficient two-stroke engines. The compounds emitted are considered responsible for acute health effects - hydrocarbons, aldehydes, nitrogen oxides and carbon monoxide, being among them. Exposure to tetramethyllead, dibromoethane and polycyclic aromatic hydrocarbons also occurs. This results in high exposure levels of short duration ([Nilsson, et al. 1987](#)) and contributes to carbon dioxide in the atmosphere. Consequently, work would not be done during air-pollution alert days, because of potential cumulative impacts.

*Cumulative Impacts:* The exhaust fumes of short duration will not contribute to cumulative effects as long as the mitigation actions are taken.

*Conclusions:* Impacts from hazard fuel treatment are direct, adverse, minor, and short-term, localized, and will not result in impairment.

### Alternative 2, Including Prescribed Fire

The impacts associated with mechanical and manual treatment of hazard fuels, as stated in Alternative 1, apply to this Alternative.

Smoke plume-related visibility degradation in urban and rural communities is not subject to regulation under the *Clean Air Act*. Nuisance smoke is regulated under state laws and local ordinances and is frequently based on either public complaint or compromise of highway safety (*Eshee 1995*). Public outcry regarding nuisance smoke often occurs before smoke exposures reach levels that violate National Ambient Air Quality Standards. The Courts have ruled that the taking of private property by interfering with its use and enjoyment caused by smoke without just compensation is in violation of federal constitutional provisions under the Fifth Amendment. The trespass of smoke may diminish the value of the property, resulting in losses to the owner (*Supreme Court of Iowa 1998*).

Prescribed fire practitioners often rely on favorable atmospheric conditions to successfully disperse the smoke away from smoke-sensitive areas, such as communities, areas of heavy vehicle traffic, and scenic vistas. At times, however, unexpected changes in weather (especially wind) or residual combustion, may result in an intrusion of smoke that causes negative impacts on the public.

Air Quality Forecast Guidance for Yankton, SD is provided by the National Weather Service

([http://www.weather.gov/aq/probe\\_aq\\_data.php?latitude=42.9&longitude=-97.37](http://www.weather.gov/aq/probe_aq_data.php?latitude=42.9&longitude=-97.37)). As a mitigation measure, this guidance should be part of the "Go, No Go" criteria, checked prior to ignition. Additionally, both states have devised smoke management guidelines and a permit system to regulate the amount of smoke put into the atmosphere from prescribed burning (S.D. --

<http://www.state.sd.us/DENR/DES/AirQuality/openburn.htm#GUIDELINES> and NE -- <http://www.deq.state.ne.us/>). The permit system in both states ensures that cumulative impacts are avoided. High-resolution weather prediction models promise to



provide increased accuracy in predictions of wind speeds and directions and mixing heights at time and spatial scales useful for land managers.

*Cumulative Impacts:* Cumulative impacts are mitigated through the state sponsored permitting system and mitigation.

*Conclusions:* In the worst case, impacts are direct, adverse, short-term, minor locally, negligible regionally, and will not result in impairment. Mitigation may reduce the impacts to negligible.

*Summary:* Although neither alternative will result in a significant impact to resources, Alternative 2 provides the greatest protection against unwanted wildland fire and is preferred. Smoke management is difficult or impossible in a wildland fire. Alternative 2 allows managers to prevent nuisance smoke and dangerous conditions from unwanted wildland fire most effectively. There are no cumulative impacts, because the permitting process mitigates that possibility. Neither Alternative will result in impairment of air quality or visual resources.

#### 4.3 Threatened, Endangered, and Species of Management Concern

The habitat within the two reaches supports a large number of threatened and endangered species, including the endangered pallid sturgeon, interior least tern, and the threatened piping plover. The western prairie fringed orchid (*Platanthera praeclara*) has not been documented in the MNRR but may occur in areas proposed for treatment.

##### Impacts from Wildland Fire

The danger posed to each of the listed species is in the event of *unwanted wildland fire*. The intensity of the fire, the rapid movement, or the heating of the substrate, and falling debris can be a threat to eggs (bird and turtle) and plants, or slow moving or non-moving organisms (young of all species, turtles, plants). Increases in sedimentation and water temperatures after a burn have a small potential for affecting fish eggs in the substrate, but Missouri River species are well adapted to high turbidity and sedimentation rates. Adult fishes can escape impacts.

Least terns and piping plovers utilize sandbar habitats that are not typically connected to the riverbank and thus would not be directly impacted by unwanted wildland fire. Some of the sandbar locations have become vegetated, but generally the fuels are discontinuous and do not carry fire. Reptiles and amphibians utilizing these sandbar locations would also be relatively safe from fire. Species utilizing wetlands could be impacted by unwanted wildland fire, but moisture content would usually make the fire carry poorly. Wetlands are most susceptible to fire damage during drought.

The extent of damage to rare species depends on the season and intensity of the fire. Fuel loads, fuel moisture, fire residence time, wind speed, relative humidity, and slope all contribute to fire intensity ([Leis 2008](#)). Wildland fire will even pose a threat to fire dependent species, such as western prairie fringed orchid, if fire intensity, and particularly fire residence time, is greater than what the plant can survive. In any case, unwanted wildland fire must be prevented to protect rare species.

Wildland fire could result in long-term impacts if large areas of habitat are destroyed. Any reduction in numbers of individuals can be significant to species survival. The impacts of unwanted wildland fire could be negligible to major, depending on season and severity of the fire, have a long-term effect, and a local to a regional impact, depending upon species.



### **Alternative 1, No Action**

Mitigation for trampling of Piping Plover and Interior Least Tern eggs has been presented. Workers reducing hazard fuels will be briefed on species habits and they will avoid working on sandbars.

Removal of snags could reduce availability of roost trees for other rare or protected species, such as American Bald Eagles. Removal of downed timber may reduce sunning locations for turtles. Dead snags should be left standing if they pose no significant fire threat and logs immediately along the shoreline should remain undisturbed. Western prairie fringed orchid should be inventoried and their locations mapped. These areas would be avoided during July, the blooming season.

*Cumulative Impacts:* Activities associated with fire management and those for IPM may increase the amount of traffic in rare species habitat, creating a disturbance. This can be mitigated by coordination of timing.

*Conclusions:* Direct adverse impacts from hazard fuel removal could be mitigated so that they do not exceed negligible, short-term, and localized. Hazard fuel removal may have benefits for the western prairie fringed orchid by reducing competition. The ESA impact statement for fire management activities would be *No Effect* or *May Affect – not likely to adversely affect*.

### **Alternative 2, Including Prescribed Fire**

All of the potential impacts from Alternative 1 apply to Alternative 2, except that the effective removal of fuels would reduce the probability of wildland fire. Prescribed fire generally remains surficial, leaving burrowing animals and perennial herbaceous plants unharmed. Prescribed fire is not proposed on sandbars, the nesting area for several rare and protected species. Wetlands providing habitat for rare reptiles, such as the false-map turtle, will be avoided during most prescribed fire. Generally, the turtles are near water and will become submerged when threatened, so the risk is very small. If wetlands are subjected to prescribed fire, only small sections will be burned at a time to retain refugia for escaping wildlife and sources for recolonization. Typically, prescribed fire would be ignited outside of breeding season.

Use of prescribed fire will enhance the habitat for western prairie fringed orchid, which is a fire dependent species of moist prairie and sedge meadow. Fire effects monitoring will show trends in habitat improvement and changes in populations of orchids, allowing managers to use adaptive management in scheduling treatment.

The ESA impact statement for fire management activities would be *No Effect* or *May Affect – not likely to adversely affect*.

*Cumulative Impacts:* The cumulative impacts of implementing the IPM plan and the use of fire within that implementation and for hazard fuel mitigation will have a beneficial, long-term, moderate, localized impact on rare species.

*Conclusions:* Improvement of habitat results in a finding of beneficial, long-term, minor to moderate, localized impact. Adverse impacts are mitigated.

**Summary:** Mitigation ensures that actions under Alternatives 1 and 2 do not have direct adverse impacts to rare species. The Alternative that allows implementation of all of the IPM options results in the greatest benefit to the species by providing good quality habitat. The fire effects monitoring allows managers to manage species adaptively based



on trends. As with other impact topics, the Alternative that best prevents unwanted wildland fire protects the rare species most effectively. Therefore, Alternative 2 is preferred. Wildland fire could result in impairment, if fire occurred within critical habitat or greatly impacted habitat and the individuals located there. Alternative 2 provides the best protection against potential impairment.

#### 4.4 Vegetation<sup>7</sup>

Natural vegetation along the river is composed of two major plant communities, the floodplain forest and meadow, and upland woodlands and grasslands. Varying stages of floodplain succession are evident throughout MNRR. Annual weeds, short-lived grasses, sedges, seedling willow, and cottonwood grow on the sandbars and newly deposited accretion land. Larger willow and cottonwood trees dominate farther back and higher above the water table, although younger year-classes of willow and cottonwood are being replaced by cedar and recruitment is not occurring. Grasslands have been replaced by pasture or row cropping, but grassland/prairie would do well in areas subject to frequent disturbance and uplands, which are too dry to support floodplain forests. Cedar often invades abandoned pastures.

##### Impacts from Wildland Fire

The potential for wildland fire is slightly greater for this Alternative than for Alternative 2 and carries with it the risk of fires being larger and much more intense than if prescribed fire were used as a treatment. Intense fires are likely to damage tree canopy, and possibly bolls and roots. Soils tend to become very hot to a significant depth (Neary, et al. 2005), killing herbaceous plants and destroying seed banks that would normally survive prescribed fire. Super heating of the soil surface can remove the organic layer, leaving poor quality mineralized soil as a seedbed. Large fires remove sources for recolonization of plant communities by killing plants over a large area. The effects of wildland fire can alter or irreparably change the plant community. Wildland fire often results in high concentration of exotic species and low native species richness and diversity (Kuenzi, et al. 2008). Therefore, the direct adverse impacts can be long-term, major, and localized.

##### Alternative 1, No Action

Hazard fuel treatment can impact soils and herbaceous understory from trampling and compaction. This can be minimized by avoiding sensitive areas, keeping all terrain vehicles on pathways, and working in small areas with small crews. Dragging cut slash and woody debris across the soil can uproot plants in the understory or otherwise damage them. Piling debris in brush piles creates a hotspot for wildland fire and damages ground cover beneath. These direct adverse impacts are generally localized, short-term with the exception of the impacts of brush-piles, which are long-term, and minor.

Hazard fuel reduction can selectively remove some of the invasive species that are altering the plant communities in the riparian and on the bluffs. Cedar is a very volatile ladder fuel and it is also an invasive that is targeted for removal to meet natural resource objectives. This is a beneficial impact of hazard fuel removal. Herbaceous plants would seldom be removed in a wildlands hazard fuel mitigation program, but several herbaceous plants are considered invasive and problematic in MNRR.

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<sup>7</sup> Species lists are too long to include in this document, but can be found on NPSpecies, <http://science.nature.nps.gov/im/apps/npspp/index.cfm>.



Plants that are treated through IPM are not removed from site. Even woody debris from mechanical removal of invasive species has been placed in brush-piles and not removed. Without the option to use prescribed fire on herbaceous debris or to burn brush-piles, hazardous levels of fuels may accumulate.

*Cumulative Impacts:* Restoration and hazard fuel mitigation, as currently implemented, may result in a dangerous fuel loads over time.

*Conclusions:* Adverse impacts resulting from the No-Action Alternative are short-term for direct and long-term for indirect, and would be minor. They are localized to area-wide, but not as large as regional. Reduction in plant competition may be moderate, beneficial, long-term and localized.

### **Alternative 2, Including Prescribed Fire**

Mechanical/manual hazard fuel mitigation may be necessary prior to a prescribed fire near values to be protected or where fuels present a control problem. It may also be necessary before the first prescribed fire in previously untreated areas to reduce fuels to a level manageable by the fire crew.

The direct adverse impacts of wildland and prescribed fire include removal of above ground biomass. Some mortality of grass, shrub, and tree species would result, especially if the residence time of fire is extended and the severity (downward heat pulse) is subsequently increased. The moisture levels in the lowlands will prevent hot fires and should create a mosaic effect of burned and unburned vegetation. Maintaining a three- to five-year fire recurrence will also prevent severe over-heating, even in dry areas.

Indirect effects of wildland and prescribed fire on these vegetation communities is varied, depending on the existing plant community structure and completeness of the burn. The response of communities would be within the normal range of response where those communities are dominated by native species, such as wet or mesic grasslands, sand plain grasslands, and mesic bur oak woodlands. Resprouting by grass and many shrubs would be expected during the same year as burning or, if the year is particularly dry, no later than the next spring.

Timing and intensity of burning may result in an indirect impact – a shift in species composition, and the hope is that the degree of shift is moderate and beneficial. Prescribed fires and other restoration efforts can be timed to give desirable species benefits, while suppressing invasive species. The long-term indirect effect of burning in native fire-dependent plant communities such as prairies and oak woodlands is to invigorate the community, resulting in robust growth and increased seed production. This would be considered a long-term, minor to moderate, beneficial impact of fire.

The direct effect of burning nonnative species would also include removal of above ground biomass and some mortality of individual plants. The indirect impacts may range from expansion/proliferation of nonnative species in the burned area to depression of nonnative species. The response is largely dependent on the time and intensity of burning as well as secondary factors such as competition with native species, seed bank in the soil, natural or remedial reseeding efforts, or other subsequent treatment of nonnative species. The IPM program will complement the fire management activities to ensure that invasive plants cannot take advantage of the reduced competition caused by fuel management.



The direct impacts of fuel management activities would be removal of nonnative and invasive (e.g. eastern red cedar) species and reduction in stem density. These effects would be moderate in local areas and beneficial for native plant communities.

*Cumulative Impacts:* Cedar and exotic cool-season grasses are suppressed or killed by fire, but prescribed fire is not effective on all targeted exotic/invasive species at MNRR. Combinations of fire and chemical treatment, as outlined in the *Northern Great Plains Exotic Plant Management Plan 2005*, will ensure the desired outcomes. Both the FMP and *Northern Great Plains Exotic Plant Management Plan 2005* allow managers enough flexibility to employ adaptive management for the restoration of plant communities in both the lowlands and the uplands. Both plans working together will be more effective in suppressing difficult to control species than fire alone. Fire effects monitoring as outlined in the *Fire Monitoring Handbook 2003 (NPS 2003)* will provide information on trends caused by the cumulative impacts of a coordinated IPM and fire management program.

*Conclusions:* Alternative 2 is the most effective in managing fuel loads and hazard fuels, thus preventing wildland fire. The adverse impacts from Alternative 2 can be mitigated and would be short-term, localized, and negligible, while offering moderate to major, long-term, localized benefits in fuel management and community restoration. It will also allow a complete IPM approach to invasive plant management.

*Summary:* The impacts of wildland fire are direct and indirect, long-term and could be major over a broad area. Wildland fire could result in plant community replacement and would remove the native seed bank in the soils. Alternative 2 provides the greatest protection against unwanted wildland fire and is preferred. Wildland fire has a low probability, but a possibility of resulting in impairment of native and desirable plant communities. Alternative 2 also allows synergy between the FMP and all treatments proposed in *Northern Great Plains Exotic Plant Management Plan 2005*.

## 4.5 Water Resources

Water in the Missouri River originates from mountain snowmelt, plains snowmelt and seasonal rainfall. A large portion of MNRR is listed in the National Wetland Inventory. The river provides important riverine and riparian habitat. The reservoirs created by dams have served as sinks, preventing downstream movement of organic constituents and sediment. Sediment-free water leaving the reservoirs once again seeks a load to carry, and the result is channel bed deepening, severe bank erosion and drainage of remnant backwaters. Channel degradation caused by dams has isolated the river from its floodplain and wetlands. Loss of connectivity with wetlands and the floodplain has resulted in a reduction of nutrients important in fish and wildlife habitat. Enrichment of soils by deposition of carbon and nutrient laden water has all but ceased.

### Impacts from Wildland Fire

The discussion of impacts on water resources must address impacts on soil, because soil transport after a fire will be the primary vector of change for water resources. Erosion is a natural process occurring on landscapes at different rates and scales depending on geology, topography, vegetation, and climate. Increases in stream flow following a fire can result in little to substantial impacts on the physical, chemical, and biological quality of water in water bodies. The magnitude of these impacts is largely dependent on the size, intensity, and severity of the fire, the condition of the watershed when rainfall starts, and the intensity, duration, and total amount of rainfall (Neary, et al. 2005).





Post-fire stream flow can transport solid and dissolved materials that adversely affect the quality of water for human, agricultural, or industrial purposes. The most obvious effects are produced by sediments. Severson and Rinne (1988) reported that most of the focus of post-fire effects on riparian-stream ecosystems has traditionally been on hydrological and erosional responses. The Yellowstone Complex Fires in 1988 ushered in an extensive effort to examine both the direct and indirect effects of wildfire on aquatic ecosystems (Minshall et al. 1989, Minshall and Brock 1991). Prior to the 1990s, little information existed on the effects of wildfire on fishes, other aquatic organisms such as macroinvertebrates, and their habitats.

The direct adverse impacts of wildland fire at MNRR would be negligible to minor, demonstrated in the form of soil erosion from bare ground, which then enters the water. Wildland fire can denude the forest, killing trees, and destroying canopy. Canopy is important in breaking the fall of precipitation and thus preventing splash erosion and reducing sheet erosion. Wildland fire would not affect floodplain or wetland structure and function. The "Big Muddy" ecosystem is accustomed to absorbing the impacts of sedimentation, but that ecosystem has been altered by the reduction in sediment transport. Therefore, impacts would be localized and short-term. This could affect water quality and possibly isolated spawning habitat on gravel shoals. Temperature and amount of runoff from the burned areas may increase, but these changes in input are negligible once they reach the volume of water carried in the Missouri River.

The only event that would result in cumulative impacts would be a large, landscape scale fire that affected water resources over 10% or more of MNRR rural lands. This is very unlikely and unprecedented in modern times.

### **Alternative 1, No Action**

The fire management activities will not adversely impact floodplains or wetlands. Suppression efforts may have potential for impacts, but MIST will mitigate those impacts. Some of the mechanical and manual hazard fuel reduction may indirectly benefit wetland resources by contributing to improvements in native plant community structure. This can have a secondary impact on the river ecosystem that depends on wetlands for water filtration, nursery areas, and recharge zones.

*Cumulative Impacts:* Although numerous demands are placed on the water resources of the Missouri River, the No-action Alternative's impacts very localized, and would not be cumulative with those demands.

*Conclusions:* There are no direct adverse impacts of this alternative on water resources. There are indirect beneficial impacts resulting from improvements in native plant communities through hazard fuel mitigation. Indirect adverse impacts are negligible, short-term, and localized.

### **Alternative 2, Including Prescribed Fire**

Appropriate management response allows firefighters to choose the best response with the least impact to wetlands and floodplain. Use of prescribed fire reduces the chances of wildland fire occurring. Prescribed fire will not damage forest canopy, but will rejuvenate native ground cover. This ground cover will stabilize soils, even after fire, because of extensive root systems. The intact canopy will prevent erosion. Therefore, water quality will not be significantly affected by sediment input.



Light wildland fires or prescribed burnings do not affect hydrologic regime significantly but frequent burnings or intense fires can cause changes in hydrologic regime similar to that caused by clear cutting (Shu-ren 2003).

Although floodplains and wetlands of this area are not associated with frequent natural fire regimes, they are associated with natural disturbance regimes caused by ice flows and flooding. The ice scraping tore succession back to a primary level, usually grasslands and sedges. Fire will replace a natural process on the floodplains where water and land once interacted. Upland areas were subjected to frequent fire. Natural upland communities include prairie and oak forest. Both are fire dependent.

*Cumulative Impacts:* Cumulative impacts are the same as for Alternative 1.

*Conclusions:* Impacts from Alternative 1 can be applied to Alternative, with a reduction in the impacts caused by unwanted wildland fire. The indirect adverse impacts to water resources will be short-term, localized, and negligible. This Alternative returns a natural disturbance regime to the floodplain and may indirectly benefit water resources by improving terrestrial plant communities.

*Summary:* Although neither Alternative will result in a significant impact to resources, Alternative 2 provides the greatest protection against unwanted wildland fire and is preferred. Alternative 2 allows managers to return a disturbance regime to the floodplain and to the uplands that will maintain open woodlands and meadows where the land and water interact. Neither Alternative will result in impairment of water resources.

## 4.6 Wildlife

Missouri NRR corridor provides high-quality fishing, hunting, and trapping, all based on the wildlife available there. Opportunities for bird watching and other wildlife observations abound. The water is important to wildlife habitat and the variation in vegetation communities supports diverse fauna. The Missouri River is one of the most important flyways on the continent.<sup>8</sup>

### Impacts from Wildland Fire

Wildland fire has some potential to catch and carry in the fuels that are left as a result of hazard fuel treatment. Fire intensity would determine the degree of habitat loss; rate of spread would determine the direct kills of wildlife that could not escape; and fire extent would determine the amount of habitat destruction. Therefore, fire could cause direct and indirect impacts that were long-term, covering square miles of area. Herpetofauna and immature wildlife are subject to entrapment from fire, as well.

### Alternative 1, No Action

The same impacts expressed for rare animal species would also apply to wildlife in general. Removal of all dead wood during hazard fuel mitigation would reduce the availability of nesting cavities and roost trees, but piling slash would benefit ground dwelling animals. Snags and logs that do not pose hazards would remain intact. Fire management actions may cause disturbance to animals, but that disturbance, although adverse and direct, would be negligible, localized, and short-term. Disturbance would be more problematic during breeding season, but actions can be planned around that time period to prevent disturbance to wildlife and the rare species.

<sup>8</sup> Species lists can be found at NPSpecies, <http://science.nature.nps.gov/im/apps/npspp/index.cfm>.



*Cumulative Impacts:* The multiple treatments for implementation of IPM and hazard fuel reduction would tend to disturb wildlife more frequently than if hazard fuel and IPM were implemented together. Adverse impacts would be short-term, but become long-term if disturbance was frequent. In any case they would be localized and negligible to minor. Chemical treatment and mechanical/manual cutting for IPM will result in debris on the ground that would dry to become fuel, increasing the potential for wildland fire.

*Conclusions:* Fire management actions cause some beneficial impacts in habitat improvement that are minor and adverse impacts that are negligible, localized, and short-term to long-term (loss of nesting cavities).

### **Alternative 2, Including Prescribed Fire**

Impacts of Alternative 1 apply to this Alternative. Wildlife would experience a limited, localized, and short-term loss of habitat after prescribed fire. Ignition of small areas within the Fire Management Unit and not burning more than one-half of the available habitat will prevent any long-term impacts by providing refuge for displaced animals.

Some loss of individuals to direct exposure to the fire is expected, but improvements in ecosystem condition offset those losses. Additionally, the reduction in probability of an intense wildland fire also offsets the loss of individuals.

*Cumulative Impacts:* Coordinating hazard fuel actions and IPM may reduce disturbance to wildlife as compared to the impacts in Alternative 1. Cumulative impacts would be negligible, short-term, and localized, but indirect beneficial impacts will result as habitat improves.

*Conclusions:* Alternative 2 prevents unwanted wildland fire and encourages coordination of IPM and fire management actions to minimize impacts and maximize results in restoring quality habitat. Therefore, Alternative 2 provides the benefits of improved habitat, while causing negligible adverse impacts that are short-term and localized.

Summary: Alternative 2 provides the greatest protection against unwanted wildland fire and is preferred. Neither Alternative will result in significant impact, nor will they impair resources.

## **4.7 Archeology**

Only one archeological site is known to exist on parkland. One of the mitigations to protect archeology is to inventory and document archeology in all treatment areas. Other mitigations will protect known archeology from compression and disturbance. All activities will cease if new sites are discovered during the course of fire management.

### **Impacts from Wildland Fire**

Impacts to archeological resources by fire vary. The main factors determining the level of impact are 1) fire intensity, 2) duration of heat, 3) heat penetration into soil, and 4) suppression actions (Anderson 1983). The first three factors are directly related to fuel load and fire behavior, and impact to artifacts is also affected by the proximity of artifacts to the fuels as well as the class of artifact (Buenger 2004).

In the unlikely event of wildland fire, particularly in the floodplain forest or mesic burr oak, archeological sites could be affected by accumulated fuels that produce hot fire. Extreme fire behavior may also require extreme measures to control the fire spread in order to protect the health and safety of public and firefighters. These impacts could be



local, long-term, and major and in the worst case scenario would result in a loss or alteration of archeological resources.

The probability of resource loss or alteration because of wildland fire with extreme intensity and behavior were extreme is small and would require the perfect combination of factors, particularly in the floodplain. At this time, no archeological sites have been identified in woodland areas of the parkland.

### **Alternative 1, No Action**

Fire management using mechanical and manual methods would have little impact, as long as the listed mitigation procedures were employed. Impacts would be localized, negligible, and short-term.

*Cumulative Impacts:* No cumulative impacts have been identified.

*Conclusions:* Impacts are direct, negligible, short-term, and localized. Any direct damage to archeological resources could result in impairment, but this is unlikely because of mitigation measures.

### **Alternative 2, Including Prescribed Fire**

In general, prescribed fire in the following fuel types will have limited impact on surface or shallowly buried archeological materials: mixed grass, grass/mixed conifer with grass but not litter or logs, and riparian with grass or small willows/cottonwoods. Prescribed fire in other fuel types will have moderate impact to surface or shallowly buried materials: grass/mixed conifer with grass/litter, riparian with large willows, sagebrush, and mixed conifer with duff/litter. Significant impacts to artifacts can be expected with the following fuel types: grass/mixed conifer with logs, mixed conifer with logs, and pinion-juniper with large litter (Buenger 2004).

As long as the mitigation is employed, prescribed fire will result in negligible and localized, impacts and will not cause impairment to the resource. It may also result in new finds after a prescribed fire. Removal of the vegetative cover may expose visible features not seen before the fire. This would be beneficial, long-term, minor to major, and localized.

*Cumulative Impacts:* Efforts by the IPM team and fire management should be coordinated such that slash and fuels from IPM activities do not accumulate and create a hazard fuel situation or cause excessive fuels on or near archeological sites.

*Conclusions:* Impacts from adding prescribed fire to the fire management and resource management techniques will result in negligible and localized impacts. Any damage to archeological resources could result in impairment, but this is unlikely because of mitigation measures. Some beneficial impacts would result, if new discoveries are made because of the denuding of soils.

**Summary:** Although none of the treatment combinations will result in a significant impact to resources, Alternative 2 provides the greatest protection against unwanted wildland fire and is preferred. Alternative 2 allows managers to prevent unwanted wildland fire most effectively although it must be acknowledged that intense wildland fire and extreme fire behavior is unlikely in the floodplain woodlands or near the only identified archeological site on parkland. Neither Alternative will result in a loss of the resources and the data associated with archeological materials.



## 4.8 Health and Safety

Fires can be hazardous, even life threatening, to employees, visitors, and firefighters. Current Federal fire management policies emphasize that firefighter and public safety is the first priority; all FMPs must reflect this commitment (NIFC 1998). This safety pertains to both the direct effects of flame and smoke and the indirect impact from exposure to smoke. The chemicals in smoke that cause the most hazard to human health are carbon monoxide, a group of gases called aldehydes, and tiny particles of solid matter that are small enough to be inhaled. Coarse particles about 5 to 10 microns in diameter deposit in the upper respiratory system. Fine particles less than 2.5 microns in diameter can penetrate much deeper into the lungs. These fine particles deposit in the alveoli where the body's defense mechanisms are ineffective in removing them. People with heart or lung disease, children, and the elderly are considered sensitive to exposure to particulate matter. The effects of breathing smoke include eye and throat irritation, shortness of breath, headaches, dizziness, and nausea.

### Impacts from Wildland Fire

Wildland fire management programs have some level of inherent risk to both firefighters and the public. Potential risks to firefighter and public safety can be reduced by mitigation measures such as, but not limited to:

- Adhering to the 10 Standard Firefighting Orders (the 10 Standard Orders are basic safety principles in wildland firefighting, developed in 1957, and updated)
- Being aware of potential Watch Out Situations (the 18 “watch out” situations identify conditions under which fire fatalities have occurred)
- Employing LCES, Lookouts, Communications, Escape Routes, and Safety Zones
- Completing risk analyses
- Imposing temporary closures
- Distributing informational fliers to residents and visitors, including information on temporary closures

Fire behavior in grass communities is characterized by rapid rates of spread with moderate to high flame lengths. Surface fire in forest stands would exhibit less intense fire behavior with lower rates of spread and shorter flame lengths. The direct adverse effect is exposure of fire management personnel to the hazards typically associated with wildfire suppression: burns, cuts, abrasions, falls, smoke inhalation, and other injuries. Indirect adverse effects include long-term effects of smoke inhalation to both firefighters and the public. Exposure to direct and indirect effects would be greatest with this alternative.

The communities scattered throughout MNRR have fabricated fuel discontinuities, barriers to fire such as roads, green lawns, and other low flammability vegetation, between them and areas subject to wildland fire. There is low risk of wildland fire threatening communities. Rural residences may be impacted by wildland fire, especially if fuels are contiguous with the buildings. FIREWISE<sup>9</sup> provides several educational modules on preparing for fire season and protecting property from wildland fire,

<sup>9</sup> A multi-agency effort designed to reach beyond the fire service by involving homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire - before a fire starts.



[http://www.firewise.org/fw\\_youcanuse/index.htm](http://www.firewise.org/fw_youcanuse/index.htm), that would be disseminated to rural residents to help them mitigate threats to structures and property.

Smoke and visibility were discussed in Air Quality, but require further mention here for their effects on human health. Smoke has the direct short-term impacts of reducing visibility and causing respiratory discomfort and eye irritation. Smoke has long-term effects for people with respiratory ailments, of a very young age, or with repeat exposure. Any deposition of 2.5-micron particles in the lungs can cause long-term health effects.

During fire fighting operations, visitors and the general public may need/choose to evacuate the area. Many will choose to leave using a private vehicle. The added traffic caused by fire fighting operations and evacuation, and the potential for smoke hazards, would increase hazards to both firefighters and the public. In addition, firefighters and the public may be subjected to a long exposure to smoke during unwanted wildland fire. The cumulative effects on wildland firefighter and public safety are localized and moderate.

### **Alternative 1, No Action**

Air quality concerns during the use of small engines was discussed in the Air Quality section and applies here as a direct impact. Various gases and particulates emitted from engines are known to affect people's health. The principle mitigation is to not use these engines during periods of high air pollution or when air is locally stagnant. These conditions are very rare in MNRR. Otherwise, typical safety precautions, such as a Job Safety Analysis and tailgate session, will help to prevent the incidental injuries. Only workers certified to use specific equipment will be allowed to use the power tools.

*Cumulative Effects:* No cumulative impacts are likely as long as operations do not occur on air-pollution alert days or stagnant air.

*Conclusion:* The direct and indirect adverse impacts to firefighters and the public under the no-action alternative would be localized, short-term (direct) and negligible.

### **Alternative 2, Including Prescribed Fire**

There is an element of danger in any activity, and firefighting is no exception. As long as all firefighters follow the safety rules and recommendations, they should remain safe. Prescribed fire, implemented using a site-specific plan, takes the unknowns out of fire management actions.

Smoke management is a critical aspect of wildland fuels reduction. A prescribed fire done using smoke mitigation techniques will reduce the impacts to firefighters and the public. Details on smoke management can be found at <http://www.nifc.gov/fuels/implementation/smokeManagement.html>. Firefighters have Personal Protection Equipment, such as filters and masks that further reduces their smoke exposure.

*Cumulative Impacts:* No cumulative impacts are likely as long as operations do not occur on air-pollution alert days or during stagnant air conditions. The permit system also ensures that there will not be multiple fires in the vicinity at the same time. As long as firefighters implement all safety procedures, their exposure to long-term health impacts is mitigated.

*Conclusions:* Direct adverse impacts are short-term, localized, and negligible.



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## Summary

Alternative 2 provides the greatest protection against unwanted wildland fire, which is the greatest source of impact, and may have beneficial impacts in the event of an unwanted fire by limiting fire behavior and reducing fuels. Cumulative impacts occur in the case of unwanted wildland fire, also.

### 4.9 Recreational River

Missouri NRR provides high-quality outdoor recreation, including fishing, hunting, trapping, and boating. Opportunities for bird watching and other wildlife observations abound. The river valley provides scenic vistas of a variety of natural landscapes.

#### Impacts from Wildland Fire

As with other analyses, consideration must be given to the impacts of wildland fire on the recreational opportunities, acknowledging that this is unlikely. The wildland fire intensity and techniques used to control it have a moderate impact in the long-term and a severe impact in the short-term to recreational opportunities. Wildland fire can kill or displace wildlife, leave a severely charred landscape, and prevent use of the burned areas until rehabilitation is complete. Although localized, it is an adverse impact.

In the worst case, adverse impacts could be moderate to major, long-term, and localized.

#### Alternative 1, No Action

Because the rivers in MNRR are considered recreational, issues such as moderate intrusion by people are not a concern. The views do not need to be pristine, although scenic vistas are expected. In fact, recreational activities often involve noise (motor boats) and proximity to other people. Therefore, the occasional intrusion of laborers removing invasive species and hazard fuels will have a negligible adverse impact locally, and for the short-term. Attaining management objectives will open vistas, allow shoreline use, and improve habitat that can support wildlife.

*Cumulative impacts:* No cumulative impacts are noted.

*Conclusions:* There may be short-term, adverse, and negligible impact from the disturbance to a treatment area, but indirect beneficial impacts would be long-term, localized, and minor.

#### Alternative 2, Including Prescribed Fire

Using prescribed fire as a management technique would result in an efficient and effective way to maintain vistas, open forest and meadows, and improve habitat. The intrusion of laborers and visual impact of blackened soil are not a problem on the recreational river. Unlike with wildland fire, mature trees will remain intact and recovery from fire treatment will occur in the first growing season. Therefore, no adverse impacts were found. Impacts are beneficial, localized, long-term, and moderate. Using prescribed fire is a very effective way to reduce hazard fuels and, once again, becomes an important consideration.

*Cumulative impacts:* Prescribed fire applied as part of IPM will be very effective in controlling invasive species. These impacts are beneficial, moderate, long-term, and localized.

*Conclusions:* The beneficial impacts would be long-term, localized, and minor to moderate. Wildland fire prevention is a consideration.



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## **Summary**

The likelihood of wildland fire in the floodplain forest is very low, but wildland fire could occur in the uplands, which are part of the vistas experienced from the water. This makes wildland fire prevention a factor in determining impacts of the Alternatives. Although none of the treatment combinations will result in a significant direct impact to resources, Alternative 2 provides the greatest protection against unwanted wildland fire, an indirect impact, and so is preferred. Additionally, prescribed fire may be more effective in maintenance of vistas and accessibility of the land from the water than manual/mechanical treatment alone. Neither Alternative will result in impairment of resources.





## Chapter 5 -- Coordination and Consultation

This section summarizes the internal and public scoping, coordination of stakeholder and public engagement, and consultation and collaboration with partner agencies/organizations that went into developing and finalizing the Fire Management Plan for MNRR. The principle collaborators in fire management activities are the land management agencies and private landowners in the legislative boundary of the MNRR. Several of the local Rural Fire Districts, whose firefighters are the first responders to wildland fire within MNRR may enter into cooperative agreements with NPS as a result of collaboration during the FMP process. Additionally, agencies with natural resource responsibilities have assisted and reviewed the fire management activities and planning. The [\*State Historic Preservation Office\*](#) and the [\*Tribal Historic Presentation Office\*](#) have remained an ongoing consultant in the preservation of MNRR cultural resources and assisted with the FMP.

### 5.1 Internal Scoping

Missouri NRR began its fire management planning with an internal scoping meeting at Gavins Point Project's Lewis and Clark Visitor Center (USACE) December 4, 2007. Participants from the regional office, Niobrara National Scenic River, and MNRR participated. The purpose and scope of the FMP were defined at that meeting and some topics of concern were identified.

Interdisciplinary Team:

George Berndt, chief interpreter, Missouri National Recreational River  
Nick Chevance, regional environmental coordinator, Midwest Region  
Sherry Middlemis-Brown, biologist, Midwest Region, NPS  
Stuart Schneider, chief ranger, Niobrara National Scenic River  
Dugan C. Smith, park ranger (interpretation), Missouri National Recreational River  
Anne Vawser, archeologist, Midwest Archeological Center  
Wayne Werkmeister, resource management specialist, Missouri National Recreational River  
Stephen K. Wilson, resource management/GIS specialist, Missouri National Recreational River

### 5.2 Public Scoping

Public scoping was done by means of an informational booth at a Missouri River landowner workshop on March 13, 2008 in Yankton, South Dakota. Approximately 40 people attended the meeting and five requested a copy of the draft fire management plan to review. Additional topics of concern were identified through this process.

### 5.3 Scoping Letter

A scoping letter was not sent, but rather the Missouri River landowner workshop and consultations with partners provided the necessary external scoping.

### 5.4 Public Review

The draft Fire Management Plan and draft Environmental Assessment were made available to the public for review. It was placed in X public libraries, X NPS contact points, and copies were available upon request. It could be downloaded from the MNRR web site at <http://inside.nps.gov/index.cfm?handler=parkdetails&alphacode=mnrr>. A news release explaining availability went to the local newspapers:



- name
- name
- name

and the following radio and TV stations:

- call letters and town
- 

## **5.6 Consultation**

The following agencies and organizations entered into consultation with MNRR to develop the FMP and EA. They also reviewed the draft.

State Historic Preservation Office, Nebraska

State Historic Preservation Office, South Dakota

U.S. Army Corps of Engineers, Department of Defense

U.S. Fish and Wildlife Service, Department of Interior

South Dakota Department of Game, Fish and Parks

Nebraska Game and Parks Commission

South Dakota Department of Environment and Natural Resources

Nebraska Department of Environmental Quality

Yankton Sioux Tribe

Ponca Tribe

Santee Sioux Tribe

Bureau of Indian Affairs

Local fire departments were consulted.

## **5.7 Preparers**

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## **Appendices**

(to be removed when documents are combined)

**Appendix D1: Literature Cited and Bibliography**

**Appendix D2: Acronyms and Glossary**

**Appendix D3: Tables and Figures Common to EA and FMP**



## **Appendix D1: Literature Cited and Bibliography**

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## **Appendix D2: Acronyms and Glossary**

<b>Term</b>	<b>Definition</b>
<b>AMR</b>	Appropriate Management Response
<b>BI</b>	Burning Index
<b>DI-1202</b>	Individual Fire Report form
<b>DO-18</b>	Director's Order 18, Wildland Fire Management
<b>DOD</b>	Department of Defense
<b>DOI</b>	Department of the Interior
<b>EPMP</b>	Northern Great Plains Exotic Plant Management Plan (NPS 2005)
<b>ESA</b>	Endangered Species Act of 1973, as amended
<b>FIREPRO</b>	National Park Service Fire Program
<b>FMH</b>	Fire Monitoring Handbook
<b>FMO</b>	Fire Management Office
<b>FMP</b>	Fire Management Plan
<b>FMU</b>	Fire Management Unit
<b>FPA</b>	Fire Program Analysis
<b>FWS</b>	U.S. Fish and Wildlife Service, Department of Interior, United States government; partner agency
<b>GMP</b>	General Management Plan
<b>IQCS</b>	Incident Qualifications Certification System
<b>KBDI</b>	Keetch Byram Drought Index
<b>LAL</b>	Lightning Activity Level
<b>LCES</b>	Lookouts, Communication, Escape Routes, and Safety Zones (the 4 Fire Orders)
<b>MIST</b>	Minimum Impact Suppression Tactics
<b>MNRR</b>	Missouri National Recreational River
<b>NEPA</b>	National Environmental Policy Act
<b>NHPA</b>	National Historic Preservation Act
<b>NICC</b>	National Interagency Coordination Center





Term	Definition
NIFC	National Interagency Fire Center
NPS	National Park Service
RFA	Rural Fire Assistance
RFD	Rural Fire Districts
SHPO/THPO	State /Tribal Historic Preservation Office
USACE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
WUI	Wildland Urban Interface
39-mile District	In 1991, three river segments were added to MNRR: 39 miles of Missouri River below Fort Randall Dam to Running Water, South Dakota, 20 miles of the lower Niobrara River, and the last eight miles of Verdigre Creek before its confluence with Niobrara River.
59-mile District	Fifty-nine miles of Missouri River, downstream of Gavins Point Dam to Ponca, Nebraska
Adaptive Management	Adaptive management focuses on learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable ecosystems.
Appropriate Management Response (AMR)	The objective of putting the fire dead out by a certain time has been replaced by the need to make unique decisions with each fire start to consider the land, resource, and incident objectives, and to decide the Appropriate Management Response and tactics that result in minimum cost and minimum resource damage. Fire management requires the fire manager and firefighter to select management tactics commensurate with the fire's existing or potential behavior while causing the least possible impact on the resource being protected.
Bald and Golden Eagle Protection Act.	Bald Eagle Protection Act of 1940 as amended (16 U.S.C. 668-668d, 54 Stat. 250) as amended -- Approved June 8, 1940, and amended by P.L. 86-70 (73 Stat. 143) June 25, 1959; P.L. 87-884 (76 Stat. 1346) October 24, 1962; P.L. 92-535 (86 Stat. 1064) October 23, 1972; P.L. 95-616 (92 Stat. 3114) November 8, 1978. This law provides for the protection of the American Bald Eagle (the national emblem) and the golden eagle.
Clean Air Act	1990 Clean Air Act is the most recent version of a law first passed in 1970 to clean up air pollution.
Clean Water Act	Federal Water Pollution Control Act of 1972, as amended



Term	Definition
<b>Comprehensive Strategy</b>	A logically-organized and tracked sequence of activities designed to achieve and/or maintain the desired conditions established in MNRR's GMPs
<b>Consultation</b>	A discussion, conference, or forum in which advice or information is sought or given, or information or ideas are exchanged. Consultation can take place on an informal basis in some cases, but formal consultation requirements for compliance with some regulations, such as Section 106 of NHPA, demand written documentation of the process. Consultation with recognized tribes is done on a government-to-government basis, according to NPS Management Policies, 2006, p. 256. Consultation is also a part of NEPA with consultation commonly involving Section 7 of the Endangered Species Act and the Clean Water Act.
<b>Cultural Landscape</b>	A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values
<b>Desired Conditions</b>	The optimal state of a resource or visitor experience. A description of the "ideal" resource conditions or visitor experience opportunities to be achieved in a specific portion of a park (desired conditions are found in MNRR's GMPs).
<b>Ecosystem</b>	An interacting system of interdependent organisms
<b>Ecosystem management</b>	The careful and skillful use of ecological, economic, social, and managerial principles in managing ecosystems to produce, restore, or sustain ecosystem integrity and desired conditions over the long term.
<b>Endangered Species Act (ESA)</b>	Endangered Species Act of 1973, as amended
<b>Environmental Assessment (EA)</b>	Under NEPA, a risk assessment aimed at protecting human health and the environment
<b>Ethnographic resources</b>	Objects and places, including sites, structures, landscapes, and natural resources with traditional cultural meaning and value to associated peoples. Research and consultation with associated people identifies and explains the places and things they find culturally meaningful.
<b>Federal lands</b>	NPS fee-simple lands and those lands under the management and jurisdiction of other federal agencies that accept the use of this FMP relative to their fire management actions.
<b>Federally listed species</b>	Federal list of endangered and threatened wildlife and plants, under the authority of the Endangered Species Act of 1973, as amended.
<b>Fire Management Plan (FMP)</b>	A strategic plan that defines a program to manage wildland and prescribed fires, and documents the fire management program in the approved land use plan.



Term	Definition
<b>Fire Management Unit (FMU)</b>	Any land management area definable by objectives, topographic features, values-to-be-protected, fuel types, or major fire regimes, that sets it apart from management characteristics of another unit.
<b>Fire regime</b>	The pattern of fire across a landscape, characterized by frequency, intensity, and type and size of typical fire events, resulting from a unique combination of climate and vegetation.
<b>Fundamental Resources and Values</b>	Those resources identified in the foundation of planning and management that are critical to achieving MNRR's purpose and maintaining its significance. They may include systems, processes, features, visitor experiences, stories, scenes, sounds, smells or other resources and values.
<b>Fuel</b>	The materials burned in a fire: duff, litter, grass, dead branch wood, snags, logs, stumps, weeds, brush, foliage, and, to a limited degree, live vegetation.
<b>Foundation for Planning and Decision-making (or Management)</b>	A statement clearly defining the legal and policy requirements that mandate MNRR's basic management responsibilities, including the identification and comprehensive analysis of those resources and values determined to be critical to achieving MNRR's purpose and maintaining its significance, or to be otherwise important to park planning and management.
<b>GMP, General Management Plan</b>	General management planning results in a shared understanding among NPS managers and the public about the kinds of resource conditions and visitor experiences that will best fulfill the purpose of MNRR.
<b>Guild</b>	A group of species that exploits the same class of environmental resources in a similar way.
<b>Hazard fuels</b>	Fuels which, when ignited, threaten: public safety, structures and facilities, cultural resources, natural resources, natural processes, or any other social, political, or economic value. Also, fuels that permit the spread of wildland fires across administrative boundaries except as authorized by agreement.
<b>Implementation Plan</b>	Implementation plans tier off MNRR's General Management Plan, program plans, and strategic plan and describe in detail the high-priority actions that will be taken over the next several years to help achieve the desired conditions for MNRR.
<b>Initial Attack</b>	Wildland fires that are identified for suppression must receive appropriate initial attack action (IA) as defined in the fire management plan. The goal in all IA actions is to limit damage to values to be protected and to prevent the escape of the fire.
<b>Integrated Pest Management (IPM)</b>	A decision-making process that coordinates knowledge of pest biology, the environment, and available technology to prevent unacceptable levels of pest damage, by cost-effective means, while posing the least possible risk to people, resources, and the environment. Each exotic plant's natural history is evaluated before developing management strategies.



Term	Definition
<b>Management Prescription</b>	Description of the desired conditions and visitor experience opportunities to be achieved in each Management Zone (management prescriptions are found in MNRR's GMPs).
<b>Management Zone</b>	A geographically delineated overlay of management goals or themes, based on the park foundation documents (management zones are found in the park GMP)
<b>Migratory Bird Treaty Act of 1918 (as amended)</b>	(16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755) as amended by: Chapter 634; June 20, 1936; 49 Stat. 1556; P.L. 86-732; September 8, 1960; 74 Stat. 866; P.L. 90-578; October 17, 1968; 82 Stat. 1118; P.L. 91-135; December 5, 1969; 83 Stat. 282; P.L. 93-300; June 1, 1974; 88 Stat. 190; P.L. 95-616; November 8, 1978; 92 Stat. 3111; P.L. 99-645; November 10, 1986; 100 Stat. 3590 and P.L. 105-312; October 30, 1998; 112 Stat. 2956
<b>Minimum Impact Suppression Tactics (MIST)</b>	The use of the minimum amount of forces necessary to effectively achieve the fire management protection objectives consistent with land and resource management objectives. It implies a greater sensitivity to the impacts of suppression tactics and their long-term effects when determining how to implement an appropriate suppression response.
<b>Missouri NRR or MNRR</b>	Missouri National Recreational River
<b>Mitigation actions</b>	Mitigation actions are considered to be those on-the-ground activities that serve to minimize threats to life, property, and resources. Mitigation actions protect values during suppression or in prescribed fire planning and implementation.
<b>National Environmental Policy Act of 1969 (NEPA)</b>	as amended; Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982. An Act to establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes
<b>National Fire Danger Rating System (NFDRS)</b>	A system to predict several measures of fire probability and resistance to control.
<b>National Historic Preservation Act of 1966, As amended through 2000 (NHPA)</b>	This Act became law on October 15, 1966 (Public Law 89-665, October 15, 1966; 16 U.S.C. 470 et seq.). Since enactment, there have been 22 amendments. The NHPA and its implementing regulations are the primary Federal historic preservation laws and regulations outlining the historic preservation responsibilities of the agencies.
<b>National Interagency Fire Center (NIFC)</b>	Mission is to serve as a focal point for coordinating the national mobilization of resources for wildland fire and other incidents throughout the United States.



Term	Definition
<b>National Interagency Coordination Center (NICC)</b>	The nation's logistical support center.
<b>Natural Resource Inventory and Monitoring Program (Vital Signs)</b>	Natural resource inventory and monitoring provides site-specific information needed to understand and identify change in complex, variable, and imperfectly understood natural systems and to determine whether observed changes are within natural levels of variability or may be indicators of unwanted human influences. The monitoring is often referred to as “Vital Signs” monitoring, because it focuses on quantifying changes in indicators of ecosystem health.
<b>Nuisance smoke</b>	US Environmental Protection Agency defines it as <i>the amount of smoke in the ambient air that interferes with a right or privilege common to members of the public, including the use or enjoyment of public or private resources (EPA 1990).</i>
<b>Other Important Resources and Values</b>	Significant resources and values that are not directly linked to MNRR purpose, but that support the Fundamental Resources and Values of MNRR or are part of resource stewardship because of policy, statute, or regulation, and are determined to be important to park planning and management.
<b>Park Purpose and Significance</b>	Statements of why, within a national, regional, and system wide context, MNRR’s resources and values are important enough to warrant national park designation.
<b>Parkland</b>	MNRR fee-simple land
<b>Partner</b>	An agency, organization, or individual with whom the NPS has a documented agreement.
<b>Prescribed Fire</b>	Purposefully ignited fire intended to meet management objectives.
<b>Prescribed Fire [Burn] Plan</b>	Sets the objectives for and parameters by which a prescribed fire may be used to meet management objectives. Parameters include weather conditions, air quality objectives, holding actions, techniques and other specifics associated with a project implementation plan.
<b>Program Plan or Program Management Plan</b>	Park managers and staffs conduct various kinds of program planning to identify and recommend the best strategies for achieving the desired conditions and/or visitor experiences related to each particular program area (resource management, visitor use, facility management, etc.). Park-level program plans are not decision-making documents.
<b>Resources</b>	See Fundamental Resources and Values and Other Important Resources
<b>Resource Management Plan (RMP)</b>	A program plan that detailed specific resource management activities and actions. This plan will be retired by each park upon approval of MNRR’s resource stewardship plan.



Term	Definition
<b>Resource Stewardship Strategy (RSS)</b>	This 15-20 year program management document provides a clear linkage between the qualitative desired conditions prescribed in the General Management Plan and the measurable performance outcomes and implementing actions identified in park strategic planning. These linkages include specific science- and scholarship-based Comprehensive Strategies that provide park managers with a logical sequence of activities necessary to achieve or maintain MNRR's desired conditions.
<b>Rural Fire Assistance (RFA)</b>	Intended to increase local firefighter safety and enhance the fire protection capabilities of Rural Fire Departments by helping RFDs meet accepted standards of wildland fire qualifications, training, and performance for initial and extended attack at the local level.
<b>Scoping</b>	to identify the key issues of concern at an early stage in the planning process; usually involves public input
<b>Section 106</b>	National Historic Preservation Act of 1966 (NHPA) requires Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Section 106 defines procedures for consultation and review.
<b>Special Mandates</b>	Legal, regulatory, and policy requirements specific to MNRR or to the National Park Service generally. Protection of habitat for an endangered species in a park not set aside for that purpose exemplifies a special mandate.
<b>Stakeholders</b>	An individual, group, or other organization that can place a claim on our attention, resources, or output, or is affected by that output. In other words, a stakeholder has a stake in what we do and can exert significant influence on park or program mission and strategies. Examples include citizens, higher level managers, special interest groups, and governing bodies (e.g., Congress).
<b>State Historic Preservation Officer (SHPO)</b>	State Historic Preservation Officers (SHPOs) administer the national historic preservation program at the State level, review National Register of Historic Places nominations, maintain data on historic properties that have been identified but not yet nominated, and consult with Federal agencies during Section 106 review. SHPOs are designated by the governor of their respective State or territory.
<b>State listed species</b>	State list of endangered and threatened wildlife and plants under the authority of state statute
<b>Structure (as a cultural resource)</b>	A constructed work, usually immovable by nature or design, consciously created to serve a human activity



Term	Definition
<b>Suppression</b>	An Appropriate Management Response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration while minimizing loss of resource values, economic expenditures, and the use of critical firefighting resources.
<b>Tribal Historic Preservation Officer (THPO)</b>	In the context of RSS efforts, the office that engages in the consultation for those tribes that have assumed SHPO responsibilities on their tribal lands and have been certified pursuant to Section 101(d)(2) of the NHPA. THPOs would be consulted in lieu of the SHPO, while non-certified tribes would be consulted in addition to the SHPO.
<b>Vital Signs (Vital Signs Monitoring)</b>	A set of indicators that, as with medical vital signs, give a general measure of ecosystem health.
<b>Wildland Fire</b>	Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildland fires and prescribed natural fires.
<b>Wildland fire management program</b>	The full range of activities and functions necessary for planning, preparedness, emergency suppression operations, and emergency rehabilitation of wildland fires; prescribed fire operations; and non-fire fuel management to reduce risks to public safety and achieve resource management goals.
<b>Wildland Fire Situation Analysis (WFSA)</b>	The decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives. Also, the paperwork documenting this process.
<b>Wildland fire use (WFU)</b>	The management of naturally-ignited wildland fires to accomplish specific, pre-stated, resource management objectives in pre-defined geographic areas outlined in Fire Management Plans. It is not authorized in this FMP.
<b>Wildland-urban interface (WUI)</b>	An area or zone where structures and other human development occur next to or within undeveloped wildland fuel complexes.



## Appendix D3: Tables and Figures Common to EA and FMP

Figure 1: Map of MNRR







Table D6 All listed species for both states and Federal Endangered, Threatened, and of Management Concern

South Dakota Species	Status	Habitat	Likelihood of fire effects in MNRR
Black-footed ferret ( <i>Mustela nigripes</i> )	Federal Endangered; State Endangered.	Open grasslands with prairie dogs.	Not near park
Black bear ( <i>Ursus americanus</i> )	State Threatened.	Remote areas of mixed deciduous, coniferous forest.	Not near park
Fringe-tailed myotis ( <i>Myotis thysanodes pahasapensis</i> )	Rare; Candidate for Federal Listing.	Caves in the southern Black Hills.	Not documented
Marten ( <i>Martes americana</i> )	Rare.	Dense forest.	Not documented
Mountain lion ( <i>Felis concolor</i> )	State Threatened.	Remote mountainous areas.	Unlikely; not documented
River otter ( <i>Lutra canadensis</i> )	State Threatened.	Rivers, ponds and lakes in wooded areas.	Probably present
Swift fox ( <i>Vulpes velox</i> )	State Threatened: Candidate for Federal Listing.	Short to mid-grass open prairies.	Not documented
Baird's Sparrow ( <i>Ammodramus bairdii</i> )	Rare; Candidate for Federal Listing.	Wet meadows, mixed grass and tall grass prairies.	Not documented
American Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	Federal de-listed; State Endangered.	Near large waterways with trees.	Mitigated
Eskimo Curlew ( <i>Numenius borealis</i> )	Federal Endangered; State Endangered.	Marshes, mud flats, grasslands and pastures.	Not documented
Interior Least Tern ( <i>Sterna antillarum athalassos</i> )	Federal Endangered; State Endangered.	Barren sandbars, gravel or sand beaches, and mud flats.	Mitigated
Osprey ( <i>Pandion haliaetus</i> )	State Threatened.	lakes, large rivers and coastal bays.	Mitigated
Peregrine Falcon ( <i>Falco peregrinus</i> )	Federal Endangered; State Endangered.	Along larger bodies of water, and prairies.	Unlikely; Not documented
Piping Plover ( <i>Charadrius melodus</i> )	Federal Threatened; State Threatened	Sand bars and sand and gravel beaches with short, sparse vegetation.	Mitigated
Whooping Crane ( <i>Grus americana</i> )	Federal Endangered; State Endangered.	Freshwater marshes, wet prairies, shallow wetlands.	Migrant; unlikely; Not documented
Blanding's turtle ( <i>Emydoidea blandingii</i> )	State Threatened.	Shallow water of marshes and ponds.	Not documented



South Dakota Species	Status	Habitat	Likelihood of fire effects in MNRR
Eastern hognose snake ( <i>Heterodon platirhinos</i> )	State Threatened.	Sandy areas in prairies, woodlands, and flood plains.	Not documented
False map turtle ( <i>Graptemys pseudogeographica</i> )	State Threatened.	Slow moving rivers, sloughs, and lakes with vegetation.	Potential
Lined snake ( <i>Tropidoclonion lineatum</i> )	State Threatened.	Various; prairie, woodland, and residential.	Unconfirmed; potential
Northern redbelly snake ( <i>Storeria occipitomaculata occipitomaculata</i> )	State Threatened.	Moist woodlands.	Not documented
Short-horned lizard ( <i>Phrynosoma douglassii</i> )	Rare	Semi-arid, short grass prairie.	Not documented
Spiny softshell ( <i>Apalone spinifera</i> )	State Threatened	Aquatic	Not directly
Higgins eye ( <i>Lampsilis higginsii</i> )	Federal Endangered	Aquatic	Not directly
Scaleshell ( <i>Leptodea leptodon</i> )	Federal Endangered	Aquatic	Not directly
Banded killifish ( <i>Fundulus diaphanus</i> )	State Endangered	Aquatic	Not directly
Central mudminnow ( <i>Umbra limi</i> )	State Endangered.	Aquatic	Not documented
Finescale dace ( <i>Phoxinus neogaeus</i> )	State Threatened.	Aquatic	Not directly
Longnose sucker ( <i>Catostomus catostomus</i> )	State Threatened.	Aquatic	Not directly
Northern redbelly dace ( <i>Phoxinus eos</i> )	State Threatened.	Aquatic	Not directly
Paddlefish ( <i>Polyodon spathula</i> )	Rare; Candidate for Federal Listing.	Aquatic	Not directly
Pallid sturgeon ( <i>Scaphirhynchus albus</i> )	Federal Endangered; State Endangered.	Aquatic	Not directly
Pearl dace ( <i>Semotilus margarita</i> )	State Endangered.	Aquatic	Not directly
Plains topminnow ( <i>Fundulus sciadicus</i> )	State Threatened; Candidate for Federal Listing.	Aquatic	Not documented
Sicklefin chub ( <i>Macrhybopsis meeki</i> – was <i>Hybopsis</i> )	State Threatened; Candidate for Federal Listing.	Aquatic	Not directly



South Dakota Species	Status	Habitat	Likelihood of fire effects in MNRR
Sturgeon chub ( <i>Macrhybopsis gelida</i> – was <i>Hybopsis</i> )	State Threatened; Candidate for Federal Listing.	Aquatic	Not directly
Troutperch ( <i>Percopsis omiscomaycus</i> )	State Threatened.	Aquatic	Not documented
American burying beetle ( <i>Nicrophorus americanus</i> )	Federal Endangered.	Woodlands, grasslands with sufficient ground litter and topsoil for beetles to bury carrion.	Unlikely; not documented
Dakota skipper butterfly ( <i>Hesperia dacotae</i> )	Rare; Candidate for Federal Listing.	Dry to moist tall grass prairies.	Not documented
Regal fritillary butterfly ( <i>Speyeria idalia</i> )	Rare; Candidate for Federal Listing.	Wet meadows and tall grass prairie.	Not documented
Tawny crescent butterfly ( <i>Phyciodes batesii</i> )	Rare; Candidate for Federal Listing.	Moist meadows and stream bottoms near forests in the Black Hills.	Not documented

Nebraska Species	Status	Habitat	likelihood of fire effects in MNRR
Eskimo Curlew ( <i>Numenius borealis</i> )	Federal and State Endangered	Marshes, mud flats, grasslands and pastures.	Unlikely; Not documented
Whooping Crane ( <i>Grus americana</i> )	State and Federal Endangered	Freshwater marshes, wet prairies, shallow wetlands.	Migrant; unlikely; Not documented
Interior Least Tern ( <i>Sterna antillarum athalassos</i> )	State and Federal Endangered	Barren sandbars, gravel or sand beaches, and mud flats.	Mitigated
Bald Eagle ( <i>Haliaeetus leucophalus</i> )	State Threatened and Federal de-listed	Large cottonwoods	Mitigated
Piping Plover ( <i>Charadrius melodus</i> )	State and Federal Threatened	Sand bars and sand and gravel beaches with short, sparse vegetation.	Mitigated
Mountain Plover ( <i>Charadrius montanus</i> )	Federal Candidate; State Threatened	Sand bars and sand and gravel beaches with short, sparse vegetation	Not documented



Nebraska Species	Status	Habitat	likelihood of fire effects in MNRR
Black-footed ferret ( <i>Mustela nigripes</i> )	State and Federal Endangered	Open grasslands with prairie dogs.	Not documented
Swift fox ( <i>Vulpes velox</i> )	State Endangered	Short to mid-grass open prairies.	Not documented
River otter ( <i>Lutra canadensis</i> )	State Threatened	Rivers, ponds and lakes in wooded areas.	Probably present; unlikely
Southern flying squirrel ( <i>Glaucomys volans</i> )	State Threatened	Large trees	Not documented
Black-tailed prairie dog ( <i>Cynomys ludovicianus</i> )	Federal Candidate	Open grasslands	Not documented
Massasauga ( <i>Sistrurus catenatus</i> )	Federal Threatened; State Threatened	wetlands	Unlikely; not documented
Pallid sturgeon ( <i>Scaphirhynchus albus</i> )	Federal Endangered; State Endangered	Aquatic	Not directly
Topeka shiner ( <i>Notropis Topeka</i> )	Federal Endangered; State Endangered	Aquatic	Not directly
Sturgeon chub ( <i>Macrhybopsis gelida</i> )	State Endangered	Aquatic	Not directly
Blacknose shiner ( <i>Notropis heteropsis</i> )	State Endangered	Aquatic	Not directly
Lake sturgeon ( <i>Acipenser fulvescens</i> )	State Threatened	Aquatic	Not directly
Northern redbelly dace ( <i>Phoxinus eos</i> )	State Threatened	Aquatic	Not directly
Finescale dace ( <i>Phoxinus neogaeus</i> )	State Threatened	Aquatic	Not directly
American burying beetle ( <i>Nicrophorus americanus</i> )	Federal Endangered; State Endangered	Woodlands, grasslands with sufficient ground litter and topsoil for beetles to bury carrion.	Unlikely; not documented
Salt Creek tiger beetle ( <i>Cincindela nevadica lincolniana</i> )	Federal Candidate; State Endangered	ground-dwelling, predatory insect confined to eastern Nebraska saline wetlands	Not documented
Scaleshell mussel ( <i>Leptodea leptodon</i> )	Federal Endangered; State Endangered	Aquatic	Not directly



Nebraska Species	Status	Habitat	likelihood of fire effects in MNRR
Hayden's (blowout) penstemon ( <i>Penstemon haydenii</i> )	Federal Endangered; State Endangered	sand prairie	Not documented
Colorado butterfly plant ( <i>Gaura neomexicana coloradensis</i> )	Federal Threatened; State Endangered	stream side in Kimball County	Not documented
Saltwort ( <i>Salicornia rubra</i> )	State Endangered	fertile, moist soils with high salinity	Not documented
Western prairie fringed orchid ( <i>Platanthera praeclara</i> )	Federal Threatened; State Threatened	mesic to wet prairie	On park list but not documented
Ute Lady's Tresses ( <i>Spiranthes diluvialis</i> )	Federal Threatened; State Threatened	mesic to wet riparian meadows, marshes, streambanks	Not documented
Ginseng ( <i>Panax quinquefolium</i> )	State Threatened	woodlands	Present;
Small white lady's slipper ( <i>Cypripedium candidum</i> )	State Threatened	mesic to wet prairies and fen meadows, rarely on wooded slopes	Not documented