EFFIGY MOUNDS NATIONAL MONUMENT

Fire Management Plan
April 5, 2004

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I. INTRODUCTION

A. Reason for Developing Plan

Effigy Mounds National Monument, located in Clayton and Allamakee counties, in northeast Iowa, was established (Presidential Proclamation No. 2860, October 25, 1949) and is directed with the preservation of "*earthern mounds in the northeastern part of the State of Iowa known as the Effigy Mounds are of great scientific interest because of the variety of their forms, which include animal effigy, bird effigy, conical, and linear types, illustrative of a significant phase of mound building culture of the prehistoric American Indian…*"

Public Law 87-44, May 27, 1961, added land to the Monument and mandated preservation of the mounds, wildlife, and other natural values.

Public Law 106-323 Effigy Mounds National Monument Additions Act, October 19, 2000, added the Heritage Unit to the Monument.

The Monument includes 2,526 acres in four units: North, South, Sny Magill, and Heritage Addition. The North and South Units overlook the Mississippi River from adjacent bluffs beside the Monument headquarters. The Sny Magill Unit, lying in the Mississippi River floodplain eleven miles south of the headquarters, contains approximately 100 mound sites, the nation's largest extant concentration of American Indian mounds in public ownership. The Heritage Addition contains forested uplands and bottomlands with savannas and goat prairies on southern exposures. Effigy Mounds National Monument contains 206 mounds in a variety of forms (effigy, linear, conical, and compound). Many of the mounds are known to contain human burials; some of which occurred 2,500 years ago. The mounds represent three known Woodland mound building cultures: Red Ochre, Hopewell, and Effigy Mound builders. The mounds are the legacy of the belief systems and practices of these prehistoric indigenous peoples. These mounds have long been recognized as an important expression of the ceremonial and funerary activities of prehistoric occupants of the upper Mississippi River area.

The landscape of the monument reveals evidence of a continuum of mound building cultures and their relationship to the environment over a span of at least 1,800 years. The Monument's varied landforms and habitats, characteristic of the unglaciated "driftless zone", provide exceptional diversity of plant and animal species. These natural resources are important both for understanding past cultures, which depended on them, and monitoring the health of present ecosystems.

For the last 3,000 years evidence has shown that a transition zone has been maintained in this area between the prairies to the west and the forests to the east. Fire from natural and anthropologic sources maintained this transition until European settlement. Evidence also suggests that aboriginal fire started to become an environmental factor about 3,000 years ago, which helped maintain this transition zone. This time period closely follows the archeological dates for the beginning of the Woodland culture and its mound building phases.

In order to maintain the cultural landscape that was present during the mound building period, it is important to maintain the presence of fire on the landscape. The purpose of this plan is to define the parameters under which fire will be used and incorporated into the management of both the natural and cultural resources.

Director's Orders #18 (November, 1998) under legal authority 16 U.S.C. 1 through 4 states the following:

"Each park with vegetation capable of burning will prepare a fire management plan to guide a fire management program that is responsive to the park's natural and cultural resource objectives and to safety considerations for park visitors, employees, and developed facilities."

B. Resource Management Relationship

The Monument's fire management program will be designed to meet resource management objectives prescribed for the various areas and to ensure that firefighter and public safety are not compromised.

A systematic decision process will be used to determine the order and range of suppression strategies to be used for all unplanned ignitions. All prescribed fires that are out of prescription will also be covered under these same suppression strategies.

The Fire Management Plan (FMP) for Effigy Mounds National Monument is an operational guide for fire management, which includes the use of prescribed fire as a cultural landscape management tool. The FMP is the most significant action plan that is directly tied to the goals for resource management within the monument. The FMP directly addresses fire related resource management issues that are referred to in general by the Resource Management Plan (RMP). The Monument will utilize this plan to change the course of fire management from small unit (resource specific i.e. exotic species control) to vegetation community based prescribed fires which will replicate a natural fire mosaic.

C. Fire Management Policies

The management authorities (Director's Order 18 and Reference Manual 18, February 1999) are the guiding documents for fire management plan implementation. These documents along with "The Wildland and Prescribed Fire Management Policy: Implementation and Reference Guide" and 1995 and 2001 Federal Wildland Fire Management Policy establish the current servicewide fire management policy and are incorporated herein by reference. The Monument's fire management objectives conform to these documents.

In November 1998, the Director of the National Park Service (NPS) approved the new Director's Order 18 Wildland Fire Management. This document incorporated the 1995 policy and program review by institutionalizing within NPS, the new policies, organizational and operational relationships, and changes in law and reporting requirements reflected in the report, and establishing a framework by which the NPS will implement the report's principles, policies, and recommendations.

Reference Manual 18 (2001): Wildland Fire Management is a technical discussion of wildland fire management requirements and procedures that provides detailed definitions and expanded guidance of all information presented in Director's Order 18. Among other subjects, contents of this manual include guidance for safety, planning, qualifications, wildland fire and prescribed fire management, monitoring, and incident evaluation and review.

1) Federal Wildland Fire Management Policy and Program Review

Effigy Mounds National Monument will implement the guiding principles which are fundamental to a successful wildland fire management program. The first priority of this is the safety of firefighters and the public. It is recognized that wildland fire is an essential ecological process and that natural change will be incorporated into the planning process. Fire management plans, programs and activities will support land and resource management plans and their implementation. Sound risk management will be the foundation for all fire management activities. The fire management program will be based upon values to be protected, costs, and land and resource management objectives. The fire management plans and activities will be based on the best available science to enhance and protect the resource. Public health and environmental quality considerations will be incorporated into fire management plans and activities.

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

Effigy Mounds National Monument will invest in projects that will reduce fire risk. Those projects include the expanded use the prescribed fire on the landscape and the removal of hazardous fuels in the wildland/urban interface. Fuels will be removed from the boundary with neighboring landowners as part of a wildland fire prevention program, which would prevent fires from spreading onto adjacent properties, threatening the safety and welfare of the public.

Prescribed fires will be carefully planned and executed. Firefighter safety will be of the utmost consideration. Any prescribed fire that does not meet the goals of its plan or that is out of its prescription parameters will be suppressed.

Additional considerations will be given to the wildland-urban interface between the monument and developed areas as well as to the infrastructure that supports them (i.e. highways and roads), to sensitive habitats supporting endangered, threatened and special concern species, and to sensitive cultural resource sites.

A greater understanding and valuing of ecological processes is necessary to sustain ecosystem health. Options will be evaluated and decisions weighed to determine long-term outcomes. A Long-Term Ecological Monitoring (LTEM) program is in place to provide the data necessary to determine if management goals are being reached.

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

The Effigy Mounds National Monument Fire Management Plan (FMP) will support the 10-year goals of this plan through improved fire prevention and suppression strategies, and by reducing hazardous fuels through mechanical removal and increasing the use of prescribed fire on a landscape scale. This will, in turn, aid in restoring the fire-adapted ecosystems of prairies and open woodlands (cultural landscape) that were present during the mound building era. The LTEM monitoring program will provide the information necessary to determine if ecosystem and cultural landscape goals are being met. The reduction of hazardous fuels along the monument's boundaries will reduce the risk of wildfire threats to adjacent properties.

D. Compliance

An Environmental Assessment (EA) was developed in support of the FMP to ensure that no significant impacts occur to monument resources. This serves as the National Environmental Policy Act (NEPA) documentation (Appendix D). The National Historic Preservation Act (NHPA) compliance is also documented in Appendix D. Personal consultation with the U.S. Fish and Wildlife Service (USFWS), Rock Island District, has taken place concerning impacts on federally threatened or endangered species. Only two federally listed species are found in the vicinity of Effigy Mounds National Monument. The bald eagle has been observed and currently does not nest within the monument boundaries. The Higgin's eye clam is found in the Mississippi River adjacent to the monument. It has been determined that the use of prescribed fire will have no negative impact on these species.

E. Authorization for Implementing This Plan

The statutes cited herein authorize and provide the means for managing wildland fire on lands or threatening lands under the jurisdiction of the Department of the Interior (DOI) or lands adjacent thereto.

- 1995 and 2001 Federal Wildland Fire Management Policy
- Protection Act of September 20, 1922 (42 Stat. 857; 16 U.S.C. 594);
- McSweeney-McNary Act of 1928 (45 Stat. 221; 16 U.S.C. 487);
- Economy Act of June 30, 1932 (47 Stat. 417; 31 U.S.C. 1535);
- Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315);
- O. and C. Act of August 28, 1937 (50 Stat. 875; 43 U.S.C. 1181e);
- National Park Service Acts as amended (67 Stat. 495; 16 U.S.C. 1b);
- Federal Property and Administrative Service Act of 1949 (40 U.S.C. 471; et seq.);
- Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66; 42 U.S.C. 1856a);
- National Wildlife Refuge System Administration Act of 1966 as amended (80 Stat. 927; 16 U.S.C. 668dd through 668ee);
- Alaska Native Claims Settlement Act of December 18, 1971 (85 Stat. 688; 43 U.S.C. 1601);
- Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C. 5121);
- Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C. 2201);

- Federal Land Policy and Management Act of 1976 (90 Stat. 2743);
- Federal Grant and Cooperative Agreement Act of 1977 (P.L. 950224, as amended by P.L. 97-258, September 13, 1982) (96 Stat. 1003; 31 U.S.C. 6301 through 6308);
- Alaska National Interest Lands Conservation Act of December 2, 1980 (94 Stat. 2371);
- Supplemental Appropriation Act of September 10, 1982 (96 Stat. 837);
- Wildfire Suppression Assistance Act of 1989 (P.L. 100-429, as amended by P.L. 101-11, April 7, 1989);
- Indian Self-Determination and Education Assistance Act (P.L. 93-638) as amended;
- National Indian Forest Resources Management Act (P.L. 101-630, November 28, 1990);
- Tribal Self-Governance Act of 1994 (P.L. 103-413);
- Department of the Interior and Related Agencies Appropriations Act (P.L. 103-32).

II. RELATIONSHIP TO LAND MANAGEMENT PLANNING AND FIRE POLICY

A. NPS Management Policies Concerning Fire Management

National Park Service (NPS) *Management Policies* (USDI, National Park Service) for wildland fire management were revised in 1998 to meet the intent of the new Director's Orders and the Federal Wildland Fire Management Policy and Program Review. Policies stated that monument fire management programs would be designed to meet specific resource management objectives while ensuring that firefighter and public safety are not compromised.

All fires burning in natural or landscaped vegetation will be classified as either wildland fires or prescribed fires. Wildland fires will be evaluated and monitored or suppressed, using a full range of strategic and tactical operations, while considering resource values to be protected, resource management objectives, firefighter and public safety. Prescribed fires, which are ignited to achieve specific resource objectives, will be monitored for fire and smoke behavior. Fire effects will be evaluated in order to determine if management objectives are met. Any prescribed fire that is out of prescription will be suppressed.

From 1916 to 1968, national policy was to suppress all fires, regardless of size or origin. It is now recognized that fire and other disturbances are essential for the maintenance of natural ecosystems. Further evidence shows that lack of fire was a major contributor to increasing fuel accumulations, especially in forest communities.

B. Legislation and Purpose of Effigy Mounds National Monument

1. Enabling Legislation for Effigy Mounds National Monument

Presidential Proclamation 2860, October 25, 1949, established Effigy Mounds National Monument and directed preservation of "... earthen mounds in northeastern part of the State of Iowa known as the Effigy Mounds are of great scientific interest because of the variety of their forms, which include animal effigy, bird effigy, conical, and linear types, illustrative of a significant phase of the mound building culture of the prehistoric American Indians..."

The Mission statement for Effigy Mounds National Monument is:

To preserve significant sites and artifacts of prehistoric American Indian mound building cultures within a natural environment. Park resources are managed to protect their scientific values while providing education opportunities and enjoyment for all.

In the National Park Service Organic Act of 1916 (PL Chapter 408; 39 Stat 535 et seq; 16 USC Congress provided that:

"The Service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations, hereinafter, specified by such means and measures as conform to the fundamental purpose of said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The agency has an overriding conservation mission rather than one of multiple use.

2. Significant Resources and Values

Today, Effigy Mounds National Monument covers 2,526 acres and contains 206 mounds in a variety of forms including effigy, linear, conical and compound. Many of these mounds are known to contain burials; some of which are estimated to be 2,500 years old. These mounds are remnants of the mound building cultures, which occupied the area. The Red Ochre culture of the early Woodland period occupied the area from 500 BC to 100 BC. The Hopewellian occupation occurred from about 100 BC to AD 600. The Effigy Mound Builders occupied the area from AD 600 to AD 1400 and are known for the bird and bear burial mounds that remain.

C. Management Objectives of the General Management Plan (GMP)

The General Management Plan (1991) and the General Management Plan Amendment and Environmental Assessment (1999) identifies problems and issues for Effigy Mounds National Monument and presents a series of actions for solving identified problems.

Cultural Resource Preservation

- Preserve and protect the integrity of prehistoric American Indian burial mounds;
- Restore mounds, with careful documentation, to their original profile in those areas where research has deemed it necessary;
- Eliminate destructive tree growth and animal burrowing in the mounds.

Natural Resource Management

- Restore and perpetuate the ecological conditions that existed during the mound building period to protect and maintain the burial mounds and their environs.

Interpretation, Visitor Use, And Visitor Orientation

- Foster appreciation and understanding of the Indian burial mounds, the culture of the people who produced them, and the forest in which they lived by providing appropriate and safe interpretive programs, visitor use activities, and orientation programs;

- Maintain the Ellison Orr archeological and geological collection, and manuscripts and library collection in a manner conducive to appropriate scholarly research and use;

Cultural landscape management and restoration as outlined in the Resource Management Plan (RMP) will be conducted in phases to achieve the goal of establishing the environmental conditions associated with the era of the prehistoric mound builders.

Phase I targeted and began the restoration of native species to the most severely disturbed areas. The old field areas were the most heavily impacted, containing few native species. This part of the restoration is complete and is managed by prescribed fire.

Phase II is the restoration of moderately impacted areas currently exhibiting good native species composition but suffering woody invasion or serious non-native species competition. These areas have sufficient species diversity and do not require supplemental seeding at this time. Prescribed fire and mechanical clearing are the methods of restoration for these sites.

Phase III is targeting environmentally disruptive, non-native species by the use of integrated pest management techniques. These species will not be completely eradicated, however, they can be reduced to levels where they have minimal impact and are easily controlled. Invasion by new non-native species is increasing at a rapid rate. Garlic mustard (*Alliaria officinalis*) and reed canary grass (*Phalaris arundinacea*) are just two non-native, invasive species that were absent from the monument and now cover hundreds of acres. Buckthorn (*Rhamnus cathartica*), Japanese honeysuckle (*Lonicera japonica*), barberry (*Berberis repens*), and multiflora rose (*Rosa foliolosa*) are woody invaders that are also presenting control problems.

Phase IV involves encouraging protective, native, vegetative cover on the mounds which will vary from mound to mound depending on surrounding vegetation and environmental conditions. Shading and treatment type will change vegetation types through time. Seeding of native species may be necessary where non-native species persist. Native vegetation will be promoted in some areas by the use of prescribed fire.

Phase V involves monitoring and protecting rare, native species so that natural succession and or other impacts do not degrade their habitats. Fire will be used to restore the balance of native vegetation communities and improve critical habitat conditions for sensitive species

Phase VI is expanding the use of prescribed fire on a landscape basis that will mimic the natural role of fire in the environment. The initial focus of this phase will be the identification and restoration of remnant savannas existing in the monument and the development of a new fire management plan to include the implementation of landscape burns. This is the final step in addressing the restoration of the remaining areas of the monument and establishing the presettlement vegetation mosaic. A long-term prescribed fire regime will create the vegetation setting of prairie, savanna, and mid succession hardwood forest similar to presettlement and mound building eras. This process, by itself, would slowly expand the prairies and goat prairies until corridors of prairie mixed with widely spaced fire resistant oak would dominate south facing slopes and ridges. By adding mechanical clearing and selective seeding with native prairie and tree species the restoration rate will be increased. Restoration of core sites will act as the nucleus for vegetation communities. Most of the woodlands would be sustained in a mid-successional state dominated by oaks and hickories.

Phases I through IV are currently in progress with monitoring showing great success. Phase V is being implemented as baseline data increases and cooperation with partners in the peregrine restoration program progresses. Critical habitats are stable but may be deteriorating for some species as the natural progression of forest succession occurs.

D. Objectives of the Cultural and Natural Resource Management Plan

1. Cultural Resource Preservation

As stated in the GMP and the cultural resource section of the RMP, the primary purpose of Effigy Mounds National Monument is to preserve and protect the integrity of prehistoric American Indian burial mounds. This objective is expanded in other action plans to include the management of protective vegetation that prevents erosion. Fostering of the protective cover, of both native and non-native plants and accumulations of leaf litter, is the single most important protective measure that can be employed for the protection of the prehistoric burial mounds within the monument (General Management Plan, 1991).

Past research (Blewett, 1986; Howell, 1984) as well as historic records indicate that the vegetation in the mound areas was more open then it is today. Use of the area by Indian peoples contributed to this openness while fires, both natural and those set by indigenous peoples, maintained it. The areas were dominated by prairies, oak savannas and open forests rather than by the dense oak/maple/basswood forests of today. The re-introduction of fire along with mechanical means i.e. thinning, will provide the tools with which to meet the cultural landscape vegetation goals.

The surrounding forest vegetation also impacts the vegetation on the mounds through shading. Opening the forest canopy should increase vegetation cover on the mounds which should reduce the potential for soil erosion.

2. Natural Resource Management

As stated in the natural resource section of the RMP, the goals of resource management are:

a) Restore and perpetuate the ecological conditions that existed during the mound building period to protect and maintain the burial mounds and their environs.

   1.) Research (Blewett, 1986; Howell, 1984) indicate that the vegetation communities during the mound building era were primarily prairie, oak savanna, and open forest. Today those open areas have filled in to form a dense climax forest of oak/maple/basswood.

   2.) Many of the open community species have been replaced by invasive Eurasian species such as common buckthorn *(Rhamnus cartharica)*, multiflora rose *(Rosa multiflora)*, and garlic mustard. *(Alliaria petiolata).*

b) Combine the protection of the cultural and natural resources while providing the public with a setting that accurately portrays the context and the content of the cultural landscape associated with the mound building era.

   1.) The RMP states that the cultural landscape restoration is based on research of the vegetation communities associated with the environment of the mound builders. Restoring this landscape involves the restoration of the vegetation mosaic that resulted from the influence of fire, topography, climate and species composition.

   2.) Aggressive, exotic (non-native) species can displace native species and disrupt natural processes. An integrated pest management (IPM) program will identify and locate infestations of exotic species, determine their impact on the resource and develop strategies that will prevent, eliminate or control the occurrence of undesirable species.

Active resource management at the monument began by addressing many issues, which included mound erosion, old field management, and archeological site stabilization. The development of a unified management approach of natural and cultural resources was essential. This represented a shift from the general management approach of protecting the resource to one of actively managing the resource to mitigate European cultural disturbance and interrupted environmental processes.

The ecological conditions that existed during the mound builder era and preserved the mounds through time have been altered by 150 years of European influence. Today's altered state does not allow the proper interpretation of the mound builders and the connection of the mounds to the river systems. During the summer, it is difficult to make this important visual connection. During the winter, it is apparent that the mounds on the bluff are within view of the main channel of the Mississippi River. Information from early explorers, settlers, maps, and vegetation pattern analysis suggests that the ridges were once covered with prairie or oak savannas (Blewett, 1986). These historic vegetation patterns would allow for visibility of the river from the mound locations especially during the summer months when they were most likely built.

To properly interpret the mounds and the people of the mound building culture, it is critical to manage the mounds in the proper context. Reproduction of an environment similar to that of the mound building culture addresses the necessity of introducing fire in areas, where in combination

with vegetation, topography, and climate, which will approximate the diverse mosaic that once covered the land. Implementation of this plan in combination with other strategies will create the environmental diversity that once supported the mound building cultures. The resulting vegetation mosaic will be maintained by microenvironments, some of which may support fire and others that do not. These microenvironments are influenced by slope, aspect, topography, and exposure (percent of shade) as well as by type of soils and water regime.

E. Fire Management Plan

The FMP will carry the monument forward in achieving a condition that simulates the landscape of the mound building era. It is a constantly evolving, multiple phased action plan that will mitigate existing and future ecological impacts, establish a regime of ethnological and ecological processes now absent, and implement the transition process without negatively impacting the cultural and natural resources. Utilization of prescribed fire, on a landscape scale, will be the most significant and effective planning strategy in achieving resource protection and restoration goals. Wildland fire suppression will use minimum impact strategies to protect all resources, both natural and cultural. Hazardous fuels will be removed from identified areas by mechanical means to further reduce threats to cultural resources and natural resources as well as to public and private property.

III. WILDLAND FIRE MANAGEMENT STRATEGIES

A. General Management Considerations

Wildland fires are defined as any non-structure fire, other than a prescribed fire, that occurs in the wildland. This may include prescribed fires, which have gone out of prescription.

Wildland Fire Suppression

The Monument will suppress all wildland fires that have the potential to damage or threaten surrounding structures within and outside the monument boundaries. Those wildland fires, which threaten sensitive cultural and natural resources, will be quickly suppressed.

Minimum impact strategies will be employed during the suppression efforts in order to protect all resources. Because of the archeological nature of the monument, natural and man-made barriers will be used as much as possible for containment. Fireline construction will be kept to a minimum, avoiding sensitive cultural and natural resources. Equipment and tools used will meet the desired objectives of inflicting the least impacts upon the resources of the monument. Vehicle access will be limited to existing maintenance and old logging roads avoiding cultural sites. Any areas impacted by fire suppression activities or by the fire will be rehabilitated.

Prescribed Fire

A prescribed fire is any fire ignited as a management action to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met prior to ignition.

Wildland Fire Use

This plan does not recommend wildland fire monitoring and management for resources benefit as an option, due to staff limitations, relatively small land management parcels, long response times, valuable resources, and the values at risk on neighboring lands

Hazard Fuel Reduction and Ecosystem Management

Past land use practices have created a landscape that has excluded fire for 150 years. Agriculture and logging have disrupted vegetation patterns, which show little resemblance of presettlement conditions. The monument contains over 2,000 acres of forest that has not been burned in recent history. Natural fuel accumulations and logging debris could make suppression of an uncontrolled wildland fire extremely difficult during drought conditions and could pose a threat to property and safety. Therefore, it is necessary to reduce hazardous fuel accumulations, create a defensible perimeter and compartmentalize the monument should a wildland fire start within the monument or on adjacent lands. Reduction of accumulated fuels and fire control corridors will be implemented through mechanical fuel removal and the use of prescribed fire. Thinning, grinding or chemical treatment may be required as a pre-treatment of the area before fire is introduced. This will also be used in maintaining breaks, and buffers in sensitive areas and to adjacent landowners.

B. Wildland Fire Management Goals

The FMP prescribes actions necessary to implement servicewide fire management policies (Reference Manual 18, Director's Order 18) and to achieve monument resource management objectives.

- Make firefighter and public safety the highest priority of every fire management activity. Maintain the highest standards of professional and technical expertise in planning and safely implementing an effective wildland fire management program.

- Protect the resources of the monument, public and private property by suppressing all wildland fire.

- Protect the resources of the monument by reducing fuels through prescribed fire and/or mechanical treatment. Integrate fire management with all other aspects of monument management.

- Protect cultural and natural resources from the effects of prescribed fire preparation and suppression activities. Stabilize and prevent future degradation of cultural and natural resources lost or damaged by impacts of wildland fires or fire management activities. Effectively integrate the preservation of wilderness including the application of "minimum requirement" management techniques into all activities impacting the resources.

- Scientifically manage wildland fire using the best available technology as an ecological process to restore, preserve, or maintain ecosystems and apply data gathered through inventory and monitoring to evaluate the program. Replicate the role of natural and American Indian fire regimes in restoring and maintaining the fire-adapted ecosystem

associated with the mound building era. Achieve maximum overall benefits and minimize damages of wildland fire use within the framework of land use objectives and resource management plans.

- Facilitate reciprocal fire management activities through the development and maintenance of cooperative agreements and working relationships with pertinent fire management entities.

- Maintain communication with landowners, news media, and private and public agencies during prescribed fire and wildfire events. Educate employees and the public about the effect of wildland fire management.

- Manage wildland fire incidents in accordance with accepted interagency standards i.e. smoke management, using appropriate management strategies and maximize efficiencies realized through interagency coordination and cooperation.

C. Wildland Fire Management Options

- Wildland Fire Suppression

All wildland fires that have the potential to damage or threaten structures within and outside the monument boundaries will be suppressed. Those wildland fires, which threaten sensitive cultural and natural resources, will be suppressed using appropriate management response following the criteria of the Cultural Resource Protection Matrix (Appendix D).

- Prescribed Fire

Prescribed fire is utilized to achieve resource management goals and objectives and to simulate the role of natural or aboriginal fires. The use of prescribed fire on landscape-scale areas strives to restore vegetative composition to the natural conditions existing prior to European settlement. At Effigy Mounds National Monument the goal is to restore the cultural landscape which was present during the mound building era. The cultural landscape included more open forest, savanna, and prairie communities.

- Wildland Fire Use

Due to staff limitations, relatively small land management parcels, long response times, valuable natural and cultural resources, and the values at risk on neighboring lands, wildland fire use is not currently an option.

- Non-Fire Applications

Mechanical treatments to reduce hazard fuels in and around developed areas and along monument boundaries are a viable option. Public and firefighter safety is a high priority as is the protection of private property. Reduction of hazardous fuels in cultural resources areas will protect those resources and enhance the cultural landscape.

D. Description of Wildland Fire Management Strategies by Fire Management Unit

Each of the four monument units; North, South, Heritage Addition, and Sny Magill are designated as Fire Management Units (Appendix E(a)) with specific vegetation goals defined. These goals

will be met through the use of either prescribed fire or mechanical treatments. Prescribed fire parameters have been identified for each unit depending on the vegetation type present and the type of vegetation that is desired.

Fire Management Units incorporate the objectives of the FMP and differ only in unique management strategies involving intensity, timing and intervals of fire. Each Fire Management Unit is divided into Fire Management Areas, which may contain numerous Burn Units.

The North Unit (508 acres) is part of the original tract obtained by the National Park Service in 1949. This area has had the most intense visitor use during the history of the monument. It is separated from the Mississippi River by the Iowa, Central and Eastern railroad and contains numerous ravines extending up the bluff from the river. This unit contains three Fire Management Areas that are divided into sixteen (16) Burn Units.

The South Unit (770 acres) is also part of the original tract. This unit has experienced less visitor traffic. This unit is separated from the Mississippi River by a steep limestone bluff, State Highway 76, the Iowa, Central and Eastern railroad, State of Iowa property, and private property. This unit contains four Fire Management Areas that are divided into seventeen (17) Burn Units.

The recently acquired Heritage Addition (998 acres) is bisected by the Yellow River and is located to the west of the North Unit. It does not border the Mississippi River and currently has restricted access for visitors. While this unit consists of steep topographical relief, it does not exhibit the bluffs that are associated with the Mississippi River. This unit was the site of two recent, extensive logging episodes, which has altered the forest vegetation to a greater degree than the other upland units. This unit contains seven Fire Management Areas and no Burn Units.

Sny Magill Unit (122 acres) is located 12 miles to the south of the monument in the Mississippi River floodplain. The Mississippi River frequently floods this unit. This unit contains two Fire Management Areas and no Burn Units.

Both the North and South units contain numerous restored prairie areas, which are managed as separate burn units for ease of management and fire control. Besides the restored prairie areas, there are 21 hill prairies or "goat prairies" that are also managed by fire. Due to their small size and sensitive characteristics, each hill prairie will have an individual prescribed fire plan so that they may be burned with greater frequency than the surrounding landscape. All of these smaller burn units will be included in the larger landscape burns.

1. Fuel Management Units of Effigy Mounds National Monument

The Monument is located in the driftless (non-glaciated) area of northeastern Iowa. The Monument headquarters is located in the Yellow River valley (Appendix E(a)).

The North Unit extends up the bluffs to the north of the visitor center and is the most accessible to visitors. This unit contains a number of effigy, conical, and linear mounds which overlook the Mississippi River. This unit is separated from the Mississippi River by the railroad, which parallels the riverbank. The vegetation is dominated by white oak (*Quercus alba*), shagbark hickory (*Carya ovata*), red oak (*Quercus borealis*), big tooth aspen (*Populus grandidentata*) and basswood (*Tilia*

americana). Interspersed throughout the area are a variety of species including ironwood (*Ostrya virginiana*), blue beech (*Carpinus caroliniana*), eastern red cedar (*Juniperus virginiana*), and chinquapin oak (*Quercus muhlenbergii*). At the forest/old pasture interface, large stands of mature big tooth aspen are found. The understory contains shagbark hickory with basswood and sugar maple (*Acer saccharum*) found in lesser numbers. Numerous goat prairies are present on the blufftops overlooking the Yellow and Mississippi Rivers. A restored prairie now occupies a previously farmed ridge top. The bluffs in this unit have a perpendicular drop near the top and slope to the bottom.

The South Unit includes the confluence of the Yellow River and adjacent bluffs to the south. This unit is well known for the number of bear effigies (Marching Bear Mounds), which overlook the Mississippi River. This unit is separated from the Mississippi River by the same railroad as the North Unit, however, State Highway 76 runs between the base of the bluff and the railroad. Sugar maple and red oak dominate the forest of the South Unit. Large white oak trees are also common on portions of the site along with shagbark hickory. The drainage on the west side of the unit has a canopy with sugar maple as the dominant species. The bluffs in this unit have a 30 – 100 foot perpendicular drop at the base.

The Heritage Addition, which lies to the west of the North Unit was acquired in 2000 and contains a large area of the Yellow River floodplain. This unit is relatively inaccessible and contains a few mounds. Two extensive logging events occurred on this unit within the last fifteen years. The hardwood forests similar to the other upland units dominate this unit. However, many forest components are lacking including larger, mature trees.

The Sny Magill Unit is located 11 miles to the south of the monument headquarters in the Mississippi River floodplain. This unit also contains a significant number of mounds. The Sny Magill Unit is a river floodplain that is inundated yearly by spring floods. The vegetation is dominated by silver maple (*Acer saccharinum*), elm (*Ulmus americana*), and green ash (*Fraxinus pennsylvanica*). Swamp white oak (*Quercus bicolor*) is well represented in this area.

The total area included in the monument's boundaries is 2,526 acres.

a. Physical and Biotic Characteristics

Cultural Resources

Prehistoric

The primary mission of the monument is the preservation of 206 prehistoric Indian mounds found within its jurisdiction. This is a small remnant of the thousands of mounds built by the mound building cultures of the upper Midwest. The Great Bear mound is 140 feet long, 70 feet across the shoulders and fore legs, and 3 ½ feet high. Linear mounds are between 100 and 200 feet in length. Average height of the mounds is 2 ½ to 3 feet. All of the units contain examples of the mound building culture, which included the Red Ochre, Hopewell, and Effigy Mound Builder cultures. These cultures existed from 500 B.C. to 1300 A.D.

Historic

Two excellent historical features are found within the monument boundaries. The military road built in 1840 by the U.S. Army between the Mississippi River and Fort Atkinson, Iowa crosses the southern half of the South Unit. The Jefferson Davis Sawmill, which was constructed in 1829 by the future Confederate president, then a young Army officer, is found in the Heritage Addition.

Natural Resources

Geology

The bedrock of northeast Iowa was formed five hundred million years ago as the advance and retreat of an inland sea deposited sediments of limestone and sandstone. The rugged terrain of northeast Iowa is the result of water flowing over and percolating through the limestone, eroding and dissolving the rock. The intricate system of tributary rivers and streams has cut through a plain leaving high divides and precipitous bluffs. These bluffs tower up to 500 feet above the Mississippi River, the Yellow River and Sny Magill Creek. During the Ice Age, the area known as the "driftless area" was left unscathed by the advance and retreat of the continental ice sheets. Although glaciers did not directly affect the area, their melt waters did carve out the Mississippi River valley.

The confluence of the Yellow River and the Mississippi River is approximately 600 feet above sea level while the highest point in the monument lies at 1084 feet above sea level. The uplands above the 900-foot elevation contour make up about half of the monument area.

Climate

The climate is typical of mid-continent North America with large annual and daily fluctuations. The following information is from the United States Weather Service station records at LaCrosse, Wisconsin. Average annual snowfall is approximately 42 inches. The average January low temperature is 5 degrees F. while average high January temperature is 24 degrees F. The lowest recorded temperature in January was –37 degrees F. There are approximately 150 days with below freezing temperatures. The average July low temperature is 62 degrees F. while the average July high is 85 degrees F. The highest recorded temperatures occurred during the months of June (102 degrees F.), July (104 degrees F.), and August (105 degrees F.). The average annual precipitation is 30 inches. The sun shines annually an average of 192 days. The average growing season is 140 days. The Mississippi River Valley has a moderating effect on the climate, which reduces the variance of temperature extremes. (National Weather Service, 1993)

Soils

North, South, and Heritage Addition Units

The principal soils of the ridge tops are Fayette silt loams. The Fayette series consists of deep, well-drained, moderately permeable soils formed in loess on uplands and high stream benches. Slope ranges from 0 to 40 percent. Rock outcrops occur on both the western and eastern slopes of the North and the South Units. (USDA Soil Conservation Service, 1982, 1994)

The principal soils found on the steep slopes are Lacrescent cobbly, silty clay loam. The Lacrescent series consists of deep, well-drained soils that formed in a thin mantle of loess or a mixture of loess and loamy colluvium and in loamy-skeletal colluvial sediments from dolomite. Lacrescent

soils are on convex hill slopes in dissected uplands. Permeability is moderate in the upper part and moderately rapid in the lower part. Slopes range from 5 to 70 percent.

The soils at the mouth of the Yellow River consist of Caneek silt loam. The Caneek series consists of deep, somewhat poorly drained and poorly drained, moderately permeable soils that formed in calcareous silty alluvium on low terraces and bottomlands. Slope ranges from 0 to 2 percent. The soils in the remainder of the Yellow River floodplain are either Ion silty loam or Lawson silt loam. The Ion series consists of deep, moderately well drained, moderately permeable soils on floodplains. They formed in calcareous silty alluvial sediments. Slopes range from 0 to 2 percent. The Lawson series consists of deep, somewhat poorly drained soils formed in silty alluvium on flood plains. These soils have moderate permeability. Slopes range from 0 to 3 percent.

Sny Magill
The soil that is found in the Mississippi floodplain is Caneek silt loam. The soil in the elevated area of the mounds is Wapsie loam. The Caneek series consists of deep, somewhat poorly drained and poorly drained, moderately permeable soils that formed in calcareous silty alluvium on low terraces and bottomlands. Slope ranges from 0 to 2 percent. The Wapsie series consists of deep, well drained soils formed in about two feet of loamy alluvium and the underlying coarse textured alluvium on stream terraces and outwash areas. Permeability is moderate in the upper part and very rapid in the coarse textured material. Slope ranges from 0 to 9 percent.

Hydrology
The Mississippi River, the Yellow River and Sny Magill Creek all have an important effect on the monument. The Mississippi River borders the monument on the east and the majority of mounds found in the monument overlook the river. The Yellow River bisects the monument. The confluence of the Mississippi River and the Yellow River lies within the monument forming an extensive floodplain wetland and forest community. The Sny Magill Unit lies at the confluence of Sny Magill Creek and the Mississippi River.

The Monument has been cooperating in a ten-year water quality study sponsored in part by the Environmental Protection Agency (EPA) and in cooperation with the U.S. Geological Survey (USGS) and the Iowa Geologic Survey. The study shows that the Yellow River and Sny Magill Creek have good water quality that appears to be improving over time.

Vegetation
The Monument lies in a transition zone of forested communities along the riverine blufflands and the prairie uplands to the west. The microclimate produced by the cool, north-facing slopes provides habitat for plants of northern latitudes while the moderating influence of the river valley attracts southern species, providing a mixture of plants not found elsewhere in the state.

The USGS Biological Resource Division is developing a vegetation map of the monument and surrounding area. Today, sugar maple and basswood dominate the remaining oak forests of the upland with scattered prairie openings on the ridge tops and bluff edges. The major openings today are remnants of past farming activities. These old field areas which were once prairie or savanna

openings have been restored to prairie through the use of fire or by seeding native prairie species. The small goat prairies existing on bluff edges show signs of encroachment by woody species.

b. Strategic and Measurable Fire Management Objectives

The following are strategic and measurable objectives of the fire management program at Effigy Mounds National Monument.

- Maintain the current level of no injuries to firefighters or the public
- Conduct fire personnel safety briefings before each prescribed fire
- Minimize the impact of wildland fires by keeping 90 percent of wildland fires to 50 acres or less
- Minimize the intensity of wildland fires by reducing the hazardous fuels present in the wildland/urban interface
- Apply hazard fuel reduction around structures and cultural and historic sites through mechanical means
- Follow established cultural resource fire management matrix guidelines for cultural resource protection and minimum impact line construction
- Introduce fire on a landscape basis to produce a natural mosaic of fire dependent vegetation communities
- Annually review and modify as necessary, any existing cooperative agreements and add any new agreements.
- Develop and implement guidelines for interacting with other agencies, media, and neighbors for education, cooperation, and suppression activities.
- Ensure air quality thresholds for (National Ambient Air Quality Standards) NAAQS are not exceeded and visual quality is not reduced in adjacent airsheds due to fire use activities

c. Operational Implementation Criteria

Fire management activities will be subject to the following implementation criteria.

- All monument staff responsible for fire operations will be familiar with the Monument's fire policy.
- Only qualified individuals who promote the safe and skillful application of fire management strategies and techniques will carry out fire management operations. All NPS personnel will be qualified according to NPS standards.

- All personnel involved in fire management operations will receive a safety briefing describing known hazards and mitigating actions, current fire season conditions and current and predicted fire weather and behavior. Lookout, Communications, Escape Routes and Safety Zones (LCES) will be communicated at all times. Staffing levels of prescribed fires will be determined for adequate response and will incorporate the minimum number into the go/no-go checklist. All safety procedures will be outlined in prescribed fire plans in order to conduct safe, objective-oriented prescribed fires consistent with Reference Manual 18, Chapter 10 requirements.

- Increase public education during periods of high fire indices. Prevent unplanned, human-caused ignitions through cooperative fire prevention aimed at the visitor, staff and neighbors. Neighbors, visitors and the local residents will be notified of all prescribed fire and wildland fire suppression activities that have the potential to impact them. All or portions of the monument will be closed to the public, at the discretion of the Superintendent, when fire activity poses a threat to human safety.

- Prioritize suppression strategies for protection of resources and public and private property. All of the monument's fire equipment will be maintained in a state of readiness during the fire season.

- The occurrence or risk of human-caused fires will be minimized through reduction of hazard fuels by prescribed fire and/or mechanical treatment in and around developed areas and along monument boundaries. Mechanical hazard fuel reduction will be implemented around structures to reduce fire intensity and severity. Vulnerable cultural and historic sites will be protected from fire damage by reduction of heavy fuels in their vicinity.

- A resource advisor will be present during all suppression actions. Fire operations personnel will be briefed on sensitive cultural and natural resources and the potential damage from fire and suppression actions. All wildland fire suppression operations will employ Minimum Impact Suppression Tactics (MIST). The Cultural Resource Protection Matrix will serve as the implementation guideline.

- Determine and duplicate the historic role of natural fire in maintaining natural communities, which were present during the mound building era with an emphasis on the cultural landscape goals. Restore and perpetuate native plant communities that have deteriorated or are disturbed.

- Use prescribed fire as a management tool in creating ecological conditions that perpetuate native plant species and control exotic plants not adapted to a fire regime. Alternative methods (e.g., mechanical, biological, etc.) to fire use will be analyzed prior to selecting fire use treatments. Prescribed fire may be one of the most efficient and cost effective tools in preventing pioneer woody species and exotic plants from invading cultural landscape management areas.

- Cooperate extensively with adjacent landowners through agreements to provide safe and prompt suppression of wildfire. Maintain working relations with the Harpers Ferry Volunteer Fire Department and the McGregor/Marquette Fire Department, USFWS (Upper Mississippi River National Wildlife & Fish Refuge), and the Iowa Department of Natural Resources (Yellow River State Forest).

- Promote an interagency approach to managing wildland fires on an ecosystem basis. Develop and maintain a contact list to inform cooperating and public agencies, media and neighbors of all planned and wildland fire events. Develop a program to explain fuels management, resource protection, wildfire prevention, hazard/risk assessment, mitigation and rehabilitation, and fire's role in ecosystem management.

- Current LaCrosse fire weather indices will be monitored prior, during and after fire operations for changes in mixing heights, transport winds, 20 foot wind speed and direction, approaching cold fronts, and any other pertinent weather information.

- Air quality objectives will be incorporated in each prescribed fire plan. Smoke impact mitigation measures will be developed and implemented for prescribed fire and wildland fire actions.

d. Historic Role of Fire

Indigenous peoples as early as 12,000 years ago occupied this area of Iowa. The mound builders appeared on the scene approximately 500 B.C. and occupied the area until 1300 A.D. During that time, the vegetation in the area included prairies, oak savannas, and open forests. Fires from natural and aboriginal sources maintained these vegetation types until European settlement. As fires swept into the driftless area from the glaciated prairie areas to the west, trees grew in the fire-sheltered areas of the rocks and streams where less intense fires were unable to invade.

During historic times, settlers and explorers passing through the Midwest documented the use of wildland fire by American Indians (Bray and Bray, 1976). Fires were set for a number of reasons. They realized that fire stimulated new growth, which attracted herds of game. As a management tool, fire may have been used to maintain openings in wooded areas or to drive herds of animals over cliffs. Lewis and Clark reported in 1804 that American Indians set fire to the prairie to signal distant villages.

Although fire was a significant influence in maintaining the prairie community, little is known about fire frequency or what percentage of burned areas were natural or human-caused. It appears that fires of human origin increased in frequency as human cultures and lifestyles became more complex.

During post-historic times (late 1800's to mid-1900's), the occurrence of fire has been greatly restricted and was seen as a destructive force that must be controlled. This was due primarily to the large, uncontrolled forest fires of the Midwest logging era (Peshtigo [1871], Hinckley [1896], Cloquet [1918], and Moose Lake[1918]) during the late 1800's and early 1900's when countless settlers lost their lives. This lack of disturbance has allowed the prairie and savanna ecosystems,

and the conditions that supported it, to disappear. The oak forests have advanced toward their climax state and are converting to a maple/basswood community.

The cultural landscape management focus of the monument is to maintain the vegetation in the state of the mound builder era. The reintroduction of fire would be one tool used to accomplish this. This would reverse the trend toward a climax forest of maple/basswood and move it back toward the vegetation (prairie, oak savanna, and open forest) of the mound builder era.

e. Specifics of Wildland Fire Management

1) Historical Weather Analysis/Fuel Characteristics
While the mid-continent climate is usually moist and hot during the summer months (primarily June through August), droughts do occur. The most notable ones in the Midwest occurred during the 1930's, and more recently in 1976 and 1987-88 (Figure 1). The high temperatures are usually accompanied by low rainfall. Vegetation dries out, lowering the fuel moisture in the 100 and 1000 hours fuels, increasing the risk of an extended fire event.

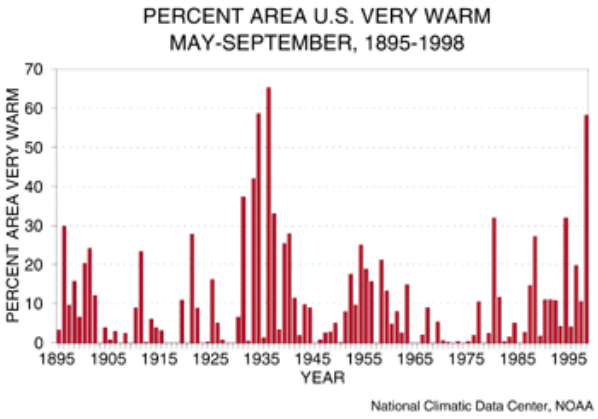

Figure 1. Drought Periods, United States, May – September, 1895-1998

2) Fire Season
Under normal conditions, the fire season ranges from April 1 to May 15 and again from October 15 to November 15. It is during this fire season that prescribed fire conditions are optimal. Wildland fires can also occur at this time. Typical Midwest winter conditions occur from November 15 to April 1. Green-up conditions exist between May 15 and October 15. During periods of drought, or a winter with reduced snow cover, the potential season for wildland fire could extend from March 1 to December 15. The intervals for these conditions occur approximately once every 10 - 20 years.

Since the establishment of the monument there have been four wildland fires recorded. In each case, the ignition source was of human origin and the fire was actively suppressed with minimal damage occurring. A review of fire incidents follows:

Date	Source	Damage area
04/16/50	Human/picnicker	1.5 acres
02/09/54	Human/burning debris	9.0 acres
10/23/82	Human/matches	0.1 acre
05/08/90	Thrown cigarette from car	1.0 acre

While these were not during extreme drought years, the impact would have been greater if they had occurred during those times.

3) Fuel Characteristics

The fuel models at Effigy Mounds National Monument are primarily Fuel Model 3 (tallgrass prairie, 2.5 feet), and Fuel Model 8 (closed timber litter). Other fuel models which are used include Fuel Model 1 (short grass prairie, 1 foot) for goat prairies, and Fuel Model 9 (hardwood litter) for fall timber conditions (Anderson, 1982).

The shortgrass (Model 1) and tallgrass (Model 3) fuel models are typical of the prairie and wetland fuels found in this area of Iowa. The closed timber litter (Model 8) is typical of the timber fuels found here during most of the year. The exception occurs in the fall during leaf drop (Model 9). During this period the leaves are light and fluffy, subject to rapid wind movement, especially in areas of high relief. Slopes range from 6% to 70%, which can have a significant impact on fire behavior as the slopes become more exposed with the loss of leaf cover. Much of the slope aspect for the monument is south, west, and east which causes a greater drying of the fuels during the day especially with prevailing south/southwest winds.

4) Fire Regime Alteration

The potential vegetation types in northeastern Iowa include a mosaic of bluestem/oak-hickory, oak-hickory, and elm-ash communities (Schmidt, et al, 2002). The current cover types are primarily agriculture, with small, interspersed areas of oak-hickory. This area of Iowa fell into the Historical Natural Fire Regime 1 (0 – 35 years frequency, low severity). These forests experienced frequent, low-severity, nonlethal, surface fires. Fire exclusion, housing, agricultural development, livestock grazing, logging, and invasion of exotic species are the primary causes of departures from the historic fire regime. According to the preliminary information provided by the study, the Current Condition Class for this area is moderate (Class 2) risk to loss of key components that define these communities. Survey methods have yet to be defined to determine the Current Condition Class for the monument.

The greatest cumulative risk is loss of native plant and animal habitats, reduction in air quality due to wildfire smoke, and risk of wildfire degradation to watersheds. Conversion of the natural ecosystem to agriculture and the associated fragmentation of forested areas has the greatest impact on natural function of fire and the role that it played in this ecosystem.

5) Control Problems

Fire control becomes difficult along the steep bluff terrain (up to 70% slopes) found along the Mississippi and Yellow Rivers. These areas are difficult to access by fire personnel and equipment. The steep slopes also increase the rate of spread and fire intensity (chimney effect). Small ravines intersect these bluffs. Fires in these ravines are influenced by the wind flow in the Mississippi River basin causing erratic fire behavior.

6) Other Elements

Of primary concern within the monument, is the protection of the cultural resources from the detrimental effects of fire management. Excessive heat and heavy equipment use can cause irreparable damage to these unique artifacts of past cultures. Protection of adjacent property is another consideration affecting fire management. Potential impacts to houses and other structures present along the monument boundary include increased risk from wildland fires and smoke. These same impacts are of concern along the roadways and trails, which traverse the area.

IV. WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS

A. General Implementation Procedures

Due to the low frequency of wildland fire in northeast Iowa, a Fire Family analysis has not been run to determine a 90th percentile from the National Fire Danger Rating System (NFDRS). With the availability of funds or a partnership with other agencies, the Monument will obtain a fire weather station. Until then, the Monument will use the less structured state indices and information from the Iowa Department of Natural Resources (IADNR) and the National Weather Service (NWS) as well as the Minnesota Department of Natural Resources (MDNR), together with the monitoring of local conditions to determine the levels of preparedness in the Step-up Plan. The Monument will consult with the Regional Fire Management Officer (FMO) on the need for personnel and equipment funding.

B. Wildland Fire Suppression

1. Potential Fire Behavior

The steep, hilly terrain presents control problems due to the reduced mobility of personnel and equipment. High slope angles (up to 70%) also increase fire intensity and rate of spread especially during years of drought which occur every 10-20 years. During normal years, high humidities, even during periods of high temperature, tend to slow the fire intensity and rate of spread. However, access can be even more difficult due to the slipperiness of the moist clay soils and the dense vegetation canopy.

2. Preparedness Actions

a. Prevention

The Monument is not located in an area of high wildland fire occurrence. But in cases of high fire danger, warnings will be posted on bulletin boards and at trailheads as well as included in public presentations.

b. Training

All training and qualifications of wildland fire personnel are based on the standards developed by National Wildland Fire Coordinating Group (NWCG) and may be found in the Wildland and Prescribed Fire Qualification System Guide PMS 310-1. Employee qualifications are tracked and archived through the NPS Wildland Fire Management Qualification System found on the Shared Applications Computer System (SACS).

Basic and fitness training and an annual refresher will be completed prior to April 1 of each year for permanent fire employees and by May 1 for other fire personnel. Whenever possible, trainee assignments will be made to further develop skills. The Resource Manager will direct the fire program and maintain operational readiness by following the predetermined schedule.

c. Equipment and Supplies

Preparedness includes activities conducted before a fire to ensure the ability of the monument to respond. This action may include the evaluation and selection of appropriate suppression strategies. Preparedness activities also include recruitment, training, planning, organization, fire equipment maintenance and procurement of equipment and supplies.

d. Fire Weather and Fire Danger

1)Weather Stations

At the current time, Effigy Mounds National Monument does not have a fire weather or remote automated weather station. Therefore, there is no real-time access to the NFDRS system. This information can be obtained from the Minnesota Department of Natural Resources Forestry Office at Caledonia, MN or the Wisconsin Department of Natural Resources Office at Boscobel, WI. The State of Iowa does not have an organized structure in coordination with NWCG (National Wildfire Coordinating Group) therefore; the National Weather Service Offices in Iowa do not post fire weather forecasts.

2) NFDRS
When drought conditions exist, the Monument will contact either Caledonia, MN, or Boscobel, WI, to obtain the Fire Danger Rating. Minnesota also posts the Fire Danger Index to their web site www.dnr.state.mn.us/forestry/fire/index.html. The index is defined as follows:

Low Fire Danger – Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open, cured grasslands may burn freely a few hours after rain, but fires burning in forested areas spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.

Medium Fire Danger – Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open, cured grasslands will burn briskly and spread rapidly on windy days. Woods fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.

High Fire Danger- All fine, dead fuels ignite readily and fires start easily from most causes. Unattended campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuel. Fires may become serious and difficult to control unless they are hit hard and fast while small.

Very High Fire Danger-Fires start easily from all causes, spread rapidly and intensify quickly. Spot fires are a constant danger. Fires burning in heavy fuels may quickly develop high-intensity characteristics, such as long-distance spotting and fire whirlwinds. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.

Extreme Fire Danger – Fires under extreme conditions start quickly, spread furiously and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the very high danger class. Direct attack is rarely possible, and may be dangerous, except immediately after ignition. Fires burning in heavy slash may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

e. Step-up staffing plan

The following staffing conditions will be maintained in accordance with the fire danger rating index.

Low Fire Danger

- *All equipment and qualified personnel will be maintained for readiness at all times.*

Medium Fire Danger

- *The public and the employees will be informed of the conditions and posters will be displayed relating to the danger of smoking during current fire conditions.*
- *Fire weather will be reviewed daily.*
- *Outlying fire equipment supply boxes within the monument will be checked and stocked with additional equipment from the monument's central cache.*
- *A minimum of two qualified personnel will be available for initial attack.*
- *Severe weather (dry thunderstorms) or red flag conditions will automatically initiate the staffing conditions for High, Very High, and Extreme Fire Danger.*

High, Very High, and Extreme Fire Danger

- *All precautions mentioned above plus the restriction of smoking to developed areas only.*

- *All wood chipped trails will be buffered by use of raking or leaf blowers to reduce potential for wildland fire burning on or across those trails.*
- *Increase awareness of surroundings when using chainsaws and other power equipment, which don't have spark arresters.*
- *Hand pumps and fire tools will be carried in monument vehicles at all times.*
- *Red Carded personnel will be available at all times.*
- *Fire Situation reports will be entered into the NIFC computer daily before 9:30 a.m.*
- *Visitor center personnel will alert the public to fire hazards.*
- *Interpretive activities will include a fire safety message.*
- *Fire danger notices will be posted.*
- *Emergency preparedness funds (PWE 343) may be used to bring staff to required levels. However, regularly scheduled personnel will be used to the extent possible. Both nonessential activities and project work may be postponed.*

The step-up plan is most pertinent during late summer and fall (August-November). The vegetation is mature, and during years of drought, moisture levels in 100 and 1000 hour fuels can become low. However, during drought years, high to extreme fire danger levels can occur any time. In normal years, after snowmelt and prior to greenup (late March to June), medium to very high fire danger levels can also occur.

Emergency preparedness describes actions to provide extra capability during times of extreme or unusual fire danger. Worst case scenarios will be determined through the use of the BehavePlus Fire Software Program. These unusual conditions are usually the result of weather influences on the monument's natural fuel complexes. The Monument's authority to expend emergency preparedness funds is detailed in Reference Manual 18. Appropriate use of these funds include: hiring of temporary emergency firefighters; placing existing staff on extended tours of duty; increasing or initiating special detection operations; pre-positioning additional wildland fire resources in the monument; and hiring fixed wing or rotary aircraft to accomplish necessary preparation. These ensure prompt response with adequate forces to those situations where adverse fire weather conditions and high to extreme fire danger exist.

The only NWCG qualified red carded personnel in Iowa are located at NPS and USFWS units. The state of Iowa is not a signatory to the national fire system at the current time.

Annual course of action for prescribed fire and wildland fire preparedness

January 1 - April 30

- Update and maintain accurate employee training and qualification records.
- Review cooperative agreements with surrounding fire management agencies.
- Prepare plans for any prescribed fires for hazard fuel reduction and resource management projects.
- Order fire cache supplies and replacement equipment as needed.
- Provide updates or changes to cooperators for local and regional mobilization plans, provide an addendum to the FMP regarding these changes.

By April 1, the fire caches and all equipment will be ready for service. Suppression personnel will be fitness tested and protective gear will be available as stated above. A minimum of two people will be available to respond to wildland fires. If qualified personnel are not available, the most qualified person will assess the situation and call for appropriate response resources. Those responding must have the proper personal protection equipment (PPE) including Nomex clothing, leather boots and gloves, helmet, and fire shelters. Fire tools should be sharpened and available for use. This equipment should be readily available in the monument's fire cache.

May 1 - June 15

- Maintain a current inventory of all fire supplies and equipment.
- Maintain fire cache equipment readiness.
- Check operation of slip-on pumpers.
- Outfit field vehicles, initial attack personnel, and interagency crew participants.
- Review established procedures for utilizing suppression and emergency preparedness accounts.
- Evaluate the need for basic firefighter training and conduct if necessary.

June 16 - September 30

- Maintain state of readiness as identified (May 1-June 15);
- Test all slip-on units and portable pumps at least monthly.

October 1 - December 31

- Critique fire season;
- Evaluate individual performance ratings of fire personnel and correct deficiencies and recommend training as needed;
- Review and revise FMP as needed.

3. Pre-attack Plan

Due to the small size and scope of the wildland fire program at the monument, only a preliminary pre-attack plan has been written (Appendix G). Certain preparations and procedures are, however, established prior to and during the fire season. These are discussed the previous section. In addition, pre-attack plans are informally discussed among the personnel during practice or equipment maintenance assemblies. The value of an extensive written pre-attack plan or checklist is recognized. Such preparation will inevitably become apparent as the fire program evolves into a more complex and operationally committed program.

4. Initial Attack

Visitors, neighbors and monument staff report wildland fires to the monument. The following information is collected at the time of the report: fire and smoke location, behavior, dispersal and approximate area size, time of discovery, and the reporting party's name, address, and phone number. These reports will be relayed to the appropriate monument personnel. It may be necessary to have the reporting parties remain in contact until the fire is located and confirmed.

a. Initial Attack Priorities

Whenever fire is reported to the Monument headquarters, the following steps will be taken:

1) Determine the location, legal description, and land ownership at the occurrence site;

2) The Resource Manager or other qualified person will assess the situation. The Superintendent will be updated on the fire situation and will be responsible for all actions taken on the fire.

3) At least two or more personnel will be dispatched to the fire. Personnel dispatched will be qualified and equipped to undertake initial attack.

4) Upon determination of fire location and based on the information reported following the initial fire size-up, the Resource Manager will develop the appropriate suppression response, giving consideration to applicable resource management objectives and constraints, together with considerations of personnel safety and economics.

In the event of a prescribed fire escape, the first priority will be based on the safety of the public and the firefighters. The secondary priorities will include protection of private property and monument resources and improvements. The following maps will be available for setting priorities in the event a prescribed fire escapes:

- Map displaying private structures within one-half mile of NPS boundaries.
- Map displaying cultural and historic sites.
- Map displaying monument facilities.

b. Criteria for Appropriate Initial Attack Response

Suppression actions will be governed by human safety, availability of equipment and management objectives and constraints. Current objectives include rapid, aggressive, initial attack by NPS personnel on all fires within the monument. In general, these can be met most effectively and cost-efficiently by:

- Quickly evaluate each fire for geographic location, spread potential, and amount and type of force(s) needed for effective suppression. The following will be used to set the priorities for wildland fire suppression:

  - Proximity to private structures outside the monument's boundaries.
  - Potential impact to cultural and historic sites.
  - Proximity to monument facilities

- Use appropriate management response methods and tactics designed to efficiently and effectively suppress fires safely.

- Maintaining the safety of the firefighters, other personnel, and the public.

c. Confinement Strategy

A confinement strategy may be selected for initial attack as long as it is not being used solely to meet resource management objectives. A confinement strategy may also be selected in the Wildland Fire Situation Analysis (WFSA) process when initial attack has failed to contain a wildland fire. When confinement is selected as the action, the same management process applies as for wildland fire use decisions. A Wildland Fire Implementation Plan (WFIP) will be prepared in stages as the fire management conditions change and associated considerations require additional attention.

d. Response Time

Typical fire response times will vary depending on the staffing, fire management activity in the local area, and time of day. During working hours, monument personnel can respond to fires from the closest access within 10 minutes. Reinforcements from other area agencies can respond to the closest access road within 30 minutes. Reinforcements from outside the area cannot respond any sooner than one hour after request has been issued.

e. Restrictions and Special Concerns

Vehicular traffic is limited to roads and trails because of the steepness of the terrain. Protection of sensitive cultural resources, particularly the area around the mounds and including the mounds, is critical to the management of the area. It is critical that the cultural resource protection matrix in Appendix D be used as a guide in determining the allowable impact to those areas. Sensitive natural resource areas will be protected from high impacts of fire suppression. Minimum Impact Suppression Tactics (MIST) will be used in efforts to contain wildland fires.

f. Special Issues

At this time, no special issues have been identified in the area of tribal relations, local government issues, the hiring of local people because of the short duration of any projected wildland fire. A major issue lies in the fact that the state of Iowa is not a signatory to the national fire system and does not have nationally recognized, red carded wildland fire personnel.

5. Extended Attack and Large Fire Suppression

If the fire threatens to exceed all initial attack capabilities, the fire will become an extended attack event. Extended attack continues until either the transition to a higher level incident management team is completed or the fire has been contained or controlled.

a. Needs

Extended attack needs include obtaining additional resources to control and contain the wildland fire. The immediate contact would be the MDNR Forestry Office at Caledonia, MN. They would order additional resources through the Minnesota Interagency Fire Center (MIFC), Grand Rapids, MN.

b. Implementation Plan Requirements

A WFIP will be prepared in stages as the fire management conditions change and associated considerations require additional attention. At the current time, a WFIP does not exist for the monument.

c. Complexity Decision Process

Once the wildland fire is accessed, the monument's qualified fire person will make the decision to determine whether the Harpers Ferry or the McGregor/Marquette fire departments are called in. If it is felt that the local fire department cannot adequately contain the fire, a call will be put in to the Incident Commander at the MDNR Forestry Office at Caledonia, MN. Once the Incident Commander has been apprised of the situation, he will make the determination of the resources needed and the projected time needed to control and contain the fire.

d. "Delegation of Authority" for Incident Commander

The Superintendent will sign over the "Delegation of Authority" for the Incident Commander on the fire once he/she is on the scene.

6. Exceeding Existing Wildland Fire Implementation Plan

Conditions that cause an existing WFIP to be exceeded include wildland fires that are not contained during initial attack and prescribed fires that escape and are declared wildland fires.

7. Minimum Impact Suppression Tactics

Initial Attack

All initial attack should be aggressive as possible to prevent fires from crossing boundaries and damaging private property while minimizing the impact to the cultural and natural resources. MIST will be used in efforts to contain wildland fires. All suppression strategies and line construction tactics will follow minimum impact guidelines listed in Reference Manual 18, Chapter 9, Exhibit 5.

The following criteria will be used for appropriate initial attack response, which is consistent with RMP objectives:

- Public and firefighter safety.
- Protection of cultural, historic, and natural resources.
- Protection of improvements and private property.
- Minimum fireline construction.
- Available suppression resources and response times.
- Fire danger as determined by fuels, weather, and topography.

Control Line Construction

- Minimum impact line construction techniques (leaf blower instead of hand tools).
- Use water or swatters for fireline control whenever possible.
- Use minimum width for line construction.
- Minimize bucking of logs by constructing fireline around them.

Mopup

- Minimize bucking of logs by allowing them to burn out safely at least 100 feet inside the blackened area.
- Minimize use of hand tools by using water whenever possible to soak all smoldering trees, branches and trash within 10 feet of the control line.
- All standing smoldering trees and branches will be cut and soaked.
- Burning logs inside the line will be turned perpendicular to the slope whenever possible.
- The blackened area will be thoroughly inspected and the fire declared contained before personnel leave the scene.
- Control line will be continuously inspected until fire is declared out.

8. Short and Long-term Rehabilitation Guidelines and Procedures

All suppression activities will be designed to cause the least amount of resource damage. After the fire is declared out, all litter and trash will be removed. Firelines will be refilled and erosion control devices installed if necessary. Stumps will be flush cut. Logs and brush will be chopped and scattered or removed. The severity of the burn and its impact will be considered in determining the need to seed or otherwise re-establish native plant species. Such efforts regarding landscaping and plants will be in full compliance with NPS Management Policies and given prior approval of the Regional Director. A rehabilitation plan, outlining what species are to be planted, techniques to be used, locations and cost estimates will be prepared before any action is taken.

All rehabilitation associated with suppression activities will be charged to the fire account. All rehabilitation associated with fire damage will need to be charged to a Burned Area Emergency Rehabilitation (BAER) account. To acquire such funding, a BAER plan must be approved. The regional fire ecologist is the BAER contact.

9. Records and Reports

Procedures are outlined in Reference Manual 18. Fire reports will be completed by the Resource Manager and entered into NPS SACS. Individual fire reports will be completed for the monument, cooperative agreement fires, and all other fire responses including all out-of-monument fire assignments. Each wildland fire documentation package will include the following:

- Individual Fire Report Form (DI-1202).
- Fire Weather Observations.
- Situation Reports and fire updates.
- Incident Maps.
- Wildland Fire Situation Analysis (if appropriate).
- Narrative Summary (if appropriate).

Individual Fire Reports (DI-1202)

The basic report used by National Interagency Fire Center (NIFC) and parks for documenting a wildland fire is the Individual Fire Report (DI-1202). The report is valuable as it provides an historical record of the fire regime for the monument. As such, it is important that all fires that occur within the boundaries be documented using, at a minimum, this form. This includes self-extinguishing fires so the location can be documented. (Incidents known as support actions where monument personnel respond to fires outside the monument, including out of state, are also reported on this form.) An individual can only receive credit for jobs performed on any fire though records NIFC maintains. This form also records each fire incident and its assigned Fire Number. The Incident Commander on each the fire is the person responsible for preparation of the Individual Fire Report. A Case Incident Report (Form 10-343) for the fire may also be prepared in addition to the DI-1202. Fires will be assigned a sequential fire number by calendar year; i.e. fires in 1989 are numbered 8901, 8902, etc. Instructions for filling out the report are found in Reference Manual 18. The reports will be reviewed for completeness and data will be entered into the database for permanent recordkeeping. The procedure also prepares a final draft for the files. The information will also be entered into the Wildland Fire Management Computer System (WFMCS). Finally, a copy of the DI-1202 will be sent to the Regional FMO for their records.

A complete fire report will include the following attachments, if applicable:

- Any written policies, guidelines or authority statements signed by the Superintendent.
- Copies of equipment purchased or personnel request orders.
- All situation maps.
- Personnel lists (including emergency time slips.).
- Press clippings.
- Accident reports.
- All weather data reports and records.

C. Wildland Fire Use

Wildland fire use is not a viable alternative due to the small size of the monument. Wildland fires pose a hazard to the adjacent community of Marquette as well as to a major traffic corridor (State Highway 76) which bisects the monument. All wildland fires will be managed using appropriate management response.

D. Prescribed Fire

Prescribed fire is utilized as a tool to achieve the resource management objectives and simulate the role of natural fire. The use of prescribed fire on landscape-scale areas strives to restore

vegetative composition to the natural conditions existing prior to European settlement. By restoring the vegetation communities to the more open types of the mound builder era, the potential for heavy, woody fuel accumulation will be reduced. Prescribed fire will also be used to develop a fire resistant zone along the monument boundary, which will protect adjacent public and private lands from the threat of wildland fire during drought years.

Fire alone will not restore the environment to conditions of the past due to changing forest conditions. Thinning of small to medium sized trees will be required in targeted areas. This tree-thinning project will both aid in the restoration process and reduce the chance of uncontrollable fire occurring within the monument.

Prescribed fires are intentionally ignited under predetermined weather and fuel-moisture conditions with predetermined goals, i.e. resource management objectives and/or hazard fuel reduction. They permit managers to exert substantial influence over the spread and intensity of fires as well as the ability to contain the fire within a specified area. All prescription parameters, acceptable ranges, and objectives are clearly stated in a Prescribed Fire Plan for each prescribed fire conducted.

1. Planning and Documentation

a. Annual Activities

Actions carried out in the prescribed fire program include: selection and prioritization of projects to be carried out during the year, the development of prescribed fire plans including prescription preparation, documentation, reporting and critiquing of prescribed fires. All prescribed fire projects will have a prescribed fire plan approved by the Superintendent. Each prescribed fire plan will be prepared using a systematic decision-making process to determine measurable objectives and will follow NPS policy as outlined in RM-18, Chapter 10. Prescription parameters will be designed to meet those objectives. Contingency actions must be described in the event the prescription is exceeded. An Environmental Assessment (EA) has been completed for the FMP to ensure that the plan all meets the necessary regulations and mandates. Therefore, an EA will not be necessary for those prescribed fire projects outlined in this plan. All prescribed fire plans will address the need for alerting neighbors and appropriate public officials to the timing and the planning of the prescribed fire.

The Monument submits annual requests for funding of hazardous fuels treatment and conducting prescribed fires. Funding is also requested for maintenance of the fire cache equipment, fire equipment and personnel protective gear issued to qualified personnel.

b. Long-term Prescribed Fire Strategy

The first objective of landscape applications of prescribed fire is to re-establish a natural fire regime, which will restore the vegetation mosaic associated with the mound building era. The influences of topography, soils, aspect, slope, and microhabitats, combined with existing plant communities will influence the impact of fire and the patterns of native vegetation. Landscape burns will utilize natural and artificial fuel breaks in determining unit boundaries. Landscape burns will be conducted in conjunction with smaller prescribed fires. Smaller prescribed fires will

continue to be conducted on restoration areas that require more intense management, seasonal timing, intervals and locations that cannot be adequately addressed with landscape burns. These burn units are generally 25 acres or less in size. The transition from smaller prescribed fires to landscape burns will be gradual depending on management needs.

The Fire Management Program will be the primary resource management tool used to restore and maintain the open field areas and prairie remnants. Initially, the most promising open field and bluff prairie areas will be managed. Eventually, fire management will be extended to other areas as research, study, and experience determines the need and ability to improve poor quality sites. The management plan includes the mechanical removal of woody growth and hazardous fuels. This operation will be conducted in areas where fire is not effective in killing large trees and shrubs or in removing fuel accumulations.

This plan will integrate the three goals of introducing fire on a landscape to duplicate the effects of a natural fire regime, to remove fuel concentrations, and to aid in the suppression of all wildland fire.

The following sequence is based on spatial distribution (allowing adjacent areas to revegetate prior to another prescribed fire). Prescribed fires will occur in spring or possibly in fall depending on weather conditions. Ignition will be conducted primarily with a driptorch. Burn unit acreages will include the total area of the burn unit, which is divided into black, partially burned, and unburned. A mosaic fire pattern is expected with variable fire effects in larger burn units, which may cover several vegetation types (Appendix H).

c. Required Qualified Personnel

Successful implementation of prescribed fires will include Prescribed Fire Plans prepared by a qualified Prescribed Fire Manager (RXM1 or RXM2) or a Prescribed Fire Burn Boss (RXB1 or RXB2). A NWCG-qualified Prescribed Fire Burn Boss will conduct prescribed fires with NWCG-qualified support personnel present to accomplish objectives. The support personnel will monitor fire behavior and weather, control hot spots and fires outside control lines, support ignition needs, and complete initial attack on escape fires. Complexity of prescribed fires requires a normal organization structure consisting of a Type II Burn Boss (RXB2), a Type II Ignition Specialist (IGN2), Holding Specialists (specific mnemonic depends on number and type of holding resources), and a Prescribed Fire Monitor (RXFM). This organizational structure may be modified for specific requirements.

The Wildland Fire Qualifications System, a subsystem of the National Interagency Incident Management System (NIIMS) is used by the NPS for wildland fire suppression personnel. All monument personnel dispatched to fires will meet minimum red carded qualifications. Each person will receive S-130 and S-190, plus complete the pack test, which involves carrying 45 pounds over a three-mile course in 45 minutes. Both the Annual Wildland Fire Safety Refresher Training and the Pack test are required each year. The Prescribed Fire Burn Boss will, at a minimum, be a qualified as Type II. A Type III Incident Commander will be available within a two-hour response time.

d. Weather, Fire Behavior and Fire Effects Monitoring

Weather, fuel loading, and fuel moisture conditions must be monitored closely in burn units to determine when the prescription has been met.

When all prescription criteria are within the desired ranges, the Burn Boss will select an ignition date based on current and predicted weather forecasts and available resources. The Burn Boss will also identify the windows of opportunity and work with available personnel to assure the prescribed fire is accomplished in the scheduled year. A thorough briefing will be conducted stressing personnel assignments, resource placements, contingency actions, and safety concerns along with measures to mitigate these concerns. Ignition sequence will be of special concern. Ignition team members must know how and where to ignite, as well as the locations of sensitive areas to be excluded from treatment. A current spot weather forecast will be obtained on the day of ignition and all prescription elements will be rechecked to determine if parameters are within desired ranges. If all prescription criteria meet the planned ranges, a test fire will be ignited to determine fire behavior conditions. If these conditions appear satisfactory and consistent, the prescribed fire will continue. If the test burn indicates fire behavior outside the desired ranges, the test fire will be suppressed and the main burn will be postponed until conditions are more favorable.

Operational guidelines and allowable ranges of fire behavior and weather conditions shall be specified in the Prescribed Fire Plan drafted for each project. Each project shall include monitoring and evaluation, which will be conducted continuously during the prescribed fire. The purpose is to ensure that ongoing fire behavior and weather conditions remain within the Prescribed Fire Plan parameters. The individual responsible for the fire monitoring and evaluation shall keep the Burn Boss informed of any and all changes, which might result in the fire exceeding parameters.

Fire monitoring will evaluate the degree to which prescribed fire objectives are accomplished. Long-term monitoring is required to document that overall programmatic objectives are being met and undesired effects are not occurring.

Pre-burn and post-burn vegetation surveys have been conducted on all prairie restoration units that are treated with prescribed fire. Ten years of fire data has been produced on the vegetation response to the frequency and timing of prescribed fire. This information has yet to be analyzed in detail.

The Monument is part of the pilot Long-Term Ecological Monitoring (LTEM) program with permanent plots established in prairie and savanna restoration units. Information from the LTEM program will be used to assess fire effects monitoring and to guide the direction of the fire management program.

The Monument is currently undergoing a complete Veg-Map project with a fuel-monitoring component. The preliminary field survey was completed during the summer of 2001.

e. Critique Format

- All Prescribed Fire Plans will be approved and signed by the Superintendent.

- Outside support, from NPS prescribed fire management teams or interagency incident management teams, may be requested for planning, implementation, or supplemental management stages.

- The Burn Boss will conduct a field reconnaissance of proposed burn locations with monument staff to discuss objectives and special concerns and to gather all necessary information to develop the Prescribed Fire Plan.

f. Reporting and Documentation

Procedures are outlined in Reference Manual 18. Individual fire reports will be completed for the monument and entered into NPS SACS.

g. Historic Fuel Treatment

The prescribed fire program began at Effigy Mounds National Monument in 1988. The first prescribed fires were conducted on degraded goat prairies and in old field areas in the North and South Units. Fifteen years later, prescribed fires are being conducted in restored grasslands, goat prairies, and oak savannas. Plans are to transition to landscape burns of 200 to 600 acres per year. These prescribed fires would cover multiple vegetation communities including prairie/grasslands, oak savanna, open forest and into the denser forests. On the landscape scale, large fires probably occurred every 10-20 years, which corresponded to the drought cycles. Because these areas have not been burned on a landscape basis in the recent past, future prescribed fires will be based on the amount of available fuels.

h. Prescribed Fire Plan Requirements

A prescribed fire plan must be developed for each project area. Detailed requirements of the prescribed fire plan are found in RM-18, Chapter 10. A plan for each area will be tailored to meet specific needs and prescribed fire parameters. This plan is a site specific action plan which describes the purpose, objectives, and prescription along with operational procedures, a go/no-go check list, an organization chart, weather forecasts, contingency actions, monitoring actions, and safety concerns involved in prescribed fire preparation and implementation. The treatment area, objectives, constraints, and alternatives will be clearly outlined. A prescribed fire will not be ignited unless all prescriptions are met. On small-scale projects, one or more personnel may hold multiple positions. Resource management staff will identify locations of sensitive resources, (archaeological sites and sensitive plants and animals). Prescribed Fire Plans will be technically reviewed and approved by the Regional FMO and meet all requirements of Reference Manual 18. All plans will be reviewed and approved by the Superintendent.

2. Exceeding Existing Prescribed Fire Plan

In the event of an escaped fire, the on-scene Burn Boss will assume control of the fire and take appropriate management actions as discussed in the preburn briefing and identified in the prescribed fire plan. Other designated personnel will continue holding action on the prescribed fire. In the event, a prescribed fire escapes the assigned holding resources, prescribed fire ignition will cease and personnel not directed to remain as holding resources will transition to full suppression on the escaped fire. The Superintendent and the nearest Type III Incident Commander will be contacted. Calls to the local fire departments will be made to inform them the situation and request necessary assistance. The Midwest Region FMO will be notified immediately of the escape and prescribed fire status. Once a wildfire declaration has been made, the project cannot return to a prescribed fire designation. For all escaped prescribed fires converted to wildfire status, a WFSA will be prepared and appropriate resource orders will be placed. Spot fires may not constitute an escape if they are contained within standards that are identified in the prescribed fire plan.

In the event of a prescribed fire escape, the first priority will be based on the safety of the public and the firefighters. The secondary priorities will include protection of private property and monument resources and improvements.

3. Air Quality and Smoke Management

a. Air Quality Issues

Due to the rural location and limited duration and intensity of prescribed fire programs at the monument, air quality concerns are minimal.

Smoke management is a concern on all fires whether prescribed or wildland fire. The main concern is for the firefighter working on the fire. Long-term exposure to smoke has shown health impacts (NFES 2557). For this reason, all possible precautions will be taken to control the particulate size, length of exposure and concentrations of smoke by implementing fire control and ignition strategies that minimizes smoke inhalation by fire personnel.

b. Program of Action

Smoke Management

NPS fire management activities which result in the discharge of air pollutants, (e.g., smoke, carbon monoxide, and other pollutants from fires) are subject to, and must comply with, all applicable federal, state, interstate, and local air pollution control requirements. These requirements are specified by Section 118 of the Clean Air Act, as amended (42 USC 7418). It is the not the primary intent of the Clean Air Act to manage the impacts from natural sources of impairment (i.e. wildland fire use or unwanted wildland fire). Smoke from these fires is an inevitable by-product. Fires are not considered point sources of emissions, but tend to be spatially distributed singular events, and temporary impacts to visibility and visitor enjoyment must be recognized, expected, and managed.

Adverse environmental effects from smoke shall be minimized through monitoring fuel characteristics, atmospheric moisture, velocity and direction of wind, and selecting the time and place that will have the least impact.

This may include temporary closures or warnings during the management of approved prescribed fires. Smoke drift affecting neighbors and public roads is a concern. Weather parameters monitored include wind speed and direction, temperature, relative humidity, and precipitation. Smoke management is of particular concern in areas where it can settle in the valleys between the bluffs. These areas include Highway 76, and the towns of Marquette and McGregor. Smoke lying in these areas not only impacts the health of people living in these areas, but also can impact visibility and impede the movement of vehicles.

The Monument will comply with Air Quality-Smoke Management Guidelines listed in Reference Manual 18. The fire management program will be in compliance with interstate, state, and local air pollution control regulations, as required by the Clean Air Act. The procedures to ensure compliance will include:

- The Resource Manager will contact local and state authorities to ascertain all procedures prerequisite to compliance with regulations or permits, and determine if any burn bans are in effect. Burning permits are not required.

- All prescribed fire plans will have stated objectives and will monitor impacts of smoke on human and natural environments. Current and predicted weather forecasts will be utilized along with test fires to determine smoke dispersal. The fine-grass fuels in the monument generate low volumes of smoke for short duration and are not usually a smoke management problem.

- Prescribed fires ignited in proximity to structures will be ignited only after careful considerations are given to levels of visitation and impacts upon visitation and local residents.

Considerations useful in managing smoke from longer duration fires include:

- Selection of weather conditions to lessen smoke in sensitive areas;

- Utilize lower fuel moistures and avoid green-up conditions to reduce smoke;

- Break burn areas into smaller acreage to reduce total smoke production;
- Control smoke production by increasing or decreasing ignition rates.

- Develop contingency plans to limit smoke production if the need arises (may involve suppression on portions of the line).

The Iowa DNR restricts the burning of "Landscape Waste" in IAC 900--23.2(3)d. According to this statue, burning cannot be conducted within one-quarter mile of an inhabited building. All proposed initial burn sites are outside the one-quarter mile restricted zone.

E. Non-Fire Fuel Treatment Applications

Mechanical treatments to reduce hazard fuels will be undertaken in and around developed areas and along monument boundaries to reduce the natural fuels. The top priority will be personal (public, visitor, and firefighter) safety associated with public use areas and travel corridors followed by protection of public property. Hazard fuels management by mechanical actions outside of developed areas will be combined with the reintroduction of fire into the fire dependent ecosystem. The intent of this program, currently referred to as Wildland/Urban Interface Initiative (WUII), is to reduce wildland fire hazard to levels that local fire suppression forces can control with minimal loss of values to be protected. In addition, control lines for the landscape application of prescribed fire will also be created.

The mechanical treatments are part of a long-term fuels management and reduction program. This program has been implemented to increase fire control capabilities and reduce the risk of fire escapes during prescribed fires and the movement of wildland fires across boundaries.

1. Annual Activities

The Monument submits annual requests for the funding of hazardous fuels treatment. Annual activities are dependent on the funds available to complete projects. Activities include reducing natural fuels at the wildland/urban interface, cultural sites, and sensitive natural resource sites, as well as mowing along the trails, roads, and boundaries.

2. Equipment and Seasonal Use Restrictions

All equipment use will follow the recommendations of the Cultural Resource Protection Matrix (Appendix D). This matrix outlines the historic context, the resource types and the elements, and the risk conditions or activities which will impact the elements. In addition the resource at risk is identified along with the action required to protect that resource.

3. Monitoring

The LTEM program will be used to determine if the overall programmatic objects of cultural landscape management and goals are being met and undesired effects are not occurring.

4. Critique Format

All mechanical treatment programs will be under the supervision of the monument's Resource Manager and approved by the Superintendent.

Outside support may be requested for implementation and supplemental management stages through the hiring of additional personnel or through contracting.

The Resource Manager will conduct a field reconnaissance of proposed locations with monument staff to discuss objectives and special concerns and to gather all necessary information to develop a plan of action.

5. Cost Accounting

The Resource Manager and the maintenance staff needed for the projects will maintain a record of the time and materials expended. The appropriate NPS reporting standards will be used to determine costs associated with the project. These will be submitted to the designated personnel annually.

6. Reporting and Documentation

All work, both planned and completed, will be documented on maps and by written reports to the designated personnel.

7. Annual Planned Project List

Annual projects are dependent solely on the availability of funds. Work considered includes the maintenance of fire breaks along private property, sensitive natural and cultural resources, protection activities around infrastructure facilities i.e. headquarters area.

F. Emergency Rehabilitation and Restoration

After prescribed fires are conducted, natural vegetation will quickly stabilize the topsoil. The use of natural or existing fire breaks will minimize soil disturbance. In cases where erosion may occur, the construction of water bars or reseeding may be used. On steep slopes, logs and branches can be placed perpendicular to slope for erosion control.

V. ORGANIZATIONAL AND BUDGETARY PARAMETERS

A. Fire Management Organizational Structure

This section describes the key personnel involved in fire management, delineates the chain of command and discusses responsibilities, and recommended qualifications.

Superintendent
The Monument Superintendent is responsible for overall operation and management of the monument, ensuring that DOI, NPS and Effigy Mounds National Monument policies are maintained and followed. Approval and implementation of the FMP and all Burn Unit Plans are the Superintendent's responsibility. The Superintendent will also approve the use of any heavy equipment, and will issue all press releases.

Chief Ranger
The Chief Ranger incorporates fire management information into interpretive programs, when appropriate, to provide fire information to monument staff and visitors. This person ensures that accurate information on the use of fire is incorporated into monument books, brochures, and exhibits. This person may provide on-site interpretation of fires when appropriate and safe. The Chief Ranger may also serve as Fire Information Officer.

Resource Manager/Fire Program Manager

The Resource Manager is responsible for the coordination and supervision of all prevention, preparedness, detection, prescribed fire, suppression, monitoring, and post-fire activities on the monument grounds and coordinates with adjacent public and private landowners through cooperative fire management agreements. This individual reviews and advises the Superintendent on requests for fire emergency assistance, operational activities required for the implementation of this FMP, and completeness and correctness of all final fire reports. The development of short and long-range plans for prescribed fires is the responsibility of the Resource Manager. This also includes coordinating all phases of the fire plans including revisions of those plans including public scoping, review, and National Environmental Act (NEPA) compliance. Additional responsibilities include the coordination of fire effects monitoring activities and evaluation of the result on resource management objectives.

The Fire Program Manager submits budget requests and monitors FIREPRO funds. All records as required by Shared Applications Computer System (SACS) for all personnel are entered by the Fire Program Manager. This person conducts debriefing sessions for fire activity, completes and reviews all prescribed fire plans and Fire Reports (DI-1202). They direct fire prevention activities, wildfire suppression, and post-fire activities occurring within the monument, as well as maintain equipment and supply caches adequate to undertake initial attack actions. This person determines fire qualifications and training needs of all monument personnel who are available for fire duties.

Cultural Resource Specialist

The Cultural Resource Specialist reviews fire management plans and documents cultural resource protection issues. This person develops and maintains the Cultural Resource Protection Matrix, which advises of cultural resource concerns. The Cultural Resource Specialist ensures that pre- and post-burn archeological surveys are conducted in areas potentially impacted by fire management activities.

Administrative Manager

The Administrative Manager provides overall administrative support for the fire management program including budget support, contracting and purchasing.

Chief of Maintenance

The Chief of Maintenance is responsible for overall maintenance of equipment and vehicles, including wildland engines.

Area Fire Management Officer (OZAR)

The Area Fire Management Officer (OZAR) is responsible for providing fire management assistance to the park. Requests for assistance from the Area FMO (OZAR) will be coordinated through the Superintendent at Ozark National Scenic Riverway. Requests should be made as far in advance as is practical. The Area FMO will provide fire management expertise and advice at the planning and implementation levels. The Area FMO will hep the Monument arrange for needed resources and equipment, and will assist in preparing FIREPRO funding requests. The

Area FMO may be requested to serve as the agency representative regarding activities with an incident management team.

All qualified monument personnel will be subject to occasional fire duty. The order of preference shall be dependent on availability/response time, level of qualification, and complexity of fire assignment. Division Chiefs are also responsible for making a reasonable effort to provide qualified firefighting personnel to assist with wildland and prescribed fire support efforts, both locally and nationally.

B. FirePro Funding

Funding for conducting prescribed fires, fireline preparation, and purchase of equipment is funded by FirePro. FirePro does not fund any positions at this time.

C. Fire Management Organization/Park Unit Organization

Currently the monument does not have sufficient staffing to support a fire organization. Staffing levels fluctuate seasonally and depend on individual interest in fire fighting. The Resource Manager serves as fire program manager and relies on the FMO for program support.

The Resource Manager develops planning for resource management operations and also develops planning of all fire/fuel-related operation. The current Resource Manager is rated as Burn Boss Type II.

D. Superintendent's Certification

All fire management planning must be approved under the signature of the Superintendent. For additional information, see Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide and RM #18, Chapter Nine.

E. Interagency Coordination

Interagency coordination and cooperation is essential for successful implementation of the fire management program at the monument. Only small, slow-moving wildland fires can be managed with the current staff. All other wildland and prescribed fires will require external support by interagency cooperators and/or other NPS units. The annual review of cooperative agreements will ensure successful coordination.

Implementation of the Wildland Fire Management Program at the monument requires the assistance and involvement of other agencies. Close coordination with Midwest Region and Ozark National Scenic Riverways fire management personnel (Appendix E (g)) and Fire Use Modules is necessary to achieve fire management objectives.

Risk analysis shows that control of an escaped prescribed fire would require 11 people to adequately control the existing prescribed fire and suppress the escape fire. This would require additional fire fighting personnel from other areas and a Fire Use Module from within the region.

All assistance requests must be documented on the Resource Order Form, NFES 1470, which is an obligating procurement document. These forms are designed to be transmitted over the telephone when an out-of-monument incident management team is ordered. The Superintendent must provide a written limited delegation of authority and a briefing package to the incoming Incident Commander.

F. Key Interagency Contacts

See Appendix E (g) for full list of contacts and phone numbers.

Bobby Bloodworth, Fire Management Officer (NPS)
Fred Bird, Regional Fire Management Officer (NPS)
Randall Mell, ITC 3, Caledonia, MN (MDNR)
John Kelly, ITC3, Preston, MN (MDNR)
Tom Romaine, ITC3, New Ulm, MN (MDNR Forestry Supervisor)

G. Fire-Related Agreements

No interagency cooperative agreements currently exist in relation to this plan. The focus is on mutual support of equipment and personnel between the monument and the fire departments.

Cooperative agreements are and will be developed with the Yellow River State Forest (IDNR) and private landowners in the future.

The DOI periodically provides the McGregor/Marquette and Harpers Ferry Fire Departments with monetary assistance for equipment under the rural fire department assistance program.

VI. MONITORING AND EVALUATION

A. Monitoring

Director's Order #18 requires monitoring of prescribed fires to ensure that prescribed fire objectives are being met, and that no unwanted effects are occurring. Monitoring data is to be analyzed and incorporated into adaptive management of the prescribed fire program. The Fire Monitoring Handbook (2001) describes four levels of monitoring:

Level 1: Reconnaissance

This monitoring level, which provides a basic overview of the fire event, is essential to all types of fires. The following information will be collected at this level:

- Fire cause, location, and size
- Fuel and vegetation type
- Relative fire activity
- Potential for further spread

- Current and forecast weather
- Resource or safety threats and constraints
- Smoke volume and movement

Level 2: Fire Conditions

Fire conditions will be documented for all fires that have the potential to threaten resource values at risk, or that are being managed under specific constraints, such as a prescribed fire. The following information will be monitored to satisfy fire conditions minimal acceptable standard:

- Fire Monitoring Period
- Ambient Conditions
- Fuel Model
- Fire Characteristics
- Smoke Characteristics
- Fire Conditions

Level 3: Immediate Postfire Effects

Immediate postfire effects monitoring requires collecting information on fuel reduction, vegetative change, or other objective-dependent variables within 1 to 5 years after a fire. This monitoring permits a quantitative evaluation of whether a stated objective was achieved.

Level 4: Long-Term Change

Long-term change monitoring requires collecting information on trends, i.e. change over time, in a managed ecosystem. Once a trend is detected, a research program and appropriate management response can be implemented.

Levels 3 and 4 will be performed through a cooperative program between the Prairie Cluster LTEM and the Regional Fire Ecology Program. Plots, photo points, and vegetation transects will be included as part of the monitoring program. Monitoring data will be archived and reviewed for future refinement of prescriptions and to determine program success. Short and long-term cultural and natural resource monitoring applicable to a specific burn area will be stated in the Prescribed Fire Plan.

Reasons for not meeting objectives will be identified and refinement of the prescriptions will be modified as needed. Data on all parameters of the prescribed fire will be collected so that a baseline can be established for accurate prescription development. The influences of each of these parameters will be studied as to the effect it has on the outcome of the prescribed fire. A Fire Evaluation Report will be used for all management fires.

The Monument will take advantage of the LTEM program for fire effects monitoring. LTEM has been tracking long-term vegetation change since 1994 on the monument's restored prairies and goat prairies. The LTEM personnel are currently working with the regional fire ecologist to formalize this program as a cooperative unit for fire effects monitoring. Specifically, at Effigy

Mounds they are developing a plan for expanding monitoring to the forests/savannas, and are working to incorporate monitoring of variables that may be important to fire management, such as fuel loading.

B. Monitoring Procedures

RM18, Chapter 11, provides policy guidelines for monitoring of fire effects. The NPS Fire Monitoring Handbook (2001) is the recommended source document for monitoring procedures. While the monitoring program will follow the general guidelines of the handbook, the specific protocols are not germane in light of the collaboration with LTEM.

C. Fire Monitoring Plan

Currently, there is not a monitoring plan for the monument. When the LTEM program has fully adopted monitoring protocols that meet the requirement of the RM18, Chapter 11, a plan will be developed to track vegetation and fuel response to the implementation of this plan.

VII. FIRE RESEARCH

A. Previous and Ongoing Fire Research

Fire research is necessary to evaluate the effectiveness of prescribed fires to determine if the burns are achieving the desired results of altering the vegetative state of the monument to replicate the vegetation communities of the mound builder era. Significant research has been conducted on fire history of the "driftless area" and the monument area in particular.

In 1984, an extensive survey of the hardwood forest and old field areas was conducted (Howell, 1984). The survey showed that the forests were proceeding through mid to late successional stages, which would culminate with a sugar maple/basswood climax condition.

A vegetation overview of the monument was conducted in 1986 which focused on prairie vegetation (Blewett, 1986). The presettlement forest (General Land Office Survey) showed a higher percentage of bur oak (*Quercus macrocarpa*), which is associated with savannas. The survey (1986) showed that a significantly higher percentage of sugar maple, a climax species was occurring which suggested a shift toward a mature forest.

In 1975, a survey of prairie remnants was conducted at the monument (Landers, 1975). This report demonstrates the existence of prairie remnants and limestone outcrop prairies that were rapidly growing in with woody vegetation. A study (Blewett, 1986) identified 21 bluff prairie remnants with eleven in the North Unit and ten in the South Unit. All sites were reported to be suffering from invasion of woody species and in need of management strategies in order to maintain their integrity.

An exotic plant survey (Butterfield, Stubbendieck, and Stumpf, 1996) showed the extent of exotic species invasion. A wetland survey (Sanchini, 1999) gave an assessment of vegetation near the wetlands area.

Vegetation surveys have shown that the forest is progressing through seral stages after early, 1900's logging operations. When comparing presettlement and current forest conditions, it appears that the presettlement forest was experiencing impacts that were setting back succession. With the higher percentage of bur oak (a fire tolerant species) and lower percentage of sugar maple (a fire intolerant species), it would appear fire played an important role in maintaining the historic landscape.

Initial results of the LTEM monitoring data shows that the goat prairies are among the most diverse areas monitored in the Midwest region of the NPS. The combined lists compiled in 1997 by the LTEM team shows 507 species of plants are currently found within the monument. This number is expected to increase when the data from a wetland survey is added.

Wildlife

A formal wildlife survey has not been conducted; however, observation records can be used to determine the status of common wildlife species. An accurate wildlife list cannot be made but evidence shows wildlife indigenous to eastern hardwood ecosystems is well represented.

Mammals

Rare sightings of gray fox (*Urocyon cinereoargenteus*) and coyote (*Canis latrans*) occur, while rare or endangered species such as bobcat (*Felis rufus*), black bear (*Ursus americanus*), and river otter (*Lutra canadensis*) are seldom seen. A sighting of a mountain lion (*Felis concolor)* has been reported within the monument and timber wolf (*Canus lupus)* packs are found within 80 miles to the north of the monument.

Birds

Approximately 291 species of birds nest or migrate through the monument and the surrounding area. The re-introduced wild turkey (*Meleagris galloparo*), once extirpated, is now nesting here. The Yellow River floodplain has been identified as one of 12 nesting sites and one of two multiple nesting sites of the red-shouldered hawk (*Buteo lineatus*) in the state. Each year the sightings of bald eagles (*Halineetus leucocephalus*) increase with occasional roosting occurring in the spring and fall. Peregrine falcons (*Falco preregrinus*) reintroduction efforts have returned nesting peregrines to areas near the monument.

Reptiles and Amphibians

A number of species of reptiles are found in the monument. Although their status is unknown within the monument; 61 percent of the state's reptile and amphibian species are endangered, threatened or declining (R. Howe, 1984).

Fish

A study of the pond area, the Yellow River and Sny Magill Creek is needed to determine the status of fish in the monument. At present, fishing according to state regulations, is permitted.

Gastropods (Snails)

Northeast Iowa is the only area within the state with populations of three species of land snails. Although the federally endangered Iowa Pleistocene snail (*Discus macclintocki*) has not been found here, habitat conditions exist for its survival. It is known that land snails exist here but species composition and densities are not known.

Bivalves (Mussels)
The status of mussels is unknown. Mussels, which are found in adjoining rivers, are suffering a decline in diversity and numbers. In Iowa, the decline is from habitat loss, siltation, pollution, and loss of larval host species. The Higgins's eye clam (*Lampsilis higginsii)*; a federal endangered species, has been found in the Mississippi River adjacent to the monument. Zebra mussels heavily infest the Mississippi River, however, the level of infestation is currently unknown in the monument.

Listed Species

There is one federally listed species found in the monument:

Bald eagle	*Haliaeetus leucocephalus*	State Status – Endangered Federal Status – Threatened

There are two state listed endangered birds, one state listed threatened mammal and seven state listed plants (two endangered and five threatened found in the monument. (See Appendix C (b)).

Properties

Structures located within the monument include the visitor center, two maintenance buildings and two houses located in the headquarters area. Other structures include boardwalks, footbridges, signs, storage sheds, fence posts, and electric poles. Also included are materials stored outdoors including vehicles.

B. Fire Research Needed

Numerous studies have been completed in the "Driftless area" including the area encompassed by the Monument boundary. However, more specific studies are needed within the Monument.

There are three issues on which fire research is needed.

- What are the historic historical fire regimes, both natural and cultural
  Pollen analysis and tree coring
- What fire regimes, combined with other methods are necessary to restore the monument to historic conditions
  Weather records, paleobotany, ash sedimentation studies
- What fire regimes, combined with other methods are necessary to eliminate exotic species from the monument
  Fire effects studies, literature searches, field studies

Limited funding for fire research is available through FirePro or the United States Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory in Missoula, Montana. The regional fire ecologist is the contact for research as research questions are identified.

VIII. PUBLIC SAFETY

A. Public Safety Issues and Concerns

Because wildfires are dynamic and can be hazardous, safety must be given very high priority. Employees responsible for, and involved in, any wildland fire activity must always consider the safety of human life above all other values. Ensuring visitor safety takes priority over other activities at all times. Being able to provide a consistent and accurate evaluation of fire behavior is the basis for contingency plans, contacts, and briefings that ensure public and personnel safety.

The following are the monument, public and employee safety considerations:

- The expanded fire management plan containing extensive use of fire on the landscape will increase the potential of introducing smoke to the Hwy. 76 corridor which goes through the middle of the monument. Coordination with local law enforcement will be required for controlling traffic in the event of visual impairment.

- The bluffs overlooking the highway along the South Unit will be excluded from fire to avoid the potential of landslides onto the highway during the spring thaw and heavy rainstorms.

- Trails that border Burn Units or are within the area of proposed prescribed fires will be closed during the actual prescribed fire.

- There is limited opportunity for safety zones within the monument.

B. Procedures for Mitigating Public Safety

There are limited opportunities to find safety zones to escape from a fast moving wildland fire on the trail and road system. Monument visitors will be unlikely to recognize a safe area so emphasis will be to sweep potentially affected areas as quickly as possible. Certain areas will be closed when the risk to visitors is too high or there are inadequate personnel to handle the situation. The authority to close areas is cited in 36 CFR 1.5.

Information concerning fire danger will be disseminated through visitor center contacts, bulletin boards, and pamphlets. Any time human life may be endangered, all necessary means will be taken to warn or evacuate visitors, neighboring landowners and other users. The extent of public notice will depend on the specific fire situation. The following actions should be considered:

- When evacuation of an area is recommended, the Superintendent and the Resource Manager will be informed immediately. The Chief Ranger will ensure that trail closure and/or informational signs on prescribed fires are properly posted.

- The Superintendent will notify and make media releases to local TV, radio and newspapers, and through electronic mail. If needed, a monument information "hot line" will be installed, and the Resource Manager will update the message whenever new fire information is

available. Additional notification will be made to cooperating agencies, as appropriate, about monument fires through the Fire Information Officer.

IX. PUBLIC INFORMATION AND EDUCATION

A. Capabilities and Needs

The Monument incorporates the use of prescribed fire into ranger-guided tours, special evening programs and guided walks focusing on restoration of the cultural landscape. Educational displays that interpret the use of fire within the monument and its importance in the restoration of native vegetation are also part of the public education program. During periods of high fire danger indices, warnings will be posted on bulletin boards and at trailheads as well as included in public presentations. Media access to fire scenes will be facilitated when it is safe to do so.

The Superintendent will issue all press releases to the local media regarding fire danger levels, closures, special precautions, and prescribed fires, unless this task is specifically delegated to other qualified personnel. All fire related information requests and media contacts will be handled through the Superintendent's Office.

1) Prior to prescribed fires, the Resource Manager will inform park staff on details of the prescribed fire.
2) Landowners or agencies located near the prescribed fire will be contacted and the Superintendent will initiate a press release.
3) On the day of the prescribed fire, all staff should be notified as to the prescribed fire's location and any special safety warnings to pass on to visitors, i.e., to watch for smoke on the road, or advised not to hike in the area.
4) Key visitor use or access sites where visitors could likely observe or approach the burn area should have temporary signs indicating a prescribed fire is occurring. This provides for public safety and education, and decreases the likelihood that visitors will report or attempt to put out a prescribed fire accomplishing resource objectives.

Post-season activities will include those tasks necessary to adequately assess how the local public and cooperators received the monument's fire management efforts. This will be accomplished through coordination with neighbors, local groups, and the State Department of Air Quality.

The Resource Manager and other monument staff will cooperate with the Chief Ranger in the following programs:

- Development of a brief interpretive handout which will discuss the basic objectives of using prescribed fire;
- Develop an evening program that educates the public on the monument's fire program;
- Maintain a file of public comments received concerning prescribed fires and use them to improve communication for increasing support for the fire management program.

B. "Step-Up" Public Information Activities and Capabilities

- News releases will be prepared and submitted to the local media when fire danger increases especially during periods of drought.
- Fire safety messages will be incorporated into interpretation programs.
- Smoking will be prohibited on trails and in wildland areas.

X. PROTECTION OF SENSITIVE RESOURCES

A. Cultural Resources

A Cultural Resource Protection Matrix, which accompanies this plan, will guide the process of cultural site protection (Appendix D). The guidelines will be incorporated into prescribed fire plans that will be developed with input from Cultural Resource staff.

The Monument contains both prehistoric and historic cultural resources. The entire area of the monument is considered a cultural landscape. The prehistoric resources consist of burial mounds, rock shelters, scattered artifacts, and potential village sites. Historic resources consist of cabin foundations, village sites, roads and fence rows. The impact of fire on prehistoric resources is minimal due to exposure of the landscape to fire for centuries. However, cultural sites are susceptible to damage and contamination from sustained heat and deposits of ash and carbon. Sustained heat can crack or break lithic and clay artifacts. Excessive heat penetration into the soil is to be avoided and carbon loading of the soil could influence future dating. To prevent this, fuel accumulations on mounds are to be removed before including the mounds in a prescribed fire. Protective measures may be used around sensitive sites. The monument's Cultural Resource Specialist will address all sensitive sites in site specific Prescribed Fire Plans, or as required.

Rockshelters are to be excluded from all prescribed fires due to lack of information on these sites and the potential for exposing artifacts that would be susceptible to theft. Village sites may exist within the monument's boundary, however, none have been documented.

Historic sites have not been thoroughly studied and are considered to be more vulnerable to the impacts of fire due to materials associated with those sites. All foundation sites will be excluded from prescribed fires.

The Jefferson Davis Sawmill site is located along the Yellow River in the Heritage Addition. The site has not undergone an archeological survey to determine its' exact location and will require a fire exclusion buffer of a couple of acres to prevent inadvertent disturbance or impact to the site from prescribed fire activities.

The accumulation of heavy fuels and the resulting fires of high intensity and long duration may negatively impact the cultural resources of the monument. A Cultural Resource Protection Matrix was developed to direct prescribed fire activities on cultural sites. This guide outlines the appropriate action to be implemented before a prescribed fire is conducted near an archeological site and provides reasons to exclude the use of fire at any site (Appendix D). This can be mitigated by removal of fuels and by monitoring heat levels generated by the fire. Total avoidance of the area would be an alternative in extreme cases.

Cultural sites can also be detrimentally impacted by the use of heavy equipment (trucks, etc.) especially during the spring when the ground is saturated with water from snow melt and spring rains. The operators of heavy equipment should be instructed to avoid the cultural areas.

B. Natural Resources

The Monument lies within a forest/prairie transition zone with vegetation that historically was maintained through wildland fire. Many of the native species and associated habitats are fire-adapted and many are dependent on influences from a natural fire regime. Some species may be sensitive to the artificial use of fire or the unnatural fire intervals needed to restore fire-adapted communities. To prevent negative impacts to those species, sensitive habitats may be excluded from prescribed fire. Plant species that are on the Iowa endangered/threatened list shall be reviewed to determine the impact of fire. Until such time, these species will be avoided. At this time, no federally listed plant species have been identified as occurring in this area.

Habitats of animal species, both state and federally listed, will be evaluated as to the negative or positive impact of burning.

The bluffs of the South Unit are susceptible to landslides, which rain debris on Highway 76 below. During the spring thaw, large rocks and debris create unsafe conditions for unsuspecting motorists especially at night. This unstable bluff area will be excluded from prescribed fire to prevent further destabilization of the bluff slope and release of material onto the highway.

Two species considered threatened in Iowa are located in the goat prairie habitat at the monument: 1) roundstem false foxglove (*Agalinis gattingeri*), and 2)creeping juniper (*Juniperus horizontalis*). Most juniper occur on the cliffsides adjacent to goat prairies and are naturally protected by fire. In instances where juniper occurs on the ridge tops, efforts may be necessary to protect individuals from fire. The foxglove species is an annual plant and fire's influence on the species is uncertain. Fire may reduce reproduction and seed production or perhaps initiate germination of seeds in the soil. However, periodic fire is necessary to maintain the species' habitat. The species flowers in Aug-Oct; therefore, a conservative approach would be to burn in early spring or late fall.

Jeweled shooting star (*Dodecatheon amethystinum*), also threatened in Iowa, occupies the margins of goat prairies and moist, north facing bluffs and outcrops. The unique habitat also supports many ferns and fern allies. Historically, the fire return intervals of the cool, moist bluffs and outcrops would have been much longer than the surrounding landscape; fire prescriptions should be written to include conditions that would promote patchy burns which would exclude these areas.

The habitats of these sensitive species are associated with rocky, north facing bluffs that have low fuel loadings. At this time these areas are still included in prescribed fire units. These habitats may require intermittent disturbance by fire to maintain a balance of shade and sunlight. These areas will be monitored for fire effects on these species and will be excluded from fire if plant populations show long-term negative impact from fire.

C. Developments to be Protected

All of the structures within the monument are considered to be at risk as well as materials stored outdoors and vehicles.

Structures to be protected within the monument consist of the visitor center, two houses and two maintenance buildings with a combined value of over three million dollars. Between the two houses is a pump house, which contains the well pump and water chlorinator. Signs and fences are found along the trails. Access gates to service trails while metal, require wood posts to support them.

The area around the buildings will be buffered by removing fuel accumulations and thinning of trees. Control lines will be constructed around the buildings when adjacent areas are to be burned. Fire hydrants will have hose and nozzles attached and ready to supplement implemented resource protection measures.

When making decisions regarding management actions for wildland fire, the Resource Manager will consider potential impacts to resources including cultural resources. Cultural resource protection actions will be utilized when necessary and safely possible. A variety of fire management techniques may be utilized to buffer sensitive areas: 1) blacklining, 2) foam and/or water application, and 3) mechanical fuel removal. In all instances, fuel reduction and pretreatment measures will be employed to protect resources and improve fireline control.

The order of attack, to minimize soil disturbance, is as follows:

1. Direct attack with water resources (engine use only from established roadways and areas without known cultural sites;
2. Use of swatters;
3. Use of leaf blowers to construct fireline;
4. Burning-out to create a black-line;
5. Direct attack with water resources (off-road);
6. Construction of a scratch line.

Property outside the monument includes private property that is bordered on three sides by the North Unit and lies between two prairie restorations. (Appendix E (a)). This property consists of a house with an attached garage and a few older buildings.

Additional private property is adjacent to the north boundary of the North Unit. This consists of a grain bin and some associated grain handling equipment. Private property adjacent to the Heritage Addition includes a barn, storage shed and a log home.

The nearest community is Marquette approximately one and a half miles from the monument's south boundary. This community is connected to the monument by an unbroken bluff of hardwood forest that is capable of sustaining fire.

The monument is currently participating in the Wildland/Urban Interface Initiative (WUII) that will reduce fuel accumulations around property at risk.

XI. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

The FMP will be reviewed and evaluated annually to determine if the resource objectives are current and being met, and to make necessary revisions. Any problems associated with the guidelines or standards set for fire management, cost effectiveness and suppression will be addressed through a revision or addendum and made a part of this plan. The Superintendent will approve all revisions.

Fire reviews will be conducted in accordance with procedures found in Reference Manual 18. Each review will be documented and filed with the final fire documentation. If the need exists, the Regional FMO can be included in such reviews.

Upon completion of a prescribed fire, the Resource Manager will hold an immediate review of the prescribed fire. The purpose of the critique is to improve strategies, implementation procedures, improve future effectiveness, improve safety and minimize cost. A report detailing the actual fire will accompany any recommendations or changes to the program identified. The report will be submitted to the Superintendent, the Area FMO, and the Regional FMO for review.

XII. CONSULATION AND COORDINATION

The primary duty of the monument staff is to carry out the fire management program with emphasis on human safety and prevention of damage to threatened and endangered species, natural resources, cultural resources, private and public buildings and facilities. Careful planning, good public information and a well-trained staff can provide for a safe and effective fire program.

The following offices and personnel were contacted for information in writing the FMP and its supporting document (Environmental Assessment).

<u>Effigy Mounds National Monument, National Park Service, Harpers Ferry, IA:</u>
Phyllis Ewing - Superintendent
Rodney Rovang – Resource Manager
Jacquelin St. Clair - Cultural Resource Specialist (former)
Ken Block – Chief Ranger
Bob Palmer – Park Ranger
Tom Sinclair – Chief of Maintenance
Friday Wiles – Administrative Officer
Sharon Greener - Administrative Assistant

<u>Midwest Archaeological Center, National Park Service, Lincoln, NE</u>
Mark Lynott - Archeologist
Tom Theisson - Midwest Region Archeologist

Jan Dial-Jones - Midwest Region Archeologist

Midwest Regional Office, National Park Service, Omaha, NE
Mike Madell - Environmental Protection Specialist (former)
Steve Cinnamon – Chief Scientist
Fred Bird - Fire Management Officer
Doug Alexander – Wildland Fire Specialist (former)
Roberta Young - Cultural Resources
Sherda Williams - Cultural Resources

Midwest GIS Office, National Park Service, Madison, WI
Peter Budde - Midwest Region GIS Specialist
Kathie Hansen - Midwest Region GIS Fire Specialist

United States Fish and Wildlife Service
John Lindell, District Manager, Upper Mississippi Wildlife and Fish Refuge, U.S. Fish and Wildlife Service, McGregor, Iowa
Gerry Bade, U.S. States Fish and Wildlife Service, Rock Island, Illinois

Iowa State Historical Preservation Office, Des Moines, IA
Doug Jones, Archaeologist
Dan Higginbottom, Archaeologist

Office of State Archaeologist, University of Iowa, Iowa City, IA
Joseph Arts, State Archaeologist
Beth Pauls, State Archeologist
Shirley Schermer, Burials Program Director

Iowa Department of Natural Resources
Bruce Blair, District Forester, Iowa Department of Natural Resources, Elkader, IA.

NAGPRA Representatives
Patt Murphy, Iowa Tribe of Kansas and Nebraska, Abilene, KS
Francis Yellow, Shakopee Mdewakanton Sioux, Prior Lake, MN
Bob Larsen, Lower Sioux Indian Community, Morton, MN
Johnathan Buffalo, Sac and Fox Tribe of the Mississippi in Iowa, Tama, IA
David Smith, Winnebago Tribe of Nebraska, Winnebago, NE
Tom Ross, Upper Sioux Indian Community, Granite Falls, MN
Deanne Bahr, Sac and Fox Nation, Reserve, KS
Edmore Green, Sac and Fox Nation, Reserve, KS
Victor Roubidoux, Iowa Tribe of Oklahoma, Perkins, OK
Marriane Long, Iowa Tribe of Oklahoma, Perkins, OK
George Garvin, Ho-Chunk Nation, Black River Falls, WI
Mildred Hudson, Otoe-Missouria Tribe, Red Rock, OK
Scott Doig, Prairie Island Indian Community, Welch, MN
Chenenia LaDeaux, Sac and Fox Nation, Oklahoma, Stroud, OK

Jim Jones, Minnesota Indian Affairs Council, Bemidji, MN

XIII. APPENDICES

APPENDIX A: References

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APPENDIX B: Definitions

Appropriate Management Response - Specific actions taken in response to a wildland fire to implement protection and fire use objectives. This term is a new term that does not replace any previously used term.

Burn Unit – The smallest area that would be burned independently for resource management objectives.

Fire Complexity Analysis – A process for assessing wildland fire organizational needs and relative complexity in terms of ICS types (I, II, III etc.).

Fire Management Areas (FMA) - A sub-geographic area within an FMU that represents a pre-defined ultimate acceptable management area for a fire managed for resource benefits. This pre-defined area can constitute a Maximum Manageable Area (MMA) and is useful for those units having light fuel types conducive to very rapid fire spread rates. Pre-definition of these areas removes the time-lag in defining an MMA after ignition and permits pre-planning of the fire area, identification of threats to life, property, resources, and boundaries, and identification of initial actions.

Fire Management Plan (FMP)- 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. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fire Management Unit (FMU) - Any land management area definable by objectives, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regimes, etc., that sets it apart from management characteristics of an adjacent unit. FMUs are delineated in Fire Management Plans (FMP). These units may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

Fire Use - The combination of wildland fire use and prescribed fire application to meet resource objectives.

Holding Actions - Planned actions required to achieve wildland and prescribed fire management objectives. These actions have specific implementation timeframes for fire use actions but can have less sensitive implementation demands for suppression actions. For wildland fires managed for resource benefits, an MMA may not be totally naturally defensible. Specific holding actions are developed to preclude fire from exceeding the MMA. For prescribed fires, these actions are developed to restrict the fire inside the planned burn unit. For suppression actions, holding actions may be implemented to prohibit the fire from crossing containment boundaries. These actions may be implemented as firelines are established to limit the spread of fire.

Initial Attack - An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Long-Term Ecological Monitoring. (LTEM)- Ecological monitoring protocols under development are intended to help determine the degree to which the species, communities, and processes under park stewardship are sustainable. The protocols relate to three high priority management issues: 1) sustainability of small remnant and restored prairie communities, 2) external landuse and watershed impacts to small prairie preserves, and 3) impacts of fragmentation on the biological diversity of small prairie parks. The program has established partnerships with academic institutions, other agencies, and private groups to ensure scientific credibility and long-term consistency within the monitoring program.

Maximum Manageable Area (MMA) - The firm limits of management capability to accommodate the social, political, and resource impacts of a wildland fire. Once established as part of an approved plan, the general impact area is fixed and not subject to change. MMAs can be developed as part of the FMP and described as a FMA. They can also be developed as part of the planning and implementation of management actions after a fire has ignited. If they are developed after the ignition, their definition will occur during the Wildland Fire Implementation Plan Stage III process. In the event a fire occurs in a pre-planned MMA or FMA and the local unit determines that this MMA is not the best-suited alternative for the present wildland fire conditions, a new MMA can be developed as part of the Stage III process. Once this occurs, the Stage III MMA becomes the firm limits of the fire and is fixed.

Mitigation Actions - Mitigation actions are considered to be those on-the-ground activities that will serve to increase the defensibility of the MMA; check, direct, or delay the spread of fire; and minimize threats to life, property, and resources. Mitigation actions may include mechanical and physical non-fire tasks, specific fire applications, and limited suppression actions. These actions will be used to construct firelines, reduce excessive fuel concentrations, reduce vertical fuel continuity, create fuel breaks or barriers around critical or sensitive sites or resources, create "blacklines" through controlled burnouts, and to limit fire spread and behavior.

National Ambient Air Quality Standards (NAAQS) – Standards developed by the Environmental Protection Agency (EPA) for each of the critical pollutants as regulated by the Clear Air Act. Areas of the country where air pollution levels persistently exceed the standard may be designated “non-attainment”.

National Fire Danger Rating System – A set of computer programs and algorithms that allow land management agencies to estimate today’s or tomorrow’s fire danger for a given rating area.

National Interagency Incident Management System (NIIMS)- NIIMS is a system for responding to a wide range of emergencies, including fires, floods, earthquakes, hurricanes, tornadoes, tidal waves, riots, spilling of hazardous materials, and other natural or human-caused incidents.

National Wildfire Coordinating Group (NWCG) – an operational group designed to coordinate programs of the participating wildfire management agencies.

Preparedness - Activities that lead to a safe, efficient and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. This term replaces presuppression.

Prescribed Fire - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition. This term replaces management ignited prescribed fire.

Prescribed Fire Plan - A plan required for each fire application ignited by managers. It must be prepared by qualified personnel and approved by the appropriate Agency Administrator prior to implementation. Each plan will follow specific agency direction and must include critical elements described in agency manuals. Formats for plan development vary among agencies, although content is the same.

Prescription - Measurable criteria which define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations.

Shared Applications Computer System (SACS) – A joint effort by the Department of Interior (DOI) to combine fire information needs between the National Park Service (NPS), Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), and Fish and Wildlife Service (FWS).

Wildfire -An unwanted wildland fire**. This term was only included to give continuing credence to the historic fire prevention products. This is NOT a separate type of fire.**

Wildland and Prescribed Fire Complexity Analysis – The formal process to determine the full complexity rating for wildland and prescribed fires. It utilizes 12 variables having numerically weighted importance combined with user identified complexity values.

Wildland Fire - Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Wildland Fire Implementation Plan (WFIP) - A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies (i.e., fires managed for resource benefits will have two -three stages of the WFIP completed while some fires that receive a suppression response may only have a portion of Stage I completed).

Wildland Fire Management Program - The full range of activities and functions necessary for planning, preparedness, emergency suppression operations, and emergency rehabilitation of wildland fires, and prescribed fire operations, including non-activity fuels management to reduce risks to public safety and to restore and sustain ecosystem health.

Wildland Fire Situation Analysis (WFSA) - A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

Wildland Fire Suppression - 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, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources.

Wildland Fire Use - 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. Operational management is described in the Wildland Fire Implementation Plan (WFIP). Wildland fire use is not to be confused with "fire use," which is a broader term encompassing more than just wildland fires (see definition above):

Wildland/Urban Interface Initiative (WUII) - The WUII fuels program can be used for a variety of purposes, with the ultimate objective of reducing fuels in the wildland/urban interface. Fuel treatments may include prescribed fire, mechanical, and chemical methods to mitigate risk in the Wildland/Urban Interface.

APPENDIX C(a): The Flora of Effigy Mounds National Monument

Aceraceae	Number of Species in the family: 5	
Acer negundo	L.	boxelder
Acer platanoides	L.	Norway maple
Acer rubrum	L.	red maple
Acer saccharinum	L.	silver maple
Acer saccharum	Marsh.	sugar maple
Adiantaceae	Number of Species in the family: 2	
Adiantum pedatum	L.	northern maidenhair
Pellaea glabella	Mett. ex Kuhn	smooth cliffbrake
Alismataceae	Number of Species in the family: 2	
Alisma subcordatum	Raf.	American water plantain
Sagittaria latifolia	Willd.	broadleaf arrowhead
Amaranthaceae	Number of Species in the family: 1	
Amaranthus retroflexus	L.	redroot amaranth
Anacardiaceae	Number of Species in the family: 4	
Rhus glabra	L.	smooth sumac
Rhus hirta	(L.) Sudworth	staghorn sumac
Toxicodendron radicans	(L.) Kuntze	eastern poison ivy
Toxicodendron rydbergii	(Small ex Rydb.) Greene	western poison ivy
Apiaceae	Number of Species in the family: 8	
Cryptotaenia canadensis	(L.) DC.	Canadian honewort
Daucus carota	L.	Queen Anne's lace
Osmorhiza claytonii	(Michx.) C.B. Clarke	Clayton's sweetroot
Osmorhiza longistylis	(Torr.) DC.	longstyle sweetroot
Pastinaca sativa	L.	wild parsnip
Sanicula odorata	(Raf.) K.M. Pryer & L.R. Phillippe	clustered blacksnakeroot
Sium suave	Walt.	hemlock waterparsnip
Zizia aurea	(L.) W.D.J. Koch	golden zizia
Apocynaceae	Number of Species in the family: 3	
Apocynum androsaemifolium	L.	spreading dogbane
Apocynum cannabinum	L.	Indianhemp
Vinca minor	L.	common periwinkle
Araceae	Number of Species in the family: 2	
Arisaema dracontium	(L.) Schott	green dragon
Arisaema triphyllum	(L.) Schott	Jack in the pulpit
Araliaceae	Number of Species in the family: 3	
Aralia nudicaulis	L.	wild sarsaparilla
Aralia racemosa	L.	American spikenard
Panax quinquefolius	L.	American ginseng
Aristolochiaceae	Number of Species in the family: 1	
Asarum canadense	L.	Canadian wildginger
Asclepiadaceae	Number of Species in the family: 6	
Asclepias amplexicaulis	Sm.	clasping milkweed
Asclepias exaltata	L.	poke milkweed
Asclepias incarnata	L.	swamp milkweed
Asclepias syriaca	L.	common milkweed
Asclepias tuberosa	L.	butterfly milkweed
Asclepias verticillata	L.	whorled milkweed
Aspleniaceae	Number of Species in the family: 1	
Asplenium rhizophyllum	L.	walking fern
Asteraceae	Number of Species in the family: 82	
Achillea millefolium	L.	common yarrow
Ageratina altissima	(L.) King & H.E. Robins.	white snakeroot
Ambrosia artemisiifolia	L.	annual ragweed

Ambrosia trifida	L.	great ragweed
Antennaria neglecta	Greene	field pussytoes
Antennaria parlinii	Fern.	Parlin's pussytoes
Antennaria plantaginifolia	(L.) Richards.	woman’s tobacco
Anthemis cotula	L.	stinking chamomile
Arctium minus	Bernh.	lesser burdock
Artemisia ludoviciana	Nutt.	white sagebrush
Aster borealis	(Torr. & Gray) Prov.	northern bog aster
Aster cordifolius var. sagittifolius	(Wedemeyer ex Willd.)	common blue wood aster
Aster drummondii	Lindl.	Drummond’s aster
Aster ericoides	L.	white heath aster
Aster laevis	L.	smooth blue aster
Aster lanceolatus ssp. lanceolatus var .interior	(Wieg.) Semple & Chmielewski	white panicle aster
Aster lanceolatus ssp .lanceolaus var .lanceolatus	Willd.	white panicle aster
Aster lateriflorus	(L.) Britt.	calico aster
Aster novae-angliae	L.	New England aster
Aster oolentangiensis var oolentangiensis .	Riddell	sky blue aster
Aster pilosus	Willd.	hairy white oldfield aster
Aster urophyllus	Lindl	white arrowleaf aster
Bidens cernua	L.	nodding beggartick
Bidens frondosa	L.	devil's beggartick
Brickellia eupatorioides var eupatorioides.	(L.) Shinners	false boneset
Cichorium intybus	L.	chickory
Cirsium arvense	(L.) Scop.	Canada thistle
Cirsium discolor	(Muhl. ex Willd.) Spreng.	field thistle
Cirsium vulgare	(Savi) Ten.	bull thistle
Conyza canadensis	(L.) Cronq.	Canadian horseweed
Coreopsis palmata	Nutt.	stiff tickseed
Echinacea pallida	(Nutt.) Nutt.	pale purple coneflower
Erigeron annuus	(L.) Pers.	eastern daisy fleabane
Erigeron philadelphicus	L.	Philadelphia fleabane
Erigeron pullchellus	Michx.	robin's plantain
Erigeron strigosus	Muhl. ex Willd.	prairie fleabane
Eupatorium maculatum	L.	spotted joepyeweed
Eupatorium maculatum var. maculatum	L.	spotted joepyeweed
Eupatorium purpureum var. purpureum	L.	sweetscented joepyeweed
Eupatorium serotinum	Michx.	lateflowering thoroughwort
Galinsoga quadriradiata	Ruiz & Pavon	shaggy soldier
Helenium autumnale	L.	common sneezeweed
Helianthus annuus	L.	common sunflower
Helianthus divaricatus	L.	woodland sunflower
Helianthus giganteus	L.	giant sunflower
Helianthus laetiflorus	Pers. (pro sp.)	stiff sunflower
Helianthus strumosus	L.	paleleaf woodland sunflower
Helianthus tuberosus	L.	Jerusalem artichoke
Hieracium scabrum	Michx.	rough hawkweed
Krigia biflora	(Walt.) Blake	twoflower dwarfdandelion
Kuhnia eupatorioides var. corymbulosa	T.& G.	false boneset

Lactuca biennis	(Moench) Fern.	tall blue lettuce
Lactuca canadensis	L.	Canada lettuce
Lactuca floridana	(L.) Gaertn.	woodland lettuce
Lactuca ludoviciana	(Nutt.) Riddell	biennial lettuce
Lactuca serriola	L.	prickly lettuce
Leucanthemum vulgare	Lam.	oxeye daisy
Liatris aspera	Michx.	tall blazing star
Polymnia canadensis	L.	whiteflower leafcup
Prenanthes alba	L.	white rattlesnakeroot
Ratibida pinnata	(Vent.) Barnh.	pinnate prairie coneflower
Rudbeckia hirta	L.	blackeyed Susan
Rudbeckia triloba	L.	three-lobed coneflower
Senecio plattensis	(Nutt.) W. A. Weber & A. Love	prairie groundsel
Silphium integrifolium	Michx.	wholeleaf rosinweed
Silphium perfoliatum	L.	cupplant
Solidago canadensis	L.	Canada goldenrod
Solidago canadensis var.scabra	Torr. & Gray	Canada goldenrod
Solidago flexicaulis	L.	zigzag goldenrod
Solidago gigantea	Ait.	giant goldenrod
Solidago missouriensis	Nutt.	Missouri goldenrod
Solidago nemoralis	Ait.	gray goldenrod
Solidago rigida	L.	stiff goldenrod
Solidago sciaphila	Steele	shadowy goldenrod
Solidago speciosa	Nutt.	showy goldenrod
Solidago ulmifolia	Muhl. ex Willd.	elmleaf goldenrod
Sonchus arvensis	L.	field sowthistle
Taraxacum officinale	G.H. Weber ex Wiggers	common dandelion
Tragopogon dubius	Scop.	yellow salsify
Ttagopogon pratensis	L.	Jack-go-to-bed-at-night
Vernonia fasciculata	Michx.	prairie ironweed
Vernonia gigantea	(Walt.) Trel.	giant ironweed
Balsaminaceae	Number of Species in the family: 2	
Impatiens capensis	Meerb.	jewelweed
Impatiens pallida	Nutt.	pale touch-me-not
Berberidaceae	Number of Species in the family: 2	
Caulophyllum thalictroides	(L.) Michx.	blue cohosh
Podophyllum peltatum	L.	mayapple
Betulaceae	Number of Species in the Family: 7	
Betula nigra	L.	river birch
Betula papyrifera	Marsh.	paper birch
Betula pendula	Roth	European white birch
Betula populifolia	Marsh.	gray birch
Carpinus caroliniana	Walt.	American hornbeam
Corylus americana	Walt.	American hazelnut
Ostrya virginiana	(P. Mill.) K. Koch	hophornbeam
Boraginaceae	Number of Species in the family: 1	
Lithospermum canescens	(Michx.) Lehm.	hoary puccoon
Brassicaceae	Number of Species in the family: 14	
Alliaria petiolata	(Bieb.) Cavara & Grande	garlic mustard
Arabis canadensis	L.	sicklepod
Arabis lyrata	L.	lyrate rockcress
Barbarea vulgaris	R. Br.	garden yellowrocket
Berteroa incana	(L.) DC.	hoary false madwort
Brassica juncea	(L.) Czern.	India mustard
Brassica rapa var. rapa	L.	field mustard

Capsella bursa-pastoris	(L.) Medik.	shepherd's purse
Cardamine concatenata	(Michx.) Sw.	cutleaf toothwort
Cardamine pensylvanica	Muhl. ex Willd.	Pennsylvania bittercress
Hesperis matronalis	L.	dames rocket
Lepidium campestre	(L.) R. Br.	field pepperweed
Sisymbrium officinale	(L.) Scop.	hedgemustard
Thlaspi arvense	L.	field pennycress
Campanulaceae	Number of Species in the family: 5	
Campanula rotundifolia	L.	bluebell bellflower
Campanulastrum americanum	(L.) Small	American bellflower
Lobelia cardinalis	L.	cardinalflower
Lobelia siphilitica	L.	great blue lobelia
Lobelia spicata	Lam.	Pale spike lobelia
Cannabaceae	Number of Species in the family: 1	
Cannabis sativa	L.	Indian hemp
Caprifoliaceae	Number of Species in the family: 6	
Lonicera reticulata	Raf.	grape honeysuckle
Lonicera tatarica	L.	Tartarian honeysuckle
Sambucus canadensis	L.	common elderberry
Triosteum perfoliatum	L.	feverwort
Viburnum dentatum	L.	southern arrowwood
Viburnum lentago	L.	nannyberry
Caryophyllaceae	Number of Species in the family: 6	
Dianthus armeria	L.	Deptford pink
Saponaria officinalis	L.	bouncingbet
Silene scereii	Baumg.	bladder-campion
Silene noctiflora	L.	night flowering silene
Silene stellata	(L.) Ait. f.	windows frill
Stellaria media	(L.) Vill.	common chickweed
Celastraceae	Number of Species in the family: 4	
Celastrus scandens	L.	American bittersweet
Euonymus americana	L.	strawberry bush
Euonymus atropurpurea	Jacq.	eastern wahoo
Euonymus europaea	L.	European spindletree
Chenopodiaceae	Number of Species in the family: 1	
Chenopodium album	L.	lambsquarters
Clusiaceae	Number of Species in the family: 2	
Hypericum perforatum	L.	common St. Johnswort
Hypericum punctatum	Lam.	spotted St. Johnswort
Commelinaceae	Number of Species in the family: 2	
Tradescantia bracteata	Small ex Britt.	longbract spiderwort
Tradescantia ohiensis	Raf.	bluejacket
Convolvulaceae	Number of Species in the family: 2	
Calystegia sepium	(L.) R. Br.	hedge false bindweed
Convolvulus arvensis	L.	field bindweed
Cornaceae	Number of Species in the family: 5	
Cornus alternifolia	L. f.	alternateleaf dogwood
Cornus drummondii	C.A. Mey.	roughleaf dogwood
Cornus racemosa	Lam.	Gray dogwood
Cornus rugosa	Lam.	roundleaf dogwood
Cornus sericea ssp.sericea	L.	redosier dogwood
Crassulaceae	Number of Species in the family: 1	
Penthorum sedoides	L.	ditch stonecrop
Cucurbitaceae	Number of Species in the family: 2	
Echinocystis lobata	(Michx.) Torr. & Gray	wild cucumber
Sicyos angulatus	L.	oneseed bur cucumber

Cupressaceae	Number of Species in the family: 3	
Juniperus communis	L.	common juniper
Juniperus horizontalis	Moench	creeping juniper
Juniperus virginiana	L.	eastern redcedar
Cuscutaceae	Number of Species in the family: 1	
Cuscuta gronovii	Willd. ex J.A. Schultes	scaldweed
Cyperaceae	Number of Species in the family: 10	
Carex cephalophora	Muhl. ex Willd.	oval-leaf sedge
Carex eburnea	Boott ex Hook.	bristleleaf sedge
Carex muehlenbergii	Schkuhr ex Willd.	Muhlenberg's sedge
Carex normalis	Mackenzie	greater straw sedge
Carex pensylvanica	Lam.	Pennsylvania sedge
Cyperus esculentus	L.	chufa flatsedge
Eleocharis palustris	(L.) Roemer & J.A. Schultes	Common spikerush
Schoenoplectus tabernaemontani	(k.C. Gmel)	softstem bullrush
Scirpus acutus	Muhl. ex Bigelow	hardstem bulrush
Scirpus atrovirens	Willd.	green bulrush
Dennstaedtiaceae	Number of Species in the family: 1	
Pteridium aquilinum	(L.) Kuhn	western brackenfern
Dioscoreaceae	Number of Species in the family: 1	
Dioscorea villosa	L.	wild yam
Dryopteridaceae	Number of Species in the family: 9	
Athyrium filix-femina	(L.) Roth	common ladyfern
Athyrium filix-femina ssp. angustum	(Willd.) Clausen	subarctic ladyfern
Cystopteris bulbifera	(L.) Bernh.	bulblet bladderfern
Cystopteris fragilis	(L.) Bernh.	brittle bladderfern
Dryopteris carthusiana	(Vill.) H.P. Fuchs	spinulose woodfern
Dryopteris goldiana	(Hook. ex Goldie) Gray	Goldie's woodfern
Dryopteris intermedia	(Muhl. ex Willd.) Gray	intermediate woodfern
Dryopteris spinulosa	(O. F. Muell.)	spinulose woodfern
Onoclea sensibilis	L.	sensitive fern
Equisetaceae	Number of Species in the family: 2	
Equisetum arvense	L.	field horsetail
Equisetum laevigatum	A. Braun	smooth horsetail
Euphorbiaceae	Number of Species in the family: 5	
Acalypha virginica var.rhomboidea	(Raf.) Cooperrider	Virginia threeseed mercury
Chamaesyce maculata	(L.) Small	spotted sandmat
Chamaesyce nutans	(Lag.) Small	eyebane
Euphorbia corollata	L.	flowering spurge
Euphorbia dentata	Michx.	toothed spurge
Fabaceae	Number of Species in the family: 28	
Amorpha canescens	Pursh	leadplant
Amphicarpaea bracteata	(L.) Fern.	American hogpeanut
Apios americana	Medik.	groundnut
Astragalus canadensis	L.	Canadian milkvetch
Baptisia alba var. macrophylla	(Larisey) Isely	largeleaf wild indigo
Baptisia bracteata var. leucophaea	(Nutt.) Kartesz & Gandhi	longbract wild indigo
Chamaecrista fasciculata	(Michx.) Greene	sleepingplant
Dalea purpurea	Vent.	purple prairie clover
Desmodium canadense	(L.) DC.	showy ticktrefoil
Desmodium glabellum	(Michx.) DC.	Dillenius' ticktrefoil
Desmodium glutinosum	(Muhl. ex Willd.) Wood	pointedleaf ticktrefoil
Desmodium illinoense	Gray	Illinois ticktrefoil
Desmodium nudiflorum	(L.) DC.	nakedflower ticktrefoil

Gleditsia triacanthos	L.	honeylocust
Gymnocladus dioicus	(L.) K. Koch	Kentucky coffeetree
Lespedeza capitata	Michx.	roundhead lespedeza
Lespedeza cimeata	(Dum.-Cours.) G. Don	Chinese lespedeza
Lotus corniculatus	L.	birdsfoot deervetch
Medicago lupulina	L.	black medick
Medicago sativa	L.	alfalfa
Melilotus albus	Medik .	white sweetclover
Melilotus officinalis	(L.) Lam.	yellow sweetclover
Robinia pseudoacacia	L.	black locust
Strophostyles helvula	(L.) Ell.	trailing fuzzybean
Trifolium hybridum	L.	alsike clover
Trifolium pratense	L.	red clover
Trifolium repens	L.	white clover
Vicia caroliniana	Walt.	Carolina vetch
Fagaceae	Number of Species in the family: 6	
Quercus alba	L.	white oak
Quercus bicolor	Willd.	swamp white oak
Quercus macrocarpa	Michx.	bur oak
Quercus muhlenbergii	Engelm.	chinkapin oak
Quercus rubra	L.	northern red oak
Quercus rubra var.ambigua	Gray) Fern.	northern red oak
Fumariaceae	Number of Species in the family: 2	
Corydalis aurea	Willd.	scrambled eggs
Dicentra cucullaria	(L.) Bernh.	dutchman's breeches
Gentianaceae	Number of Species in the family: 2	
Gentiana flavida	Gray	plain gentian
Gentiana saponaria	L.	harvestbells
Geraniaceae	Number of Species in the family: 1	
Geranium maculatum	L.	spotted geranium
Grossulariaceae	Number of Species in the family: 2	
Ribes cynosbati	L.	eastern prickly gooseberry
Ribes missouriense	Nutt.	Missouri gooseberry
Hydrophyllaceae	Number of Species in the family: 2	
Hydrophyllum appendiculatum	Michx.	great waterleaf
Hydrophyllum virginianum		Shawnee salad
Iridaceae	Number of Species in the family: 2	
Iris virginica	L.	Virginia iris
Sisyrinchium campestre	Bickn.	prairie blue-eyed grass
Juglandaceae	Number of Species in the family: 5	
Carya alba	(L.) Nutt. ex Ell.	mockernut hickory
Carya cordiformis	(Wangenh.) K. Koch	bitternut hickory
Carya ovata	(P. Mill.) K. Koch	shagbark hickory
Juglans cinerea	L.	butternut
Juglans nigra	L.	black walnut
Juncaceae	Number of Species in the family: 4	
Juncus dudleyi	Wieg.	Dudley’s rush
Juncus tenuis	Willd.	poverty rush
Luzula congesta	(Thuill.) Lej.	heath woodrush
Luzula echinata	(Small) F.J. Herm.	hedgehog woodrush
Lamiaceae	Number of Species in the family: 18	
Agastacje scrophylariifolia	(Willd.) Kuntze	purple giant hyssop
Blephilia hirsulta	(Pursh) Benth.	Hairy pagoda-plant
Glecoma hederacea	L.	ground ivy
Lamium amplexicaule	L.	deadnettle henbit
Leonurus cardiaca	L.	common motherwort

Lycopus americanus	Muhl. ex W. Bart.	American waterhorehound
Monarda fistulosa	L.	wild bergamot
Nepeta cataria	L.	catnip
Physostegia virginiana	(L.) Benth.	obedient plant
Prunella vulgaris	L.	common selfheal
Pycnanthemum tenuifolium	Schrad.	narrowleaf mountainmint
Pycnanthemum verticillatum var. pilosum	(Nutt.) Cooperrider	whorled mountainmint
Pycnanthemum virginianum	(L.) T. Dur. & B.D. Jackson ex B.L. Robins. & Fern.	whorled mountainmint
Scutellaria lateriflora	L.	blue skullcap
Scutellaria ovata	Hill	heartleaf skullcap
Scutellaria parvula	Michx.	small skullcap
Scutellaria parvula var.leonardii	(Epling) Fern.	Leonard's skullcap
Teucrium canadense	L.	Canada germander
Lemnaceae	Number of Species in the family: 1	
Lemna minor	L.	common duckweed
Liliaceae	Number of Species in the family: 13	
Allium tricoccum	Ait.	wild leek
Asparagus officinalis	L.	garden asparagus
Erythronium albidum	Nutt.	white fawnlily
Hemerocallis fulva	(L.) L.	orange daylily
Hypoxis hirsuta	(L.) Coville	common goldstar
Lilium canadense	L.	Canada lily
Maianthemum racemosum ssp. racemosum	(L.) Link	feathery lily of the valley
Maianthemum stellatum	(L.) Link	starry lily of the valley
Polygonatum biflorum	(Walt.) Ell.	smooth Solomon's seal
Polygonatum biflorum var. commutatum	(J.A. & J.H. Schultes)	smooth Solomon's seal
Smilacina stellata	(L.) Desf.	starry false lily of the valley
Trillium cernuum	L.	whip-poor-will flower
Uvularia grandiflora	Sm.	Largeflower bellwort
Lycopodiaceae	Number of Species in the family: 1	
Huperzia lucidula	(Michx.) Trevisan	shining clubmoss
Lythraceae	Number of Species in the family: 3	
Decodon verticillatus	(L.) Ell.	swamp loosestrife
Lythrum alatum	Pursh	winged lythrum
Lythrum salicaria	L.	purple loosestrife
Malvaceae	Number of Species in the family: 3	
Abutilon theophrasti	Medik.	velvetleaf
Hibiscus trionum	L.	flower of an hour
Malva neglecta	Wallr.	common mallow
Menispermaceae	Number of Species in the family: 1	
Menispermum canadense	L.	common moonseed
Monotropaceae	Number of Species in the family: 1	
Monotropa uniflora	L.	Indianpipe
Moraceae	Number of Species in the family: 1	
Morus rubra	L.	red mulberry
Nyctaginaceae	Number of Species in the family: 1	
Mirabilis nyctaginea	(Michx.) MacM.	heartleaf four o'clock
Oleaceae	Number of Species in the family: 3	
Fraxinus americana	L.	white ash
Fraxinus nigra	Marsh.	black ash
Fraxinus pennsylvanica	Marsh.	green ash

Onagraceae	Number of Species in the family: 4	
Circaea lutetiana ssp. canadensis	(L.) Aschers. & Magnus	broadleaf enchanter's nightshade
Epilobium coloratum	Biehler	purple willowherb
Gaura biennis	L.	biennial beeblossom
Oenothera biennis	L.	common evening-primrose
Ophioglossaceae	Number of Species in the family: 3	
Botrychium dissectum	Spreng.	cutleaf grapefern
Botrychium multifidum	(Gmel.) Trev.	leathery grapefern
Botrychium virginianum	(L.) Sw.	rattlesnakefern
Orchidaceae	Number of Species in the family: 4	
Cypripedium parviflorum	Salisb.	Lesser yellow lady's slipper
Galearis spectabilis	(L.) Raf.	showy orchid
Liparis liliifolia	(L.) L.C. Rich. ex Ker-Gawl.	brown widelip orchid
Triphora trianthophora	(Sw.) Rydb.	threebirds orchid
Osmundaceae	Number of Species in the family: 1	
Osmunda claytoniana	L.	interrupted fern
Oxalidaceae	Number of Species in the family: 2	
Oxalis stricta	L.	common yellow oxalis
Oxalis violacea	L.	violet woodsorrel
Papaveraceae	Number of Species in the family: 1	
Sanguinaria canadensis	L.	bloodroot
Pinaceae	Number of Species in the family: 4	
Abies balsamea	(L.) P. Mill.	balsam fir
Picea abies	(L.) Karst.	Norway spruce
Picea pungens	Engelm.	blue spruce
Pinus strobus	L.	eastern white pine
Plantaginaceae	Number of Species in the family: 3	
Plantago lanceolata	L.	narrowleaf plantain
Plantago major	L.	common plantain
Plantago rugelii	Dcne .	blackseed plantain
Poaceae	Number of Species in the family: 43	
Agrostis stolonifera	L.	creeping bentgrass
Andropogon gerardii	Vitman	big bluestem
Bouteloua curtipendula	(Michx.) Torr.	sideoats grama
Bouteloua hirsuta	Lag.	hairy grama
Bromus inermis	Leyss.	smooth brome
Calamagrostis canadensis	(Michx.) Beauv.	bluejoint
Cenchrus longispinus	(Hack.) Fern.	mat sandbur
Dactylis glomerata	L.	orchardgrass
Danthonia spicata	(L.) Beauv. ex Roemer & J.A. Schultes	poverty oatgrass
Dichanthelium acuminatum var fasciculatum .	(Torr.) Freckmann	western panicgrass
Dichanthelium latifoliium	(L.) Gould & C.A. Clark	broadleaf rosette grass
Dichanthelium villosissimum var. villosissimum	(Nash) Freckmann	whitehair rosette grass
Digitaria ischaemum	(Schreb.) Schreb. ex Muhl	smooth grabgrass
Echinochloa crus-galli	(L.) Beauv.	barnyardgrass
Echinochloa muricata	(Beauv.) Fern.	rough barnyardgrass
Elymus canadensis	L.	Canada wildrye
Elymus hystrix var .hystrix	L.	eastern bottlebrushgrass
Elymus virginicus	L.	Virginia wildrye
Elytrigia repens var. repens	(L.) Desv. ex B.D. Jackson	quackgrass
Eragrostis hypnoides	(Lam.) B.S.P.	teal lovegrass

Festuca subverticillata	(Pers.) Alexeev	nodding fescue
Hordeum jubatum	L.	foxtail barley
Leersia oryzoides	(L.) Sw.	rice cutgrass
Lolium arundinaceum	(Schreb.) S.J.	tall fescue
Muhlenbergia frondosa	(Poir.) Fern.	wirestem muhly
Oryzopsis racemosa	(Sm.) Ricker ex A.S. Hitchc.	blackseed ricegrass
Panicum capillare	L.	witchgrass
Panicum dichotomiflorum	Michx.	fall panicgrass
Panicum virgatum	L.	switchgrass
Pennisetum glaucum	(L.) R. Br.	pearl millet
Phalaris arundinacea	L.	reed canarygrass
Phleum pratense	L.	timothy
Poa annua	L.	annual bluegrass
Poa compressa	L.	Canada bluegrass
Poa pratensis	L.	Kentucky bluegrass
Schizachyrium scoparium	(Michx.) Nash	little bluestem
Setaria viridis	(L.) Beauv.	green bristlegrass
Sorghastrum nutans	(L.) Nash	Indiangrass
Spartina pectinata	Link	prairie cordgrass
Sporobolus cryptandrus	(Torr.) Gray	sand dropseed
Sporobolus heterolepis	(Gray) Gray	prairie dropseed
Stipa spartea	Trin.	porcupinegrass
Tridens flavus	(L.) A.S. Hitchc.	purpletop tridens
Polemoniaceae	Number of Species in the family: 3	
Phlox divaricata	L.	wild blue phlox
Phlox pilosa	L.	downy phlox
Polemonium reptans	L.	Greek valerian
Polygalaceae	Number of Species in the family: 1	
Polygala senega	L.	Seneca snakeroot
Polygonaceae	Number of Species in the family: 10	
Fagopyrum esculentum	Moench	buckwheat
Fagopyrum vulgare	Hill	buckwheat
Polygonum aviculare	L.	prairie knotweed
Polygonum pensylvanicum	L.	Pennsylvania smartweed
Polygonum punctatum	Ell.	dotted smartweed
Polygonum scandens	L.	climbing false buckwheat
Polygonum virginianum	L.	jumpseed
Rumex acetosella	L.	common sheep sorrel
Rumex altissimus	Wood	pale dock
Rumex crispus	L.	curly dock
Polypodiaceae	Number of Species in the family: 1	
Polypodium virginianum	L.	rock polypody
Portulacaceae	Number of Species in the family: 1	
Claytonia virginica	L.	Virginia springbeauty
Primulaceae	Number of Species in the family: 4	
Dodecatheon ameshystinum	(Fassett) Fassett	jeweled shootingstar
Dodecatheon pulchellum	(Raf.) Merr.	darkthroat shootingstar
Lysimachia ciliata	L.	fringed loosestrife
Lysimachia nummularia	L.	creeping jenny
Ranunculaceae	Number of Species in the family: 20	
Actaea pachypoda	Ell.	white baneberry
Actaea rubra	(Ait.) Willd.	red baneberry
Anemone canadensis	L.	Canadian anemone
Anemone cylindrica	Gray	candle anemone
Anemone quinquefolia	L.	nightcaps

Anemone virginiana	L.	tall thimbleweed
Aquilegia canadensis	L.	red columbine
Clematis virginiana	L.	devil's darning needle
Enemion biternatum	Raf.	eastern false rue anemone
Hepatica nobilis var. acuta	(Pursh) Steyermark	sharplobe hepatica
Hydrastis canadensis	L.	goldenseal
Isopyrum biternatum	(Raf.) T. & G.	eastern false rue anemone
Pulsatilla patens	(L.) P. Mill.	American pasqueflower
Ranunculus abortivus	L.	littleleaf crowfoot
Ranunculus hispidus	Michx.	bristly buttercup
Ranunculus hispidus var. nitidus	(Chapman) T. Duncan	bristly buttercup
Ranunculus recurvatus	Poir.	blisterwort
Thalictrum dioicum	L.	early meadow-rue
Thalictrum revolutum	DC.	waxyleaf meadow-rue
Thalictrum thalictroides	(L.) Eames & Boivin	rue anemone
Rhamnaceae	Number of Species in the family: 2	
Ceanothus americanus	L.	New Jersey tea
Rhamnus cathartica	L.	common buckthorn
Rosaceae	Number of Species in the family: 21	
Agrimonia gryposepala	Wallr.	tall hairy agrimony
Amelanchier arborea	(Michx. f.) Fern.	common serviceberry
Amelanchier canadensis	(L.) Medik.	Canadian serviceberry
Fragaria vesca ssp. americana	(Porter) Staudt	woodland strawberry
Fragaria virginiana	Duchesne	Virginia strawberry
Geum canadense	Jacq.	white avens
Malus ioensis	(Wood) Britt	prairie crabapple
Physocarpus opulifolius	(L.) Maxim.	common ninebark
Potentilla arguta	Pursh	tall cinquefoil
Potentilla norvegica	L.	Norwegian cinquefoil
Potentilla recta	L.	sulphur cinquefoil
Potentilla simplex	Michx	common cinquefoil
Prunus americana	Marsh	American plum
Prunus serotina	Ehrh.	black cherry
Prunus virginiana	L.	chokecherry
Rosa blanda	Ait.	smooth rose
Rosa carolina	L.	Carolina rose
Rosa multiflora	Thunb. ex Murr.	multiflora rose
Rubus allegheniensis	Porter	Allegheny blackberry
Rubus idaeus ssp. strigosus	(Michx.) Focke	grayleaf raspberry
Rubus occidentalis	L.	black raspberry
Rubiaceae	Number of Species in the family: 7	
Cephalanthus occidentalis	L.	common buttonbush
Galium aparine	L.	stickywilly
Galium asprellum	Michx.	rough bedstraw
Galium boreale	L.	northern bedstraw
Galium circaezans	Michx.	licorice bedstraw
Galium concinnum	Torr. & Gray	shining bedstraw
Galium triflorum	Michx.	fragrant bedstraw
Rutaceae	Number of Species in the family: 2	
Ptelea trifoliata	L.	common hoptree
Zanthosylum americanum	P. Mill.	common pricklyash
Salicaceae	Number of Species in the family: 6	
Populus deltoides	Bartr. ex Marsh.	cottonwood
Populus grandidentata	Michx.	bigtooth aspen
Populus tremuloides	Michx.	quaking aspen
Salix exigua	Nutt.	narrowleaf willow

Salix interior	Rowlee	sandbar Willow
Salix nigra	Marsh.	black willow
Santalaceae	Number of Species in the family: 1	
Comandra umbellata	(L.) Nutt.	bastard toadflax
Saxifragaceae	Number of Species in the family: 4	
Heuchera richardsonii	R. Br.	Richardson's alumroot
Mitella diphylla	L.	two-leaf miterwort
Mitella nuda	L.	naked miterwort
Sullivantia sullivantii	(Torr. & Gray) Britt.	Sullivant's coolwort
Scrophulariaceae	umber of Species in the family: 7	
Agalinis fasciculata	(Ell.) Raf.	black false foxglove
Linaria vulgaris	P. Mill.	butter and eggs
Mimulus ringens	L.	Allegheny monkeyflower
Pedicularis canadensis	L.	Canadian lousewort
Scrophularia marilandica	L.	carpenter's square
Verbascum thapsus	L.	common mullein
Veronicastrum virginicum	(L.) Farw.	Culver's root
Smilacaceae	Number of Species in the family: 2	
Smilax herbacea	L.	smooth carrionflower
Smilax lasioneura	Hook.	Blue Ridge carrionflower
Solanaceae	Number of Species in the family: 7	
Physalis heterophylla	Nees	clammy groundcherry
Physalis philadelphica var. immaculata	Waterfall	Mexican groundcherry
Physalis pubescens	L.	husk tomato
Physalis virginiana	P. Mill.	Virginia groundcherry
Solanum carolinense	L.	Carolina horsenettle
Solanum nigrum	L.	black nightshade
Solanum ptycanthum	Dunal	West Indian nightshade
Sparganiaceae	Number of Species in the family: 1	
Sparganium eurycarpum	Engelm. ex Gray	broadfruit bur-reed
Staphyleaceae	Number of Species in the family: 1	
Staphylea trifolia	L.	American bladdernut
Taxaceae	Number of Species in the family: 1	
Taxus canadensis	Marsh.	Canada yew
Thelypteridaceae	Number of Species in the family: 1	
Phegopteris hexagonoptera	(Michx.) Fee	broad beechfern
Thymelaeaceae	Number of Species in the family: 1	
Dirca palustris	L.	eastern leatherwood
Tiliaceae	Number of Species in the family: 1	
Tilia americana	L.	American basswood
Typhaceae	Number of Species in the family: 1	
Typha latifolia	L.	broadleaf cattail
Ulmaceae	Number of Species in the family: 3	
Celtis occidentalis	L.	common hackberry
Ulmus americana	L.	American elm
Ulmus rubra	Muhl.	slippery elm
Urticaceae	Number of Species in the family: 3	
Boehmeria cylindrica	(L.) Sw.	smallspike false nettle
Laportea canadensis	(L.) Weddell	Canadian woodnettle
Urtica dioica	L.	stinging nettle
Verbenaceae	Number of Species in the family: 6	
Phryma leptostachya	L.	American lopseed
Phyla lanceolata	(Michx.) Greene	lanceleaf fogfruit
Verbena bracteata	Lag. & Rodr.	bigbract verbena
Verbena hastata	L.	swamp verbena

Verbena stricta	Vent.	hoary verbena
Verbena urticifolia	L.	white vervain
Violaceae	Number of Species in the family:	6
Viola missouriensis	Greene	sand violet
Viola pedata	L.	birdfoot violet
Viola pubescens	Ait.	downy yellow violet
Viola pubescens var. leiocarpon	(Fern. & Wieg.) Seymour	downy yellow violet
Viola pubescens var. pubescens	Ait.	downy yellow violet
Viola sororia	Willd.	common blue violet
Vitaceae	Number of Species in the family:	3
Parthenocissus quinquefolia	(L.) Planch.	Virginia creeper
Vitis aestivalis	Michx.	summer grape
Vitis riparia	Michx.	riverbank grape

Nomenclature follows the Natural Resource Conservation Service (NRCS) PLANTS database

APPENDIX C (b): Rare or Endangered Species
Federal listed species located in the monument or adjacent areas.

1. Bald eagle (*Halineetus leucocephalus)*
2. Peregrine falcon (*Falco preregrinus*)
3. Higgins eye mussel (*Lampsilis higginsii*)

State of Iowa threatened or endangered species on the monument include the following:

Red-shouldered hawk (*Buteo lineatus*) Endangered

Eastern bobcat (*Felis rufus*) Threatened

Leathery grapefern (*Botrychium multifidum*) Threatened
Golden corydalis (*Corydalis aurea*) Threatened
Swamp loosestrife (*Decodon verticillatus*) Endangered
Jeweled shooting star (*Dodecatheon amethystinum*) Threatened
Glandular wood fern (*Dryoperis intermedia*) Threatened
Creeping juniper (*Juniperus horizontalis*) Threatened
Waxy meadowrue (*Thalictrum revolutum*) Endangered

No reproducing populations of federal listed species have been found within the monument.

APPENDIX D: NEPA COMPLIANCE

FIRE MANAGEMENT PLAN
WILDLAND/URBAN INTERFACE INITIATIVE
Environmental Assessment/Assessment of Effect

August, 2003

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PURPOSE AND NEED

Background

Effigy Mounds National Monument, in northeastern Iowa, was established (Presidential Proclamation No. 2860, October 25, 1949) and directed with the preservation of " *earthen mounds in the northeastern part of the State of Iowa known as the Effigy Mounds are of great scientific interest because of the variety of their forms, which include animal effigy, bird effigy, conical, and linear types, illustrative of a significant phase of mound building culture of the prehistoric American Indians…*

Public Law 87-44, May 27, 1961, added land to the monument and mandated preservation of the mounds, wildlife, and other natural values. Public Law 106-323 Effigy Mounds National Monument Additions Act, October 19, 2000, added the Heritage Addition to the monument.

The monument includes 2,526 acres in four units: North, South, Sny Magill and Heritage Addition. The North and South Units overlook the Mississippi River from adjacent bluffs beside the monument headquarters. The Sny Magill Unit, lying in the Mississippi River floodplain, eleven miles south of the headquarters contains approximately 100 mound sites, the nation's largest extant concentration of American Indian mounds in public ownership. The Heritage Addition contains forested uplands and bottomlands with savannas and goat prairies on southern exposures. The Monument contains 206 mound in a variety of forms (effigy, linear, conical, and compound) are found in the four units. The mounds represent three known Woodland mound building cultures, Red Ocher, Hopewell and Effigy Mounds builders. The mounds are the legacy of the belief systems and practices of these prehistoric, indigenous peoples. These mounds have long been recognized as an important expression of the ceremonial and funerary activities of prehistoric occupants of the upper Mississippi River area. Many of the mounds are known to contain human burials; some of which are estimated to be 2,500 years in age.

The landscape of the monument reveals evidence of a continuum of mound building cultures and their relationship to the environment over a span of at least 1,800 years. The monument's varied landforms and habitats, characteristic of the unglaciated "driftless zone", provide exceptional diversity of plant and animal species. These natural resources are important for understanding past cultures, which depended on them.

The Mission Statement for Effigy Mounds National Monument is:

To preserve significant site, and artifacts of prehistoric American Indian mound building cultures within a natural environment. Park's resources are managed to protect their scientific values while providing education opportunities and enjoyment for all.

The prehistoric mound builders and their environment were inextricably linked. The culture of the effigy mound builders was sustained by a unique association of climate, geology, soils, topography, and associated flora, and fauna that shaped the life styles and belief systems of these people. The mound building cultures are associated with the eastern hardwood forest that extended across the eastern third of the continent.

Information from a variety of sources including pollen and isotope deposits in cave formations track the changes in vegetation since the last Ice Age. With the advance and retreat of Pleistocene glaciation, this area has gone through many stages of vegetation succession, which included tundra, boreal forest, hardwood forest, prairie, and savanna. Current climate conditions support hardwood forests that would dominate the area if not disturbed either by man or natural causes. These climatic conditions have been relatively stable for the last 3,000 years. This stable period with a cooler moister climate would have changed the prairie to forest.

However, for the last 3,000 years evidence shows that a transition zone has been maintained between the prairie and forests. Fire from natural and anthropologic sources maintained this transition until European settlement. Evidence also suggests that aboriginal fire started to become an environmental factor about 3,000 years ago, which helped maintain this transition zone. This time period closely follows the archeological dates for the beginning of the Woodland culture and its mound building phases.

The presettlement landscape showed that these conditions continued to exist through the repeated use of fire to modify the environment to optimize resource availability. Since European settlement of the are American Indians and their influence on the environment quickly diminished resulting in fire deprivation and wide spread ecological transformation.

When Effigy Mounds National Monument was established, over 100 years of logging, agriculture, and development left a landscape that had little resemblance to the presettlement era. Prairies were plowed, forests cut, mounds destroyed drastically changing the landscape. In northeast Iowa, the natural environment has the ability to quickly recover from disturbances giving the surficial appearance that things are in a natural state. In reality many native species of flora and fauna have been eliminated and replaced by introduced species from Europe and Asia that in turn replace or threaten the remaining native species.

Due to the impact of 150 years of European influence, there is little resemblance between the landscape of the mound building era and the setting the burial mounds are found in today. The ecological conditions that once existed and preserved the mounds through time have been replaced by an altered landscape, which confuses the interpretation of the mound builders culture. The connection of the mounds to the Mississippi and Yellow River systems is not readily apparent due to extensive forest growth. This becomes apparent when the trees lose their leaves during the winter months, allowing the river to be seen from the mounds. Information from early explorers, settlers, maps, and vegetation pattern analysis suggest that the ridges where the mounds are located were covered with prairie or oak savannas that would allow visibility of the river from the mound locations during the summer months when they were though to have been built.

To properly protect and interpret the mounds, and the people of the mound building culture, it is critical to manage them in the proper context. The vegetation mosaic associated with the cultural landscape of the mound building era was influenced by ethnological and ecological processes that are absent or altered in the present setting.

Purpose and Need

The resource management goal is to combine the protection of the cultural and natural resources while providing a setting that accurately portrays the context and the content of the cultural landscape associated with the mound building era for the public. The most effective means of achieving a landscape representative of the mound building era is the implementation of a constantly evolving, multiple phased plan incorporating the use of prescribed fire with selective tree and fuel removal to mitigate existing environmental impacts, establish a regime of ecological processes now absent, and to complete the transition process without negatively impacting existing resources.

Utilization of prescribed fire on the landscape will be the most significant planning strategy in achieving the resource protection and restoration goals. The Fire Management Plan (FMP) and the Hazardous Fuels Reduction Plan are the most effective approaches for future monument management efforts.

The needs that this plan is addressing are the requirements of Director's Order 18, which mandates a fire management plan for all parks which have vegetation capable of burning. This plan will guide the fire management program that is responsive to the monument's natural and cultural resource objectives and to safety considerations for monument visitors, employees, and developed facilities.

The primary need of the fire management plan is the restoration of the open forest landscape present during the presettlement period particularly that of the moundbuilder era. Fire, both natural and man-caused, was an important component of the landscape. During historic times, fire has been suppressed and the forests have reached the climax succession stage of a closed oak forest with a maple/basswood component. If succession is allowed to continue, these forests will become a closed maple/basswood climax community.

The protection of the mounds is a major need. As the forest vegetation closes in around the mounds the ground cover is reduced due to shading subjecting these valuable cultural resources to erosion. By opening the forest, and introducing fire into those areas, grasses and forbs will be encouraged, providing protective cover for the mounds.

Protection of neighboring properties and the monument infrastructure from the potential of wildland fires during drought periods is a need that can be met through mechanical reduction of hazard fuels and the use of prescribed fire.

Scoping

Scoping is an early and open process to determine the breadth of environmental issues and alternatives to be addressed in an environmental assessment/assessment of effect. Effigy Mounds National Monument conducted both internal scoping with appropriate NPS staff and external scoping with the public and interested and affected groups and agencies.

Internal scoping was conducted by the staff of Effigy Mounds National Monument and the planning, cultural resource, natural resource and fire personnel in the NPS Regional office. This interdisciplinary process defined the purpose and need, identified the potential actions to address the need, determine what the likely issues and impact topics would be, and identify the relationship, if any, of the proposed action to other planning efforts at the monument.

A press release will be sent out announcing the availability of the Effigy Mounds National Monument's Fire Management Plan for public review. The date of the public informational meeting will be announced in the same press release. The comment period for public review will extend for 30 days after the informational meeting.

The undertakings described in this document are subject to Section 106 of the National Historic Preservation Act, as amended in 1992 (16 USC Section 470 *et seq.*).

THPO/SHPO consultation will take place during the review period.

RELATIONSHIP OF THE PROPOSED ACTION TO PREVIOUS PLANNING EFFORTS

Monument documents

The prescribed fire program and the hazard fuel reduction plan are consistent with the objectives of Effigy Mounds National Monument's *General Management Plan* (1991) and *Resource Management Plan* (1999). The monument will utilize the Fire Management Plan to address fire-related resource management issues that are referred to in general by the Resource Management Plan which include the use of prescribed fire to manage the cultural landscape. This will also allow for the change of fire management from small unit burning to landscape burns, which will more closely approximate the natural fire regime.

Director's Order 18

Director's Order 18 under legal authority 16 U.S.C. 1 through 4 states: "…park fire management programs will be designed to meet resource management objectives for the various areas of the park and to ensure that firefighter and public safety are not compromised. Each park with vegetation capable of burning will prepare a fire management plan to guide a fire management program that is responsive to the park's natural and cultural resource objectives and to safety considerations for park visitors, employees, and developed facilities." The Fire Management Plan (FMP) for Effigy Mounds National Monument will be used as an operational guide for the use of prescribed fire to manage the cultural resource.

National Fire Program

Wildland fire management activities are essential to protect human life, personal property, and irreplaceable natural and cultural resources, and to accomplish the National Park Service mission "*…to promote and regulate the use of the…national parks…which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the*

enjoyment of future generations." *National Park Service Organic Act, 16 U.S.C. 1.* Interagency recognition of risks and expenses associated with wildland fire management culminated in the Federal Wildland Fire Management Policy and Program Review (USDA Forest Service and DOI, 1995, revised 2001). The Secretary of the Interior has accepted and endorsed the principles, policies, and recommendations in the report and has directed the National Park Service to implement them.

IMPACT TOPICS

National Park Service Management Policies (2001) for wildland fire management were revised in 1998 to meet the intent of the new Director's Orders and the Federal Wildland Fire Management Policy and Program review. Policies stated that monument fire management programs would be designed to meet specific resource management objectives and to ensure that firefighter and public safety are not compromised. A fire management plan with a comprehensive environmental assessment will be developed for each unit.

The policies continued that all fires burning in natural or landscaped vegetation will be classified as either wildland fires or prescribed fires. Wildland fires will be effectively managed, considering resource values to be protected and firefighter and public safety, using a full range of strategic and tactical operations. Prescribed fires, which are ignited by unit managers to achieve resource objectives, will be monitored for fire and smoke behavior and effects in order to determine whether specific objectives are met. All units will use a systematic decision making process to determine the most appropriate management strategies for all unplanned ignitions and for prescribed fires that are no longer meeting resource objectives. Superintendents will consider the full range of suppression strategies. Suppression methods for wildland fires should minimize impacts of the suppression action and the fire, commensurate with effective control and resource values to be protected.

Impact issues were identified based on regulatory and planning requirements and known resource issues. Assessment of the impacts to the affected environment will be discussed along with the reasons for including the topics as well as the rationale for dismissing specific topics from further consideration.

Analysis of impacts and consequences by the NPS is based on site inspection by monument staff and review of existing literature, studies and consultation with subject matter experts from the NPS and other agencies. Monument staff conducted a professional project review and their determinations were incorporated into this document.

Natural Resources

Natural resources refer to the components, structures, and functioning of affected ecosystems. The NPS *Management Policies* and *Natural Resources Management Guidelines* (NPS-77) provide direction for the protection of natural resources based on law and regulation. The natural resources discussed in this document include vegetation, wildlife, special status species, air quality, soil, and water resources.

Cultural Resources

Cultural resources will be addressed in the context of prehistoric, ethnographic, cultural landscape, and historic resources. Ethnographic resources are natural and cultural resources that continue to have special meaning, or ceremonial or religious significance for traditionally associated communities. These resources may be prehistoric, historic or contemporary places (sites, structures, and landscapes), objects, fauna as well as natural resources like rivers, watersheds, and plant species).

Visitor Use

The monument was established for the protection of prehistoric burial mounds and scientific study for the benefit and enjoyment of this and future generations. The impacts reviewed under Visitor Use will be confined to Safety and Visual or Aesthetic Values due to the short-term time interval of the alternative.

IMPACT TOPICS ELIMINATED FROM FURTHER EVALUATION

Prime and Unique Farmland

The Farmland Protection Policy Act (PL97-98, 1980) requires analysis of impacts on Prime and Unique Agricultural lands. No land in the project area is classified as prime and unique farmland.

Hazardous Materials

There are no known hazardous materials present in the project area.

Environmental Justice

Environmental Justice: Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" requires all federal agencies to address disproportionately high and adverse human health or environmental effects to minority or low-income populations in the area.

According to the 1990 Census, approximately 1.03% of the population of Marquette was made up of minorities, while approximately 2.00% of the population of McGregor were minorities. The town of Marquette (population 485) lies just outside a one-mile buffer around the monument boundary. The town of McGregor (population 798) is approximately 2 miles from the monument's southern boundary.

Because of the population concentration in these areas, steps would be taken to avoid adverse impacts, i.e. smoke, to these areas. Therefore, there would be no disproportionately high and adverse human health or environmental effects to these populations.

Socioeconomic Resources

Socioeconomic impacts will not occur, since both beneficial impacts and negative impacts are subject to study. Only those impacts that do not occur or are so minute as to be not worthwhile studying can be eleminated.

ALTERNATIVES CONSIDERED

The following alternatives were analyzed for this EA. Under all alternatives, appropriate suppression response would be taken on all wildland fires. This would include those prescribed fires which did not meet prescriptions or management goals, human-caused fires (railroad, etc.), and lightning-caused fires.

1) ***Current Prescribed Fire Program (No-Action Alternative)***

The Monument is currently conducting burns of between 0.2 acres and 24 acres. Under this alternative, only small prairie and goat prairie areas continue to be burned. Goat prairies are those small prairie areas (less than 5 acres) occurring at the terminus of ridges. The forest vegetation around the mounds would remain dense and the connection between the mounds and the river systems would not be obvious to the visitor. As the ground vegetation continues to be shaded out, the potential for erosion to occur would become more prevalent. Large woody fuels would build up in the forested areas.

2) ***Prescribed Fire and Mechanical Thinning (Preferred Alternative)***

Under this alternative, the proposed Fire Management Plan would be implemented. Prescribed fires, ignited by qualified personnel, would be used to simulate the ecological effects of natural fire, and to reduce hazardous fuels. Whereas the Alternative 1 (No Action) focused the use of prescribed fire on the prairie vegetation, this alternative would entail the use of prescribed fire across much of the forested landscape of the monument. The goal of these fires is to manage for a cultural landscape associated with the prehistoric mound builders. Prescribed fires would be used to accomplish management objectives in specific areas under conditions identified in approved prescribed fire plans. All other ignitions (whether of natural or human origin) would be suppressed. All prescribed fires would be monitored and be available as research projects.

Mechanical reduction and manipulation of fuels prior to ignition of prescribed fire would be used to reduce fuel loading in areas where it is important to minimize the impact of fire on cultural resources and in interface areas between public and private ownership. This manual manipulation might include the use of chainsaws and hand crews to accomplish the fuel reduction goals. The fuels removed may be chipped and placed on trails as a natural covering instead of using gravel. They may also be used as rails in fencing along the visitor hiking trails.

3) ***Expanded Prescribed Fire Program***
Under this alternative, prescribed fire would be used to manage the natural resources and the reduction of hazardous fuels. As with the Alternative 2, prescribed fire would be applied across

the forested landscape. Hazard fuel buildups occur naturally or from resource management activities. These activities cannot be completely mitigated by fire or can result in fire behavior beyond controllable levels. This alternative would not affect the larger hardwood trees that need to be thinned to maintain fuel buffer areas.

4) ***Suppression and No Prescribed Fire***
All unplanned ignitions at the monument would be suppressed. These would include human-caused fires (trash fires, cigarette, railroad) and all fires of natural origin (lightning, spontaneous combustion, etc.). Prescribed fires would not be conducted and there would be no mechanical (cutting, thinning, raking, etc.) fuel manipulation.

Alternatives Considered but Rejected

5) ***No Suppression or Prescribed Fire***
Under this alternative, all ignitions (human or naturally caused) would be allowed to burn in all areas and at all times. This would be a hands-off approach to resource management. This alternative was rejected due to the unacceptable risk to human life and property, which would have significant negative political, socioeconomic, and environmental impacts to the surrounding area. Cultural and natural resources would be significantly and negatively impacted from wildland fires. Without the use of prescribed fire, the forested areas would continue their succession to a climax forest of maple/basswood. The goat prairies and prairie remnants would convert to forests. There would be no indication of the connectivity of the mounds to the Mississippi and Yellow River systems.

6) ***Wildland Fire Use***
Under this alternative, natural ignitions would be managed in predetermined areas for resource benefits, if all prescription criteria were met. This alternative was rejected due to staff limitations, small land management parcels, long response times, valuable cultural resources, and values at risk on neighboring lands. This plan does not recommend wildland fire be managed for resource benefit at the monument. At the current time Effigy Mounds National Monument does not have trained fire personnel on staff to manage a wildland fire program. The entire monument covers 2,526 acres which is divided into smaller parcels by natural barriers i.e. rivers, and human created breaks i.e. highways. The response time for qualified fire personnel to monitor and control a wildland fire would be at least 3 – 4 hours minimum and probably longer. Due to the lack of easy access to these teams, cultural resources would be placed at risk as well as neighboring lands. Therefore, the monument has adopted a guideline of suppression of wildland fires.

7) ***Mechanical Manipulation of Fuels Only***
Under this alternative, hazard fuel buildups would be removed or manipulated strictly by mechanical means to the extent possible. This alternative was rejected because it would be extremely expensive and time consuming. Natural ecological processes would not be allowed to function in this fire-dependent community. This option could result in a cultural landscape that does not reflect the mission of the monument due to the loss of the fire-dependent herbaceous understory community as well as goat prairies and prairie remnants.

AFFECTED ENVIRONMENT

Natural Resources

Vegetation

The Monument lies in a transition zone of forested communities along the riverine blufflands and the prairie uplands to the west. The microclimate produced by the cool, north-facing slopes provides habitat for plants of northern latitudes while the moderating influence of the river valley attracts southern species, providing a mixture of plants not found elsewhere in the state.

The USGS Biological Resource Division is developing a vegetation map of the monument and surrounding area. Today, sugar maple and basswood dominate the remaining oak forests of the upland with scattered prairie openings on the ridge tops and bluff edges. The major openings today are remnants of past farming activities. These old field areas which were once prairie or savanna openings have been restored to prairie through the use of fire or by seeding native prairie species. The small goat prairies existing on bluff edges show signs of encroachment by woody species.

Wildlife

A formal wildlife survey has not been conducted; however, observation records can be used to determine the status of common wildlife species. An accurate wildlife list cannot be made but evidence shows wildlife indigenous to eastern hardwood ecosystems is well represented.

Mammals

Rare sightings of gray fox (*Urocyon cinereoargenteus*) and coyote (*Canis latrans*) occur, while rare or endangered species such as bobcat (*Felis rufus*), black bear (*Ursus americanus*), and river otter (*Lutra canadensis*) are seldom seen. A sighting of a mountain lion (*Felis concolor)* has been reported within the monument and timber wolf (*Canus lupus)* packs are found within 80 miles to the north of the monument.

Birds

Approximately 291 species of birds nest or migrate through the monument and the surrounding area. The re-introduced wild turkey (*Meleagris galloparo*), once extirpated, is now nesting here. The Yellow River floodplain has been identified as one of 12 nesting sites and one of two multiple nesting sites of the red-shouldered hawk (*Buteo lineatus*) in the state. Each year the sightings of bald eagles (*Halineetus leucocephalus*) increase with occasional roosting occurring in the spring and fall. Peregrine falcons (*Falco preregrinus*) reintroduction efforts have returned nesting peregrines to areas near the monument.

Reptiles and Amphibians

A number of species of reptiles are found in the monument. Although their status is unknown within the monument; 61 percent of the state's reptile and amphibian species are endangered, threatened or declining (R. Howe, 1984).

Fish

A study of the pond area, the Yellow River and Sny Magill Creek is needed to determine the status of fish in the monument. At present, fishing according to state regulations, is permitted.

Gastropods (Snails)
Northeast Iowa is the only area within the state with populations of three species of land snails. Although the federally endangered Iowa Pleistocene snail (*Discus macclintocki*) has not been found here, habitat conditions exist for its survival. It is known that land snails exist here but species composition and densities are not known.

Bivalves (Mussels)
The status of mussels is unknown. Mussels, which are found in adjoining rivers, are suffering a decline in diversity and numbers. In Iowa, the decline is from habitat loss, siltation, pollution, and loss of larval host species. The Higgins's eye clam (*Lampsilis higginsii)*; a federal endangered species, has been found in the Mississippi River adjacent to the monument. Zebra mussels heavily infest the Mississippi River, however, the level of infestation is currently unknown in the monument.

Special Status Species

There is one federally listed species found in the monument:

Bald eagle	*Haliaeetus leucocephalus*	State Status – Endangered Federal Status – Threatened

There are two state listed endangered birds, one state listed threatened mammal and seven state listed plants (two endangered and five threatened found in the monument. (See Appendix C (b)).

Air Quality
The monument is designated as a Class II clean air area under the prevention of significant deterioration program as enacted by the Clean Air Act, amended on August 7, 1977. Due to the rural location and limited duration and intensity of prescribed fire programs at the monument, air quality concerns are minimal.

Smoke management is a concern on all fires whether prescribed or wildland fire. The main concern is for the firefighter working on the fire. Long-term exposure to smoke has shown health impacts (NFES 2557). For this reason, all possible precautions will be taken to control the particulate size, length of exposure and concentrations of smoke by implementing fire control and ignition strategies that minimizes smoke inhalation by fire personnel.

Water Resources
The Mississippi River, the Yellow River and Sny Magill Creek all have an important effect on the monument. The Mississippi River borders the monument on the east and the majority of mounds found in the monument overlook the river. The Yellow River bisects the monument. The confluence of the Mississippi River and the Yellow River lies within the monument forming an extensive floodplain wetland and forest community. The Sny Magill Unit lies at the confluence of Sny Magill Creek and the Mississippi River.

The Monument has been cooperating in a ten-year water quality study sponsored in part by the Environmental Protection Agency (EPA) and in cooperation with the U.S. Geological Survey

(USGS) and the Iowa Geologic Survey. The study shows that the Yellow River and Sny Magill Creek have good water quality that appears to be improving over time.

Soils

The principal soils of the ridge tops are Fayette silt loams. The Fayette series consists of deep, well-drained, moderately permeable soils formed in loess on uplands and high stream benches. Slope ranges from 0 to 40 percent. Rock outcrops occur on both the western and eastern slopes of the North and the South Units. (USDA Soil Conservation Service, 1982, 1994)

The principal soils found on the steep slopes are Lacrescent cobbly, silty clay loam. The Lacrescent series consists of deep, well-drained soils that formed in a thin mantle of loess or a mixture of loess and loamy colluvium and in loamy-skeletal colluvial sediments from dolomite. Lacrescent soils are on convex hill slopes in dissected uplands. Permeability is moderate in the upper part and moderately rapid in the lower part. Slopes range from 5 to 70 percent.

The soils at the mouth of the Yellow River consist of Caneek silt loam. The Caneek series consists of deep, somewhat poorly drained and poorly drained, moderately permeable soils that formed in calcareous silty alluvium on low terraces and bottomlands. Slope ranges from 0 to 2 percent. The soils in the remainder of the Yellow River floodplain are either Ion silty loam or Lawson silt loam. The Ion series consists of deep, moderately well drained, moderately permeable soils on floodplains. They formed in calcareous silty alluvial sediments. Slopes range from 0 to 2 percent. The Lawson series consists of deep, somewhat poorly drained soils formed in silty alluvium on flood plains. These soils have moderate permeability. Slopes range from 0 to 3 percent.

Sny Magill

The soil that is found in the Mississippi floodplain is Caneek silt loam. The soil in the elevated area of the mounds is Wapsie loam. The Caneek series consists of deep, somewhat poorly drained and poorly drained, moderately permeable soils that formed in calcareous silty alluvium on low terraces and bottomlands. Slope ranges from 0 to 2 percent. The Wapsie series consists of deep, well drained soils formed in about two feet of loamy alluvium and the underlying coarse textured alluvium on stream terraces and outwash areas. Permeability is moderate in the upper part and very rapid in the coarse textured material. Slope ranges from 0 to 9 percent.

Cultural Resources

Prehistoric

The primary mission of the monument is the preservation of 206 prehistoric Indian mounds found within its jurisdiction. This is a small remnant of the thousands of mounds built by the mound building cultures of the upper Midwest. The Great Bear mound is 140 feet long, 70 feet across the shoulders and fore legs, and 3 ½ feet high. Linear mounds are between 100 and 200 feet in length. Average height of the mounds is 2 ½ to 3 feet. All of the units contain examples of the mound building culture, which included the Red Ochre, Hopewell, and Effigy Mound Builder cultures. These cultures existed from 500 B.C. to 1300 A.D.

Historic
Two excellent historical features are found within the monument boundaries. The military road built in 1840 by the U.S. Army between the Mississippi River and Fort Atkinson, Iowa crosses the southern half of the South Unit. The Jefferson Davis Sawmill, which was constructed in 1829 by the future Confederate president, then a young Army officer, is found in the Heritage Addition.

ENVIRONMENTAL CONSEQUENCES

Natural Resources

Natural resources refer to the components, structures, and functioning of affected ecosystems. The NPS *Management Policies* (2001) and *Natural Resources Management Guideline* (NPS-77) provide direction for the protection of natural resources based on law and regulation. The natural resources discussed in this document include vegetation, wildlife, special status species, wetlands, and water resources.

Vegetation - Analysis of the proposed action is included to document the effect to plant communities in the area. The proposed action would disturb floodplain vegetation and upland forest understory vegetation. A long-term monitoring program is in place to document those disturbances.

Wildlife – Analysis of the proposed action is included to document the impact on wildlife by the proposed project. The proposed action would cause some short-term disturbance to wildlife in those areas.

Special Status Species – The Endangered Species Act of 1973, as amended, and the NPS require examination of the impacts to federal and state-listed endangered or threatened species, and species whose status is of special concern. The Endangered Species Act of 1973 requires consultation with the U.S. Fish and Wildlife Service (USFWS) pertaining to special status species. This consultation is in process and copies of required documents have been submitted. Discussion of special status species is included to document effects to species identified by the USFWS and the IADNR.

Air Quality – The monument is designated as a Class II clean air area under the prevention of significant deterioration program as enacted by the Clean Air Act, amended on August 7, 1977. The State of Iowa maintains the nearest air quality monitoring station, 65 miles south at Dubuque, Iowa. The data indicates that sulfur dioxide levels are below national ambient air quality standards, and carbon dioxide levels are above the 8 hour national standards probably due to heavier automotive and increased traffic conditions in the city of Dubuque. Particulate levels (PM-10 and PM-2.5) are unknown for the immediate area at this time.

Water Resources – The Clean Water Act established a national policy designed to restore and maintain the integrity of the nation's waters and prevent water pollution. The National Park Service's *Management Policies* (2001) provide direction for the preservation, use, and quality of water originating on, flowing through, or adjacent to the monument's boundaries. This topic is included to document effects to water resources.

Soils – Most of the soils, which are found in the monument, were formed from thin loess mantle. Other soils were formed from alluvium or lacustrine deposits along rivers and streams. These soils are made up of fine-silty to coarse-silty particles which may be subject to erosion is left exposed for long periods of time.

Cultural Resources

Cultural resources are addressed in the context of prehistoric, historic and, ethnographic resources. Prehistoric and historic cultural resources include objects, sites, structures and landscapes. Ethnographic resources include natural and cultural resources that continue to have special meaning, ceremonial, or religious significance for traditionally associated communities.

The National Historic Preservation Act (NHPA) 1966, as amended and 36 CFR 800 requires federal agencies to consider the affect of their undertakings on properties on or eligible for listing on the National Register of Historic Places. Effigy Mounds National Monument is listed on this register. The following documents provide further guidance for the management of cultural resources and evaluation of potential impacts on those resources.

- American Indian Religious Freedom Act of 1978
- Conservation Planning, Environmental Impact Analysis and Decision Making (2001)
- Director's Order #28
- Native American Graves Protection and Repatriation Act (NAGPRA)
- Planning Process Guidelines (1998)

The Native American Graves Protection and Repatriation Act (NAGPRA) is critical to the management of the resources of Effigy Mounds National Monument. This act requires specific actions when American Indian human remains, funerary objects, sacred objects and objects of cultural patrimony are excavated or discovered on federal lands. Such ethnographic resources are basic expressions of human culture, and may include special places in the natural world important to American Indians.

The American Indian Religious Freedom Act of 1978 established the policy of the United States to protect and preserve for the American Indians their inherent right of freedom to believe, express and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objets and the freedom to worship through ceremonies and traditional rites. Consultation with American Indian tribes regarding projects that may affect ethnographic sites is required.

Visitor Use

Safety

Safety is a major concern when implementing prescribed fires both for the personnel involved and for the public including those visiting the monument and neighboring landowners. Safety is also an issue in the event of wildland fire occurrence.

Visual or Aesthetic Values
Visible smoke columns on the landscape when conducting burns and the scorch or black areas visible immediately after the burn are short-term, minor impacts on the surrounding area. These are best addressed through an informational program.

POTENTIAL IMPACTS

Potential impacts to the natural and cultural resources are described in the analysis of the alternatives using the following terminology:

Impact Intensity

Negligible – impact to the resource or discipline is barely perceptible and not measurable, and confined to a small area.

Minor – impact to the resource or discipline is perceptible and measurable, and is localized.

Moderate – impact to the resource or discipline is clearly detectable and could have appreciable effect on the resource or discipline.

Major – impact to resources or discipline is substantial, highly noticeable influence on the resource or discipline.

Impact Duration

Short-term – impacts are those that occur during implementation of the alternative including the construction activities.

Long-term – impacts are those that would extend beyond the implementation of the alternative and would likely have permanent effects on the resource.

Direct and Indirect Effects

Direct effects – are caused by the action and occur at the same time and place.

Indirect effects – effects caused by the action but not directly connected spatially or temporally. Indirect effects may be subtle in the immediate area of action but significant in the ecological process of a system.

IMPACTS OF NO ACTION ALTERNATIVE

1) ***Current Prescribed Fire Program***

Vegetation
Fire dependent ecological processes will be sustained with improved native grassland (remnant prairie and goat prairie communities) and reductions in the general fine fuel loading in these areas. The forested areas of the monument will not be impacted this alternative. Advanced

successional stages of sugar maple and basswood stands would not be reduced. The use of prescribed fire in the prairies would have a minor positive impact in the reduction of the fine fuel accumulations that could support destructive wildland fires. Under this alternative, fine fuel loadings will be reduced but targeted areas of heavy fuel accumulations may remain untreated causing localized extreme fire behavior.

Wildlife
This alternative would allow flexibility in planning for, locating, and avoiding disturbance to wildlife populations. Habitat impacts would be determined by prescribed fire timing, location, conditions, and patterns. Direct mortality to wildlife from prescribed fire would be minor and short-term. This would be offset by a moderate long-term improvement in habitat in the prairies. In the event of wildland fire, there would be potential negative impacts of direct morality on wildlife, and the destruction of habitat.

Special Status Species

This alternative would have a negligible impact on the listed species. Fires would be of short duration, both in time and intensity. Temporary reduction in cover would provide for a short-term food source for the birds and mammals. The listed plants are found primarily in the moist wooded sites or wetlands which would not be found in the area of these prescribed fires.

Air Quality
Air quality would be adversely affected for short periods of time during prescribed fires with air quality returning to normal following the completion of burning. Impacts may extend beyond th boundaries of the mound depending on the location of the fire. Therefore, no significant long-term health impacts are expected. The affect of particulate matter and visibility on local communities and commercial establishments can be lessened by the proper use of smoke management and public notification. The controlled nature of these prescribed fires makes their effect on air quality less severe than from wildland fires.

Water Resources
Prescribed fires may cause erosion which could negatively impact water quality. These impacts would be negligible to minor given the small areas to be treated, in that the prairies are not near open water bodies, and that erosion in the prairies is minimized through the grass roots generally not being affected by fire. Over the long-term, prescribed fire has been shown to increase grass, forb, and understory cover, all of which would reduce surface runoff. Erosion resulting from this alternative would slightly exceed natural erosion levels.

Soils
There will be negligible to minor long- or short-term changes in soils due to the controlled area, timing, and intensity of prescribed fires. Burning is often patchy which protects soils in these areas from sheet erosion as well as increasing interception of precipitation.

Cultural Resources
With the scheduled nature of burning, there would be an ability to plan for, locate and avoid the disturbance of cultural resources due to either ignition or fire control activities. This alternative, however, would not accomplish the cultural landscape goal.

Visitor Use
Safety
Safety is a primary goal in all fire management activities. Prescribed fires would follow standards outlined in RM18 to ensure safety. Furthermore, safety issues would be addressed in the prescribed fire plans, and the plans would be strictly adhered to. In the event, that smoke obstructs visibility on Highway 76, signs will be posted and local enforcement personnel will be utilized.

Visual or Aesthetic Values
Through the use of prescribed fires, areas with sensitive visual resources can be protected from fire. Short-term visual effects would consist of blackened prairies. Over the long-term, however, prescribed fires would help maintain the historic/cultural scene and also rejuvenate the natural vegetation in the prairies. This would result in increased visitor enjoyment and wildlife viewing.

OVERALL PROGRAM RISK

This alternative would present little short-term risk. Prescribed fires are conducted by trained personnel and would only be conducted in conditions optimal for control. There would be limited potential for loss of fire control. Long-term risk increases as heavy fuel concentrations increase the risk of fire moving across monument boundaries.

CUMULATIVE IMPACTS

Under the No Action alternative, continued use of prescribed fire would have long-term positive impact on the prairie, but the surrounding forested landscape would not be impacted. Cumulative impacts in the forested area would arise from the accumulation of unburned heavy fuels. In the event of a wildland fire, these fuel loads could cause uncontrollable fire behavior, and have negative impacts to cultural and natural resources.

CONCLUSION

This alternative will maintain the vegetative communities in their current state. Prescribed fire would be limited to prairie areas with little or no management of the forested areas. The cultural landscape goal would not be achieved. Trees would continue to shade the mounds. Heavy fuel accumulations would continue to occur within the forested areas that in the event of a wildland fire would exhibit localized extreme fire behavior which could threatened surrounding properties as well as the safety of employees, visitors, and neighbors.

IMPACTS OF THE PREFERRED ALTERNATIVE
2) ***Prescribed Fire and Mechanical Thinning***

Natural Resources

Vegetation
Prescribed fire and mechanical thinning would be used to manage the fire-adapted vegetation associated with the cultural landscape of the monument while reducing hazardous fuel accumulations. Diminishing the recruitment of target species will restore the balance of native, fire tolerant species and fire intolerant species. The resulting ecological conditions will increase competition of native species creating a more diverse ecosystem while controlling non-native (exotic) and pioneer woody species.

This alternative is the best-integrated approach to the control of fuel accumulations in the monument. Prescribed fires will effectively control fine fuel accumulations (1 and 10 hour) and slowly reduce large fuels over time (100 and 1000 hour). Manual removal of accumulations of large fuels will quickly treat problem areas and effectively mitigate hazardous fuel loading.

Wildlife
Under this alternative, the native plant communities adapted to a fire regime will provide high quality habitat to vertebrate and invertebrate species. Direct mortality from prescribed fires will likely be minor, though greater than in Alternative 1. However, long-term indirect impacts of improved habitat will offset these impacts, including the reduction of non-native (exotic) species, for example, garlic mustard.

This alternative would allow flexibility in planning for, locating, and avoiding disturbance to wildlife populations. Habitat impacts would be determined by prescribed fire timing, location, conditions, and patterns. Considering the small area of the monument and the modest proposed prescribed fire program, any impacts to wildlife would be minor and of a short-term nature. No long-term changes in population are anticipated. Proper planning and management of prescribed fires would aid in the reduction of ash and other contaminants that might be washed into streams.

Special Status Species
Impacts to the mammals and birds on the federal and state species of concern list should be short-term in nature and minor in intensity. To decrease negative impacts to wildlife populations, prescribed fire objectives will include burning the units in a mosaic pattern (with only 40-70% of acreage within the fire perimeter actually burned). This type of burn pattern will provide refuge for small mammals and will ensure that forage for bat and bird species remains intact.

Listed plant locations and habitat will be identified. Those plants will be classified as to whether they are fire tolerant or intolerant. Steps will be taken to maintain a negligible and short-term impact to those species, which are fire intolerant.

Air Quality
This alternative would result in short-term, minor impacts to local air quality. Selecting the timing for optimal prescribed fire conditions, locations, weather and pre-burn fuel treatments can mitigate the degree of impact. Air quality impacts will be lower due to treating high fuel concentrations and thereby reducing localized emissions. Particulate matter would be the primary pollutant with localized effects, therefore no significant long-term health impacts are expected. The controlled nature of these fires makes their effect on air quality less severe than from wildland fires. The effect of particulate matter and visibility on local communities and commercial establishments can be lessened by the proper use of smoke management and public notifications.

Water Resources
Implementation of this alternative will introduce fire into riparian areas with minor or no long or short-term impacts in water quality. Prescribed fire activities would be timed to optimize target species growth, promoting stand rejuvenation. Prescribed fire has been shown to aid in increasing grass, forb, and understory cover, all of which would reduce surface runoff. The reduction of dead and down fuels also reduces ash and other contamination into water resources. Erosion resulting from this alternative should approximate natural erosion levels.

Soils
Under this alternative, fire intensities and fuel concentrations will be reduced due to the combination of prescribed fires and mechanical manipulation. There will be less potential of localized heat concentration into the soils, altering soil chemistry, structure, or causing sterilization. There would be little or no long-term or short-term changes in the soils due to the controlled area, timing, and intensity of prescribed fire. Burning is often patchy which protects soils in these areas from sheet erosion as well as increasing interception of precipitation.

Cultural Resources
Under this alternative, the monument would be able to provide maximum protection to the cultural resource through appropriate planning. The Cultural Site Protection matrix (Appendix D) will guide burn strategies for the protection of sites. Dangerous fuel build-ups near known resources would be reduced. Cultural features would receive increased protection by reducing fuels through prescribed fires in appropriate areas.

Increased control of both prescribed fire and wildland fire by the removal of vegetation by mechanical means will minimize the impact of fire on cultural sites.

Historic sites will be excluded from prescribed fires due to lack of information of fire impacts on those sites.

Prescribed fires will duplicate the historic role of fire in setting back succession of vegetation communities. It will assist in the restoration of native plant communities in areas where they are deteriorating or disturbed through the alteration of forest structure, in addition to controlling non-native (exotic) and pioneer woody species. It is expected that areas treated by prescribed fire will closely replicate the ecological conditions thought to have existed during the prehistoric mound building era.

Visitor Use

Safety
Safety is given the highest priority in all fire management activities. The Fire Management Plan addresses how safety will be incorporated into prescribed fire and wildland fire actions.

This alternative will result in lower intensity fires and greater control during prescribed fires through mechanical treatments. Pre-burn preparation and selecting optimum conditions for a prescribed fire will minimize personnel exposure to unsafe conditions. Mechanical removal of vegetation is in accordance with OSHA and NPS regulations. The reduction of fuel levels from both prescribed fire and mechanical treatments will reduce the likelihood of large, uncontrollable fires.

Visual or Aesthetic Values
Under this alternative there will be short-term visual impacts after each prescribed fire. Short-term visual effects would consist of smoke columns or scorching of foliage. These impacts will only last until the fire is completed or in the case of foliage, until the next growing season. The long-term impact would be an improved cultural landscape with a rich diversity of species that is aesthetically appealing to the public and which provides for the proper interpretation of the mound builder culture.

OVERALL PROGRAM RISK
This alternative will present the lowest level of short-term and long-term risk to the cultural and natural resources, developments and adjacent property due to reduced fuel accumulations.

CUMULATIVE IMPACTS
No adverse cumulative impacts would be expected from the proposed alternative. Potential negative impacts associated with wildland fires would be reduced. Local air quality would be affected for short periods of time with air quality returning to normal following the completion of burns. Vegetation and wildlife habitat qualities would be improved with greater species diversity expected.

Cultural resources would receive minimal short-term impact and potentially reduced long-term impact in the event of a wildland fire.

Public and staff safety would be improved with the implementation of this alternative.

CONCLUSION

This alternative would accomplish the cultural landscape goals by reducing the undesirable forest vegetation, and encourage the growth of grasses and forbs that would reduce the potential for erosion in the mound sites. Large hazardous fuels would be removed by mechanical means. This would decrease the impact from wildland fires and increase safety for visitors, neighbors and employees as well as provide for increased protection of private property. Monument structures would also benefit from hazardous fuel reduction by decreasing the risk from

potential wildland fires. Mechanical thinning of forest vegetation would increase the ability to carry out beneficial prescribed fires in those areas.

IMPACTS OF ALTERNATIVE
3) ***Expanded Prescribed Fire Program***

Vegetation
Fire dependent ecological processes will be sustained with improved grassland (remnant prairie, open forest, and goat prairie communities) and reductions in the general fine fuel loading. By encouraging the encroachment of fire into the forested areas, these would gradually be converted to the more open woodland areas indicative of the cultural landscape of the mound builders era. However, achieving the target forest structure would be difficult to achieve using prescribed fire without mechanical reduction.

Prescribed fires, especially for fuel reduction, are often conducted during the season best suited for fire control efforts. Burning during these times of year can increase mortality rate of some plant species that are not fire adapted, thus, reducing the biological diversity of an area. Due to decades of fire suppression and logging, some areas have very high fuel loads. Prescribed fires in these areas could become uncontrollable or result in the mortality of plants that are fire adapted.

Wildlife
This alternative would allow flexibility in planning for, locating, and avoiding disturbance to wildlife populations. Habitat impacts would be determined by prescribed fire timing, location, conditions, and patterns. Considering the small size of the monument and the modest proposed prescribed fire program, any impacts to wildlife would be minimal and temporary. No long-term changes in population are anticipated, although habitat would be improved for fire dependent species.

Special Status Species
Impacts to plant species would be of a longer term than under Alternative 2. Accumulations of larger fuels would increase the fire intensity and duration in areas that would be of a sensitive nature. In the case of fire dependent species, the impacts may be of a negligible nature where fires are less intense. However, high intensity fires that can alter soil composition and moisture regimes can negatively impact fire dependent species.

Air Quality
Local air quality would be adversely affected for short periods of time during prescribed fires with air quality returning to normal following the completion of burning. Particulate matter would be the primary pollutant with localized effects. Therefore, no significant long-term health impacts are expected. The affect of particulate matter and visibility on local communities and commercial establishments can be lessened by the proper use of smoke management and public notification. The controlled nature of these burns makes their affect on air quality less severe than from wildland fires.

Water Resources
Without mechanical fuel removal, the intensity of prescribed fires may cause short-term changes in hydrologic conditions. Burning has been shown to aid in increasing grass, forb, and understory cover, all of which would reduce surface runoff. The reduction of down and dead fuel loads by prescribed fire also reduces ash and other contamination into water resources. Erosion resulting from this alternative would slightly exceed natural erosion levels.

Soils
There will be minor or no long- or short-term changes in soils due to the controlled area, timing, and intensity of prescribed fire. Burning is often patchy which protects soils in these areas from sheet erosion as well as increasing interception of precipitation.

Cultural Resources
With the scheduled nature of burning, there would be an ability to plan for, locate and avoid the disturbance of cultural resources due to either ignition or fire control activities. This alternative, however, would not accomplish the cultural landscape goal in the foreseeable future.

Visitor Use
Safety
The implementation of prescribed fires will allow fireline construction to be accomplished in a safe manner by enabling managers to schedule such activities and to plan their construction in an orderly fashion. Fires would be ignited in a preplanned pattern. Conducting prescribed fires under this alternative would not be as safe as Alternative 2, where the control lines for prescribed fires are strenghtened through mechanical treatments.

Visual or Aesthetic Values
Through the use of prescribed fires, areas with sensitive visual resources can be protected from fire. Short-term visual effects would consist of scorching of foliage. Prescribed fires would help maintain the historic/cultural scene and also rejuvenate the natural vegetation. This would result in increased visitor enjoyment wildlife viewing, and protection of resources.

OVERALL PROGRAM RISK
This alternative would present little short-term risk. Prescribed fires are conducted by trained personnel and would only be conducted in conditions optimal for control. There would be limited potential for loss of fire control. Long-term risk increases as heavy fuel concentrations increase the risk of fire moving across monument boundaries.

CUMULATIVE IMPACTS
The controlled nature of these prescribed fires would make the effect on air quality less severe than from catastrophic wildland fires. There should be little or no long- or short-term changes in soils within the prescribed fire areas. Some erosive effects would result from the construction of firelines and other ground disturbing activities. There is a potential safety problem from prescribed fires that might cross control lines.

CONCLUSION

This alternative would introduce fire into the edges of the forested areas. However, without mechanical reduction, the potential for achieving the cultural landscape goals would be minimal during periods of normal weather conditions. This method would be most productive during drought periods, however, this would have the greatest potential for escapes to occur that could threaten property and human safety.

IMPACTS OF ALTERNATIVE
4) ***Full Suppression/No Prescribed Fire***

Natural Resources

Vegetation
Under this alternative, forest succession would continue to occur due to the absence of fire from the ecosystem.. Critical microhabitats may be lost. Non-native (exotic) plant species not adapted to fire would continue to expand. Higher intensity fires could occur due to increased fuel loads. Suppression activities could result in adverse cultural and natural resource impacts.

In the prairies, native species, as well as ecosystem health, would deteriorate and resource management objectives would not be achieved. Fire dependent prairie plant communities would be at risk of being lost to encroaching forests.

Implementing this alternative would create a gradual and unnatural increase in fuel accumulations leading to the increased potential of wildland fires of greater size and intensities than would occur under natural fire regimes. Control capabilities would be compromised and suppression expenses increased. The threat to life and property would increase as well as the potential for large destructive fires to occur.

Wildlife
Wildlife populations would be influenced directly and indirectly by the impacts on fire adapted plant communities. Intense wildland fires would lead to higher mortality in less mobile vertebrate species. The potential for wildlife habitat destruction could occur from fire suppression activities as well as loss of habitat associated with mid and early successional stages managed by fire. Full suppression might have adverse impacts on fish populations in several areas. Aged, decadent, or even non-native (exotic) streamside vegetation would continue to alter the structure of riparian zones at alarming rates. Non-native plants would continue to alter the habitat rendering it less suitable to wildlife species.

Special Status Species
This alternative could lead to the long-term loss of listed species. Those species, which are fire dependent, could be lost through a change from a fire dependent habitat to that of one which is not. Additionally, an intense wildland fire could cause destruction of these species through intense heat, which might sterilize the soils. It could also result in the loss of the seed bank for this species. Animal species might experience the loss of critical habitat either through fire destruction or by successional change.

Air Quality
This alternative would produce no short-term impacts in air quality associated with prescribed fire. However, with the accumulation of fuels, there would be an increase for the potential for wildland fires and associated episodes of severe air pollution. The type and amount of emissions would vary greatly dependent upon fuel moisture, fire intensity, and other physical characteristics of the environment. Implementation of this alternative would generate a short-term reduction of particulate matter from fires due to suppression efforts.

Water Resources
This alternative would increase the potential for severe episodes of wildland fire due to accumulated fuels. The potential for large, high intensity fires would continue to increase, impacting vegetation and land over the long-term, with associated runoff to hydrological resources. Soils stripped of vegetative cover might suffer severe erosion during certain periods of the year.

Soils
This alternative would have long-term, major impacts to soils due to the increased potential for catastrophic fire. Fire suppression activities might severely impact soils for the long-term. Some erosion would result from the construction of firelines and other ground disturbing activities. Firelines would be rehabilitated to minimize erosion. Soils tripped of vegetative cover might suffer severe erosion during certain periods of the year.

Cultural Resources
Under this alternative, succession would proceed altering the cultural landscape significantly. The altered landscape would not have any resemblance to the environment associated with the mound building cultures. Visual connections between the mounds and the Mississippi River valley, which may have influenced the selection of mound sites, would be lost and incompatible with management objectives.

Untreated fuel accumulations would support higher intensity fires with the potential for damage to cultural resources. Heat penetration into the soil could damage cultural resource or corrupt future scientific analysis.

Recorded cultural resources would receive protection from wildland fire under this alternative. Potential for cultural landscape damage by fire would increase in the long-term scenario. There would be an increased possibility of destruction of previously unrecorded cultural resources as a result of fire suppression activities such as fireline construction and backfiring operations.

Visitor Use
Safety
The occurrence of catastrophic fires resulting from high fuel loadings would pose a threat to the safety of both firefighters and the public. Efforts at suppression of severe fires would pose a threat to firefighter safety. Fireline construction, backfiring operations and exposure to smoke are identified as both short-term and long-term threats to the safety and welfare of the

firefighters. Exposure to smoke can have a long-term effect on the public and monument neighbors.

Visual or Aesthetic Values
Implementing this alternative will reduce the short-term visual effects that would result from other alternatives, which utilize prescribed fire. However, degradation of the prairies would cause a long term negative impact on aesthetics, Moreover, the increased potential for high-intensity fire developing over the long run would result in drastic changes in the aesthetic appearances of affected areas and a short-term black appearance to the landscape.

OVERALL PROGRAM RISK
In the short-term, full suppression poses the least amount of risk to the natural resources and developments. However, full suppression efforts could pose a major long-term impact to the cultural resources. In the long-term, fuel buildups would increase the potential for large, uncontrollable fires posing a significant risk to developed areas and natural resources.

CUMULATIVE IMPACTS
This alternative would create a gradual and unnatural increase in fuel accumulation leading to increase in fire potential of greater size and intensities than would occur under a natural fire regime. The threat to safety and property rises during wildland fire events. Inadvertent wildlife habitat destruction could occur during fire suppression. This alternative would increase the potential for episodes of severe air pollution due to accumulated fuels, especially given that wildland fires often occur simultaneously regionwide. There would be an increased possibility of destruction of previously unrecorded cultural resources. Risk to historic sites increase as the chance for wildland fire increases. As fire hazards increase due to the fuel buildup, the magnitude of the suppression effort would rise, as would the associated costs.

CONCLUSION

This alternative would be detrimental to the prairie communities, as the forests would encroach into these areas. Hazardous fuels would accumulate creating the potential for a catastrophic wildland fire that would threaten property, cultural and natural resources, as well as firefighter and public safety. This alternative would not meet the cultural landscape goals.

PREPARED BY:

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AGENCIES AND PEOPLE CONSULTED:

The following agencies and organizations were consulted in connection with the preparation of the Environmental Assessment:

Iowa Department of Natural Resources

U.S. Fish and Wildlife Service

Advisory Council for Historic Preservation – Washington, D.C.

State Historic Preservation Officer – Iowa

Office of the State Archeologist, State of Iowa

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McGregor, IA

Bob Kammel, Landscape Architect
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National Park Service
Omaha, NE

Dr. Jim Christiansen
Drake University
Des Moines, IA

Gerry Bade
U.S. Fish and Wildlife Service
Rock Island, IL

NHPA Compliance

ASSESSMENT OF ACTIONS HAVING AN EFFECT ON CULTURAL RESOURCES

A. DESCRIPTION OF UNDERTAKING

1. Park: _Effigy Mounds National Monument_ Park district (optional) _____

2. **Work/Project Description:**

a. Project name _Wildland/Urban Interface Initiative_ date _5/24/2001_
Park project no (s.) _____

b. Describe project and area of potential effects (as defined in 36 CFR 800.2[c]); explain Why work/project is needed.

This 106 will address two related projects.

The first project is the implementation of the new Fire Management Plan for Effigy Mounds National Monument. The plan will introduce prescribed fire on a large scale throughout the monument. This project will consist of using fire across the cultural landscape to restore the environment and cultural landscape associated with the mound building cultures.

The second project is the reduction of hazardous fuels by mechanical means. Mechanical reduction refers to hand cutting and dispersal of cut small trees and downed trees and woody debris including materials from previous logging and resource management projects. The project intent is to reduce the potential for property damage in the event of a wildland fire and to improve the control of prescribed fires.

Both projects will potentially affect the entire monument.

Project I: Implementation of the Fire Management Plan

Goals of Fire Management Plan

1. Restore and manage the cultural landscape associated with the mound building cultures.
2. Protect cultural and natural resources from negative impacts of fire.
3. Duplicate the historic role of natural fire is slowing the succession of natural communities.
4. Restore and perpetuate native vegetation communities where they are deteriorating or have been disturbed.
5. Utilize fire as a management tool in creating the ecological conditions that support native plant species and to control non-native (exotic) plants not adapted to a fire regime.
6. Reduce fuel buildup and suppress wildland fires to protect cultural and natural resources within the monument boundaries, and private property outside the boundaries.

This project consists of developing and implementing a Fire Management Plan for Effigy Mounds National Monument. The Fire Management Plan will be implemented by expanding the use of prescribed fire on a landscape basis that will mimic the natural role of fire in the environment. A

long-term regime of prescribed fire is needed to create the vegetation matrix of prairie, savanna, and mid-succession hardwood forests similar to the pre-settlement and mound building eras. This process would slowly expand the prairies and goat prairies until a mosaic of prairie mixed with widely spaced fire resistant oak would dominate south facing slopes and ridges. Most of the woodlands would be sustained in a mid-successional state dominated by oak and hickory. Even with the use of fire, this phase will take hundreds of years and require an ongoing commitment from the monument to sustain this level of restoration.

The implementation of the Fire Management Plan will introduce fire into areas that are not currently part of the prescribed fire program. These areas will eventually be capable of sustaining fire. Hazardous fuel accumulations that may otherwise threaten the monument will also be reduced.

The key component of the resource management program is the use of prescribed fire. Without this tool existing and future restoration efforts would be jeopardized. Alternative restorative measures are not as effective and would require a quantum leap in funding and personnel to approximate the same results. Some of the effects of fire cannot be duplicated by any other means in the monument's fire adapted ecosystem.

Fire will be introduced to the landscape utilizing manmade and natural fire breaks such as rivers, roads, and trails to delimit fire management units of up to 600 acres in size. Sensitive sites identified in the accompanying matrix will be treated to lessen the impact of fire or excluded from the prescribed fire.

For each prescribed fire the staff archeologist will review the proposed burn area for known cultural sites and work with planners in developing the fire plan to ensure the protection of cultural sites. Fire return intervals for each management area will range from three to seven years.

Project II. Hazardous Fuel Reduction

Goals for the Wildland/Urban Interface Initiative are:

1. Increased levels of control for wildland and prescribed fire due to removal of hazardous fuel accumulations.
2. Reduced hazard to private property and nearby communities by the removal of hazardous fuels along the monument boundary.
3. Cultural and natural resources are protected from the effects of extreme or uncontrolled fire behavior.
4. Condition of the cultural landscape is improved.
5. Employee and public safety improved by reducing exposure to smoke and fire during control actions by removal of hazardous fuel accumulations.

Congress has allocated money for the reduction of hazardous fuels within federal areas and in areas where there are continuous fuels that present a fire hazard to surrounding communities or to public lands. The recent expansion of Effigy Mounds National Monument has nearly doubled the acreage of land that may be treated by prescribed fire. Adjacent landowners and the adjoining Yellow River

State Forest share 6.5 miles of forested boundary with the monument. This shared border poses a threat of property damage to all affected parties. This project would be implemented during the next three years to reduce fuel accumulations in these critical control areas.

The hazard fuels reduction project consists of removing dense, climax stands of trees around the forest periphery and along existing fuel breaks to reduce significant fuel accumulations, the potential for high intensity fires and to improve fire control capabilities in all situations. Heavy logging in the recently acquired addition, combined with savanna restoration and cultural site protection projects has produced fuel accumulations beyond the capabilities of current resources to remove. A five-person crew working six months a year for three years will be needed to thin timber stands and to remove resulting fuel accumulations.

The process will include cutting non-fruit or nut-bearing trees with a DBH (diameter at breast height) of six inches or less along a 100-foot buffer on the monument's shared boundary. The felled trees and downed fuels will be hand carried and dispersed along the treated buffer so that fuel concentrations are minimized.

After the monument boundary is treated, fuel breaks will be created along old logging roads, trails, and maintenance roads. The same mechanical fuel reduction process will treat openings containing mound groups.

Emphasis is also placed on compatibility with existing resource management objectives. Savanna management areas will be included as part of the hazard fuels reduction project.

Background:

Effigy Mounds National Monument occupies 2,526 acres in Clayton and Allamakee counties along the Mississippi River in northeast Iowa. The monument was established in 1949 to preserve about 200 prehistoric burial mounds and the associated scientific knowledge for future generations. The monument consists of steep bluffs, ridges, and river floodplains that are dominated by eastern hardwood forest. About 2,300 acres of forest and about 100 acres of prairie provide the area with sufficient fuels to potentially sustain wildland fire during times of high fire danger or drought.

The area surrounding Effigy Mounds National Monument is rural with a mixture of agricultural land and forest in a rolling topography with up to 500 feet of vertical relief making accessibility difficult. Rapid transformation of woodlands and agricultural areas to expensive developments is increasing the potential for wildland fire to result in property damage. Many of the homes are built in woodland settings and are increasingly susceptible to wildland fire. This trend is expected to continue. Yellow River State Forest, which covers approximately 8,000 acres, lies adjacent to the monument. This unit has limited fire-fighting capabilities.

The monument has approximately 17 miles of boundary, of which, 10 miles are without dependable fuel breaks, and 6.5 miles of forested boundary borders private and state woodlands. The remaining boundary borders agricultural lands that have varying crop cover types that include hay, corn, soybeans, pasture, and CRP acres. The risk of fire crossing the boundaries is

usually low with the exception of the spring (April-May) and fall (October-November) periods of reduced moisture. Depending on the agricultural use, the fields adjacent to the monument may serve as fuel breaks or may support fire during the drier spring and fall months. The potential for wildland fire occurring outside these annual dry periods does exist. Documented forest fires have occurred on state forests during periods of drought, which occur in this area every 10 – 20 years. This fire risk is highest in forested areas with heavy litter accumulation. Due to the topography of the area and the rate of development in rural areas there are a number of structures that are at risk from fire that can move through connecting woodlands. The actions described would provide increased protection from wildland fire to public and private property.

3. **Has the area of potential effects been surveyed to identify cultural resources?**

___ No
_X_ Yes Source or reference ___See list and dates below

Anderson, James P. 1961. *Mound Survey and Recommendations: South Unit Effigy Mounds National Monument, McGregor, Iowa.* Report on File, Effigy Mounds National Monument, Harpers Ferry, IA.

Dial, Janis L. 1996. *Base Line Issues at the Sny Magill Mound Group: Mound Disturbance and Historical Cartography.* Report prepared for Midwest Archaeological Center, National Park Service, Lincoln, NE.

Henning, Dale R. 1989. *Archeological Survey at Sny Magill Unit and Testing of Four Rock Shelters – Effigy Mounds National Monument.* Report on file Effigy Mounds National Monument, Harpers Ferry, IA.

Ingmanson, John E. 1964. *The Burial Complex at Effigy Mounds National Monument.* Report on file Effigy Mounds National Monument, Harpers Ferry, IA.

Mallam, Clark R. 1976. *A Cultural Resource Survey of the Ferguson Tract, Allamakee County, Iowa.* Report prepared for the Midwest Archaeological Center, National Park Service, Lincoln, NE.

Mallam, Clark R. and Lori Stanley. 1984. *The Ferguson Tract Archaeological Project II – A Cultural Resource Study in Allamakee County, Iowa.* Report prepared for Midwest Archeological Center, National Park Service.

Peterson, Robert W. 1963. *A Summary of the Mounds in Effigy Mounds National Monument.* Report on file, Effigy Mounds National Monument, Harpers Ferry, IA.

_____ 1985. *Survey of Potential Rock Shelter Sites - Effigy Mounds National Monument.* On file, Effigy Mounds National Monument, Harpers Ferry, IA.

For additional reports, please see the National Archaeological Database (NADb).

____Check here if no known cultural resources will be affected. (If this is because area has been disturbed, please explain or attach additional information to show the disturbance was so extensive as to preclude intact cultural deposits.)

4. **Potentially Affected Resource(s):**
Name and number(s): _#13AM82 – 1 through 57__
Location: _North Unit_____
NR status: _Entered____

Name and number(s): _#13AM82 – 58, 59, 60, 61; #13AM83 – 62, 63, 64; #13CT26-65 through 87, #13AM82 – 92, 93, 94, 95, 96; #13AM83 – 97, 98, 99; also Old Military Road, Cistern near Military Road; and #13AM226, #13AM230, #13AM263, #13AM267 Rock Shelter Sites._____ Location: __South Unit__
NR status: _Entered____

Name and number(s): __#13AM8 – 1 through 96 and a through –p. _____ Location: _Sny Magill_____
NR status: _Entered____

Also see List of Classification Structures (appended).

5. The proposed action will: (check as many as apply)
_____ Destroy, remove, or alter features/elements from a historic structure
_____ Replace historic features/elements in kind
_____ Add nonhistoric features/elements to a historic structure
__X__ Alter or remove features/elements of a historic setting or environment (inc. terrain)
__X__ Add nonhistoric features/elements (inc. visual, audible, or atmospheric) to a historic setting or cultural landscape
_____ Disturb, destroy, or make archeological resources inaccessible
_____ Disturb, destroy, or make ethnographic resources inaccessible
__X__ Potentially affect presently unidentified cultural resources
_____ Begin or contribute to deterioration of historic features, terrain, setting, landscape elements, or archeological or ethnographic resources
_____ Involve a real property transaction (exchange, sale, or lease of land or structures)
_____ Other (please specify)

6. **Measures to prevent or minimize loss or impairment of historic/prehistoric properties:**
(Remember that setting, location, and use may be relevant.)

Historic and prehistoric resources will be excluded from proposed prescribed fires if the presence of fire will negatively impact the resource. Each significant cultural site will be individually reviewed to assess the effects of prescribed fire. If a negative impact would result from the action of fire on the immediate site, removing hazardous fuels that may damage the site or exclude it from the area to be burned will treat the site. This decision making process will be documented in the form of a Preburn Resources at Risk Assessment for a Prescribed Fire (Appendix D).

7. **Supporting Study Data:**
(Attach if feasible; if action is in a plan, EA or EIS, give name and project or page number.)

This document will address action associated with the implementation of the Fire Management Plan for Effigy Mounds National Monument.

8. **Attachments:** [**X**] Maps [ ] Archeological survey, if applicable [ ] Drawings [ ] Specifications [ ] Photographs [ ] Scope of Work [ ] Site plan [ ] List of Materials [ ] Samples [**X**] Other **__Preburn Resources at Risk Assessment for a Prescribed Fire and List of Consultants_____**

Prepared by_____ Date _____
Title _____ Telephone _____

B. REVIEWS BY CULTURAL RESOURCE SPECIALISTS
The park 106 coordinator requested review by the park's cultural resource specialist/advisers as indicated by check-off boxes or as follows:

SPECIALISTS: Your comments here (or attached) show that you have reviewed this proposal for conformity with requirements of Section 106, with the 1995 Servicewide PA (if applicable), and applicable parts of the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, the NPS *Management Policies*, and the NPS *Cultural Resource Management Guideline*, and have given your best professional advice about this project and the issues relevant to the Section 106 process, including identification and evaluation of historic properties and further consultation needs.

[ ] ARCHEOLOGIST
Name:
Date:
Comments:

Check if project does not involve ground disturbance [ ] Assessment of Effect: _____ No Effect _____ No Adverse Effect _____ Adverse Effect _____ Programmatic Exclusion
Recommendations for conditions or stipulations:

****

[ ] CURATOR
Name:
Date:
Comments:

Assessment of Effect: _____ No Effect _____ No Adverse Effect _____ Adverse Effect _____ Programmatic Exclusion
Recommendations for conditions or stipulations:

****

[ ] ETHNOGRAPHER
Name:
Date:
Comments:

Assessment of Effect: _____ No Effect _____ No Adverse Effect _____ Adverse Effect _____
Programmatic Exclusion
Recommendations for conditions or stipulations:

****

[ ] HISTORIAN
Name:
Date:
Comments:

Assessment of Effect: _____ No Effect _____ No Adverse Effect _____ Adverse Effect _____
Programmatic Exclusion
Recommendations for conditions or stipulations:

****

[ ] HISTORICAL ARCHITECT
Name:
Date:
Comments:

Assessment of Effect: _____ No Effect _____ No Adverse Effect _____ Adverse Effect _____
Programmatic Exclusion
Recommendations for conditions or stipulations:

Check if project meets Secretary's Standards [ ]
Recommendations for conditions or stipulations:

****

[ ] HISTORICAL LANDSCAPE ARCHITECT
Name:
Date:
Comments:

Assessment of Effect: _____ No Effect _____ No Adverse Effect _____ Adverse Effect _____
Programmatic Exclusion
Recommendations for conditions or stipulations:

Check if project meets Secretary's Standards [ ]
Recommendations for conditions or stipulations:

****

[ ] OTHER ADVISERS
Name:
Title or area of specialty:
Date:
Comments:

Assessment of Effect: _____ No Effect _____ No Adverse Effect _____ Adverse Effect _____
Programmatic Exclusion
Recommendations for conditions or stipulations:

****

C. PARK SECTION 106 COORDINATOR'S REVIEW AND RECOMMENDATIONS
1. Assessment of Effect:
_____ No Effect __**X**___ No Adverse Effect _____ Adverse Effect

2. Compliance requirements:
[**X**] A. STANDARD 36 CFR PART 800 CONSULTATION
Further consultation under 36 CFR Part 800 is needed.

[ ] B. PROGRAMMATIC EXCLUSION UNDER THE 1995 SERVICEWIDE PROGRAMMATIC AGREEMENT (PA)
The above action meets all conditions for a programmatic exclusion under Stipulation IV of the 1995 Servicewide PA for Section 106 compliance.
APPLICABLE EXCLUSION: Exclusion IV.B _____ (Specify 1-13 or IV.C addition to the list of exclusions.)

[ ] C. PLAN-RELATED UNDERTAKING
Consultation and review of the proposed undertaking were completed in the context of a plan review process, in accordance with the 1995 Servicewide PA and 36 CFR Part 800.
Specify plan/EA/EIS: _____

[**X**] D. UNDERTAKING RELATED TO ANOTHER AGREEMENT
The proposed undertaking is covered for Section 106 purposes under another document such as a statewide agreement established in accord with 36 CFR 800.7 or counterpart regulations.
Specify: _The current Fire Management Plan has gone through NEPA and 106 review process._

[**X**] E. STIPULATIONS/CONDITIONS
Following are listed any stipulations or conditions necessary to ensure that the assessment of effect above is consistent with 36 CFR Part 800 criteria of effect or to avoid or reduce potential adverse effects.

All proposed actions to be implemented in conjunction with the Fire Management Plan and the Wildland/Urban Interface Initiative projects must be conducted acording to guidelines in the Preburn Resources at Risk Assessment for a Prescribed Fire and after consultation with the park archaeologist (currently vacant).

Recommended by Park Section 106 coordinator:
Name _____
Title _____
Date _____

D. SUPERINTENDENT'S APPROVAL
The proposed work conforms to the NPS *Management Policies* and *Cultural Resource Management Guideline*, and I have reviewed and approve the recommendations, stipulations, or conditions noted in Section C of this form.

Name/Signature of Superintendent _____
Date _____

SUPPLEMENTAL GUIDANCE
The Section 106 process is described in regulations promulgated by the Advisory Council on Historic Preservation as 36 CFR Part 800. PLEASE SEE ESPECIALLY 36 CFR 800.4-6, 800.8, and 800.9. Additional guidance published by the Advisory Council includes *Section 106, Step by Step* and *Preparing Agreement Documents*. Both of these discuss information and documentation needs involved in Section 106. The following discussion is not a substitute for those documents, but a brief set of reminders.

This form may be used for actions that are undertakings as defined for purposes of Section 106. It is a model that may be altered to suit the needs of a particular park and its advisers. It may or may not be the most effective format for documenting Section 106 compliance, depending on the complexity and planning needs or history of the undertaking. It can be a starting point for the review process within NPS, and it may be used to document programmatic exclusions under the 1995 Servicewide Programmatic Agreement (stipulation IV). For some cases, a memorandum, more detailed report, or NEPA document that includes information meeting documentation requirements in 36 CFR Part 800 may be necessary or preferable.

The form is designed to follow, in a condensed way, the basic questions that should be asked and answered in meeting responsibilities under 36 CFR Part 800. The basic questions are:

A. What is the project and how did the park identify it as an undertaking subject to Section 106?

(As defined in 36 CFR 800.2[o], an undertaking means a project, activity, or program that can result in changes in the character or use of properties listed or eligible for listing in the National Register of Historic Places. If in doubt about whether a project is an undertaking subject to Section 106 review, the park's Section 106 coordinator should consult the state historic preservation officer (SHPO) or others in the park's group of CRM advisers on Section 106.)

B. Does the park know whether the project's "area of potential effects" includes properties in or eligible for the National Register of Historic Places?

(Did the park define the area of potential effects in a comprehensive way? What historic properties will be affected by this undertaking? How did NPS identify those properties; did NPS make a reasonable and good-faith effort to ensure that no places that might be eligible for the National Register have been overlooked? Did NPS have enough information to evaluate the Register eligibility of properties in the area? Documentation may include descriptions of those properties and of efforts to identify them, such as National Register forms and reports or narratives summarizing the resources and survey efforts.)

C. How will the project affect any such eligible historic properties?

(How did the park and its advisers apply the criteria of effect and adverse effect in 36 CFR 800.9? How did the park get the advice of the SHPO, and of other interested persons, on this point?)

D. Did the park provide opportunities for comment by local governments, Indian tribes, other interested persons and the public that were appropriate to the scale and type of the undertaking and the known or expected public interests?

E. If the undertaking would have adverse effects, how did the park and its advisers consider alternatives that would avoid or mitigate the potential for adverse effects?

Generally, Section 106 consultation results in an agreement document of the types described in the Council's *Preparing Agreement Documents*. That booklet provides suggestions for writing agreement documents and sample formats, as well as some standard language for conditions and stipulations.

Decisions about which CRM disciplines and technical skills are relevant to the project at hand are important. This form should reflect information showing how the park made decisions about which CRM specialists should participate in and advise on individual projects. It should be used to indicate how CRM specialists have been involved in those decisions. This does not mean, however, that every one of the park's CRM advisers must comment on every undertaking.

ITEM BY ITEM:

No. 2: "Area of potential effects" is defined in 36 CFR 800.2(c) as "the geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist."

No. 4: In the first blank, please include applicable park facility or site numbers or IDLCS, IDCLI, ARI, & HABS/HAER numbers. For location, please note UTM coordinates, if available, or township, range, and section if applicable and available. If neither of these is readily available, other location description may be used. In the last blank, specify National Register status of affected resource(s), entering the appropriate number from the list below:

(1)listed in Register and documented
(2) listed but not documented
(3) determined eligible by the Keeper of the Register
(4) determined ineligible by the Keeper
(5) found eligible for 106 purposes through consultation with the SHPO
(6) found not eligible for 106 purposes through consultation with the SHPO
(7) a designated National Historic Landmark
(8) within a Register-eligible district–please name district
(0) status unknown by person completing Part A of the form

APPENDIX D: Cultural Resource Protection Matrix

Preburn Resources at Risk Assessment for a Prescribed Fire EFMO 2001 St. Clair and Rovang

Historic Context (1)	**Resource Type** (2)	**Elements** (3)	**Risk Conditions Or Activities** (4)	**Resource at Risk** (5)	**Inventory Method Proposed**
Pre-Mound Builders	Lithic Resources	Projectile Points, Tools, Lithic Debris	Heat	Projectile Points, Tools, Lithic Debris	Recon survey Map/flag and avoid Removal of hazard fuels
		Flakes	Heat	Isolated finds/scatters	Map-removal of hazard fuel
	Potential Habitation Sites	Rock Shelters	Heat and Smoke	Rock shelter walls Fire hearths	Recon survey Map/flag and avoid Removal of hazard fuels
		Village Sites	Heat Carbon blackening/infiltration	Fire hearths Mussel shells, bones, sherds, tools, flakes	Recon survey Map/flag and avoid Removal of hazard fuels
		Camp Sites	Heat Carbon blackening/infiltration	Fire hearths Misc. debris	Recon survey Map/flag and avoid Removal of hazard fuels
		Refuse Sites	Heat Carbon blackening	Misc. debris Lithic material or shell	Recon survey Map/flag and avoid Removal of hazard fuels
Mound Building Era	Earthworks	Burial Mounds	Smoldering roots Carbon infiltration	Human remains Burial inclusions	Recon survey Map Case by case: Burn or flag and avoid
		Ceremonial Mounds	Smoldering roots Carbon infiltration	Fire hearths	Recon survey Map Case by case: Burn or flag and avoid
	Habitation Sites	Rock Shelters	Heat and smoke	Rock shelter walls Fire hearths	Recon survey Map/flag and avoid Removal of hazard fuels
		Village Sites	Heat Carbon blackening Infiltration	Mussel shells, sherds, flakes, hearths	Recon survey Map/flag and avoid Removal of hazard fuel

Preburn Resources at Risk Assessment for a Prescribed Fire EFMO 2001 St. Clair and Rovang

Historic Context (1)	**Resource Type** (2)	**Elements** (3)	**Risk Conditions Or Activities** (4)	**Resource at Risk** (5)	**Inventory Method Proposed**
		Camp Sites	Heat Carbon blackening Infiltration	Fire hearths Misc. refuse	Recon. Survey Map/flag and avoid Removal of hazard fuel
	Special Use and Resource Procurement Sites	Plant Harvesting	Fire consuming existing evidence	Vegetation patterning	Recon. Survey Removal of hazard fuel No heavy equipment
		Food Processing	Fire consuming existing evidence	Bone, seeds, shells, misc. refuse	Recon Survey Map/flag and avoid Removal of hazard fuel
		Tool resharpening	Heat	Flakes, projectile points, tools, lithic debris	Map Removal of hazard fuel
	Rock alignments	Rock alignments	Heat	Rock placement	Recon survey Map/flag and avoid Removal of hazard fuel
	Rock Art/Sacred Sites	Petroglyphs/ Pictographs	Heat and smoke	Rock art	Recon survey Map/flag and avoid Removal of hazard fuel
	Tools	Quarries	Heat	Quarry area	Recon survey Map/flag and avoid Removal of hazard fuel
	Manufacturing Sites	Flakes	Heat	Isolated finds – scatters, lithic debris	Recon survey Map/flag and avoid Removal of hazard fuel
		Projectile Points	Heat	Isolated finds, lithic debris	Recon survey Map/flag and avoid Removal of hazard fuel
		Ground stone	Heat	Isolated finds	Recon survey Map/flag and avoid Removal of hazard fuel
Post Mound Building Era	Habitation Sites	Rock Shelters	Heat and smoke	Rock shelter walls Fire hearths	Recon survey Map/flag and avoid Removal of hazard fuel
		Village Sites	Heat Carbon blackening Infiltration	Mussel shell, sherds, flakes, hearths, fire cracked rocks, bones	Recon survey Map/flag and avoid Removal of hazard fuel

Preburn Resources at Risk Assessment for a Prescribed Fire EFMO 2001 St. Clair and Rovang

Historic Context (1)	**Resource Type** (2)	**Elements** (3)	**Risk Conditions Or Activities** (4)	**Resource at Risk** (5)	**Inventory Method Proposed**
		Camp Sites	Heat Carbon blackening Infiltration	Fire hearths Misc. debris	Recon survey Map/flag and avoid Removal of hazard fuel
	Special Use Sites	Plant Harvesting	Fire consuming existing evidence	Vegetation patterning	Recon. Survey Removal of hazard fuel No heavy equipment
		Food Processing	Fire consuming existing evidence	Bone, seed, shell, misc. refuse	Recon survey Removal of hazard fuel No heavy equipment
		Tool resharpening	Heat	Flakes, projectile points, tools, lithic debris	Recon survey Map Removal of hazard fuel Flag and avoid
		Rock alignments	Heat	Rock placement	Recon survey Map Removal of hazard fuel Flag and avoid
		Trees		Culturally significant trees	***Concern for Sacred white oaks and marker trees Ho-Chunk***
	Rock Art	Petroglyphs Pictographs	Heat and smoke	Rock art	Recon survey Map/flag and avoid Pretreat Removal of hazard fuel
	Tool Manufacturing Sites	Quarries	Heat	Quarry area	Recon survey Map/flag and avoid Removal of hazard fuel
		Flakes	Heat	Isolated finds/scatters, lithic debris	Recon survey Map/flag and avoid Removal of hazard fuel
		Projectile Points	Heat	Isolated finds	Recon survey Map/flag and avoid Removal of hazard fuel
		Ground Stone	Heat	Isolated finds	Recon survey Map/flag and avoid Removal of hazard fuel

Preburn Resources at Risk Assessment for a Prescribed Fire EFMO 2001 St. Clair and Rovang

Historic Context (1)	**Resource Type** (2)	**Elements** (3)	**Risk Conditions Or Activities** (4)	**Resource at Risk** (5)	**Inventory Method Proposed**
European Contact	Habitation Sites	Camp Sites	Burning wood/carbon	Fire hearths	Recon survey Map/flag and avoid Pretreat Removal of fuel
		Cabin Sites	Burning wood	Logs and foundations	Recon survey Map/flag and avoid Pretreat Removal of fuel
Fur Trade Era	Fur Trade Sites	Trading Post	Heat Carbon blackening	Logs and foundations	Recon survey Map/flag and avoid Pretreat Removal of fuel
		Refuse Dumps	Heat Carbon blackening	Misc. debris	Recon survey Map/flag and avoid Pretreat Removal of fuel
French Military Era	Habitation Sites	Camp Sites	Burning wood Carbon	Fire hearths	Recon survey Map/flag and avoid Pretreat Removal of fuel
		Cabin Sites	Burning wood	Logs and foundations	Recon survey Map/flag and avoid Pretreat Removal of fuel
British Military Era	Habitation Sites	Camp Sites	Burning wood Carbon	Fire hearths	Recon survey Map/flag and avoid Pretreat Removal of fuel
		Cabin Sites	Burning wood	Logs and foundations	Recon survey Map/flag and avoid Pretreat Removal of fuel
US Military Era	Roads	Artifacts	Heat Carbon blackening	Misc. debris	Recon survey Map No heavy equipment

Preburn Resources at Risk Assessment for a Prescribed Fire EFMO 2001 St. Clair and Rovang

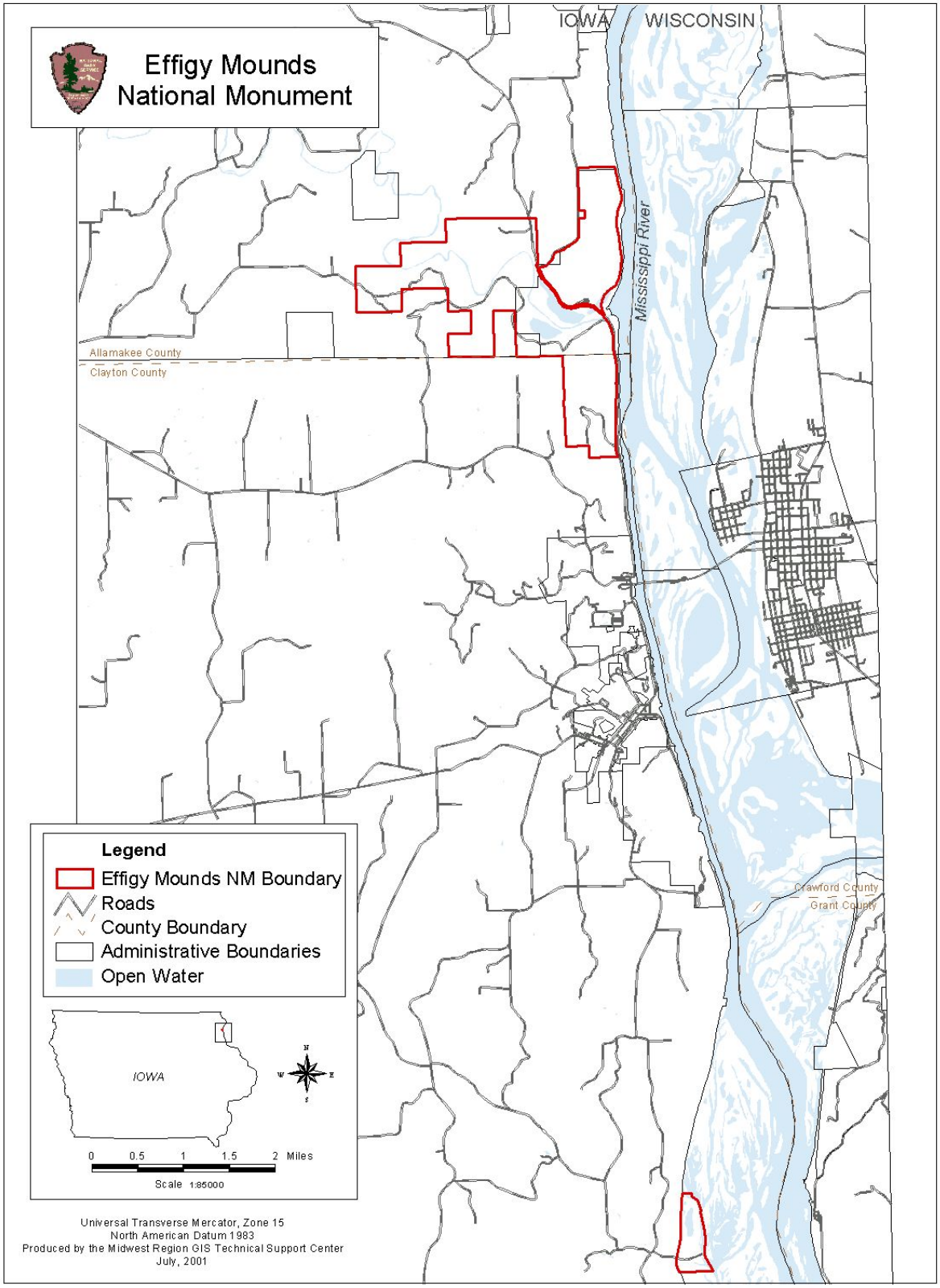
Historic Context *(1)*	**Resource Type** (2)	**Elements** (3)	**Risk Conditions Or Activities** (4)	**Resource at Risk** (5)	**Inventory Method Proposed**
		Roads/Road Berm	Ground markings Heat, carbon blackening	Berms/ruts Misc. debris	Recon survey Map No heavy equipment
	Sawmill Sites	Artifacts	Burning wood	Wood and metal remnants	Recon survey Map/flag and avoid Pretreat Removal of fuel
	Garden	Artifacts	Heat Carbon blackening Infiltration	Vegetation pattern Soils disturbance	Recon survey Map No heavy equipment
	Habitation Sites	Camp Sites	Heat Carbon blackening Infiltration	Fire hearths Misc. refuse	Recon survey Map No heavy equipment
		Structures	Heat Carbon blackening Infiltration	Fire hearths Misc. refuse	Recon survey Map/flag and avoid
Settlement Era	Communities	Villages	Burning wood Heat	Log and foundations Misc. refuse	Recon survey Map/flag and avoid Removal of fuel
		Towns	Burning wood Heat	Logs and foundations Misc. refuse	Recon survey Map/flag and avoid
	Habitation Sites	Cabins	Burning wood Heat	Logs and foundations Misc. refuse	Recon survey Map/flag and avoid
		Farmsteads	Burning wood Heat	Logs and foundations Misc. refuse	Recon survey Map/flag and avoid
		Houses	Burning wood Heat	Logs and foundations Misc. refuse	Recon survey Map/flag and avoid
		Schools	Burning wood Heat	Logs and foundations Misc. refuse	Recon survey Map/flag and avoid
		Buildings	Burning wood Heat	Logs and foundations Misc. refuse	Recon survey Map/flag and avoid
	Roads	Logging Roads	Ground markings	Berms/ruts	Map No heavy equipment
		Farm to Market Roads	Ground markings	Berms/ruts	Map No heavy equipment

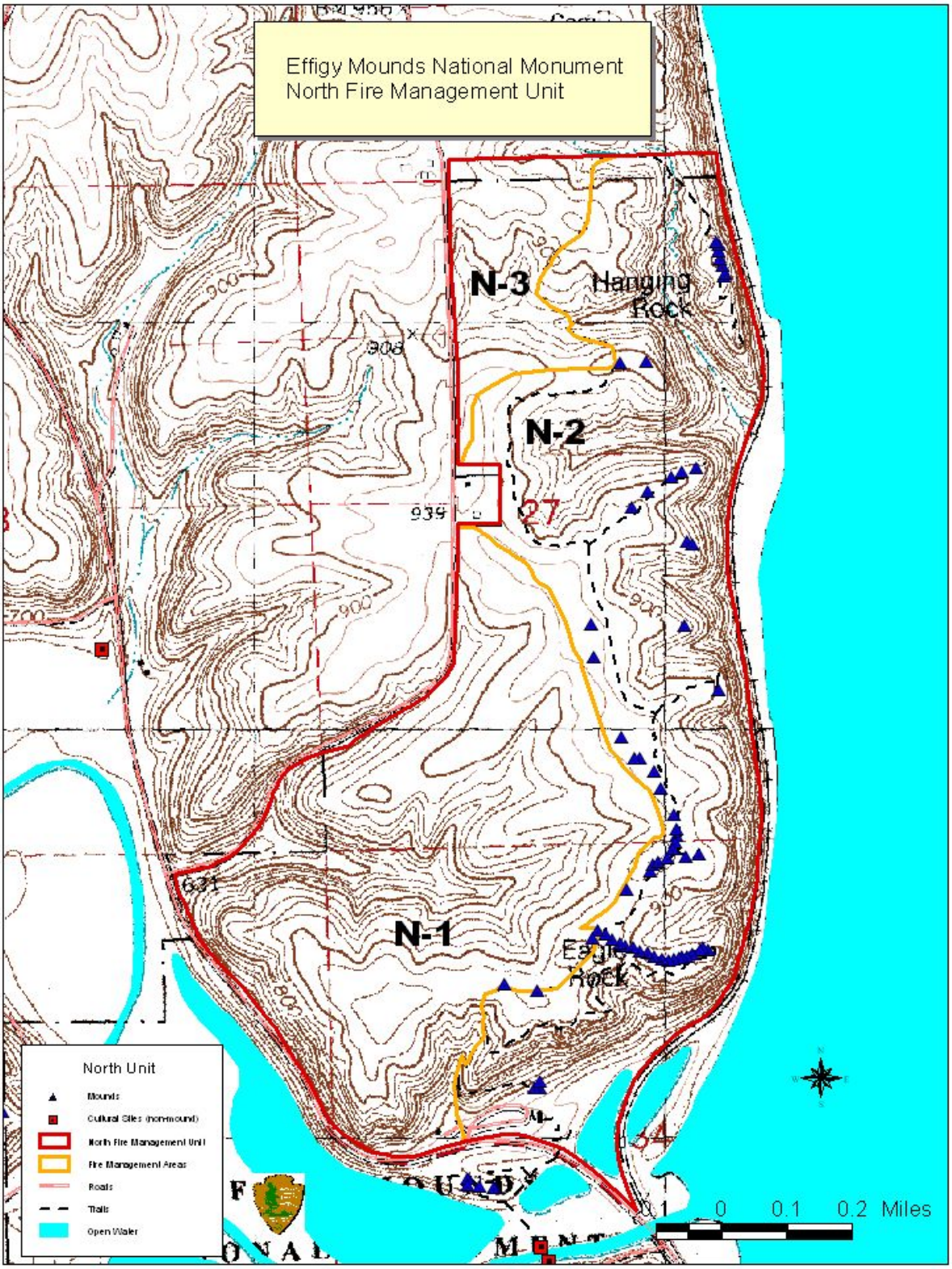
Preburn Resources at Risk Assessment for a Prescribed Fire EFMO 2001 St. Clair and Rovang

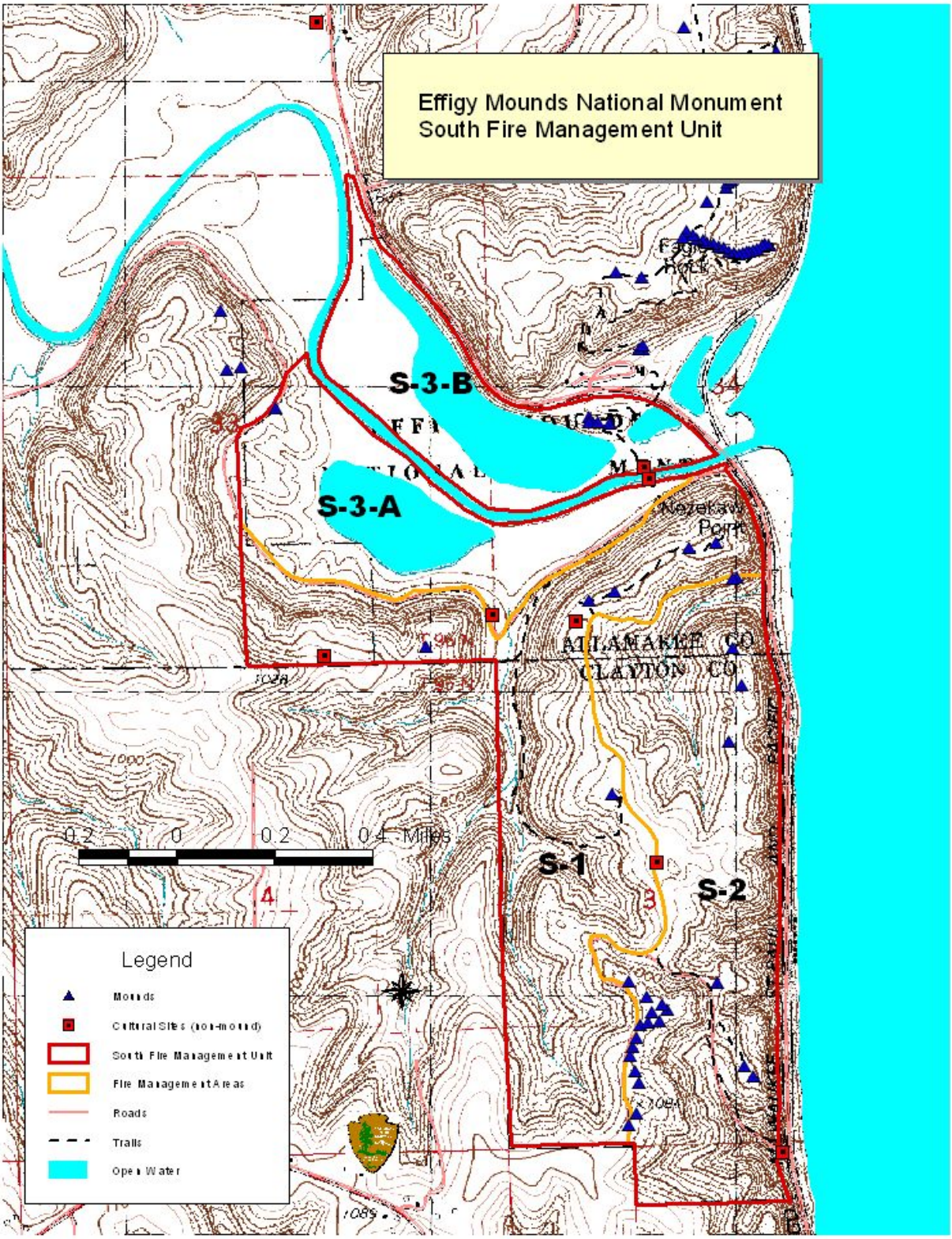
Historic Context *(1)*	**Resource Type** (2)	**Elements** (3)	**Risk Conditions Or Activities** (4)	**Resource at Risk** (5)	**Inventory Method Proposed**
	Agricultural Sites	Fields/Gardens	Ground markings Vegetation	Vegetation patterns Soil disturbance	Recon survey No heavy equipment
		Field Edge	Ground markings Vegetation	Berms	Recon survey No heavy equipment
		Wells	Heat	Remnants	Recon survey No heavy equipment
		Barnyards	Burning Wood	Remnants	Recon survey No heavy equipment
		Watering Sites	Ground markings Misc. refuse	Remnants	Recon survey No heavy equipment
	Commercial	Clamming Sites	Heat Carbon blackening	Shell Misc. refuse	Recon survey Map/flag and avoid
	Fences	Fences	Burning wood Heat	Wood and metal fragments	Recon survey Map/flag and avoid
	Refuse Dumps	Historic artifacts	Heat Carbon blackening	Cans, glass, metal, wood, leather	Map
Modern Era	Monument Development	Landscaping	Burning wood	Vegetation	Map No heavy equipment
		Buildings	Heat	Buildings and equipment	Map
		Roads	Heat	Soil disturbance	Map
		Trails	Burning wood Erosion	Soil disturbance	Map No heavy equipment
		Archaeological Sites	Heat Carbon blackening Infiltration	Misc.	Map No heavy equipment Flag and avoid

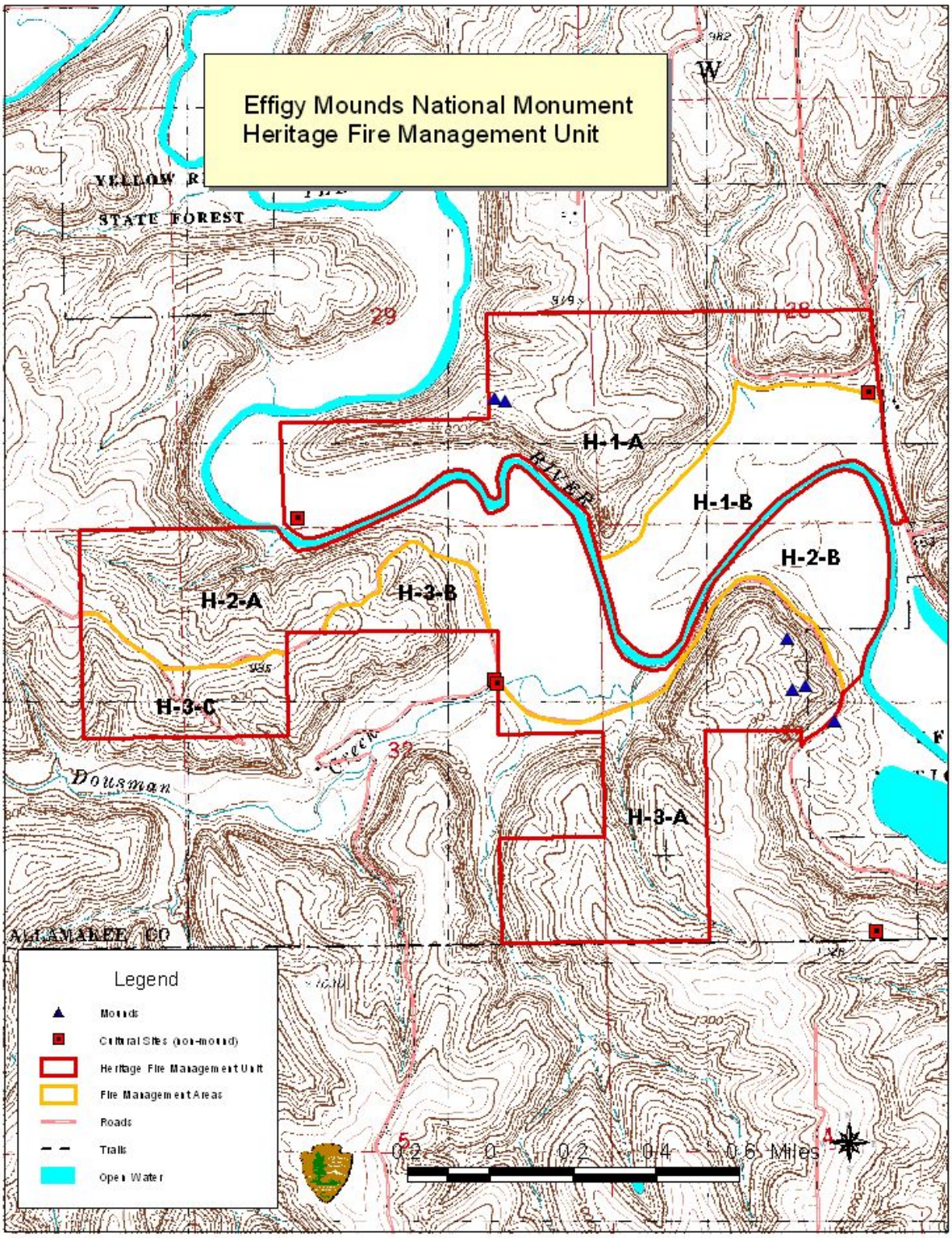
1 – Historic contexts are themes, activities, events, or time periods that are represented by cultural resources
2 – Resource types are categories of physical objects or properties that share common attributes, elements, and usually functions
3 – Elements are the basic building blocks or constituents that make up resources
4 – Risk Conditions or Activities are the project actions that could damage elements of resource types
5 – Resources at Risk are those resources that have cultural value and are likely to be damaged by fire activities

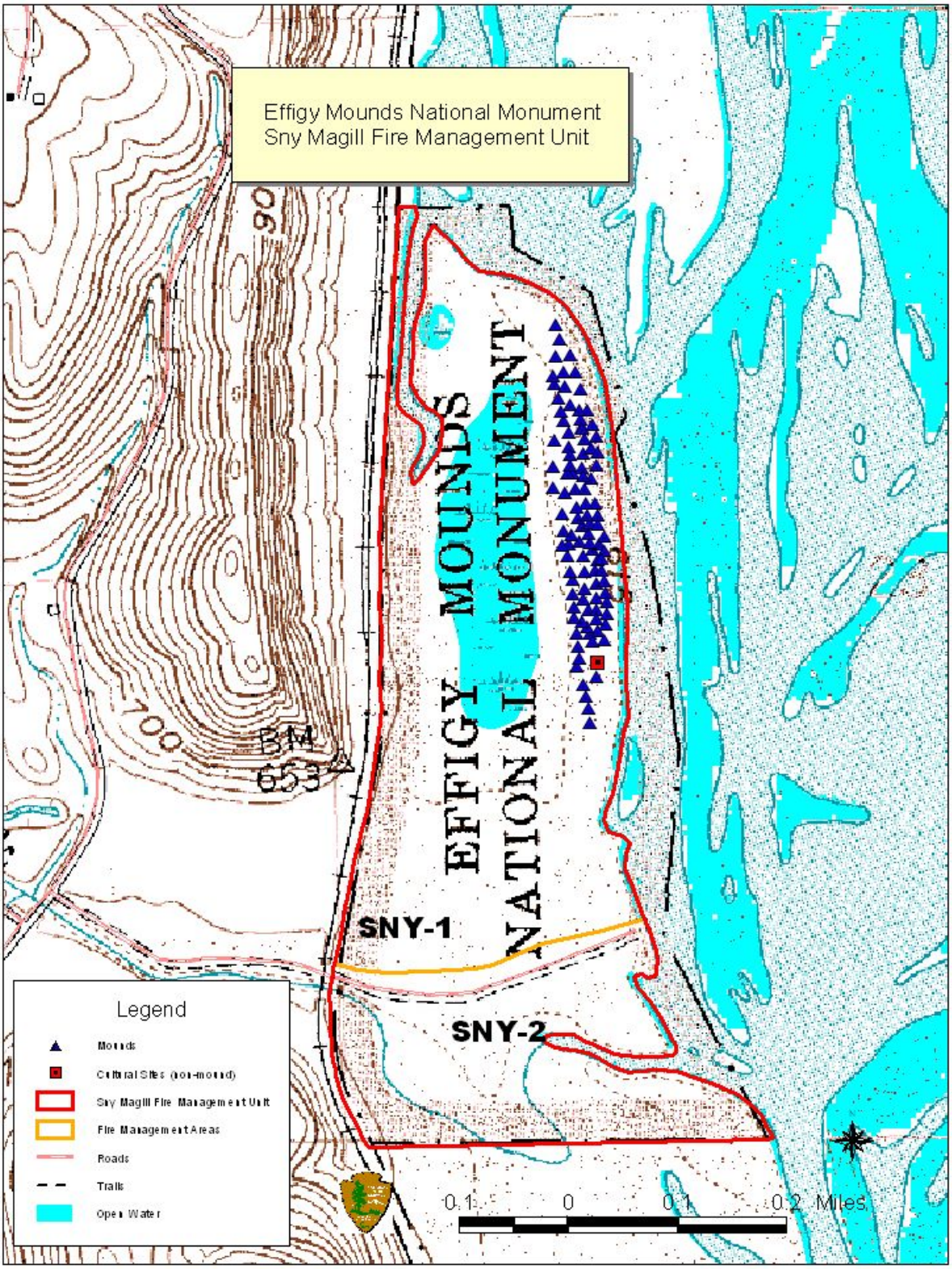
APPENDIX E(a): MAPS




Effigy Mounds National Monument
North Fire Management Unit
N-3
Hanging Rock
N-2
N-1
Eagle Rock
North Unit
Mounds
Cultural Sites (non-mound)
North Fire Management Unit
Fire Management Areas
Roads
Trails
Open Water
0.1 0 0.1 0.2 Miles


Effigy Mounds National Monument
South Fire Management Unit
S-3-B
S-3-A
S-1
S-2
Nezekan Point
ALLAMAKEE CO
CLAYTON CO
0.2 0 0.2 0.4 Miles
Legend
Mounds
Cultural Sites (non-mound)
South Fire Management Unit
Fire Management Areas
Roads
Trails
Open Water


Effigy Mounds National Monument
Heritage Fire Management Unit
STATE FOREST
H-1-A
H-1-B
H-2-A
H-2-B
H-3-A
H-3-B
H-3-C
RIVER
Dousman
Legend
Mounds
Cultural Sites (non-mound)
Heritage Fire Management Unit
Fire Management Areas
Roads
Trails
Open Water
0.2 0 0.2 0.4 0.6 Miles


Effigy Mounds National Monument
Sny Magill Fire Management Unit
EFFIGY MOUNDS NATIONAL MONUMENT
SNY-1
SNY-2
BM 653
Legend
Mounds
Cultural Sites (non-mound)
Sny Magill Fire Management Unit
Fire Management Areas
Roads
Trails
Open Water
0 0.1 0 0.1 0.2 Miles

APPENDIX E(b): Burn Unit Information

FMU	FMA	Burn Unit	Latitude	Latitude	Acres
North	N-1	15	43 5 18	91 11 23	0.242
North	N-1	16	43 5 18	91 11 27	0.255
North	N-1	17	43 5 22	91 11 29	0.251
North	N-1	24	43 5 17	91 11 18	0.555
North	N-1	F	43 5 55	91 11 5	18.168
North	N-2	8	43 5 23	91 11 13	0.261
North	N-2	9	43 5 27	91 11 2	0.247
North	N-2	10	43 6 17	91 10 52	0.421
North	N-2	11	43 6 20	91 10 44	0.097
North	N-2	11	43 6 20	91 10 45	0.128
North	N-2	11	43 6 21	91 10 44	0.303
North	N-2	12	43 6 18	91 10 44	0.545
North	N-2	13	43 6 24	91 10 47	0.253
North	N-2	19	43 5 52	91 10 46	0.262
North	N-2	20	43 5 54	91 10 47	0.253
North	N-2	23	43 5 31	91 10 47	0.54
North	N-2	24	43 5 17	91 11 12	0.58
North	N-2	25	43 6 26	91 10 46	0.232
North	N-2	30	43 5 20	91 11 12	2.794
North	N-2	E	43 6 14	91 11 12	3.955
North	N-2	G	43 5 55	91 11 00	12.932
North	N-3	D	43 6 15	91 11 14	4.656
South	S-1	5	43 5 00	91 10 58	0.506
South	S-1	6	43 5 00	91 10 55	0.811
South	S-1	7	43 5 2	91 10 56	0.542
South	S-1	14	43 4 36	91 11 23	0.547
South	S-1	22	43 4 24	91 11 23	0.501
South	S-1	26	43 4 14	91 11 18	7.185
South	S-1	38	43 4 50	91 11 54	6.738
South	S-1	39	43 4 52	91 11 37	1.438
South	S-1	B	43 4 27	91 11 9	8.787
South	S-2	1	43 3 59	91 10 51	0.566
South	S-2	2	43 4 2	91 10 52	0.529
South	S-2	3	43 4 13	91 10 55	0.235
South	S-2	4	43 4 17	91 10 53	0.263
South	S-2	18	43 3 58	91 11 4	0.502
South	S-2	21	43 4 29	91 10 52	0.507
South	S-2	31	43 4 10	91 11 3	0.37
South	S-2	32	43 4 16	91 11 14	2.085
South	S-2	A	43 4 33	91 11 9	8.859
South	S-2	C	43 4 24	91 11 00	15.562
South	S-3-B	27	43 5 15	91 11 18	1.078
South	S-3-B	29	43 5 15	91 11 33	23.882

Heritage	H-1-A	33	43 5 53	91 13 12	9.905
Heritage	H-1-A	34	43 5 45	91 12 38	8.265
Heritage	H-1-A	35	43 6 1	91 12 10	3.473
Heritage	H-1-A	36	43 6 1	91 11 57	1.953
Heritage	H-3-A	37	43 5 17	91 12 26	2.391
Sny Magill	SNY-1	28	42 56 34	91 9 58	1.092

APPENDIX E(c): Fire Management Areas and Burn Units Descriptions

Unit Name	Size (acres)	Description	Fuel Models	Special Considerations
FMA N-1	221	Mixture of upland forest, savanna, goat prairies (BU 15, 16 and 17) and restored prairies (BU 24 and F)	1, 3, 9	Smoke on HWY 76, smoke on Smoky Hollow RD, smoke at Trudo and Kopecky residences. Mounds 54, 52, and 51, Old Schoolhouse site, Monument Buildings, Rockshelters, See Matrix.
BU-15	0.2	Goat Prairie	1	
BU-16	0.3	Goat Prairie	1	
BU-17	0.3	Goat Prairie	1	
BN-24*	1.2	Prairie Restoration	1	Smoke on HWY 76 and visitor center area.
BU-F	18.1	Prairie restoration	3, 9	Smoke at Trudo and Kopecky residence, smoke on Smoky Hollow RD
FMA N-2	245	Mixture of upland forest (BU 40), savanna (BU 13 and 30), goat prairies (BU 8, 9, 10, 11, 12, 19, 20, 23, and 25), prairie remnant (BU G), and restored prairies (BU 24 and E).	1, 3, 9	Smoke on railroad tracks and at Trudo and Kopecky residences, Mounds 1-14, 20-50, 91-96, Rockshelters, Red House Landing Site, See Matrix.
BU-8	0.3	Goat Prairie	1	
BU-9	0.2	Goat Prairie	1	
BU-10	0.4	Goat Prairie	1	
BU-11	0.5	Goat Prairie	1	
BU-12	0.5	Goat Prairie	1	
BU-13	0.3	Savanna	9	
BU-19	0.3	Goat Prairie	1	
BN-20	0.3	Goat Prairie	1	
BN-23	0.5	Goat Prairie	1	
BN-24*	1.2	Prairie Restoration	1	Smoke on HWY 76 and visitor center area.
BN-25	0.2	Goat Prairie	1	
BU-30	2.8	Savanna restoration	9	Building in Headquarters area and smoke
BU-40	11.2	Timber/Brush	9	Mounds 3-51
BU-E	4	Prairie restoration	3, 9	Smoke at Trudo and Kopecky residence, smoke on Smokey Hollow RD
BU-G	13	Prairie Remnant	3, 9	Smoke on Smoky Hollow RD and at Trudo and Kopecky residences, Mounds 92-96 and 19 and 20. See Matrix
FMA N-3	42	Upland Forest and restored prairie (BU D)	1,3,9	Smoke at McCormick, Trudo, & Kopecky residences
BU-D	4.7	Restored prairie	3, 9	Smoke at Trudo and Kopecky residence, smoke on Smoky Hollow RD
FMA S-1	275	Floodplain forest, upland forest (BU 39), savanna (BU 5 and 14), restored savanna (BU26), restored prairie, goat prairies (BU 6, 7, 22, 38, and B)	1,3, 9	Cabin site 1, mounds 62, 63, 64, 150, 68, 69-83. Rockshelters, Smoke at Schaefers Residence, See Matrix
BU-5	0.5	Savanna	9	
BU-6	0.8	Goat Prairie	1	
BU-7	0.5	Goat Prairie	1	
BU-14	0.5	Savanna	9	
BN-22	0.5	Goat Prairie	1	
BN-26	7.2	Savanna restoration	9	

Unit Name	Size (acres)	Description	Fuel Models	Special Considerations
BU-38	6.7	Brushy hillside prairie	1, 9	Cabin site, See Matrix
BU-39	1.4	Timber/Brush/Savanna	9	Mound 87, See Matrix
BU-B	8.8	Prairie remnant	3	
FMA S-2	247	Upland Forest, prairie restoration, savanna (BU18), savanna restoration (BU 32), goat prairies (BN 1, 2, 3, 4, 21, 31, A, C)	1, 3, 9.	Sara Hartwick's Cabin, Old Military Trail, Exclude Bluffs above HWY 76 from fire to prevent destabilizing the slope, Smoke at Schaefers residence, Rockshelters, Mounds 65-67, & 69-86, See Matrix
BU-1	0.6	Goat Prairie	1	
BU-2	0.5	Goat Prairie	1	
BU-3	0.2	Goat Prairie`	1	
BU-4	0.3	Goat Prairie	1	
BU-18	0.5	Savanna	9	
BN-21	0.5	Goat Prairie	1	
BU-31	0.4	Goat Prairie	1	
BU-32	2.1	Savanna restoration	9	Mounds 69-75
BU-A	8.9	Prairie Remnant	3	
BU-C	15.5	Prairie remnant	3, 9	Sara Hartwick's Cabin. See Matrix
FMA S-3-A	123	Floodplain forest	9	Footbridge and cabin site, smoke on HWY 76, smoke in monument developed area. Mound 99, See Matrix
FMA S-3-B	125	Floodplain forest (BU 27 and 29)	9	Smoke on highway, Boardwalk, mounds 58-61, Smoke in monument developed area, See Matrix
BU-27	1.1	Prairie Restoration	1	
BU-29	23.9	Cattail Marsh	3	Smoke on HWY 76 and visitor center area
FMA H-1-A	266	Upland Forest , riparian forest, oak savanna (BU 33 and 34), goat prairie (BU 35, 36, 37)	1, 9	Smoke on HWY 76 and Kluesner and Hamman residences, Two bear mounds, Jefferson Davis Sawmill Site, cabin site, See Matrix
BU-33	9.9	Oak savanna ridge top	9	Two Bear Mounds adjacent to unit, Jeweled shooting star
BU-34	8.3	Oak savanna	9	
BU-35	3.5	Goat Prairie	1, 9	Potential of remnants of disturbed burial mounds, See Matrix
BU-36	2	Goat Prairie	1, 9	Potential remnants of disturbed burial mounds, See Matrix
BU-37	2.4	Goat Prairie	1, 9	
FMA H-1-B	116	Floodplain forest	9	Smoke on HWY 76. Smoke at Hamman residence
FMA H-2-A	239	Upland Forest, riparian forest, reed canary grass.	3, 9,	Smoke at Ambrose residence
FMA H-2-B	73	Floodplain forest	9	Smoke on HWY 76
FMA H-3-A	206	Upland Forest, riparian forest, goat prairie	9	Purple Fringed Orchid. Mounds 97, 98, 0, See Matrix
FMA H-3-B	34	Upland forest	9	
FMA H-3-C	64	Upland forest	9	Smoke at Ambrose residence
FMA SNY-1	87	Floodplain forest, prairie remnant (BU 28)	1, 9	Mounds 1-100, Cabin site. Smoke on entrance road and railroad tracks, See Matrix
BU-28	1.0	Riparian savanna	1	
FMA SNY-2	35	Floodplain forest	9	Smoke on entrance road and railroad tracks.

APPENDIX E (d): Effigy Mounds National Monument prescribed fire record

Unit	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
A	4/29			5/12			5/10				5/13		5/10			4/28
B			5/3			5/13			5/1			10/25			4/22	
C	4/29 (C2)	4/18 (C1)			5/13			5/6			5/14			5/9		
D	4/29					5/12				5/20						4/28
E		4/19				5/13				5/21					4/22	
F						5/13		5/5					5/10			
G					5/13	5/12	5/13					10/26				
1	4/30															4/28
2		4/19		5/12						5/12						4/28
3								5/3								
4	5/1															
5								5/3								
6	5/7															4/29
7			5/8								5/13					4/29
8						4/29										
9					4/30										4/23	
10						4/29										
11								4/28								4/28
12					4/28					5/14						
13								4/28								4/28
14					4/29							4/14				
15					4/30											
16	5/7															
17										5/13						
18					4/29											
19						4/29										
20									5/2							
21		4/18			5/31				5/6							
22						5/10										
23					4/30										4/22	
24				5/8	4/29		5/3	4/28*								
25					4/28											4/28
26							10/26									
27								5/2								
28																
29																
30							4/22									
31							4/22									
32												4/14				
40															4/23	

*partial

APPENDIX E(e): Records and Reports Required

Record/Report	Frequency	Responsibility Of	Distribution
DI-1202 Fire Report	Per Incident	Resource Manager Incident Commander	Monument Fire Management Officer SACS*
DI-1202 Computer Entry	Within 10 days	Resource Manager	Monument SACS*
Fire Weather Records	N/A		
Fire Atlas	As Needed	Resource Manager	Monument
Fire Management Plan Revision Environmental Assessment	5 years	Resource Manager	Monument Fire Management Officer Midwest Regional Office
Situation Report	N/A		
Fire Danger/Staffing Class	Daily during fire season	Resource Manager	Monument Superintendent District Rangers
Wildland Fire Situation Analysis	Per extended attack fire	Incident Commander Monument Superintendent	Fire Management Officer Monument Superintendent Monument Fire Coordinator
Rx Fire Plan	Per Rx Fire	Rx Burn Boss Resource Manager	Monument Superintendent Fire Management Officer Midwest Regional Office
Red Cards	Annual	Resource Manager	Monument Fire Coordinator Monument
Hazard Fuel RM Project Accomplishment Reports	Per Project	Resource Manager	Monument SACS
FIREPRO funding requests for Rx fires	Annual	Resource Manager	Fire Management Officer Midwest Regional Office
Supplemental FIREPRO Budget Requests	Annual	Resource Manager Regional Fire Management Officer	Monument
Wildfire Reviews	As Needed	Resource Manager	Monument Midwest Regional Office
Wildfire Critique	As Needed	Fire Team	Monument

*Shared Applications Computer System

APPENDIX E(f): Fire Cache Inventory

Item	Number	Item	Number
Tools		***Sawyer/Feller Equipment (con't.)***	
Axe, small	1	Harness cables	2
Axe, large	1	Hoist	1
Bags, bladder (old)	8	Line, Large w/snaps	1
Bags, bladder (new)	1	Line Loop, large	1
Combi-tools	3 (need guards)	Line, misc. old	2 rolls 100 & 50 '
McLeods	8	Line, misc. small	1
Pulaski	4	Marker, paint	1 sm. Cyl.
Pulaski handle	1	Pulley	1
Pump, hand (trombone)	8	Tree Wrap Kit	1
Scraper/swatter, metal	1	Tree Wrap	4 partial rolls
Scraper/swatter head, metal	1	Wedges	3
Saw, hand	1	Wrap, Arm	1
Hose-Hardware		Wrench	2
Hose, 1 ½" 50' rolls	14	***Personal Protective Equipment (PPE)***	
Hose ½"	2	Bags, red	5
Hose, Suction 6' lengths	2	Bags, sleeping	5
Nozzles	5	Bags, war	5
Nozzles, Garden Hose	2	Fire shelter w/hard pack	6
Reducers	4	Fire shelter, practice	1
Wye's	3	Fire shelter, practice (opened)	1
Large Equipment for Fire		First Aid Kit	7
ATV	1	Goggles, new style	2
ATV w/dump box	1	Goggles, old style	2
Blower, leaf	1	Hardpacks, fire shelters	9
Cart (2 ton) for moving pumper	1	Headlamp, large case	12
Chainsaws	1	Headlamp, small case	5
Gantry with Hoist (2 ton)	1	Helmets	7
Pumper, Slip-on 250 gal. w/foam	1	Jump suits, Nomex	2
Trailer, 100 gal. w/pump (ATV)	1	Packs, line	9
Sawyer/Feller Equipment		Pants, Nomex	35
Chaps	4	Plugs, ear	100 pr.
Files	1	Pad, sleeping	1
File Handles	2	Shirts	18
Gloves, insulated leather	1 pr.	Shroud	3
Harness, full	2	Tent	4

APPENDIX E(g): Fire contacts

Wildland Fire Incident
TYPE III INCIDENT COMMANDERS:

Randall Mell (507) 724-5264 work
DNR Forestry (507) 458-6886 cell
603 N. Sprague St.
Caledonia, MN 55921

John Kelly (507) 765-2740 work
DNR Forestry
912 Houston St. NW
Preston, MN 55965

Thomas Romaine (507) 359-6059
DNR Forestry – Regional Office
1200 South Broadway
P. O. Box 607
New Ulm, MN 56073

Minnesota Interagency Fire Center
402 SE 11th St. (218) 327-4436
Grand Rapids, MN 55744

Rolla Dispatch Center (573) 341-7484
Chris Accetturo
Forest Dispatcher Zone 1
Rolla, MO

Prescribed Fire Contacts:

McGregor/Marquette Unified Police	(563) 245-2220 or (563) 873-2500
McGregor/Marquette Fire Department	(563) 245-2220 or (563) 873-3896
Waukon Fire Department	(563) 568-2289
Emergency	(563) 568-3421
Harpers Ferry Fire Department	(563) 568-4521
Allamakee County Sheriff	(563) 568-4521
Clayton County Sheriff	(563) 245-2422
Allamakee County Conservation Officer	(563) 380-0801
Bill Collins - contact Sheriff's Office (C-345)	
Clayton County Conservation Officer	(563) 880-0422
Brian Smith – contact Sheriff's Office (C-322)	
Clayton County Conservation Officer	(563) 880-0108
Stan Blair – contact Sheriff's Office (C-161)	
Adjacent Landowners:	
Leslie Ambrose	(563) 539-2232
Brian Hamann	(563) 586-2110

Mike Kluesner	(563) 873-3839
Thomas McCormick	(563) 586-2104
Nelson Brothers Logging	(608) 326-8456
Leo Schaefers	(563) 873-2184
Rick Trudo	(563) 586-2718
Yellow River State Forest	
Area Forester	(563) 586-2254
Ranger	(563) 586-2548
Pike's Peak State Park	(563) 873-2341
U.S. Fish and Wildlife Service	(563) 873-3423

Midwest Regional Office:

Fred Bird	(402) 221-3475 work
Fire Management Officer	(402) 630-0685 cell
Doug Alexander	(402) 221-4994 work
Fuels Management Specialist	(402) 250-1233 cell
Bobby Bloodworth	(573) 323-4236 work
Fire Management Officer	(417) 331-4431 cell
Jim DeCoster	(402) 221-3859 work
Fire Ecologist	(402) 250-7844 cell
Connie Burns	(402) 221-3476 work
Fire Program Assistant	(402) 676-7256 cell

National Park Service Contacts

Buffalo National River	
James Mattingly (FMO)	(870) 741-5446 x 281
Wind Cave National Park	
M. William Gabbert (FMO)	(605) 745-1156
Shaun Larson (Supv. Forest Tech)	(605) 673-2061 x 1245
Indiana Dunes National Lakeshore	
Terry Layne Conley (Res. Coor. Fire)	(219) 926-7561 x 353
Peter Budde, MWR GIS Coordinator	(608) 265-3515
Kathie Hansen	(608) 263-7689
Regional Fire GIS Specialist	

APPENDIX E (h): Cooperative Agreements

Rural Fire Departments are mutual aid volunteer organizations.

Cooperative agreements will be developed in the future with Yellow River State Forest and private citizens regarding fire and mechanical hazard fuel reduction.

APPENDIX F: WILDLAND AND PRESCRIBED FIRE MONITORING PLAN

This is under development at the current time and will be added to the Fire Management Plan when it is complete.

APPENDIX G: PREATTACK PLAN

COMMAND

All wildfires and prescribed fires out of prescription will be suppressed

Prepositioning of equipment is not needed above that equipment that is available in the monument fire cache (Appendix E (f)) However, the cache is in need of additional items which will be purchased as funded become available.

Fire management constraints:

1) Cultural resources restrict the methods that can be employed when suppressing a wildfire (Appendix D).
2) Erosion potential exists on the bluff above Highway 76 and the railroad along the Mississippi River in the South Unit
3) Vehicular access is limited in many areas due to extreme topographical relief.

Evacuation of visitors and non-essential monument staff will be implemented.

Structural protection needs:

1) Headquarters and visitors center at the south end of the North Unit near the Yellow River.
2) Residences less than one mile from the western boundary of the Heritage Addition.
3) Residences less than one mile from the western boundary of the North Unit
4) Residences less than one mile from the western and southern boundary of the South Unit
5) The town of Marquette, which is, lies approximately one mile south of the southern boundary of the South Unit.
6) Residence less than one mile west of the Sny Magill Unit.

In the event of an extended wildfire event in the monument, all trails will be closed to visitors.

LOGISTICS

The Incident Command post, base, and camp locations will be at the monument headquarters area or at Yellow River State Forest which adjoins the monument property.

Access to the monument headquarters is via State Highway 76 between Marquette and Waukon. Access to the monument property is limited to service roads and trails. Trails will not support large vehicular traffic. Heavy equipment access will be limited/restricted because of detrimental impacts on the cultural resources including the mound structures.

Normal infrastructure utilities are available at the monument headquarters. These include water, sewer, electrical, and telephone. An intrapark radio system is in place with communications through the DNR repeater tower available.

Medical facilities are available across the river in Prairie du Chien (physician and hospital). These are within 10 minutes of the monument headquarters via State Highway 76 and US Highway 18.

Restaurants and service stations are available in Marquette approximately one mile south of the monument on Highway 76; more extensive services are available in Prairie du Chien and McGregor.

A small municipal airport is located 2 miles southeast of Prairie du Chien, Wisconsin. This airport has a lighted runway from dusk to dawn, a lighted wind indicator, no control tower, and a white/green beacon. It is open for public use. Runway 14/32 is 5000 feet long, in good condition and can handle single wheel to 30,000 pounds and double wheel to 60,000 pounds. Runway 11/29 is 3999 feet long, in fair condition and can handle single wheel to 24,000 pounds and double wheel to 40,000 pounds. Additional information can be found at www.airnav.com/airport/KPDC. Forest Service helicopters are available at Rhinelander, WI, which is 172 nautical miles from Prairie du Chien, WI. State of Minnesota helicopters are available from MIFC at Grand Rapids, MN, 271 nautical miles from Prairie du Chien.

There are no equipment rental services in the immediate area. Construction equipment such as dozers, etc. would not be allowed to work within the monument because of negative cultural impacts.

Police and fire department information is supplied in Appendix E (g).

OPERATIONS

Helispot and helibase locations would be easily placed at the Prairie du Chien airport, which is a matter of minutes southeast of the monument across the Mississippi River. There are flight restrictions over the National Monument.

Water sources would include numerous ponds, the Yellow River and the Mississippi River. The Monument has a hydrant system with a 20,000 gallon cistern available.

Control line locations would be along the monument boundary, trails and roads. Natural barriers include the Mississippi River and the Yellow River.

Safety zones would be along the rivers and highways and at the monument headquarters.

Staging area locations would be at the monument headquarters or at Yellow River State Forest.

Planning

Maps and associated information is available on GIS and as hard copy in the monument library and archives.

APPENDIX H: LONG-TERM PRESCRIBED FIRE AND HAZARD FUEL REDUCTION PLAN

The long-term goal of the prescribed fire program at Effigy Mounds National Monument is to restore the cultural landscape of the mound building era and to remove hazardous fuel build up around the mounds, the monument infrastructure, adjacent roadways, railroads, private property, and towns (Marquette).

This is currently being accomplished by the use of prescribed fire (See Appendix H) for the 5 year prescribed fire plan. This plan calls for the burning of small areas of restored prairie and goat prairies but also the increased use of fire on the landscape with larger burns covering several hundred acres of upland forest lands.

The Wildland/Urban Interface Initiative (WUII) program is addressing the mechanical removal of dense, climax stands of trees around the forest periphery using existing fuel breaks to reduce significant fuel accumulations and potential high intensity fires. Besides removing hazard fuels near adjacent private property, fuels are also being removed around the mounds themselves to reduce the intensity of the burns being conducted in the area as well as restoration of the historic landscape of the mound builders. The WUII program has been outlined through 2012, dependent on the funds available for the program.

APPENDIX H: Five Year Prescribed Fire Plan Projection

Unit	2004	2005	2006	2007	2008
A Prairie remnant			8.9 acres		
B Prairie remnant		8.8 acres			
C Prairie remnant	15.6 acres			15.6 acres	
33 Oak savanna ridge top				9.9 acres	
40 Timber/Brush					
N-1 Upland forest, savanna, goat prairie, restored prairie	221 acres				
N-2 Mixture of upland forest, savanna, goat prairies, prairie remnant, and restored prairies.				245 acres	
N-3 Upland forest and restored prairie		42 acres			
S-1 Floodplain forest, upland forest, savanna, restored savanna, restored prairie, goat prairies			275 acres		
S-2 Upland Forest, prairie restoration, savanna, savanna restoration, goat prairies.					247 acres
Totals	236.6 acres	50.8 acres	283.9 acres	270.5 acres	247 acres

APPENDIX I: FIRE PREVENTION PLAN

Effigy Mounds National Monument lies within an area of the continental United States where the climate is usually moist and hot during the summer months (primarily June – August). The normal fire season occurs from April – May (before greenup) and again during late August, September, and October (when vegetation is mature and after frost has occurred). However, droughts do occur within a 10 to 20 year cycle. During these droughts, the relative humidity drops, 100 and 1000 hour fuels dry out increasing the risk of an extended fire event, which can occur during anytime of the year.

It is during those events that awareness and fire prevention activities need to increase. Fire ignition can come from several sources in the area.

1. Natural fires can occur during dry lightning thunderstorms.
2. Smoking activities by visitors, monument personnel, vehicle occupants, and railroad and road maintenance personnel.
3. Trash burning
4. Resource management burning
5. Equipment including power equipment, and vehicles, which access the monument along service roads.
6. Railroad fires from exhaust, brakes, or sparks from the friction between the wheels and the rails.
7. Powerlines

Source: Natural Fires

Strategy:

It has been shown (NFES 1572) that the most effective method of preventing the spread of natural fires is through hazard fuel reduction including the use of prescribed fire. Effigy Mounds National Monument implemented a prescribed fire program in 1988 and burns have been conducted annually. The Monument has also implemented a wildland/urban interface fuel reduction program, which is currently removing brush and small understory trees, which could serve as ladder fuels during a drought situation.

Source: Smoking Activities

Strategy:

One of the most effective methods of reducing smoking ignitions is through the application of education and enforcement strategies. During the normal spring and fall fire seasons and during periods of drought, signing of trails and posting of informational posters can be used to educate people to the dangers of wildfire occurrence. Another method is the restriction of smoking on trails and in wildland areas.

Source: Trash burning

Strategy:

Inform the public of increased fire danger periods through news releases.

Source: Resource management burning

Strategy:

The monument will follow the prescribed fire plan. Trained personnel will conduct the burns. Any prescribed fire out of prescription will be suppressed. Neighbors and local fire and enforcement agencies will be informed as to when prescribed fires will be occurring. Issue news releases to educate the public about the importance of prescribed fires and the precautions taking to ensure that they are carried out safely.

Source: Equipment

Strategy:

Check spark arresters on equipment to make sure that they are functioning. During drought conditions, restrict the use of motorized vehicles in the monument to service roads. Make visitors aware of fire restrictions within the monument. Maintain hard surface on access road and a mowed edge.

Source: Railroad fires

Strategy:

Be aware of potential hazards during fire seasons in the spring and fall. Monitor the area along the railroad during drought years checking for smoke visually and by smell.

Source: Powerlines

Strategy:
Be aware of windy conditions especially those that precede dry lightning storms during drought conditions. Be aware of the potential of carbon arcing under highlines when conducting prescribed fires.