FIRE MANAGEMENT PLAN

for

SCOTTS BLUFF NATIONAL MONUMENT

United States Department of the Interior
National Park Service
Scotts Bluff National Monument
Gering, Nebraska

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I. INTRODUCTION

The Fire Management Plan is an addendum to Scotts Bluff National Monument's Resource Management Plan meeting the requirements of the National Environmental Policy Act (NEPA) and serving as a detailed program of action, providing specific guidance and procedures for accomplishing wildland fire management objectives.

This document is also guided by the National Park Service (NPS) Fire Management Guideline (DO-18, 1998), which requires that any area with vegetation capable of supporting fire will develop a Fire Management Plan. The Organic Act of the National Park Service (August 25, 1916, Section 102) provides the authority for implementation of this plan.

As enacted by Presidential Proclamation dated December 12, 1919, by Woodrow Wilson, the lands of Scotts Bluff and adjoining prairie were set aside " *affording a view for miles over the surrounding country; Whereas Mitchell Pass, lying to the south of said bluff, was traversed by the old Oregon Trail and said bluff was used as a landmark and rendezvous to thousands of emigrants…"* subject to the provision of the Act of August 25, 1916 (39 Stat. 535), entitled an Act to Establish the National Park Service *"...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."*

Fire represents an ecological factor of significant importance in the development and structure of nearly every terrestrial ecosystem in North America and has been present in natural ecosystems since the origin of climate on earth (Wright and Bailey, 1982). It has been well established that the Great Plains ecosystem has historically experienced frequent, fast running, short duration fires. From the recorded accounts of early European explorers and settlers, fires were a common occurrence on the plains (Higgins, 1986). Fires were often ignited by lightning activity during the late spring to early autumn season. The writings note that the plains were often on fire as a result of Indian activities, i.e., to signal others, to herd game, to change the vegetative composition, to clear campsites, etc. Following the influx of European settlers in the mid-to-late 1800's, most human-caused prairie fires resulted from the carelessness of cowboys and cooks, rather than Indians (Wright and Bailey, 1980).

Prior to the twentieth century, fire in Scotts Bluff National Monument functioned as a natural process with frequent fire of low to moderate intensities serving to maintain the bluff summit forests and prairie ecosystems. Since the early twentieth century, inhabitants of the high plains have actively suppressed all wildfire. These suppression activities significantly altered fire's role in ecosystem maintenance through reduction of accumulated ground duff and litter, ladder fuels (fuels which permit fire to climb to tree crowns) and over-mature dense canopy. Having to suppress fires that are out of control creates the potential for higher intensity fires, adversely threatening monument resources, private lands, and public safety.

As National Park Service (NPS) management planning is becoming more intensive, fire management is assuming a role of greater importance. This wildland fire management plan has been prepared to serve as a detailed program of action, which provides specific guidance and procedures for accomplishing monument fire management objectives. The implementation of this plan will define levels of protection necessary to ensure safety and protection of facilities and resources; will minimize undesirable environmental impacts of fire management; and will define levels of fire use to restore and perpetuate natural processes given current understanding of the complex relationships in natural ecosystems.

II. POLICY COMPLIANCE

A. ENABLING LEGISLATION

Scotts Bluff National Monument was established by Presidential Proclamation on December 12, 1919 (1547-41 Stat., 1779). This proclamation defines the significance of the monument:

"Whereas Scotts Bluff is the highest known point within the State of Nebraska, affording a view for miles over the surrounding country; Whereas Mitchell Pass, lying to the south of said bluff, was traversed by the old Oregon Trail and said bluff was used as a landmark and rendezvous to thousands of emigrants and frontiersmen traveling said trail enroute for new homes in the Northwest; and

Whereas, in view of these facts as well as of the scientific interest the region possesses from a geological standpoint, it appears that the public interests will be promoted by reserving the lands on which the said bluff and the said pass are located as a national Monument.

Warning is hereby given to all unauthorized persons not to appropriate or injure any natural feature of this Monument, or to occupy, exploit, settle or locate upon any of the lands reserved by this proclamation."

One additional Act, 75 Stat. 148 passed on June 30, 1961, served to adjust the boundaries and decreased the acreage of the monument in order "...*to preserve the scenic and historic integrity of Scotts Bluff and adjacent features..."*

The Federal Register publication of December 14, 1962 (F.R. Doc. 62-12403) formally established the boundaries of the monument.

B. OTHER AUTHORITIES

The authority for FIREPRO funding (Normal Fire Year Programming) and all emergency fire accounts is found in the following authorities:

1. Section 102 of the General Provisions of the Department of the Interior's annual Appropriations Bill provides the authority under which appropriated monies can be expended or transferred to fund expenditures arising from the emergency prevention and suppression of wildland fire.

2. Public Law 101-121, Department of the Interior and Related Agencies Appropriation Act of 1990 established the funding mechanism for normal year expenditures of funds for fire management purposes.

3. 31 USC 665 (E) (1) (B), provides the authority to exceed appropriations due to wildland fire management activities involving the safety of human life and protection of property.

Authorities for procurement and administrative activities necessary to support wildland fire suppression missions are contained in the Interagency Fire Business Management Handbook. Authorities to enter into agreements with other federal bureaus and agencies; with state, county, and municipal governments; and with private companies, groups, corporations, and individuals are cited in NPS-20 (Federal Assistance and Interagency Agreements).

Authority for interagency agreements is found in *Interagency Agreement between the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service of the United States Department of the Interior and the Forest Service of the United States Department of Agriculture (1982).* Authority for rendering emergency fire or rescue assistance outside the National Park System is the Act of August 8, 1953 (16 USC 1b(1)) and the Departmental Manual (910 DM).

Existing agreements pertaining to implementation of the fire management program are cited or included in Appendix F.

C. DEPARTMENT OF THE INTERIOR POLICY

Department of the Interior policy regarding wildland fire, the1995 Federal Wildland Fire Management Policy, the Review and Update of the Federal Wildland Fire Management Policy, January, 2001; and the Wildland and Prescribed Fire Management Policy, Implementation Procedures Reference Guide, 1998; state that all wildland fires will be classified as either wildfires or as prescribed. Prescribed fires are any fires ignited by management to meet specific objectives. Wildfires are defined as any nonstructural fires that occur in the wildland, other than prescribed fires. Wildfires can further be classified into two types based on their management – Wildland Fire Use for Resource Benefits (WFUFB) or suppression. Wildland fires can, but do not always, achieve burning capable of causing loss of life, detrimental impacts upon natural resources, and damages to human-made developments. Prescribed fires are conducted under prescription and on a predetermined area that will accomplish specific management objectives. Prescribed fire objectives employ fire scientifically to realize maximum benefits at acceptable costs. The methods employed in prescribed fires will have the least damage to resources and the environment.

D. NATIONAL PARK SERVICE POLICY

Director's Order #18: Wildland Fire Management directs each park with vegetation capable of burning to 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. All fires burning in natural or landscaped vegetation in parks will be classified as either wildland fires or prescribed fires. All wildland fires will be effectively managed, considering resource values to be protected and firefighter and public safety, using the full range or strategic and tactical operations as described in an approved fire management plan. Prescribed fires are those fires ignited by park managers to achieve resource objectives and will include monitoring programs that record fire behavior, smoke behavior, fire decisions, and fire effects to provide information on whether specific objectives are met.

All parks will use a systematic decision making process to determine the most appropriate management strategies for all unplanned ignitions and for any prescribed fires that are no longer meeting resource management objectives. Parks lacking an approved fire management plan may not use resource benefits as a primary consideration influencing selection of a suppression strategy, but they must consider the resource impacts of suppression alternatives in their decision.

The full range of suppression strategies will be considered by the superintendent guiding suppression efforts. Methods used to suppress wildland fires should minimize impacts of the suppression action and the fire, commensurate with effective control and resource values to be management operations.

III. MANAGEMENT GOALS AND OBJECTIVES

A. RESOURCE MANAGEMENT GOALS AND OBJECTIVES

Prescribed burning which involves using fire with consideration of vegetation and weather conditions maximizes the benefits of fire. It may be used to address the following resource management goals and objectives for the park. They include, but are not limited to, the following:

Goals

- Use prescribed fire to maintain the historic scene of the bluffs as the bluffs and surrounding countryside appeared to the emigrants.
- To the extent practical use prescribed fire as a tool to restore the ecosystem to the condition existing prior to settlement by Europeans.
- Restore the mosaic pattern of different plant communities associated with post fire stages.
- Rehabilitate prairie restoration areas that have been planted or become established with non-native grasses, such as an abandoned golf course and old home sites.
- Restore fire to its role as a critical component of the ecosystem.

Objectives

- Alter current vegetation composition in natural areas from less desirable plant species, such as the non-natives Japanese brome, smooth brome, downy brome, Kentucky bluegrass, kochia and Russian thistle, to more favorable or native plant species.
- Reduce broadleaf tree concentrations especially in ravines, along the floodplain of the North Platte River, and along irrigation canals within the monument.
- Reduce the extent of the ponderosa pine, Rocky Mountain juniper and eastern red cedar encroachment into the mixed-grass prairie.

B. FIRE MANAGEMENT GOALS AND OBJECTIVES

Scotts Bluff National Monument's fire goals are as follows:

Goals

- Reduce the incidence and extent of human-caused fires.
- Use fire to meet fire management objectives.
- Protect life, property, and monument resources from the effects of unwanted fire.
- Prevent the adverse impact from fire suppression.

Scott Bluff National Monument's fire objectives to achieve these four goals are as follows:

- Prevent unplanned human-caused ignitions through a cooperative fire prevention program aimed at the monument visitors and staff.
- Minimize the occurrence of unwanted (human-caused) fires through reduction of hazard fuels by prescribed fire and/or mechanical treatment in and around developed areas. Mechanical treatment would include mowing, thinning of trees and chipping of tree branches.

- Where applicable restore fuel loads and plant community structure and composition to ranges of natural variability comparable to pre-European settlement using prescribed fire.

- Minimize the occurrence of unnaturally intense fires through reduction of hazard fuels by prescribed burning.

- Train monument staff and cooperators to conduct safe, objective-oriented prescribed fires consistent with Director's Order #18 requirements.

- Provide opportunities for public understanding of fire ecology principles, smoke management, and wildland fire program objectives.

- Monitor and evaluate the effectiveness of the prescribed fire program.

- Provide for the safety of monument visitors, neighbors, and employees during all phases of wildland fire management operations.

- Suppress all unplanned fires in the monument.

- Cooperate extensively with adjacent landowners to facilitate safe and prompt suppression of wildfires.

- Suppress all wildfires with minimal cost, environmental and cultural impacts.

- Develop and maintain a redcard qualifications program to ensure the monument has a minimum of qualified firefighters.

- Develop and maintain cooperative agreements and training with local firefighting resources for suppression and prescribed fire.

- Suppress unplanned fires commensurate with values at risk.

- Use minimum impact fire suppression techniques and rehabilitate disturbed areas to protect natural, cultural, and scenic resources from adverse impacts attributable to fire suppression activities.

- Engender the understanding among monument staff and firefighters about the impacts of fire suppression on sensitive monument resources.

- Ensure that a resource advisor is present on all major suppression actions.

IV. LANDSCAPE VISION

Landscape Visions (Desired Future Conditions) have been determined for the four monitoring types at Scotts Bluff National Monument. Monitoring codes in parentheses follow the format outlined in the fire monitoring handbook.

Needle and Thread/Needleleaf Sedge (GSTCO1D01)

- Maintain or increase native grasses and sedges
- Increase short-term forb density and number of species
- Decrease non-native species

A literature search has been initiated to determine the landscape vision for native prairie at Scotts Bluff National Monument. Western wheatgrass, needle-and-thread mixed grass prairie is believed to be the pre-settlement vegetation for the area (Kuchler, 1964). The exact composition of the communities before settlement is unknown. The fire return intervals reported vary from as short as 5 years in level to gently rolling topography to 15-30 years in more broken topography at Scotts Bluff National Monument, Nebraska (Wendtland and Dodd, 1992). Most areas near the base of the bluffs would have had a shorter return interval. The North Platte burn unit has badlands topography around it and has an appropriately longer interval between burns. Also, the summits of Scotts Bluff and South Bluff have an appropriately longer interval between burns.

The community when maintained by fire will have reduced amounts of exotic cool season grasses and weedy annuals such as kochia (*Kochia scoparia*) and Russian thistle (*Salsola iberica*). Native grass densities would be increased or maintained. The natural diversity of associated native species would be preserved or increased. There would be short-term (2-4 years post burn) increase in native forbs. With continued burning, we will improve knowledge of the fire effects in this community type.

Reseeded/Restored Prairie (GBOCU1D01)

- Increase native grass, both density and number of species.
- Decrease exotic grass and weedy exotic annuals - kochia and Russian thistle.
- Increase native forbs by potential plants spreading from surrounding native prairie.

Most areas of disturbance are flat to rolling terrain. The areas in this type were farmed or used as a golf course. It is believed that the fire return interval in these areas would have been short. This monitoring type requires a more vigorous approach to controlling exotic vegetation.

The community when maintained by fire will have reduced amounts of exotic cool season grasses, and weedy annuals like kochia (*Kochia scoparia*) and Russian thistle (*Salsola iberica*). Native grass density would be increased or maintained. A gradual increase in the number and types of forbs will be seen as they spread into these areas from adjacent native prairie. Over time, this monitoring type will gradually resemble needle-and-thread/needleleaf sedge.

Snowberry Shrubland (BSYCO1D04)

- Increase availability of browse for deer.
- Increase in shrubs that sprout with fire – snowberry (*Symphoricarpos occidentalis*).

A literature search has been initiated to determine the landscape vision for snowberry shrublands at Scotts Bluff National Monument. Western wheatgrass, needle-and-thread mixed grass prairie is believed to be the pre-settlement vegetation for the area (Kuchler, 1964). The shrubland normally occupies lower-

slopes of escarpments and walls, and beds of draws and channels on the plains. Soils are colluvial silt and sandy loam and not rapidly drained. The fire return intervals reported vary from as short as 5 years in level to gently rolling topography to 15-30 years in more broken topography at Scotts Bluff National Monument, Nebraska (Wendtland and Dodd, 1992). These areas would have burned less frequently due to the mesic nature of the sites compared to the surrounding prairie.

The community when maintained by fire will have increased availability of browse for deer. Snowberry (*Symphoricarpos occidentalis*), shunkbush sumac (*Rhus aromatica*), and poison ivy (*Toxicodendron rydbergii*) are all common shrubs in this community. All of these shrubs are vigorous sprouters and will increase after fire. The historical pictures of the area show less shrub cover than is now present. Without the presence of large ungulates, the shrub cover will increase.

Juniper Slopes and Draws (FJUSC1D02)

- 10% reduction per burn of juniper.
- Increase mortality of juvenile trees.
- Keep shelter, cover and structure for deer, birds and small mammals.

A literature search has been initiated to determine the landscape vision for juniper slopes and draws at Scotts Bluff National Monument. Western wheatgrass, needle-and-thread mixed grass prairie is believed to be the pre-settlement vegetation for the area (Kuchler, 1964). The juniper occupies narrow draws on steep (15-45 percent) upper- and mid-slopes of escarpments. On the southwestern part of the monument, this community can be found in steep-sided ravines cutting through grassy uplands. Sites are often quite eroded and soils are poorly developed loose, loamy sands. The exact composition of these communities before settlement is unknown. The fire return intervals reported vary from as short as 5 years in level to gently rolling topography to 15-30 years in more broken topography at Scotts Bluff National Monument, Nebraska (Wendtland and Dodd, 1992). These areas would have burned less frequently due to the broken topography and bare ground present in the community.

The community when maintained by fire will have less overstory juniper (*Juniperus scopulorum* and *J. virginiana*) with each successive burn, keeping the mortality to 10 percent or less. This will help maintain shelter, cover, and structure for deer, birds, and small mammals. Mortality for the juvenile trees encroaching in the prairie will be high. The understory vegetation is very sparse. The annual exotic bromes, cheatgrass (*Bromus tectorum*), and Japenese brome (*B. japonicus*) both occur in this system and can be expected to increase in the short-term (1-5 years) after prescribed fire.

V. DESCRIPTION OF AREA

Scotts Bluff National Monument contains 3,003.03 acres of prairie and bluff habitat, situated in Scotts Bluff County in western Nebraska. The monument abuts the North Platte River on the north and is adjacent to the City of Gering, to the east, and the City of Scottsbluff to the north. This massive 800 foot high promontory above the North Platte River became a notable natural landmark and resting place along the Oregon/California/Mormon and Pony Express trails during the early to middle nineteenth century. The monument was established in 1919 by Presidential Proclamation. It is recognized primarily for its historical significance and unique geological features, the latter consisting of steep, rocky, siltstone and sandstone bluffs and areas of badlands formations. The monument also contains significant fossil deposits within its geological strata.

Scotts Bluff National Monument's developed zone is located approximately two miles west of Gering on State Highway 92. These facilities include a 6,700 square foot museum/visitor center, a 1,140 square foot administrative building, a ranger residence, a 4,000 square foot maintenance building, a maintenance yard, an employee parking lot, and a visitor parking lot. Originating from the visitor center are a bicycle trail to the east boundary, and a foot trail to the Oregon Trail remnant. Another foot trail, Saddle Rock Trail, leads to the top of Scotts Bluff. A 1.6 mile paved road allows visitors to drive to the summit of Scotts Bluff. This summit road passes through three tunnels and terminates at the summit parking lot. On the summit is an additional one-half mile of paved trails.

The purpose of the monument's designation is to preserve the existing remains of the trails and trail experience; the natural resources, including associated flora and fauna; the scientific interest in the geology of the bluff, which includes the fossils of the area; and the scenic views one has from the summit of Scotts Bluff.

A. LOCATION

Within Scotts Bluff National Monument's legislated boundary there is combined federal and non-federal 3,003.03 acres. The monument consists of prairie and bluff habitat, situated in the panhandle region of western Nebraska. The monument abuts the North Platte River to the north, the City of Gering, Nebraska, to the east and private farm/ranchland to the south and west. State Highway 92 traverses the monument, paralleling the path of the Oregon Trail.

B. CLIMATE

Scotts Bluff National Monument has a continental climate characterized by cold winters and hot summers with large variations from day to day. Annual precipitation is approximately 14.5 inches, most of which falls during the spring and summer, usually with thunderstorms. June receives the highest average precipitation during the year. Average maximum daytime temperatures reach their highest levels during the summer months. Average annual minimum temperature is 33 degrees, average maximum temperature is 63 degrees. Average snow accumulation is 42 inches. Average wind speed is 10.6 mph; however, during thunderstorms locally strong winds are common. Strong winds also accompany the passages of cold fronts and warm chinook winds from the Rocky Mountains.

C. TOPOGRAPHY, GEOLOGY, AND SOILS

Located in the North Platte River valley in the Nebraska panhandle, Scotts Bluff National Monument has a massive promontory rising about 800 feet above the North Platte River. The monument consists of at least four associations of native vegetation. The moderately dense, short to medium tall grassland designated wheatgrass-needlegrass prairie occurs on the less eroded summits and on gently sloping terraces at lower elevations. Dominant species are western wheatgrass, blue grama, needle-and-thread, green needlegrass, buffalo grass, and sedges. On the summits and steep sheltered slopes, ponderosa

pine and rocky mountain juniper occur with understory components of western wheatgrass, blue grama, and needle-and-thread. The remainder of the area on the slopes is a mixture of shrubby and herbaceous plants, designated as sage-bluestem prairie. The floodplain association along the North Platte River consists of cottonwood, willow, poison ivy, reed-canary grass, and other vegetation typical of the floodplain.

Topographically, the bluffs rise steeply to an elevation of 4,649 feet above the North Platte River. The landscape is broken by bluffs, deep ravines, badlands, roads, trails, creeks, and irrigation canals.

The monument's geological character is one of alluvial sediments, comprised of deposition from parent Rocky Mountain material and from volcanic eruptions. The deposition material is made up of sandstone, siltstone, and volcanic ash, which were deposited 40-60 million years ago. The soil is moderately to steeply sloped, of rapid permeability, and low water capacity.

D. VEGETATION

Observations taken in the monument indicate that there are no identified plant species that appear on the federal endangered or threatened species list.

Since the monument was established in 1919, the major change in the plant community has been the steady expansion of woody plants at the expense of the prairie habitat. The association of the prairie environment as well as that of the floodplain and badlands areas are considered in this plan.

1. Prairie Grassland Zone

   This zone consists of 2,604 acres and comprises 87% of the total acreage within the monument. It includes the relatively flat prairie surrounding Scotts Bluff and South Bluff as well as the grassy slopes leading to their summits. Native grasses such as little bluestem (*Schizachyrium scoparium*), needle-and,thread (*Stipa comata*). big bluestem *(Andropogon gerardi)*, side oats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), buffalograss (*Buchloe dactyloides*), and western wheatgrass (*Agropyron smithii*) are present throughout the grassland. Lesser amounts of hoary sagebrush (*Artemisia cana*), poison ivy (*Rhus radicans*), rabbit brush (*Chrysothamnus nauseosus*), and Russian olive (*Eleagnus anqustifolia*) are also a part of this zone. In addition, many exotic plants such as Canada thistle (*Cirsium arvense*), Russian thistle (*Salsola iberica*), and field bindweed (*Convolvulus arvensis*) have invaded the area with varying degrees.

   The perennial native grasses exhibit an active growth period in May, June, July, and August. By late summer the grasses dry, creating a flammable fire fuel until the next growing season. Historically, the grass prairie experienced natural and human caused fires. Fires reduced the buildup of organic matter and recycled nutrients and allowed for the warming of soils that stimulated native grass growth. Fires also acted to suppress the encroachment of trees and shrubs onto the prairie.

2. Floodplain Wooded Zone

   This is a narrow strip of wooded area approximately 86 acres in size that lies between the badlands and the North Platte River on the north boundary of the monument. Historically this area was subject to periodic flooding which stripped the area of new growth. Dams and reservoirs upriver and the diversion dams for irrigation have basically eliminated natural flooding. The area is now densely covered with heavy fuel types. The potential for a hot fire exists. Woody species include cottonwood (*Populus deltoides*), boxelder (*Acer negundo*), green ash *(Fraxinus velutina*) and Siberian elm (*Ulmus pumila*). Poison ivy and other shrubs are common.

3. Development Zone

   The development zone consists of approximately 16 acres including the visitor center/museum complex, the parking area, maintenance complex, ranger residence, summit parking area, roads, and trails. In the visitor center complex a manicured lawn is maintained, providing a fire break between the prairie and the historic structures.

4. Badlands Zone

   Barren, arid lands commonly known as the badlands consisting of 108 acres characterize the areas in the monument which are part of the Orella Member of the Brule Formation consisting of siltstones and mudstones with interbedded thin lenticular sandstones (Swinehart and others, 1985). Vegetation found in these areas includes: blue grama (*Bouteloua gracilis*), sideoats grama *(Bouteloua curtipendula*), Russian olive (*Eleagnus angustifolia*), and plains cottonwoods, a sub-species of eastern cottonwood (*Populus deltoides* ssp*. monilifera*).

   The ravines and draws contain a mix of Rocky Mountain juniper (*Juniperus scopulorum*), eastern red cedar (*Juniperus virginiana*), western snowberry (*Symphoricarpos occidentalis*), skunkbush sumac (*Rhus trilobata*), and sedges.

5. Pine Summit Zone

   This community comprises 189 acres. It is found on the summit of Scotts Bluff and the South Bluff. It has a scattering of mature trees with a fairly continuous graminoid understory. Ponderosa pine (*Pinus ponderosa*) is the most abundant tree species. Among the pines are Rocky Mountain juniper (*Juniperus scopulorum*) and Eastern red cedar (*Juniperus virginiana*). The most abundant grass species in the understory are little bluestem (*Schizachyrium scoparium*), needle-and-thread (*Stipa comata*), blue grama (*Bouteloua gracilis*), and side oats grama (*Bouteloua curtipendula*). Blackroot sedge (*Carex filifolia*) is also found in the understory.

E. FAUNA

The monument is one of the few places in the panhandle of Nebraska where wildlife is protected in a natural environment. There are resident populations of various species of reptiles, amphibians, birds, mammals, and invertebrates.

No federally listed threatened or endangered species of animals are known to breed within the monument. However, the mountain plover, least tern, swift fox, and black-footed ferret are all endangered under state law and may inhabit Scotts Bluff County. In addition, the American bald eagle and American and Arctic peregrine falcons occur in western Nebraska on an intermittent basis, either as migrants or as winter residents. Golden eagles are found throughout the year. The findings of a 1985 study by Iowa State University indicated that while no rare raptors were found within the monument during a partial survey, habitats are suitable and many nest sites are present for both Swainson's and ferruginous hawks.

F. CULTURAL RESOURCES

Scotts Bluff National Monument contains a total of 18 features that have been included in the List of Classified Structures. These include the remnants of the Oregon Trail at Mitchell Pass, as well as several Civilian Conservation Corps (CCC)-era buildings still used to provide visitor services. These structures are part of the two cultural landscapes that have been identified within the monument: the environment, and the Oregon Trail.

The monument's diverse museum collection consists of approximately 10,000 individual objects, of which about 10% are on permanent display in the museum. The research library contains 3,000 books, journals, and video tapes pertaining to frontier history. Archeological surveys within the monument have identified 56 sites, most relating to paleo-Indian use 8,000-10,000 years ago. Scotts Bluff National Monument does not appear to have been used as a primary living area during pre-historic occupation of western Nebraska.

G. AIR QUALITY

Historically, the monument and surrounding area have enjoyed fairly good air quality, with reduced visibility from local industry, blowing dust, or human-ignited maintenance fires. Under the terms of the 1990 Clean Air Act amendments, the monument is designated as a class II quality area. By definition class II areas of the country are set aside under the Clean Air Act, but identified for somewhat less stringent protection from air pollution damage than class I. Congressional concern for the air resource was apparent in the 1919 enabling legislation, *"whereas Scotts Bluff is the highest known point within the State of Nebraska, affording the view for miles over the surrounding country…"*

Although prescribed fire is defined as a "temporary" source of air pollution, state and local laws may apply to this activity under the general category of "open control burning." Specifics to the Nebraska State air quality guidelines for prescribed fire smoke and smoke management procedures are contained in the Air Quality/Smoke Management Guideline (Chapter XI).

H. WATER RESOURCES

The North Platte River flows along the northern boundary for a distance of one and three-quarter miles. This area historically flooded in the spring with the melting of the snow in the Laramie and Rocky Mountains. Woody species growing along the floodplain were usually eliminated. Today the river is controlled by several dams upstream of the monument operated by the Bureau of Reclamation which generate electric power, control flooding and provide water to several irrigation districts. Rarity of flood events has allowed woody species to prosper. These consist mainly of ash, cottonwood, and elm. Woody shrubs have also invaded the sandbars of the river. Permanent islands have become established which destroy prime habitat for species such as the piping plover and the least tern as the islands are covered with vegetation. The river can provide water for fire management operations along it, although access is limited.

The monument is traversed by three irrigation canals: the Gering Irrigation District Canal, the Central Canal, and the Gering-Fort Laramie Canal (a smaller, lateral canal). These canals preceded the establishment of the monument (1919) and all have unsurveyed, but recognized easements or right-of-ways by the federal government. The Gering Irrigation District Canal has increased the biodiversity by supporting a riparian habitat similar to the North Platte River floodplain. Wood ducks, mallards, and other waterfowl can be observed in summer months. The Gering-Fort Laramie Canal flows along the east boundary and has not changed greatly the associated plant community. The Central Canal begins within the monument on the North Platte and flows parallel to the river for approximately one mile before leaving the monument's east boundary. All three companies perform regular maintenance, such as dredging, which disturbs the land and allows non-native vegetation to invade.

There is one known natural spring in the monument. This is identified historically and until the 1960's was regularly used for drinking water. Presently the spring water is not accessible for drinking, but rather is allowed to seep back into the ground.

I. HUMAN USES

Visitor use of the park is highest from June through August, with the greatest number of visitors staying for a few hours. Most visitors drive to the summit and take a short hike on one of the monument trails. There are no campgrounds in the monument, and the monument is closed after dark. There are five buildings in the headquarters area including a ranger residence, maintenance facility with related bays and shed, visitor center, restroom building, and administration building. There are no visitor services on the summit other than hiking trails. Two historic covered wagons are utilized for living history during the summer months in the area of the Oregon Trail. The Oregon Trail has a modern hiking trail that follows the historic trail approximately a quarter mile.

VI. HISTORIC ROLE OF FIRE

A. FIRE ECOLOGY

With the large tracts of continuous, fine fuels, frequent periods of hot, dry weather, and common occurrence of lightning, the mixed-grass prairie in and around the monument has historically experienced fire. This is an integral part of the ecological process which changes the form and content of the vegetative and wildlife communities. From documented reports of early pioneer settlers in the west, the mixed grass prairie was influenced by fires (both purposeful and accidental) set by Native Americans. Fires occurring in the mixed prairie typically have been fast burning, surface fires that tend to leave a mosaic of vegetation. The mixed prairie grasslands are characterized by vegetation which grows rapidly, dies back annually above ground, and decomposes slowly, with an average height of 2 to 4 feet (grasses) and small trees and low brush (on north-facing slopes and in draws). Low humidities and low precipitation characterize the area. Periodic drought is common. Research indicates that fire, together with climate and topography, plays a major role in maintaining the grassland ecosystem and restricting the growth of trees and shrubs to the drier, rocky breaks, less frequently burned draws and riparian lands.

B. FIRE HISTORY

Knowledge of the fire history enhances the understanding of the type and frequency of fires that occur and their effect on the vegetative cover. It allows for insights as to the origins of the present vegetative cover and the reasons for its structure and distribution. Ultimately, this information should aid in developing burning prescriptions necessary for the restoration and maintenance of cover types that existed in pre-settlement times.

Since the monument was established in 1919, there has been an average of 1.5 fires per year. These fires have primarily been human caused fires on the north side of Scotts Bluff adjacent to the canal and railroad. Historical accounts show wildfires mostly occurring in the driest months of the year in late summer and early fall (Wendtland, 1993). Several of the pine trees on the summit of Scotts Bluff show evidence of lightning strikes, but no wildfires are known to have ignited from these strikes.

Fire is a natural component of the mixed grass prairie and one of the forces whereby the natural vegetation at the monument evolved. Research indicates that prior to the twentieth century fire burned on an average of every 5 to 30 years depending on the dryness and terrain (Wendtland and Dodd, 1991). Vast expanses of unbroken native prairie with continuous fuels allowed more frequent fires, whereas prairie broken by deep ravines and rock outcrops burned less frequently. These fires were usually low-intensity fires that prevented heavy fuels from accumulating and maintained an area of predominant grasslands and open forests (Weaver, 1967; Biswell, 1972; and Progulske, 1974).

Through the twentieth century wildfires were suppressed in the region resulting in a thickening of pine stands, decreased secondary stages of plant succession important to wildlife species, and the invasion of woody vegetation on the prairie (Gartner and Thompson, 1973).

Since fire records were kept beginning in 1936 one lightning fire was recorded, 14 fires were of unknown origin, and the rest were human-caused for a total of 58 fires. All the fires were extinguished while still small and of low intensity.

The major difference between the historical fire regime of the mixed grass prairie versus the present is the extent of the fires. Prior to large-scale cultivation of the Great Plains, fires could run for long distances, checked only by major river systems, badland-type topography, or weather. Presently, with large-scale cultivation in place, together with the network of roads and highways dividing up the lands, few fires are able to make the extensive runs historically recorded. The long distance fire is now the exception. A second difference is the human-caused fire frequency. With replacement of the American

Indian cultures and the lessening of open range cattle ranching practices, most of the historical human causes of fires ceased to be a threat. A large proportion of recently recorded fires is still human-caused, but these tend to be the result of careless campers or accidents and are not as extensive as the earlier fires ignitied by Native Americans or lightning. Today, as in the past, fires in the mixed grass prairie tend to be surface fires, occurring with warm temperatures and dry conditions. The flaming front may exhibit flame lengths of 2-4, to 10's of feet, depending on the speed of winds and the depth or height of the fuels burning. Generally, the flaming front has high intensity of short duration, spreads quickly and irregularly, and does not spot ahead of the front (Vogl, 1979). The historic pre-settlement pattern of frequent low intensity fires that removed ground fuels has shifted to the potential for high intensity wildfires threatening life, property, and resources because of wildfire suppression activities. Use of ignited prescribed fires was initiated in 1983, after an extensive public relations effort.

VII. FIRE MANAGEMENT STRATEGIES

The monument will use the specific strategies listed below to achieve the monument's fire management objectives. The policies of the National Park Service, as set forth in DO-18 and the Department of the Interior, will be adhered to in implementation of these strategies.

A. WILDLAND FIRE

The monument will make every effort to suppress all wildfires through initial attack actions. All available monument and local fire fighting resources will be utilized as necessary to limit damage to values at risk, prevent escape of wildfires, and prevent the spread of wildfires from monument boundaries. The monument will not use wildfire for resource benefits due to the size of the monument and proximity of structures and residences (wildland urban interface).

The Incident Commander of any wildfire is expected to combine tactics with sensitivity towards monument resources, both natural and cultural, and concern for safety of fire fighting personnel, monument employees, monument visitors, and monument neighbors threatened by the wildfire.

B. PRESCRIBED FIRE

Prescribed fires are intentionally ignited under predetermined weather and fuel moisture conditions that permit managers to exert substantial influence over the spread and intensity levels that the fire can achieve. These fires are ignited for purposes of accomplishing resource management objectives. All prescription parameters, ranges, and objectives are clearly stated in individual burn plans for each prescribed fire.

C. FIRE MANAGEMENT UNITS

The monument will be managed as one fire management unit. This is done, as opposed to being divided into several units, because the following characteristics are similar throughout the monument: climate, weather, topography, vegetation, elevation, air quality concerns, access, fire history, desired fire effects, fuel types, major fire regimes and expected fire behavior. However, the monument is divided into seven “burn units.” These burn units are established based on terrain, fuel types and burn unit boundaries, both human-made and natural.

D. MANAGEMENT CONSTRAINTS

Constraints applicable to all suppression actions include:

1. Whenever consistent with safe, effective suppression techniques, the use of natural barriers will be used as extensively as possible. The use of backfire techniques, burnout lines improvement, and wetting agents (ground and airborne) is authorized. Fire retardant agent used must be on the approved list of retardants utilized by the Forest Service and Bureau of Land Management.

2. All extended attack and project fire operations will have a monument employee designated and available to assist suppression forces in the capacity of Resource Advisor. This will usually be the monument’s resource management specialist.

3. Canal or river crossings will be limited to set locations.

4. Except for spot maintenance to remove obstructions, no improvements will be made to intermittent/perennial waterways, springs or seeps, trails, or clearings in forested areas. Log jams/debris in the streams should be left in place to protect fish and aquatic insect habitat. All

sites where improvements are made or obstructions removed will be rehabilitated to pre-fire conditions, to the extent reasonably possible.

5. Earth moving equipment such as tractors, graders, bulldozers or other tracked vehicles will not be used for fire suppression (if special circumstances warrant extreme measures to ensure protection, the Superintendent can authorize the use of heavy equipment).

6. Fireline location will be outside of highly erosive areas, steep slopes, and other sensitive areas. Following fire suppression activities, firelines will be re-contoured, water-barred and possibly seeded.

7. Fireline location will be outside cultural and archeological sites if at all possible. If a fireline must be placed through a cultural or archeological site only non-ground disturbing methods will be used, such as mowing or wet lining.

8. Riparian areas, which have been completely burned, may be seeded depending on the intensity of the burn and the composition of the vegetation prior to the burn (exotics vs. natives).

9. Helicopters may be used to transport personnel, supplies, or equipment; however, this is unlikely. Improvement of landing sites shall be kept to a minimum. Helibases will be located outside the backcountry if at all possible. Landing sites within backcountry areas will be rehabilitated to pre-fire conditions to the extent reasonably possible.

10. When handline construction is required, construction standards will be issued requiring the handline to be built with minimum impact. Use of power chain saws is authorized although such use should be kept to a minimum. Handlines constructed by exposing mineral soil will be rehabilitated and erosion control methods used on slopes exceeding 10 percent. No handlines exposing mineral soil will be allowed through cultural sites, and all handlines will be rehabilitated.

11. Incident command posts should be located outside of the backcountry whenever possible. The monument's amphitheater behind the Oregon Trail Museum will be the incident command post location.

12. If a helibase is needed for a wildland fire incident, it will be located east of the bus parking area. See Appendix J.

VIII. FIRE MANAGEMENT SITUATION

A. MONUMENT FIRE MANAGEMENT UNITS

(See Section VI, C)

B. HISTORICAL WEATHER ANALYSIS

See Appendix C for monthly temperature and precipitation data. Fuel moistures are at their maximums for live woody and herbaceous plants during the spring when plants are actively growing (Appendix L). Dead fuel moistures show little fluctuation but reach minimum values during the late summer and fall months (Appendix M). Indicators of fire danger as computed through the National Fire Danger Rating System (NFDRS) show that fire danger is highest when fuel moistures are lowest and when plants are not actively growing (Appendix N). All of the above NFDRS outputs are derived from weather observations gathered in Scotts Bluff National Monument. Onsite weather observations are made daily at the manual NFDRS weather station (#251905) located immediately adjacent to park headquarters. The earliest fire weather records gathered at this site are from May 18, 1984. Observations at this site have traditionally only been recorded between early May and early October. More recently, since fires have occurred in dry winter months, observations have been recorded year-round. Several years of winter observations will have to be collected, however, before analysis of this data will produce meaningful outputs. Weather observations from this station are recorded daily at 1300 mountain standard time (MST) for input into the Weather Information Management System (WIMS) database located in Kansas City, Missouri. Immediately WIMS will return NFDRS indices, which may then be used to make management decisions for wildland fire staffing (See Step-up Plan) in the park.

C. FUEL CHARACTERISTICS

Scotts Bluff National Monument is predominantly mixed-grass prairie, NFFL fuel model 1- FBPS model L which has been altered historically by grazing and the influx of non-native grasses such as cheatgrass, smooth brome, and Japanese brome. Principal native species include western wheatgrass, little bluestem, big bluestem, gramas, and needle-and-thread grass. Riparian areas in the monument are a mixture of primarily cottonwood, elm, and boxelder trees. The woody draws in the monument consist mainly of eastern red cedar and ponderosa pine.

Grassland fuels burn rapidly when dry. Most grassland plants are surface deciduous with above ground parts dying back at least once yearly, even in regions without seasonal climates. As a result, grasslands are particularly vulnerable to fires during stages when standing plant parts are dry and cured. Most species are xerophytic, often with stiff, scabrous leaves and rigid stems. Associated herbs also orient their leaves to minimize exposure to sun and air and reduce transpiration. Shoots produced after a fire have also been found to have a stiffer composition and more erect form than ordinary shoots. This rigid structure and erect nature not only helps to keep stems upright well after growth terminates, but also exposes the understory and soil surface to sun and wind. Conditions more conducive for combustion can result. Compaction of grassland fuels is nearly always conducive to fire propagation and seldom reaches the degree attained by heavier fuels, even after heavy snows or rains.

Rapid growth and accumulation, slow decomposition rates, chemical and physical composition of grassland plants, and highly flammable nature of plant debris lead to a vegetation type that can readily burn. Grasslands that can be readily and repeatedly burned have apparently evolved with fire, becoming dependent upon it as the primary decomposition agent and key method of nutrient recycling. At the same time, grassland plants create conditions that make fires almost inevitable. Most of the park fits NFFL fuel model 1 - FBPS fuel model L, which represents perennial grasslands with no overstory.

D. FIRE SEASON

The fire season at Scotts Bluff National Monument is generally the period from April through October. This is the period during which most fires have occurred. This period represents the situation from before spring green-up until after curing has occurred. Also during this time climatic conditions are most favorable for ignition. The majority of annual rainfall is received during April and May, but severe thunderstorms can occur in July and August which are responsible for lightning caused fires in the region. Occasionally winters are dry, and fires have occurred in December.

E. FIRE CHARACTERISTICS

The combination of grassland fuels, topography, and wind patterns in Scotts Bluff National Monument generally result in wind-driven fires that move rapidly through fine fuels. Wind-driven head fires consume most of the vegetation, have rapid rates of spread, and frequently develop wide heads. These fire fronts often become irregular in outline as topography, fuel loads, winds, natural barriers, and developing fire storms speed up or retard movements. Head fires in dense fuels and tall grasslands have the capability to generate large flames. Transported embers which could cause spot fires ahead of the main fire front are generally rare or sufficiently cooled by the time they reach unburned fuels so that spot fire problems are not significant. Due to the normally high rates of spread, and relatively short duration of heat production, few long-lasting impacts to soils occur and key nutrients supplied by ash are quickly recycled into grassland communities.

Fire behavior fuel model 1, for short grass is useful although not entirely accurate for predicting grassland fire behavior. Mixed-grass prairie types are present in the monument, with species composition including short grasses and mid-height plants.

F. CONTROL PROBLEMS

Control problems can be expected on fires burning in the peak fire season. When continuous fuels and warm, dry, windy environmental conditions are encountered, high fire intensities and rapid spread rates can be achieved within a short time. In these situations, firefighter safety may dictate use of indirect attack suppression methods.

Many areas within the monument present hazardous conditions, such as steep slopes with unstable footing, densely wooded ravines and continuous fuels. Suppression activities in such areas must be carefully planned and executed.

IX. FIRE MANAGEMENT RESPONSIBILITIES

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

A. FIRE MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

Monument Superintendent:

As the Agency Administrator, the superintendent is responsible for implementation of all fire management activities within the monument, ensuring compliance with Department, Service, and monument policies. This person has overall responsibility for development and implementation of the monument's fire management program. This person will normally function as the information officer during fire activity.

Chief Ranger:

The Chief Ranger has overall supervisory responsibility for monument-related law enforcement and search and rescue emergency operations, as well as the integration of fire management activities with other emergency operations. This person reviews and advises the Superintendent on requests for fire emergency assistance, operational activities required for the implementation of this fire management plan, and completeness and correctness of all final fire reports. This person assumes the authority and responsibility of Agency Administrator in the absence of the Superintendent. This person reviews the monument's Fire Coordinator's nominations of staff employees to receive fire-related training.

Resource Management Specialist:

The Resource Management Specialist annually reviews and revises (as necessary) this Fire Management Plan prior to commencement of the normal year fire season, to ensure that the planned actions and activities support and implement the monument's resource management plan. This person coordinates with the Fire Management Officer to develop resource management and hazard fuel reduction projects.

Fire Management Coordinator:

At Scotts Bluff National Monument the fire coordinator is currently the Resource Management Specialist. This person is responsible for the implementation of the fire management plan. This responsibility includes the coordination and supervision of all prevention, preparedness, detection, fire suppression, prescribed fire, monitoring and post-fire activities involving National Park Service lands, and submits DI-1202 fire report forms to the fire management officer.

This person coordinates with the Chief Ranger in the implementation of the fire management plan with other agencies administering adjacent lands and with local landowners. This person develops and implements cooperative fire management agreements with other federal, state, and local agencies. This person submits budget requests and monitors FIREPRO funds allocated to the monument.

Maintains fire cache equipment and supplies to adequately undertake initial attack actions on fires occurring on monument lands, ensuring that all equipment and supplies are in good working condition. This person determines fire qualifications and training needs of all monument personnel who are to be made available for fire duties and informs the Fire Management Officer of this information. This person ensures that fire-qualified personnel provide updated fire experience and training information so that it can be entered into the Qualifications section of the Shared Applications Computer System (SACS). This person will collect and record daily fire weather observations, and ensure they are entered into the Weather Information Management System (WIMS).

This person coordinates the implementation of this Fire Management Plan with other governmental agencies administering adjacent lands, and with local landowners. This person develops and implements cooperative fire management agreements with other federal, state, and local agencies

and with the local landowners.

Public Information Officer or designee:

The Public Information Officer provides basic fire program information to monument staff, visitors and the media. This person ensures that accurate information is incorporated into monument books, brochures, and exhibits. The Public Information Officer interacts with the media.

Fire Suppression Personnel:

Fire suppression personnel consists of all monument personnel, whether permanent or seasonal, who are trained and qualified to be involved in wildland fire activities. As a minimum, they have taken and passed the minimum classroom training and meet physical fitness standards required of NWCG-qualified firefighters. They undertake fire management duties as assigned by the qualified Incident Commander on each suppression action or by the Prescribed Fire Burn Boss on each prescribed fire project.

Fire Management Officer (FMO), Northern Great Plains Area:

The Fire Management Officer coordinates fire management activities within the Northern Great Plains Area, providing technical assistance and advice as needed. This person reviews and advises the Superintendent on requests for fire emergency assistance, operational activities required for the implementation of this Fire Management Plan, and completeness and correctness of all final fire reports.

This person is responsible for implementation of the Fire Management Plan. This responsibility includes coordination and supervision of all prevention, preparedness, detection, wildfire, prescribed fire, suppression, monitoring, and post-fire activities involving monument lands. This person prepares an annual report detailing fire occurrences and prescribed fire activities undertaken in each calendar year. This report will serve as a post-year fire management activity review, as well as provide documentation for development of a comprehensive fire history for the monument. This person submits budget requests and monitors FIREPRO funds allocated to Scotts Bluff National Monument.

The Fire Management Officer maintains records for all personnel involved in suppression and prescribed fire activities, detailing the individual's qualifications and certifications for such activities. This person updates all fire qualifications for entry into the Shared Applications Computer System. This person nominates personnel to receive fire-related training as appropriate.

The Fire Management Officer coordinates, prioritizes, and submits all FIREPRO funding requests for fire program activities.

Fire Program Assistant, Northern Great Plains Area:

This person provides technical and administrative support for the Area Fire Management Officer and all parks and monuments within the Northern Great Plains Area. Will assist with dispatching and mobilization activities. Serves as technical specialist and subject matter expert for incident business management and incident qualification issues.

B. QUALIFICATIONS AND TRAINING

RM-18 guides the national monument in its qualification and training of employees. All monument employees are encouraged to acquire redcards. The monument will maintain a minimum of three redcarded firefighters. Two of these employees will be minimally trained to the basic firefighter level (FFT2). The third employee will be trained as an incident commander type 4 (ICT4). The ICT4 will be responsible for all initial actions taken on wildfires within the monument. All redcarded monument employees will have the opportunity to attend advanced fire training courses. Funds for advanced training may be available from the Fire Management Officer (FMO) at Wind Cave National Park or the national monument. The monument and the fire cluster Fire Management Office will provide training

funds to maintain minimum standards.

C. AGENCY AND INTERAGENCY COORDINATION

Scotts Bluff National Monument maintains close coordination with the Northern Great Plains Fire Management Office at Wind Cave National Park. Coordination for assignments on hand crews is maintained by that office. The Custer (Custer, South Dakota) Coordination Center is the local Geographical Area Coordination Center (GACC) for central dispatching and out-of-the-area dispatching of resource orders. Mutual aid assistance may be called for local fires through the Gering Fire Department. The Fire Management Coordinator will serve as a primary liaison with other groups. Staff at the monument will regularly reinforce these contacts.

The Scotts Bluff National Monument Fire Management Coordinator will maintain all written agreements with local agencies. Monument staff will provide him/her with assistance when needed.

X. WILDLAND FIRE MANAGEMENT PROGRAM

Operational guidelines for managing fire-related activities vary, depending on the type of activity (prevention, preparedness, suppression, or prescribed fire) and on predicted and existing environmental conditions affecting fires at varying locations. Director's Order #18, Wildland Fire Management, states that firefighter and public safety is the first priority in all fire management activities. This portion of the Scotts Bluff National Monument Fire Management Plan details the operational procedures necessary to implement wildland fire management in Scotts Bluff National Monument.

A. WILDLAND FIRE PREVENTION PROGRAM

A major goal of the monument's fire management program is to reduce the threat and occurrence of human caused wildland fires. Prevention activities developed for specific areas include the following: education aimed at monument visitors, employees and adjacent landowners; engineering (or the use of appropriate equipment, methods, and projects); and enforcement of regulations aimed at preventing human caused fires.

General activities identified through the analysis are summarized below.

1. Educational:

    a) Inform monument visitors and adjacent landowners about fire prevention regulations, appropriate prevention activities, and current fire danger ratings using media, signs, and verbal contact, when or if we reach an extreme fire danger level.

    b) Inform monument employees on fire prevention activities they can integrate into their jobs.

2. Engineering:

    a) Provide and maintain fire prevention devices (e.g., spark arresters) on appropriate field equipment.

    b) Monitor power lines or other potential sources of ignition on an annual basis.

    c) Evaluate monument structures for flammable construction materials and the need for hazard fuel reduction work.

3. Enforcement:

    a) Patrol and enforce regulations regarding fires, smoking, etc., as appropriate and according to Scotts Bluff National Monument standard operating procedures.

B. WILDLAND FIRE PREPAREDNESS

Preparedness includes activities conducted before a fire occurs to ensure the ability of the monument's fire management organization to initiate effective action. This action may include the evaluation of the situation and selection of appropriate suppression strategies. Preparedness activities include recruitment, training, planning, and organization, fire equipment maintenance and procurement of equipment and supplies. The objective of preparedness is to have a well-trained and equipped fire management organization in place to manage all fire situations that confront Scotts Bluff National Monument managers. Prior to and during the fire season, the monument staff with guidance from the Fire Management Officer will take the following measures to ensure adequate fire preparedness:

January 1 – January 31: The fire management coordinator will update and maintain accurate employee training and qualification records. The coordinator with the chief ranger will review cooperative agreement with the City of Gering. Review prescribed burning needs with the Fire Management Officer at Wind Cave National Park for the year. Review resource management projects. The fire management coordinator will order fire cache supplies and replace equipment as needed; perform annual maintenance on fire weather station; and provide updates or changes to cooperators for local and regional mobilization plans. All firefighters will obtain necessary fitness testing, and the fire coordinator will review the fire weather station observation, recording, and weather station equipment maintenance procedures.

The fire management coordinator will inventory fire supplies and inspect fire cache to ensure equipment is ready; check operation of slip on and portable pump and outfit the fire truck, and check equipment needs of firefighters.

March 1 – December 31: If the fire weather is not being collected throughout the year, collection will begin being collected on March 1 each year. Maintain state of readiness as identified in the Step-up Plan, Operate all slip-on units and portable pumps at least weekly. Outfit field vehicles, all 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.

November 1 - December 31: Critique fire season. Evaluate individual performance ratings of fire personnel and correct deficiencies and recommend training as needed. Review and revise Fire Management Plan as needed.

C. WILDLAND FIRE EMERGENCY PREPAREDNESS

Emergency preparedness describes actions to provide extra capability during times of extreme or unusual fire danger caused by human activities or meteorological influences on the monument's natural fuel complexes. Unusual occurrences will be addressed by planned use of emergency preparedness funds linked to the National Fire Danger Rating System (NFDRS) burning index and described in the step-up plan (Appendix C). The monument's authority to expend emergency preparedness funds is detailed in DO-18. Appropriate actions for use of emergency preparedness funds include, hiring of temporary emergency firefighters; placing existing staff on extended tours of duty; increasing or initiating special detection operations; pre-positioning additional resources in the monument (engines, crews, etc.). These are planned to ensure the capability to respond promptly with adequate resources to whatever specific fire situation develops.

Authorization to expend emergency preparedness funds will be obtained from the area Fire Management Officer who will analyze the justification presented.

Fire Management involves prevention, detection, preparedness, and suppression activities. The scope of activities associated with each type of fire management action varies with changes in the risk of fires igniting and with the predicted fire behavior. This plan uses the Burning Index (BI), derived from the National Fire Danger Rating System (NFDRS) (Deeming et al. 1977), as an important measure for basing determinations regarding the scope and extent of fire management activities. Depending on the BI derived from the daily NFDRS/WIMS data, predicted fire danger is classified as low, moderate, high, very high, or extreme. A set of staffing classes which have a corresponding set of actions that the monument will initiate to meet potential fire danger has been developed and is presented below as the Step-up Staffing Plan.

The typical fire season is from April 1 until October 31. Staffing action guidelines are based upon the National Fire Danger Rating System Burning Index.

Fire Danger Rating		
Burning Index	Adjective Rating	Staffing Class
0-10	Low	1
11-20	Moderate	2
21-42	High	3
43-51	Very High	4
52+	Extreme	5

Actions taken under staffing classes 1-3 are funded through the normal monument budget. Additional actions detailed under staffing classes 4-5 can be supplemented by emergency preparedness funding requested through the Regional Fire Management Officer. Burning index, associated staffing classes, and designated prevention, detection, and preparedness actions to be taken with each level are discussed in the Step-up Plan.

D. WILDLAND FIRE DETECTION

Prompt and accurate reporting is essential to efficient fire suppression. All smoke and fire reports will be made to visitor center personnel. Then a report will be made to the Fire Management Coordinator and Chief Ranger or his/her designee. To enhance communication with cooperators and the public, notification of the cooperator's fire dispatch offices and the local radio and television stations can also be made.

Monument personnel will look for new fire starts as part of their normal routine. These personnel are instructed to take fire reports from visitors and relay the pertinent information to the Fire Management Coordinator or Chief Ranger. Further investigation may be necessary if monument staff in the field cannot verify a reported fire.

Visitors and employees will report most fires. Any monument employee to whom a fire is reported shall obtain complete information regarding the following: location; fire behavior and smoke dispersal, approximate size; and name, address, and telephone number of the reporting party. If possible, have the visitor or employee remain onsite until the fire is confirmed and located.

During periods of very high fire danger, the monument may assign staff to the summit of the bluff that provides a view of the surrounding terrain. In these cases, someone may be assigned to serve as a lookout for an extended period of time.

E. WILDLAND FIRE SUPPRESSION

All suppression actions will be governed by consideration of human safety; availability of effective, appropriate equipment; and management objectives and constraints. Scotts Bluff National Monument will initiate aggressive initial attack on all fires occurring within the monument. In general, the goals can be met most effectively and cost-efficiently by:

1. Quickly evaluating each fire occurrence within the monument for location, spread potential, and amount and type of force(s) needed for effective suppression.

2. Providing rapid, aggressive initial attack for those fires to be suppressed.

Whenever a fire is reported within monument boundaries, the following steps will be taken:

1. Report of the fire to the Scotts Bluff National Monument headquarters.

2. Fire Management Coordinator or Chief Ranger will determine the location, legal description, and

land ownership at the occurrence site.

3. At least two or more Scotts Bluff National Monument personnel will be dispatched to the location of the fire. Personnel dispatched will be qualified and equipped to undertake initial attack action.

4. If it is believed that containment of the fire will involve more resources than available to the monument at that time, the Chief Ranger will contact the Gering Volunteer Fire Department for assistance. Immediately upon arrival at the fire location, an initial fire size-up will be completed. This includes fire size, behavior, environmental conditions, fuels, terrain features, existence of special hazards or threats to persons or improvements, and any other factors that could affect fire behavior and suppression efforts. This information will be reported to the Fire Management Coordinator or Chief Ranger. The Gering Volunteer Fire Department will be notified and asked to be on standby.

5. If the fire increases to more than 5 acres, the Northern Great Plains Fire Management Officer will be contacted immediately.

The Step-up Plan will be reviewed by the Fire Coordinator and the Fire Management Officer (FMO) at the beginning of each fire season. The monument's Fire Coordinator will monitor the burning index (BI) daily as part of the fire weather statistics. Whenever a fire is reported on Scotts Bluff National Monument lands, forces and equipment dispatched for initial attack will be based on the daily burning index, fire location, existing and predicted environmental conditions and any other factors pertinent to making sound fire management decisions.

All wildfires will receive an immediate and aggressive initial attack response. The Fire Coordinator or Chief Ranger will assign an Incident Commander and will keep the Fire Management Officer and Superintendent updated on the fire situation. The goal in initial attack actions is to limit damage to natural resources and facilities, while minimizing the area burned and preventing escape of the fire.

An Incident Commander Type 4 (ICT4) will be responsible for all actions taken on the fire. The ICT4 will inform the Fire Coordinator or Chief Ranger of the fire situation as soon as possible after arrival on the scene. If the fire behavior and complexity continue to increase, the ICT4 may be replaced by an ICT3 along with additional support personnel and equipment. The Fire Coordinator or Chief Ranger is responsible for the selection of a replacement Incident Commander. If the fire threatens to exceed all initial attack capabilities, the fire will become an extended attack action and the Fire Management Officer and Superintendent will determine the next level of suppression effort.

Extended attack actions occur when fires have not been contained or controlled by initial attack forces. Extended attack continues until either the transition to a higher level incident management team is completed or the fire has been contained or controlled. The Wildland Fire Situation Analysis (WFSA) must be completed by monument staff when a fire escapes initial attack.

If the action escalates to incident management team levels, the incoming team will be briefed by the Superintendent (Agency Administrator's Briefing) and current Incident Commander. The team will be given a written delegation of authority and will have an Agency Administrator's Representative assigned as a staff member to the incoming Incident Commander. The delegation of authority will provide the Agency Administrator's priorities, constraints, and other guidelines prerequisite to effective suppression of the fire. When the team has accomplished its assigned tasks, the fire will be transferred back to the monument. A local Incident Commander will then be assigned, and a debriefing will be held by the departing team to provide for an orderly transition of command. The Superintendent will then conduct a closeout session that will include a performance evaluation of the departing team. The transition Incident Commander will then assume command at the agreed upon time, and the departing team will be demobilized.

Accident prevention in fighting fire is extremely important. Firefighting is hazardous work, generally performed in unfamiliar surroundings and under emergency conditions. Special hazards are almost

always present and danger from fatigue conditions can give only subtle warnings. It is the responsibility of every incident commander to ensure that safety instructions are given and followed during all suppression actions. It is the responsibility of all employees to perform only jobs that they are qualified for, to wear personal protective equipment at all times, and to ensure that adequate water, food, and rest are provided to firefighters so that high standards of safety can be maintained.

F. WILDLAND FIRE MONITORING

Wildland fires will be monitored at levels 1 and 2 (according to the NPS Fire Monitoring Handbook) with observations entered into the monument's monitoring database. In the event that long-term fire effects plots are burned in a wildland fire, they will then be read by the Northern Great Plains Fire Monitors according to the schedule of plot rereads following a burn treatment. Level 1 and 2 monitoring observations will be filed with the final fire package and a copy placed with the records for the fire management unit that was burned.

G. WILDLAND FIRE DOCUMENTATION, REPORTS, AND RECORDS

The following reports, records, and documentation are required as part of the Scotts Bluff National Monument Fire Management Program.

1. Wildfires:

    - Wildland Fire Implementation Plan, Stage 1, 2, or 3 as required
    - Individual Fire Report Form (DI-1202)
    - Fire Weather Observations – Year-round / weather dependent
    - WIMS forecasts (NFDRS indices and components)
    - Incident Maps
    - Narrative Summary (if appropriate)

2. Annual Reports:

    The Fire Management Coordinator is responsible for preparation of any annual reports dealing with fire activity. Such reports will be submitted to the Superintendent through the Chief Ranger for approval, and will remain on file in the Resource Management Office and be sent to the Northern Great Plains Fire Management Office.

XI. PRESCRIBED FIRE PROGRAM

Prescribed fires are utilized as a tool to achieve management goals. Prescribed fire will reflect and support resource management objectives as stated in the monument's revised Resource Management Plan (1996) and General Management Plan (1998). As stated in the General Management Plan, the long-term goals of resource management are to maintain healthy prairie ecosystems and to maintain the appearance of the bluffs and surrounding prairie as it appeared during the 1850's when the pioneers were traveling the Oregon and California Trails. The prescribed fire program will also facilitate the accomplishment of the resource management objectives listed on page 9 of this plan.

These fires may be used whenever it is determined by resource management and fire management personnel that prescribed fires are necessary as a substitute for naturally occurring fires. Prescribed fire will also be used to restore fuel loading and vegetative composition to the natural conditions existing prior to the fire exclusion policy, prairie restoration and the controlling of exotic vegetation. In addition, it will be used to restore fire as a critical component of the ecosystem.

Actions included in the prescribed burn mobilization program include: selection and prioritization of projects to be carried out during the year, prescribed burn plans, prescription preparation, documentation and reporting and post burn critiques. Measures to ensure successful implementation of prescribed burns will include: burn plans that are prepared by a Prescribed Fire Burn Boss (RXB1 or RXB2); prescribed burns will be conducted by a qualified Prescribed Fire Burn Boss with qualified support personnel present to accomplish objectives; adequate number of personnel will be present to monitor, control hot-spots and fires outside control lines, support ignition needs, and complete initial attack on escaped fires. Burn plans will be approved and signed by the monument superintendent. Outside support in the form of National Park Service prescribed fire personnel or interagency personnel may be requested for support in planning, implementation or supplemental management stages.

A. ANNUAL PRESCRIBED FIRE PLAN

Prescribed burning may be used throughout Scotts Bluff National Monument to accomplish resource management objectives as outlined in this plan. The Fire Management Coordinator will prepare the annual prescribed fire plan with assistance from the Area Fire Management Officer. The program will detail all burn projects proposed for the coming year and will specify objectives of each burn. The program plan will be submitted to and reviewed by the Superintendent for approval.

The Fire Management Officer will recommend a Prescribed Fire Burn Boss for each specific planned burn. 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 Burn Plan. After completion of field reconnaissance, a prescribed fire Burn Plan will be developed.

The park is divided up into seven burn units along administrative and natural barriers:

1. Prairie
2. North Platte
3. Saddle Rock
4. Scott Spring
5. Eagle Rock
6. Crown Rock
7. South Bluff

Presently the goal, in order to meet resource objectives, will be to burn each unit on a multiple year rotation. Each unit will be burned, as weather conditions and personnel permit, on a twelve-year rotation. The Saddle Rock and Headquarters units will be spring burns. The Saddle Rock unit was a golf course until the mid-1970's. It is being restored to native prairie. A spring burn for the next few years would be beneficial to reduce exotic vegetation and stimulate native plants. The need to burn this unit will be evaluated annually. Therefore, it will not be in the normal fall burn rotation. The prescribed fire schedule will be evaluated annually to evaluate resource objectives and check burning rotation time frames.

B. PRESCRIBED FIRE BURN PLANS

The prescribed fire burn plan is a site specific action plan that describes the purpose, objectives, prescription, operational procedures, contingency actions, monitoring actions and safety concerns involved in burn preparation and implementation. The treatment area, objectives, constraints, and alternatives will be clearly outlined, and no burn will be ignited unless all prescriptions of the plan are met. The factors considered in all burn plans are described in DO-18.

C. PRESCRIBED FIRE OBJECTIVES

The objectives support the monument's General Management Plan (1998) and the resource management objectives listed on page 4 of this plan. Prescribed fire will be used to perpetuate native plant and animal species and communities, to eradicate and minimize the opportunity for encroachment of exotic plant species and to reduce hazardous fuel accumulations.

To promote the overall fire management program, monument management may use prescribed fires to create fuel breaks, reduce unnatural fuel loads, maintain historic scenes, reduce fire hazards around structures inside and adjacent to the monument and along boundary areas. Prescribed fire may also be used in conjunction with mechanical hazard fuel reduction in order to burn fuels that accumulate from fuel reduction operations such as burn piles. Research burning may also take place when it is determined necessary for accomplishment of research project objectives.

Prescribed burning may be conducted anytime of the year, depending when the area to be burned is in prescription. The preferred time for burning will be late summer or early fall to simulate more natural fire occurrence.

D. PRESCRIBED FIRE OPERATIONS

Prescribed burns shall be conducted under the direction and control of a project Burn Boss designated by the Area FMO. The project Burn Boss will be certified for that position according to standards currently utilized by the National Wildfire Coordination Group. All positions required to conduct the burn will be filled with qualified personnel. All personnel listed in the plan must be available for the duration of the burn or the burn will be postponed.

Operational guidelines, allowable ranges of fire behavior and allowable ranges in weather conditions shall be specified in the prescribed burn plan drafted for each prescribed burn project. Each prescribed burn project shall include monitoring and evaluation as part of the project. This monitoring and evaluation must be a continuous activity during the actual burn operation. Its purpose is to ensure that the ongoing fire behavior and weather conditions remain within the prescribed burn plan parameters. The individual responsible for the ongoing fire monitoring/evaluation shall keep the project's Burn Boss informed of any and all changes which might result in the fire exceeding the prescribed burn plan parameters.

Weather and fuel moisture conditions must be monitored closely in planned burn units to determine when the prescription criteria are met. Weather data will be gathered for 30 days prior to burn implementation so that fuel moistures, energy release component, ignition component, and burning index can be calculated. Fuel moisture samples of dead fine fuels, fine dead woody fuels (if appropriate), and live fuels will be collected, weighed and oven dried, and percent moisture contents will be calculated to assist in determining when conditions are consistent with the prepared prescription.

When all prescription criteria are within the desired parameter ranges, the prescribed fire Burn Boss will select an ignition date based on current and predicted weather forecasts. All personnel and equipment will be assembled on the day prior to the planned ignition date. A thorough briefing will be conducted stressing personnel assignments, resource placements, contingency actions, and safety concerns and

measures to mitigate these concerns. A current spot weather forecast will be obtained on the day of ignition and all prescription elements will be rechecked to determine if all parameters are within the desired ranges. If all prescription criteria meet the planned ranges, a test fire will be ignited to determine on-site fire behavior conditions. If these conditions appear satisfactory and consistent with the plan, the burn will continue. If the test burn indicates the fire behavior to be outside the desired ranges, the test fire will be suppressed and the main burn will be postponed until conditions dictate greater probability for success.

In the event of an escaped fire, the burn is declared a wildfire. An Incident Commander Type III (ICT3) will manage the wildfire. If the prescribed burn does escape the predetermined area, suppression efforts as discussed in the pre-burn briefing and identified in the contingency plan will be initiated. The Superintendent and Fire Management Officer will be notified immediately of the current status. If the burn exceeds the initial suppression efforts, it will be declared a wildfire, and emergency funds will be used for suppression. Once a wildfire declaration has been made, the project cannot return to a prescribed fire designation. For all escaped fires declared wildfires, Wildland Fire Situation Analysis (WFSA) will be prepared and appropriate resources will be ordered.

E. PRESCRIBED FIRE DOCUMENTATION AND REPORTING

All prescribed burn documentation will be completed by the Prescribed Fire Burn Boss and/or the Fire Management Officer. Fire monitors will collect all predetermined information and complete all necessary forms prior to, during, and after the burn. All records will be archived in the monument's fire records and stored in the Fire Management Office for future use and reference.

The Prescribed Fire Burn Boss will prepare a final report on the burn for the Superintendent. Information will include a narrative of the burn operation, a determination of whether or not the objectives were accomplished, weather and fire behavior data, a map of the burn area, photographs of the burn, number of hours worked and final cost of the project.

Prescribed Fires:

- Documentation of all management decisions concerning the project
- Prescribed Burn Plan
- On-site Weather Observations
- Project Maps
- Open Burning Permits
- Spot Weather Forecasts
- Narrative Summary Analyzing Costs, Objectives, etc.
- Individual Fire Report Form (DI-1202)

F. PRESCRIBED FIRE CRITIQUE

The Fire Management Coordinator, the area Fire Management Officer, and the Chief Ranger will critique each prescribed fire. A report detailing the actual burn will accompany any recommendations or changes to the program identified. The report will be submitted to the superintendent and regional fire management officer for review. A post-season critique of the fire management program will be held each year by the Fire Management Coordinator, the Superintendent, Chief Ranger, and the area Fire Management Officer.

The Superintendent may convene a review committee for any prescribed fire. A report detailing the actual burn will accompany any recommendations or changes to the program identified. The report will be submitted to the Superintendent, the Area Fire Management Officer, and the Regional Fire Management Officer for review.

G. OTHER TREATMENTS

Mechanical treatments, including thinning with chain saws, chipping, piling slash, and burning slash piles may also be used as needed in the monument. These could be tools used to meet the objectives specified earlier in this plan.

XII. AIR QUALITY AND SMOKE MANAGEMENT

National Park Service 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 USO 7418). It is not the primary intent of the Clean Air Act to manage the impacts from natural sources of impairment (i.e., wildland fires). 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. This may include temporary closures or warnings during the progress of management approved prescribed fires.

Scotts Bluff National Monument will comply with Air Quality-Smoke Management Guidelines listed in DO-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 procedure for compliance will be:

- The Fire Management Officer or the Burn Boss will contact local and state authorities to ascertain all procedures prerequisite to compliance with regulations or permits. A copy of the Burn Plan will be forwarded to the appropriate authorities, if necessary.

- The Fire Management Officer or the Burn Boss will obtain any necessary permits or ensure in writing that regulatory requirements will be met.

- Prescribed burning will be conducted only on days that are acceptable to the permitting agency. Any monitoring activities will be coordinated with the permitting agency and information collected will be made available to them if requested.

- All burn plans will have clear objectives and will monitor impacts of smoke on the human and natural environments.

- Prescribed fires ignited in proximity to structures will only be ignited during periods of low visitation and if the prevailing winds will carry the smoke away from the structures.

- Current and predicted weather forecasts will be utilized along with test fires to determine smoke dispersal.

- Personnel from permitting agency will be allowed on-site during prescribed fires for observational purposes if necessary for their agency needs.

- Smoke from uncontrollable wildfires or prescribed fires of long duration may affect smoke sensitive areas off-site. These off site effects could cause health problems for persons with chronic respiratory problems, impair fire detection, impair visibility, and impact airsheds to the point that other fire activities may be curtailed.

Considerations useful in managing smoke from longer duration fires include:

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

- Establish and maintain close communication with state and local air regulatory agencies regarding status of such fires.

- Monitor smoke plumes as appropriate to provide advance warning of deteriorating air quality conditions.

- Inform the general public of status of such fires, including smoke management contingencies through the local press, radio and television.

XIII. FIRE RESEARCH AND MONITORING

Research may be performed to support the fire management program by providing information that is useful or necessary in decision making. Currently, principal research needs in Scotts Bluff National Monument relate to:

1 Further assessing the role of fire as a natural process from its fire history

2 Further assessing the effects of fire on:

a) individual plant species
b) plant communities
c) prairie dog towns
d) air quality
e) wildlife
f) non-native plants
g) correlation of fire effects with fire behavior

3. Further assessing fire prescriptions for prescribed burning in terms of treatment objectives, seasonality, fire behavior parameters, and fire types (heading, backing, flanking, etc.)

4. Determine which fire techniques are most effective for changing vegetation composition from undesirable exotics (i.e., Canada thistle, Japanese brome, smooth brome, etc.) to desirable plant species (native grasses and forbs).

At this time, however, no specific fire research projects have been identified for Scotts Bluff National Monument. When specific projects or study areas have been defined, they will be discussed in revisions to this plan.

Prescribed fire can be successfully used to return fire as an ecosystem process and to move plant communities toward more desirable compositions. Prescribed burning will be used at Scotts Bluff National Monument to meet a number of resource management objectives. Monitoring is used to help write measurable objectives and then observe if these objectives were met. For example, the monument is going to use fire to prevent encroachment of eastern red cedar into native prairie. Monitoring will measure what species are regenerated and how much regeneration has taken place and over what period of time.

The monument will be using the protocols in National Park Service Fire Monitoring Handbook (1992) to examine short and long-term fire effects. The Northern Great Plains Fire Monitors based at Wind Cave National Park will be installing and rereading plots for the monument. Monitoring type descriptions have been written with the Resource Management Specialist. Installations will be based on burn unit priorities and reaching numbers of plots for priority monitoring types.

Monitoring of fires involves the systematic collection and recording of fuels, topography, weather, air quality, and fire behavior data. Monitoring is key to successful completion of prescribed fires. Prerequisite to monitoring and evaluating prescribed fire projects is the establishment of measurable objectives. Monitoring is completed to document and verify the stated objectives. Plots, photo points, transects, or other methods must be created to document results of the burns. This data will be stored for future refinement of prescriptions and to determine program success.

In addition to short-term monitoring, long-term monitoring is strongly desirable. Both short and long term monitoring methods will be stated in prescribed burn plans. Data from short-term monitoring will be attached to the burn plan, along with any narrative material provided by the burn boss.

XIV. SAFETY

A. PUBLIC SAFETY

Because wildfires are dynamic and can be hazardous, they must be given very high priority during certain critical conditions. Employees responsible for and involved in any wildland fire management 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 Scotts Bluff National Monument's public and employee safety considerations:

- There may be limited opportunities to find safety zones for escape from a fast moving wildfire in some stretches of the monument trail system. Monument visitors may not have enough knowledge of fire behavior to recognize a safe area.

- Certain areas will be closed to use when the risks to visitors are too high or there are not enough personnel to handle the situation any other way.

- Any time human life may be endangered, all necessary means will be taken to warn or evacuate visitors and neighboring landowners and users.

- Visitors may ignore warnings or be unaware of potential dangers and wander into areas where fire is still active or where there are hazards from suppression activities such as tree falling.

- Smoke on roadways may create a vehicle visibility hazard from a fire burning nearby or at night under light wind conditions. It could also occur on roadways outside the monument.

- The Burn Boss or Incident Commander will inform the Chief Ranger and the Superintendent of all potentially hazardous fires in the monument. The Chief Ranger and the Superintendent will then coordinate public notification efforts within and outside the monument. The extent of public notice will depend on the specific fire situation. The following actions should be considered:

    1) If fire affects travel along any roads within Scotts Bluff National Monument, patrol rangers will be dispatched upon request by the initial attack incident commander, the fire management officer or patrol ranger to stop or control traffic.

    2) If evacuation of an area is recommended, the Superintendent will be informed immediately. If evacuation is not needed, but there is heavy smoke, personnel will be sent to inform people of the situation and assure them of the safety of remaining where they are.

    3) If a fire is projected to rapidly spread and threaten visitors on trails,a monument employee will be dispatched to the area by the safest and fastest possible means to notify visitors of the danger. Such individuals will be knowledgeable of fire behavior and fire safety principles to be able to stay with visitors as long as needed to assist them to safety.
    4) As part of initial and continuing size-up, an incident commander will determine the proximity to the fire of any visitors or other land users, inform them of potential hazards and aid in evacuation if needed. If life is threatened, and the parties do not cooperate, law enforcement assistance may be requested through the monument headquarters.

- When needed, information on location, behavior, expected dangers, areas to avoid, and other precautions will be posted on monument bulletin boards and local post offices.

- When the risks from a wildland fire are high, precautionary signs will be posted on the entrance station and trails leading into the monument. Trails and day use sites will be closed if deemed necessary by the Superintendent or his/her designee. The Prescribed Fire Burn Boss will ensure that closure and/or informational signs on prescribed burns are properly posted.

- Visitor use will be limited or prevented near wildland fires and nearby areas potentially affected. Rangers will patrol the perimeters of prescribed fires to inform visitors and neighbors about the role of fire in a natural area, explain the risks of approaching too close to a fire and enforce compliance of closures.

- An Incident Status Summary (ICS 209) for all fires burning over 24 hours will be provided to the monument information officer. Information on the fire activity will be broadcast on the monument radio as part of a morning report. The status summary will be distributed to all monument divisions on a daily basis.

- Smoke plume trajectories from large fires will be plotted using computer programs and weather information. Expected impacts on off-monument communities and roadways will be evaluated and information shared with the respective agencies. If needed, vehicular or air patrols will be used to monitor smoke plumes.

- Media releases will be made to local media before the burn. On the day of the burn the media will be informed by telephone calls.

- If needed, a monument information "hot line" will be installed, and the telephone receptionist will be updated whenever new fire information is available.

- The Fire Management Coordinator and Chief Ranger will notify nearby agencies, as appropriate, about monument fires.

- Notice of closures due to fire activity will be posted at trailheads and day use areas as necessary. Roads, trails, and other facilities will stay closed while hazard trees are removed. The public will be informed of hazards and appropriate safety precautions for hiking through areas after they have burned.

B. FIREFIGHTER SAFETY

Ensuring and maintaining firefighter safety is of the utmost importance and takes precedence over rapid suppression targets or goals. The South Canyon Fire in Colorado in 1994 serves as a reminder, reinforcing the need to ensure and maintain firefighter safety. On all actions on wildland fires in Scotts Bluff National Monument, the 10 Standard Firefighting Orders and 18 Watchout Situations will represent Park Policy and will be strictly followed.

XV. PUBLIC INFORMATION AND EDUCATION

Good public relations can engender public support and is prerequisite to a successful fire management program. Failure to provide good public information can be responsible for collapse of the program. Fires can spread very quickly on the prairie necessitating that timely, accurate information concerning both management and wildfires be provided to monument visitors and adjacent land owners.

The Superintendent's Office will issue all news releases regarding fire danger levels, closures, special precautions, and prescribed fires to newspapers, radio and television stations. The Superintendent, when necessary, will function as Information Officer, and provide for effective communication between monument personnel, the public and the media. The fire management program will be incorporated into the monument's overall interpretive program and explained when possible and appropriate.

Prior to prescribed fires, the Fire Management Officer or the Burn Boss will inform project personnel on details of the burn. Landowners or agencies located near the prescribed burn will be contacted and the Superintendent will initiate a news release. On the day of the burn, all staff should be notified as to the burn's location and any special safety warnings to pass on to visitors, i.e., caution to watch for smoke on the road or advice not to hike in the area. Key visitor use or access sites where visitors could likely observe the fire or approach the burn area should have temporary signs indicating a management 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.

Monument staff will maintain a file of public comments received concerning prescribed burns and use them to improve communication efforts targeted at increasing support for the fire management program.

XVI. ARCHEOLOGICAL, CULTURAL, AND HISTORICAL RESOURCES

Scotts Bluff National Monument preserves a variety of cultural resources that complement the natural resources and contribute to the significance of the monument.

The cultural resources of Scotts Bluff National Monument and the associated management problems are more fully described in the monument's Resource Management Plan. The Fire Management Coordinator will work closely with the monument staff to identify all historic, ethnographic, archeological, cultural resources/sites that need special attention to provide protection from fire. The Fire Management Coordinator will coordinate planning efforts to ensure that these objectives are met.

Prior to ignition of prescribed fires an investigation will occur to determine the status of a cultural resource survey in the area. If a survey is not complete, a cursory surface scan will take place prior to the fire to determine the occurrence of cultural resources that may be affected by prescribed fire. An intensive area survey will be completed post fire. The monument will determine what additional management actions are necessary after review of the pre and post fire surveys.

To facilitate the decision-making process during any proposed or occurring fire event, a digital cultural resource map was developed and incorporated into the monument’s geographic information system (GIS). The map identifies the location of the sites. This information will be readily available for prescribed fire planning and to incident commanders for wildfire management.

Eventually digital maps will also include information that will identify preferred fire management activities in regard to specific sites and site types. Actions will be identified including site avoidance (buffer area), use of physical or applied barriers, mechanical reduction of fuel loads, systemic collection of certain artifact classes prior to burn, follow-up survey, and collection post burn.

Also refer to Section VI, F – Cultural Resources.

XVII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

This Fire Management Plan will be reviewed and evaluated annually to determine if the objectives have been met and to make necessary revisions. The Chief Ranger and Fire Management Coordinator will conduct this evaluation. Any problems associated with the guidelines or standards set for fire management, cost effectiveness and suppression will be addressed through revision or addendum and made a part of this plan. The Superintendent and Regional Director will approve all revisions.

Fire reviews will be conducted in accordance with procedures found in DO-18. Each review will be documented and filed with the final fire documentation. The Fire Management Officer will retain a file copy.

The Fire Management Team and cooperators will critique all suppression actions on fires having extended attack and multi-period activities, if appropriate. If the need exists, the Regional FMO can be included in such reviews and a national review by the Branch of Fire and Aviation Management can be requested.
All entrapment and fire shelter deployments will be reviewed in accordance with NWCG Wildland Fire Entrapment/Fatality Initial Report and Entrapment Investigation Element Matrix.

XVIII. INTERAGENCY POLICY

Department of the Interior policy, as specified in Wildland and Prescribed Fire Management Policy: Implementation Procedures Reference Guide (1989), states that all fires in the wildland fuels will be classified as either wildland or as prescribed fires. Wildland fires in wildland fuels will be classified as either wildland or as prescribed fires. Wildland fires are defined as any non-structure fire, other than prescribed fire, that occurs in the wildland. These fires can, but do not always, achieve burning intensities capable of causing loss of life, detrimental impacts upon natural resources and damage to, or destruction of human-made developments. With the implementation of this plan, managers will have a wide range of appropriate management responses to naturally-ignited wildland fires, while all anthropogenic fires will be suppressed. The management of naturally-ignited wildland fires to accomplish specific pre-stated resource management objectives in pre-defined geographic areas outlined herein is defined as wildland fire use. Prescribed fire is defined as any fire ignited by management actions to meet specific objectives. These fires are conducted under prescription and on a predetermined area that will produce the intensity of heat and rate of spread required to accomplish certain management objectives. Overall, fire use (the combination of wildland fire use and prescribed fire application) objectives are to employ fire scientifically to realize maximum net benefits at minimum impact and acceptable cost.

Within the framework of management objectives and plans, overall wildland fire damage will be held to the minimum possible giving full consideration to:

- an aggressive fire prevention program
- the least expenditure of public funds for effective suppression
- the methods of suppression least damaging to resources and the environment, and
- integration of cooperative suppression actions by agencies of the Department among themselves or with other suppression organizations.

XIX. CONSULTATION 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 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 Fire Management Officer is responsible for coordination and consultation with cooperators regarding fire management activities. This includes involvement with the Midwest Regional Fire Management Officer, the Custer Dispatch Center, United States Forest Service, United States Fish and Wildlife Service, the Nebraska Game and Parks Commission, and local cooperators.

XX. Appendices

APPENDIX A: REFERENCES CITED

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APPENDIX B: DEFINITIONS AND ABBREVIATIONS

Wildland Fire Management Terminology
(Adopted By National Wildfire Coordinating Group 6/12/97)

Wildland Fire - Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Fire Management Plan - 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 procedures such as preparedness plans, dispatch plans, prescribed fire plans and prevention plan.

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.

Prescription - Measurable criteria which guide selection of appropriate management response and actions. Prescription criteria may include safety, economic, public health, environmental, geographic administrative, social or legal consideration.

Appropriate Management Response - Specific action taken in response to a wildland fire to implement protection and fire use objectives.

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.

Wildfire - An unwanted wildland fire.

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

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
as selection criteria.

OBSOLETE TERMS

Many traditional terms have either been omitted or made obsolete by the Policy. The terms listed here have uses or connotations that are contrary to the new policy.

Pre-suppression - The term "pre-suppression" has been replaced by the term "preparedness" to match policy and appropriation language.

Prescribed Natural Fire - A fire which is ignited by natural causes, such as lightning, and is allowed to burn, within a designated area. This “let burn” area is a specific acreage delineated on a map.

Management Ignited Prescribed Fire - A human ignited fire to burn a specific area under specific weather conditions to accomplish specific management objectives.

Escaped Fire Situation Analysis - This term is replaced by Wildland Fire Situation Analysis.

Confine/Contain/Control - These terms, when used in the context of suppression strategies, are confusing since they also have tactical meanings. Containment and control are assumed to maintain their definition for fire reporting purposes.

APPENDIX C: STEP-UP PLAN FOR SCOTTS BLUFF NATIONAL MONUMENT

Staffing class	Burning Index	Actions
I (Low)	0 – 10	Get Away Standard (for responding in the engine)– None Preparedness – Monument personnel will carry out normally assigned duties. The engine will be operable.
II. (Moderate)	11 – 20	*All Staffing Class-1 actions apply with further considerations noted below:* Get Away Standard – 10 Minutes Preparedness - Monument personnel will carry out normally assigned duties.
III (High)	21 - 42	*All Staffing Class-1 and 2 actions apply with further considerations noted below:* Get Away Standard - 10 Minutes Preparedness - Fire suppression tools will be added to all monument vehicles. Fire Management Officer or Supervisory Park Ranger has authority to increase Staffing Class by one level dependent on current and forecasted burning conditions.
IV (Very High)	43 – 51	*All Staffing Classes-1, 2, and 3 actions apply with further consideration noted below:* Get Away Standard - 8 Minutes Preparedness - Preparedness overtime may be authorized by the Fire Management Officer or the Chief Ranger in order to ensure that an engine can be staffed. This can be done in cooperation with AGFO. All red-carded monument personnel will be notified about the fire danger.
V (Extreme)	52 +	*All Staffing Classes-1,2,3,4 actions apply with further consideration noted below:* Get Away Standard – 6 Minutes Preparedness – In addition to the above steps the Regional Office will be kept informed of current conditions. Consideration will be given to prepositioning additional local or regional suppression resources in the monument to supplement suppression capabilities. Fire information will be provided daily to visitors, cooperators, Regional Office, and local media.

APPENDIX D: MINIMUM IMPACT FIRE SUPPRESSION AND REHABILITATION PROCEDURES

Fire suppression is taking on increased emphasis in accomplishing protection objectives while minimizing environmental degradation. It is important that fire management activities be planned to accomplish objectives in the most ecologically sound, economically efficient, and safe manners as possible. Actual fire conditions and sound judgement will dictate specific actions taken during any suppression action. However, consideration of what is specifically necessary to halt fire spread and control it within firelines should include as standard procedure, incorporation of minimum impact suppression tactics (MIST) into all action plans and strategic decisions. Minimum impact suppression tactics will be used and included into Agency Administrator's Briefing and Delegations of Authorities to incoming Incident Management Teams and all other out-of-monument resources. Suppression tactics will stress the use of methods and equipment commensurate with threats to life and property, suppression needs, and the chosen strategy of control, contain, and confine, or a combination which will least impact the landscape or disturb monument resources. Development of specific tactics in Scotts Bluff National Monument shall include consideration of the following items:

1. **Fireline Construction:**

    - Select procedures, tools, and equipment that least impact the environment.
    - Give serious condition to water use as opposed to surface disturbance.
    - In light fuels, consider cold trailing line; allowing fuels to burn out and use swatters or equivalent; constantly recheck cold-trailed line; use minimum width and depth of constructed fireline.
    - In medium to heavy fuels, consider using natural barriers as much as possible, cold-trailing fireline; cooling with dirt and water; using minimum width and depth constructed firelines; minimize felling and bucking of woody materials; building line around logs.
    - In aerial fuels, brush, burned trees, and snags, consider limbing only enough fuel adjacent to fireline to prevent additional fire spread; removing or limbing those fuels inside firelines which if ignited would have potential to spread fire outside the fireline; cutting brush and small trees flush with ground.
    - In trees, burned trees, and snags, consider minimizing all cutting of trees, burned trees, and snags while complying with safety objectives; cutting only live trees when absolutely necessary; cutting stumps flush with ground; scrape around tree bases near fireline if hot and likely to cause fire spread.
    - During indirect attack, consider not felling snags on the planned unburned side of fireline unless they constitute a safety hazard; fell only those snags that could reach across firelines.

2. **Mop-up Phase:**

    - In light fuels, cold trail areas adjacent to unburned fuels; do minimal spading.
    - In medium and heavy fuels, cold-trail charred logs near fireline; keep spading to a minimum; minimize bucking of logs; return logs to original position; refrain from piling logs or heavy fuels; minimize bucking of heavy woody materials.

- In aerial fuels remove only those fuels which, if ignited, have the potential to spread fire across firelines.

- In burning trees and snags, allow burning trees or snags to burn themselves out while ensuring personal safety; use felling as a last resort.

3. Incident Command Post and Personal Conduct:

- Use disturbed sites wherever possible.

- Select sites that are unlikely to be observed by visitors.

- Select impact resistant sites such as rocky or sandy soils, or openings in timber.

- Change sites periodically.

- Do minimal disturbance to land in preparing bedding sites.

- Do not clear vegetation or trench areas to create bedding sites.

- Clean and remove all garbage and trash (including micro-trash such as hose ties, candy wrappers, gum wrappers, match covers, etc.).

- Following suppression actions, it is often necessary to rehabilitate damaged areas. When feasible, rehabilitation will be initiated as soon as possible after the fire; and in many instances, it is desirable to initiate such activities during final stages of suppression. During this time, effective use can be made of personnel and equipment still on the firelines.

4. Firelines:

- Fill in deep and wide firelines with soil and organic materials.

- Utilize cup trenches and water bars as necessary to prevent erosion; use woody material to act as sediment dams.

- Cut, lop, and scatter any trees or large size brush that was downed during fireline construction - not to exceed 15 inches in depth.

- Ensure that stumps from cut trees or large size brush are flush with ground.

5. General:

- Remove any and all signs of human activity (including "micro-trash").

- Restore helicopter landing sites.

- Immediate rehabilitation actions to prevent further land degradation or resource loss, or to ensure safety, may be carried out as part of the incident. Post-incident rehabilitation actions will be specified in a rehabilitation plan approved by the branch of fire management.

- Rehabilitation by reseeding of native species of areas burned by wildfires or prescribed fires will be considered in some exceptional circumstances. Three primary circumstances which

may warrant such actions are:

- Sensitive areas subject to significant visitor use when it would be impractical to defer such use and where such use may unreasonably modify natural succession.

- Areas where non-native species might reasonably be expected to dominate natural regeneration without the seeding of native species.

- Areas where heavy fuels burned for long periods of time and sterilized the soil.

Rehabilitation by seeding of native species primarily use those species which occur in early seral stages.

APPENDIX E: COOPERATIVE AGREEMENTS

1. Reciprocal Fire Protection Act of May 27, 1955 (69 Stat 66; 42 USC 1856a).

2. Memorandum of Understanding between United States Department of the Interior and Department of Agriculture, dated January 28, 1943.

3. Protection Act of 1922 (16 USC 594).

4. Interagency Agreement between the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service of the United States Department of the Interior (USDI) and the U.S. Forest Service of the United States Department of Agriculture (USDA), and Amendment No. 2 to Joint USDI Agencies and USDA Forest Service Interagency Fire Agreement No. 83-SIE, dated May 5, 1987.

5. The Clean Air Act (42 USC 7401) provides the primary authority for protection and enhancing the nation's air quality.

6. General Agreement for reciprocal fire protection with the Gering Rural Fire Department, dated June 2000.

7. General Agreement for reciprocal fire protection with the Scottsbluff Rural Fire Protection District, dated June 2000.

APPENDIX F: SPECIES/HABITAT LISTS

VEGETATION

The following list is a summary of the vegetation community types identified at Scotts Bluff National Monument. This list is a result of the vegetation community mapping program completed in 1998.

Sparsely Vegetative:

1. Eroding Great Plains Badlands community is found on irregularly eroded slopes of dissected plains at elevations below 1300 meters (4000 ft.). Vegetation occurs on siltstone outcrops within the Orella Member of the Brule Formation. There is very little soil development.

2. Siltstone-Clay Butte Sparse community occurs on irregularly eroded siltstone outcrops, primarily of the Whitney Member and possibly also the Orella Member of the Brule Formation. It is on the middle to lower slopes of escarpments and on slopes of some ravines. Soils are undeveloped or poorly developed and silty.

3. Riverine Sand Flats-Bars Sparse community occupies nearly level ground in the river channel. Soils consist of freshly deposited alluvial sand. This community is seasonally flooded.

4. Inland Siltstone Bluff/Cliff community is found on very steep (60% or greater) siltstone and sandstone cliffs of the Brule, Gering, and Monroe Cree-Harrison Formations on upper portions of escarpments. These cliffs may be more than 1000 meters high. Soils are not developed.

5. Eroding Great Plains Slopes Sparse community is often restricted to lower shallower slopes. The steeper upper slopes frequently remain unvegetated. *Krascheninnikovia lanata* tends to be more abundant on silty soils and *Artemisia filifolia* on sandy soils. Total vegetation cover is usually 10-25 percent.

Shrub:

1. Mountain Mahogany/Side-oats Grama community is defined solely on the predominance of *Cercocarpus montanus*. *Rhus aromatica* is sometimes present. The herbaceous understory is quite variable though usually disturbed. The exotics *Bromus* spp. are often dominant.

2. The Wolfberry community is densely vegetated, especially in deep narrow ravines. It is dominated by *Rhus aromatica* and/or *Symphoricarpos occidentalis*, often with *Ribes aureum* var. *villosum* and *Prunus virginiana*. *Juniperus scopulorum* can be found in this community also, especially west of Scotts Bluff. *Toxicodendron rybergii* is often abundant in the understory. The herbaceous stratum is poorly developed at most sites and consists of exotics such as *Bromus japonicus*, *Poa pratensis*, and *Nepeta cataria*. Where shrub cover is less dense prairie grasses such as *Bouteloua curtipendula*, *Calamovilfa longifolia*, and *Schizachyrium scoparium* are found. Woody and herbaceous vines (*Parthenocissus vitacea* and *Clematis ligusticifolia*, respectively) are frequently mixed in with the shrubs.

3. Sandbar Willow Shrubland community is dominated by *Salix exigua* with small *Populus deltoides* scattered throughout. *Elaeagnus angustifolia* is common in some places. The herbaceous layer is nearly absent (where recently flooded) to moderately developed. *Phalaris arundinacea* is the most common herbaceous species. Other herbaceous species include *Carex* spp., *Pascopyrum smithii*, *Poa pratensis*, and *Spartina pectinata*. Some exotic forbs, such as *Lepidium latifolium*, are locally common.

Herbaceous:

1. Big bluestem-Canada bluejoint-Sawtooth sunflower community is predominantly herbaceous with scattered trees (*Populus deltoides*, *Fraxinus pennsylvanica*, and *Salix* spp.) and shrubs (*Rhus aromatica, Salix exigua*, and *Symphoricarpos occidentalis*). The common graminoids are *Bromus japonicus*, *B. tectorum*, *Elymus caninus*, *Elytrygia repens*, *Pascopyrum smithii*, and *Poa pratensis*. Exotic forbs are abundant, especially *Cardus nutans* and *Cirsium arvense*. Vegetation is dense except on some gravelly flats near the river where native annuals predominate.

2. Sand bluestem-Prairie sandreed community often has a sparse shrub cover. The dominant species are *Calamovilfa longifolia*, *Stipa comata*, and in some places, *Andropogon hallii*. Plants are relatively widely spaced with exotic *Bromus* spp. often filling the intervening spaces. *Yucca glauca* is quite conspicuous and the high concentration of yucca is often useful indicator of this community. *Artemisia filifolia* is also characteristic of but not always common in this community. It is also present in other communities. *Ipomoea leptophylla* is the most conspicuous of numerous forb species.

3. Mexican firebush/Brome early seral community is highly variable. The community is most frequently dominated by any combination of the following herbaceous species: *Kochia scoparia*, *Bromus tectorum*, *Bromus japonicus*, *Bromus inermis*, *Helianthus annuus*, *Sisymbrium altissimum*, and *Pascopyrum smithii*. *Triticum inermis* may dominate localized areas of this community where it has been seeded as a cover crop. Other common species in this community include *Agropyron cristatum*, *Lactuca serriola*, and *Conyza canadensis*. The shrubs, *Chrysothamnus nauseosus* and *Krascheninnikovia lanata* are often found in the community, though they infrequently dominate.

4. Mixed-grass prairie (reseeded/restored) community is by one or a combination of the following species: *Bouteloua curtipendula*, *Schizachyrium scoparium*, and *Pascopyrum smithii*. Often few other species besides the dominants are present in the community, creating an unnatural-looking grassland. Lack of plant species diversity is a characteristic of this community. The exotic perennial grasses *Bromus inermis* and *Agropyron cristatum* may have extensive coverage in this community. These species are likely seed mixture contaminants. Forbs native to the plains, but not to the national monument (e.g. *Echinacea angustifolia*, *Rudbeckia hirta*, and *Salvia azurea*) are also present in this community. They too are probably seed mixture contaminants. A shrub layer of *Chrysothamnus nauseosus* and *Krascheninnikovia lanata* is sometimes present in this community.

5. Western wheatgrass community is commonly dominated by *Pascopyrum smithii*. In some places *Bouteloua curtipendula* and *Schizachyrium scoparium* are more common particularly in areas that are less well-drained. *Nassella viridula* and *Koeleria macrantha* are common constituents. Shrubs typical of ravine bottoms, including *Rhus aromatica* and *Symphoricarpos occidentalis*, may be scattered in this community. *Krascheninnikovia lanata* is probably more widespread, although it is never common. Forb diversity is low. Many of the common forbs are exotic and native species that do best on disturbed sites. Among these are *Chenopodium pratericola*, *Conyza canadensis*, *Lactuca serriola*, and *Sisymbrium altissimum*.

6. Needle-and-thread grass-Blue grama-Threadleaf sedge community is dominated by graminoids that are usually between 0.5 and a meter tall. At the national monument *Carex filifolia* is particularly abundant, especially on undisturbed sites. On these sites it can form fairly dense turf. *Stipa comata* occupies the spaces between the sedge clumps. *Carex filifolia* becomes more sparse on disturbed sites. These sites frequently have greater coverage by *Pascopyrum smithii*. Where this community occurs on steep slopes of the escarpments *C. filifolia* may be almost absent. *Calamovilfa longifolia* and *Andropogon hallii* are locally common in loose sand on these

slopes and near the edges of steep ravines. *Bouteloua gracilis* also becomes more prominent upslope on the escarpments. *Krascheninnikovia lanata* is the most frequent shrub. It may be scattered to locally abundant in disturbed, sandy soil, often with *Artemisia frigida*. Forb species are quite variable and none seems to be restricted to this community. *Sphaeralcea coccinea* and *Gaura coccinea* are among the more common constituents. On nearly level areas at the base of slopes on which this community occurs *Pascopyrum smithii*, *Krascheninnikovia lanata*, and annual *Bromus* spp. become more common and in places may predominate to the exclusion of *Carex filifolia* and *Stipa comata*. These areas seem to develop only where grazing has been eliminated for long periods of time.

7. The only natural cattail-horsetail-sedge spp. Seep community is located at one small area of less than 10 square meters. Other stands are the result of water seeping from the Gering irrigation canal, but have many of the same species. Dominant plants include *Carex hallii* and *Scirpus pungens*. *Juncus torreyi* and *Agropyron caninum* are prominent. Peripheral areas that were formerly unvegetated are weedy. *Cirsium arvense* is conspicuous in these areas. Near the irrigation canal, some sites have species typical of moderately alkaline sites.

8. Cattail inland Great Plains community is similar to the global type described above. It is dominated by the hydrophytic monocots *Eleocharis erythropoda*, *Phalaris arundinaceae*, *Scripus pungens*, and *Typha latifolia*. Scattered dicots herbs and shrubs (especially *Salix exigua*) may be along the margins.

9. Ponderosa pine/Little bluestem wooded community is dominated by mid and short grass herbaceous species. These include *Bouteloua gracilis* and *Stipa comata*. There is a sparse tree canopy of *Pinus ponderosa*, sometimes with *Juniperus scopulorum*. *Juniperus scopulorum* also occurs as a shrub.

Woodlands:

1. Cottonwood (Peach leaved willow)/Sandbar willow community is found on old alluvial plains frequently by dense stands of *Acer negundo* and *Fraxinus pennsylvanica*. The woods of the sandy soils of the level, primary terraces, are more open and are dominated by *F. pennsylvanica*, *Populus deltoides* and *Salix amygdaloides*. Shrubs are usually present in the open woods. *Symphoricarpos occidentalis* is dominant. Lesser amounts of *Prunus virginiana*, *Rhus aromatica*, and *Ribes aureum* var*. villosum* can be found. *Pascopyrum smithii* and *Phalaris arundinaceae* often dominate the herbaceous layer of the open woods. Invasive exotics, such as *Bromus* spp. *Cirsium arvense*, and *Cynoglossum officinale*, are common.

2. Ponderosa pine/Rocky Mountain juniper community has moderately dense to widely spaced *Pinus ponderosa* with usually non-overlapping crowns. *Juniperus scopulorum* forms a subcanopy. The shrub layer is usually well represented, consisting of *Cercocarpus montanus*, *Ribes cereum*, and occasionally *Rhus aromatica*. The herbaceous stratum is typically composed of prairie graminoids such a *Bouteloua curtipendula*, *B. gracilis, Carex filifolia*, and *Elymus lanceolatus* ssp. l*anceolatus*. On steeper eroding slopes there is a significant amount of bare ground. Where juniper is abundant, the understory is similar to that of *Juniper scopulorum/Oryzopsis micrantha* Woodland.

3. Rocky Mountain juniper/Little-seeded ricegrass community is densely wooded with interlocking canopies of *Juniperus scopulorum*. Scattered individuals of *Pinus ponderosa* are sometimes found on the periphery. A sparse short shrub layer of *Cercocarpus montanus*, *Rhus aromatica* and *Ribes aureum* var. *villosum* is usually present. The herbaceous layer is also sparse. There is little species diversity due to the poor soils and dense shade. *Oryzopis micrantha*, *Chenopodium fremontii*, and *Parietaria pensylvanica* are common under the canopy of junipers. The exotics *Bromus* spp. are common in open areas with loose soil. On the southwestern part of

the national monument, *Juniperus virginiana* may be common to dominant in some of the ravines.

FIRE EFFECTS:

Researchers are in agreement that fire provides an overall benefit to the continued growth, health, and maintenance of the mixed grass prairie ecosystem. (Vogl, 1979; Wright and Bailey, 1980). And although there appears to be some conflict in research findings relative to whether fire benefits or harms particular species (and the degree of benefit or harm resulting to affected species), there is essential agreement that for the mixed grass prairie fire plays an integral role in maintaining the ecosystem.

Given the rapid growth characteristics and the chemical composition of most mixed-grassland species, decomposition occurs slowly in the absence of fire in this ecosystem. Fires thus remove stagnant, dead plant accumulations while converting that mass to ash and charcoal. The blackened, burned areas protect underlying soils by joining remaining unburned vegetation and charcoal bits and help to raise the soil temperature by several degrees, particularly in the spring. The ash/charcoal material returns a number of minerals and salts to the soil, thus recycling them for new plant growth. More importantly, the higher temperatures increase fungal, bacterial, and algal activity which in turn increases available nitrogen. The increased microorganism activity also helps to increase soil temperatures while aiding in nutrient recycling. Fire generally improves mixed-grassland soils without leading to increased erosion. Steep, sandy soils are more susceptible to erosion because of their steepness so fire should be managed to avoid burning previously eroded soils and those most susceptible to erosion. In addition to increasing nitrification of the soils and increasing minerals and salt amounts in the soil, the ash and charcoal residue resulting from incomplete combustion aids in soil buildup and soil enrichment by being added as organic matter to the soil profile. The added material works in combination with dead and dying root systems to make the soil more porous, better able to retain water, and less compact while increasing needed sites and surface areas for essential microorganisms, mycorrhiza, and roots. In general, fires tend to stimulate plant growth, resulting in larger, more vigorous plants, greater seed production, and increased protein and carbohydrate contents. Herbivores prefer post-fire vegetation because it is more palatable and nutritious. When fires burn in mosaic patterns, potential animal cover remains while vegetation increases. Fires tend to increase species diversity, and reduce woody species relative to grass and forb species. (Vogl, 1979; Wright and Bailey, 1980).

Research data relative to fire's effects on a great number of mixed-grassland vegetation species are lacking. However, there are some data available for some species. It must be restated that some data seem to be in conflict. This may result from the type of fire (wildfire vs. prescribed fire), season of fire (spring, summer, fall, winter); climatic conditions (lightning fires accompanied by rain vs. lightning starts during drought conditions); area of study (monument or monument-type lands vs. similar lands located further from the monument); and research methods used. Thus, data summarized here can serve as only general guides for expected effects of fire on a particular species. It is imperative that as part of the overall fire management program, site specific/species specific monitoring be conducted and observations permanently recorded in order that more accurate conclusions can be drawn as to the best method of returning the monument to a more natural fire regime and the result of using prescribed fires to aid the return to and continuation of that natural regime.

EXISTING FINDINGS PERTINENT TO FIRE MANAGEMENT OF SEVERAL PLANT AND ANIMAL SPECIES FOUND IN THE MONUMENT INCLUDE:

Western wheatgrass (*Agropyron smithii*) - Herbage yield reduced for up to three years following wildfire and prescribed fire in semi-arid mixed prairie. It remained the same or increased following May, September, and August wildfires, though herbage yield may be reduced in mesic mixed prairie; increases are found following prescribed burns in April and March with some decrease following late May prescribed burn. There was also a decline noted in unburned areas (Wright and Bailey 1980). Near

Miles City, Montana, another study of prescribed fire results showed the amount produced substantially lower following early spring burning versus fall burning (but both higher than on unburned control plots) although yields were similar by the following spring. June yields were greater on burned plots versus unburned, control plots. Soil moisture was found to have strong influence. Forage production may or may not be increased where this species is dominant. The time of year measurements are taken can vary findings substantially (White and Currie 1983).

Little bluestem (*Andropogon scoparius*) - Data from prescribed fires in the forest-grass ecotone in the South Dakota Black Hills area indicate that burning in the spring to late spring promoted an increased production by this species. Conversely, a late winter/early spring burn (early March) resulted in severe harm to little bluestem. The conclusion drawn was that late spring burns under normal to above average moisture conditions are useful to increase yields of this species. Other spring prescribed fires in the eastern edge of the mesic mixed prairie had similar results (Wright and Bailey, 1980). For comparison, data exist to show that fires in dry years in the southern Great Plains can greatly decrease yields while fires in wet years can greatly increase the yields. Similar results were found following wildfires in the central Great Plains in both the mixed grass and tall grass prairies. The key seems to be to conduct the burns in the late spring in years of at least average moisture conditions to get an increase of this species (Wright and Bailey, 1980).

Blue grama (*Bouteloua gracilis*) - Some reduction of yield resulting from a spring prescribed burn, with full recovery by the third following year in a semi-arid mixed prairie locale; frequency reduced yields following late May and fall wildfires in a mesic mixed prairie setting; although with early spring burns increases were found (Wright and Bailey, 1980). Another study near Miles City, Montana, revealed that using prescribed fire, blue grama yields were reduced early in the growing season and increased in late summer. However, results differed between this study and those following wildfires. Probably, by reduction of other competing species, blue grama had its highest herbage yield following spring burning (although better reduction of the other competing species may be greater using fall burns).

Upland sedges [Threadleaf and Sun] (*Carex* spp.) - Sedges generally tolerate fire very well. The season of a fire has the greatest effect on these plants (Wright, 1978). For the threadleaf (Blackroot) sedge (*Carex filifolia*), a low postburn precipitation may delay full recovery until postfire year 2 or 3 or longer, depending on the severity of the burn. In South Dakota, productivity was increased by burning in April and October when precipitation was above average but was reduced when postburn precipitation was low (Whisenant and Uresk, 1989). To maintain a good stand, plants should not be burned during period of drought, and burn severity should be light to moderate (Brand, 1980). Therefore, if postfire precipitation is adequate, it appears that light-moderate severity fires (particularly spring fires) often cause only minimal damage to threadleaf sedge. The sun sedge (*Carex heliophila*) is an important forage at the beginning of the grazing season and after summer rains. In South Dakota and Wyoming, the ponderosa pine/sun sedge habitat type is uses as a spring-fall range for livestock and spring-summer range for large mammals (Hermann, 1970). Although summer grass fires harm warm-season species, they favor cool-season ones like sun sedge.

Needle-and-thread grass (*Stipa comata*) - Needle-and-thread is severely damaged by fire. This grass is generally killed when aboveground vegetation is consumed by fire. Fire effects depend on the season of burn and phenology, as well as on fire intensity and severity. Site conditions and climatic factors can also play a significant role. Needlegrasses are among the least fire resistant of the bunchgrasses (Young, Evans, and Major, 1977). This species begins growth in the spring or early summer and lacks the pronounced dormant period in late summer that is typical of many other grasses. Consequently, fire is most injurious in midsummer and least detrimental in late spring or fall (Volland and Dell, 1981).

Green needlegrass (*Stipa viridula*) - Specific effects of fire depend on the season of burn, phenology, size of individual plants, and fire intensity and severity. During some high-severity fires, heat may be transferred below the soil surface by the foliage of green needlegrass, thereby increasing the amount of damage the plant receives. Needlegrasses often exhibit subsurface charring. In general, green

needlegrass plants with a lower ratio of dead to living plant material and less fuel volume generally respond more favorably to fire than larger plants do (Wright and Klemmedson 1965).

Japanese brome (*Bromus japonicus*) - Except in wet years, fire tends to reduce Japanese brome (non-native) populations. The reduction usually lasts for only 1 or 2 years (Gartner and White 1986). Some seed is killed by fire, but seedbank reserves, reproductive capacity, and competitive ability of Japanese brome are usually sufficient to allow for re-population of an area within 2 years unless the site is reburned (Whisenant, 1985). Since litter accumulations are more critical for germination and seedling establishment when precipitation is low, drastic population reductions can be expected when burning is followed by below-average precipitation (Whisenant, 1990). Kirsch and Kruse (Kirsch and Kruse, 1973) hypothesized that the successful establishment and spread of Japanese brome across the Northern Great Plains is a direct result of fire suppression: the resulting thicker surface mulch created a more mesic microenvironment for seeds and seedlings (Kirsch and Kruse, 1973). Japanese brome populations will probably continue to increase in the absence of fire (Whisenant, 1990). However, he cautions managers to balance the benefits of litter against the need to reduce Japanese brome when preparing fire management plans. Benefits of litter include soil stabilization and insulation, moisture retention, and promotion of perennials (Vogl, 1974).

Smooth brome (*Bromus inermis*) - Smooth brome is a cool season exotic that is especially troublesome in disturbed portions of old pastures in the tallgrass and mixed grass prairie regions. Although less invasive than Kentucky bluegrass, with which it often occurs and is managed, it is also less responsive to management. The optimal timing for control of smooth brome by burning appears to be in boot stage, which may be as early as mid-April in the central Great Plains or in the northern plains. Early spring (late March-April) or late-season (late summer-fall) fire can increase smooth brome productivity (Higgins, Kruse, Piehl, 1989; and Hughes, 1985) especially when smooth brome has become sod-bound. Late spring fire generally damages cool-season grasses such as smooth brome (Bailey ,1978 and Masters, Vogel, 1989). Kirsch and Kruse and Blankespoor have reported reductions in smooth brome with late spring burning. Blankespoor and Larson's 1994 prescribed fire-water treatment study suggests that prescribed late spring fire will most effectively control smooth brome in wet years. They recommend continuing a program of prescribed burning through drier years, however. Since they found that smooth brome increased in importance without burning, and that increases were greatest when initial smooth brome biomass was low, they concluded that failing to burn smooth brome in dry years is likely to accelerated its expansion.

Downy brome/Cheatgrass (*Bromus tectorum*) - This non-native grass is not appreciably affected by burning although production may be reduced the first year. The earlier the fire, the greater the degree of reduction (Stewart and Hull, 1949). Fires in pure cheatgrass stands tend to be less common in the spring or early summer. Fires generally occur in the summer after seed is shed and is less vulnerable to burning. Reduction of cheatgrass under these conditions is not great (Tisdale and Hironaka, 1981). Fire reduces cured plants to ash, but fire intensity may not be great enough to consume the litter layer, even if associated shrubs burn. Since cheatgrass produces prolific quantities of seed, even a large reduction in the seed pool will not prevent it from regaining dominance on a site (Young, Evans, and Weaver 1976). Caution must be used with this non-native grass because early summer fires can also kill perennial grasses and facilitate increases in cheatgrass.

Kentucky bluegrass (*Poa pratensis*) - There is some disagreement whether *Poa pratensis* is native in the northern tier of states and Canada (Fernald, 1950; Great Plains Flora Association, 1986; Gleason and Cronquist, 1953) or native in Eurasia and introduced throughout its North American range (Hitchcock, 1950; Mohlenbrock, 1972; and USDA, 1948). This species is a major problem throughout the tallgrass and mixed grass prairies. In natural areas it competes with native species, reducing species diversity and altering the natural floristic composition. In northern mixed prairie (north of Nebraska sandhills) *Poa* is believed to compete directly with cool season native grasses (Steuter pers. comm.). North of the Nebraska sandhills in the Dakotas, there is a more even mix of native warm and cool season grasses (Steuter pers. comm.). There is only a short period of one or two weeks between the greening-up of *Poa*

pratensis and of native co-dominant *Stipa* species. Unless fires are timed exactly within this spring period, the advantage of controlling *Poa* will be offset by damage to native cool season grasses. Results from a study by Schacht and Stubbendieck (1985) in Nebraska suggest that it is not only spring injury to *Poa*, but the shift of competitive advantage to warm season natives that makes fire an effective tool for range conversion in mixed prairie. Because natural area management goals involve the replacement of *Poa* by native species, it is important to monitor not only the decrease in *Poa*, but the increase or retention of desired native species. This is important because under sod-bound conditions *Poa* could decrease without any benefit to native species (Kruse pers. comm, Volland pers. comm.).

Canada thistle (*Cirsium arvense*) - Canada thistle is a herbaceous perennial in the aster family. It is an exotic weed that was introduced to the United States, probably by accident, in the early 1600's and by 1954, had been declared a noxious weed in forty-three states. In Canada and the U.S., it is considered one of the most tenacious and economically important agricultural weeds, but only in recent years has it been recognized as a problem in natural areas. At Scotts Bluff National Monument, it has invaded ~200 acres (+/-75 acres) depending on the year and the mapping techniques used at the time. To keep this weed from expanding its range you must eliminate or control, to the greatest extent possible, seed production. Complete control is difficult because of the perennial root system, abundant seed production, and widespread and diverse habitat of the plant. The key is to integrate prescribed fire with the biological control program (begun in 1992) and mowing efforts that are being conducted at Scotts Bluff National Monument. The use of herbicides is also being considered.

Prescribed spring burning may be a useful means of slowing the spread of Canada thistle. Spring fires would reduce the number of mature plants later in the year. They would also reduce the number of functional flower heads, resulting in lower seed production and a slow-down in the spread of new plants. Dormant-season fire is also beneficial to many native grass species, would interfere with Canada thistle growth and reproduction, and possibly its spread (Young, 1986). Patches of Canada thistle were reduced in Minnesota after 4 years of consecutive spring burning of low to moderate intensity (Becker 1989). Density and aboveground biomass were unchanged after a spring fire (May, before growth began) and increased after both summer (August, peak of growth) and fall (October, winter dormancy) fires in Manitoba. The increase on the fall fire was lower than on the summer fire (Thompson and Shay, 1989).

Ponderosa pine *(Pinus ponderosa*) - Interior ponderosa pine depends on frequent surface fires to maintain stand health and stability (Biswell, Kallander and Komarek, 1973). Fire exclusion has profoundly influenced the stability of interior ponderosa pine stands (Cooper, 1960). The following management problems are associated with reduced fire frequencies: 1) overstocked sapling patches, 2) reduced growth, 3) stagnated nutrient cycles, 4) increased disease, insect infestations, and parasites, 5) decreased seedling establishment, 6) increased fuel loadings ,7) increased vertical fuel continuity due to dense sapling patches, 8) increased severity and destructive potential of wildfires (Covington and Sackett, 1984). The effect of fire on interior ponderosa pine is generally related to tree size, fire intensity, and tree density (Alexander, 1987). Low intensity fires readily kill seedlings less than 12 inches in height (Biswell, Kallander and Komarek, 1973). Larger interior ponderosa pine seedlings can sometimes survive heat generated by low intensity surface fires, especially dormant season fires (Fischer and Clayton, 1983). Larger seedlings, saplings, and pole-sized trees are damaged but not killed by low intensity fires. Beyond the pole stage, interior ponderosa pine is quite resistant to the majority of ground fires (Schuber, Heidmann and Larson, 1970). Interior ponderosa pine usually survives fires during the dormant season, largely because insulating scales form once leader growth stops (Ryan 1982) and because dormant season fires are usually relatively cool (Dieterich, 1979). Trees are least resistant to thermal damage during early spring and most resistant in the fall when dormant (Hare, 1961). Trees can withstand up to 50 percent crown scorch from fall burning but only 30 percent crown scorch from spring burning (Mohr, 1984).

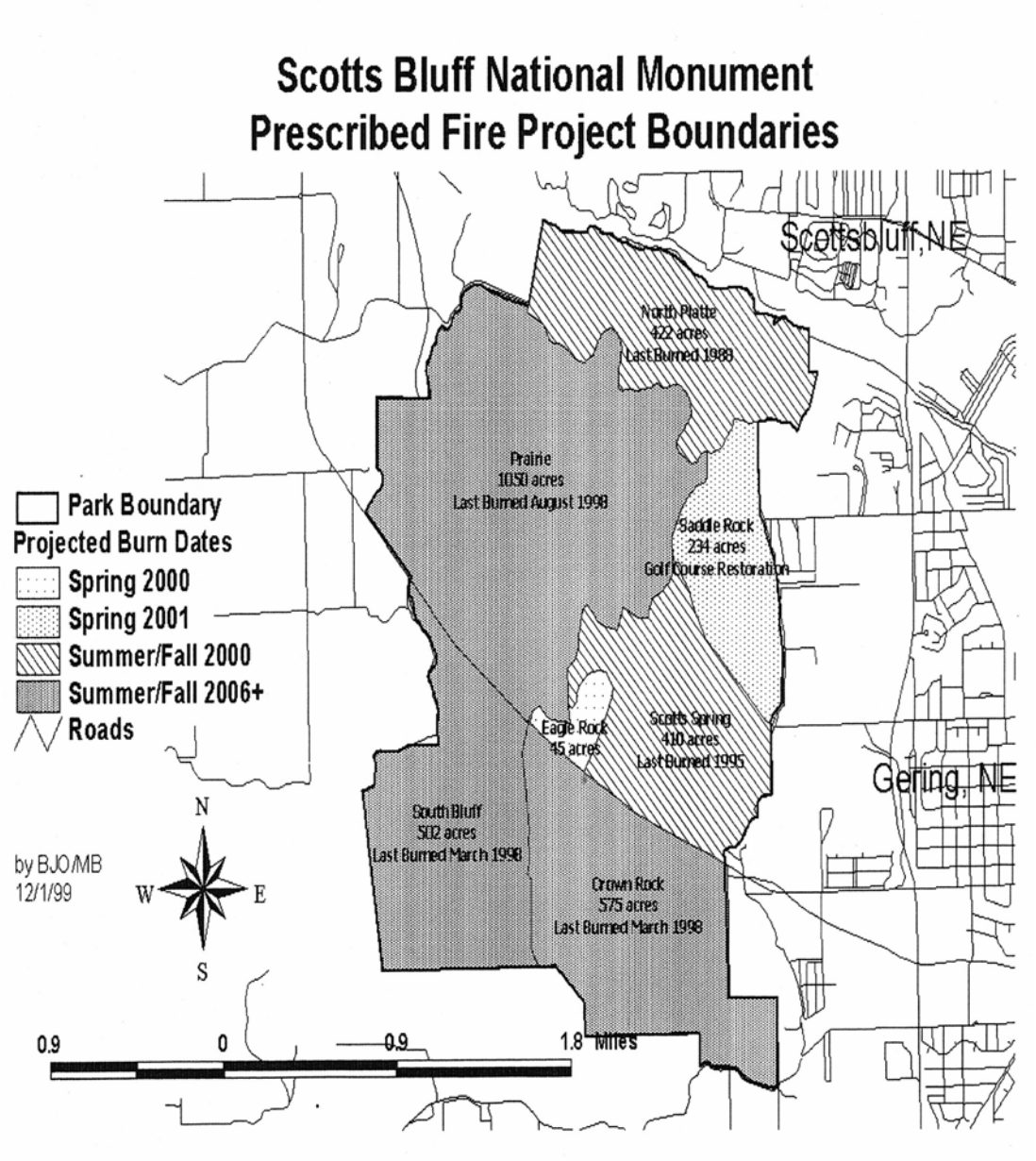
Black-tailed prairie dog (*Cynomys ludovicianus*) - Fire can be used to stimulate the growth of dogtowns as well as to temporarily halt their rate of growth or to even reduce their size. Prescribed burns immediately adjacent to dogtowns can enhance dogtown expansion by reducing the height and density of bordering ground cover. Fires on areas removed from dogtowns will significantly reduce ungulate use of colony sites. Under such conditions prairie dogs must on their own accomplish the reduction of ground cover required for expansion into uncolonized areas (Klukas, 1988).

APPENDIX G: MULTI-YEAR PRESCRIBED FIRE SCHEDULE

SCOTTS BLUFF NATIONAL MONUMENT
2000 - 2015

DATE	BURN	ACREAGE	RESOURCE GOAL
2000	North Platte	400 acres	Prairie Maintenance
2000	Eagle Rock	45 acres	Hazardous Fuel Reduction
2001	Saddle Rock	120 acres	Prairie Restoration
2002	Scott Spring	500 acres	
2003	Saddle Rock	120 acres	Prairie Restoration
2004	South Bluff		Prairie Maintenance
2005	Scott Spring		Prairie Maintenance
2005	Eagle Rock	45 acres	Hazardous Fuel Reduction
2005	Saddle Rock	120 acres	Prairie Restoration
2006	Prairie	800 acres	Prairie Restoration
2007	Crown Rock		Prairie Restoration
2008	North Platte	400 acres	Prairie Restoration
2007	Saddle Rock	120 acres	Prairie Restoration
2009	Saddle Rock	120 acres	Prairie Restoration
2010	Eagle Rock	45 acres	Hazardous Fuel Reduction
2015	Eagle Rock	45 acres	Hazardous Fuel Reduction

APPENDIX H: PRESCRIBED FIRE PROJECT BOUNDARIES



APPENDIX I: CLIMATE INFORMATION AND WEATHER DATA

SEASONAL TEMPERATURES AND RAINFALL

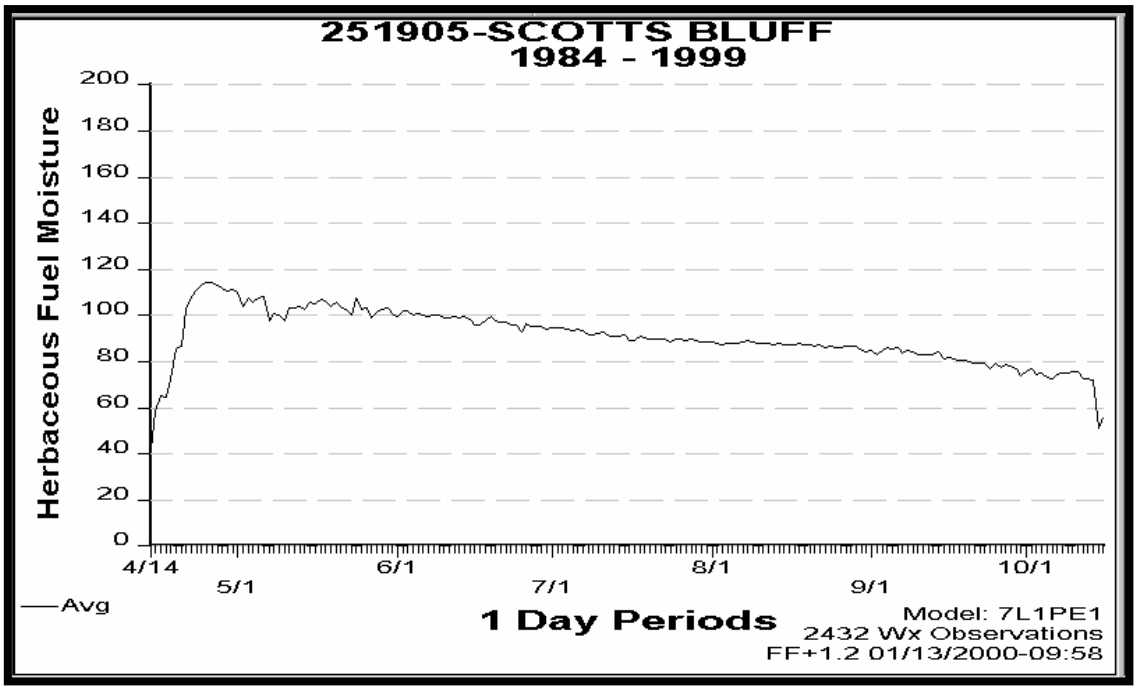
	Average Daily High Temperature	Average Daily Low Temperature	Normal[1] Monthly Precipitation
Jan	38	12	0.50
Feb	44	16	0.47
Mar	50	23	1.09
Apr	61	32	1.58
May	71	43	2.77
June	82	53	2.64
July	89	59	2.06
Aug	87	56	1.07
Sep	78	46	1.10
Oct	65	34	0.81
Nov	50	22	0.62
Dec	40	14	0.56
Annual Normal Precipitation			**15.27**

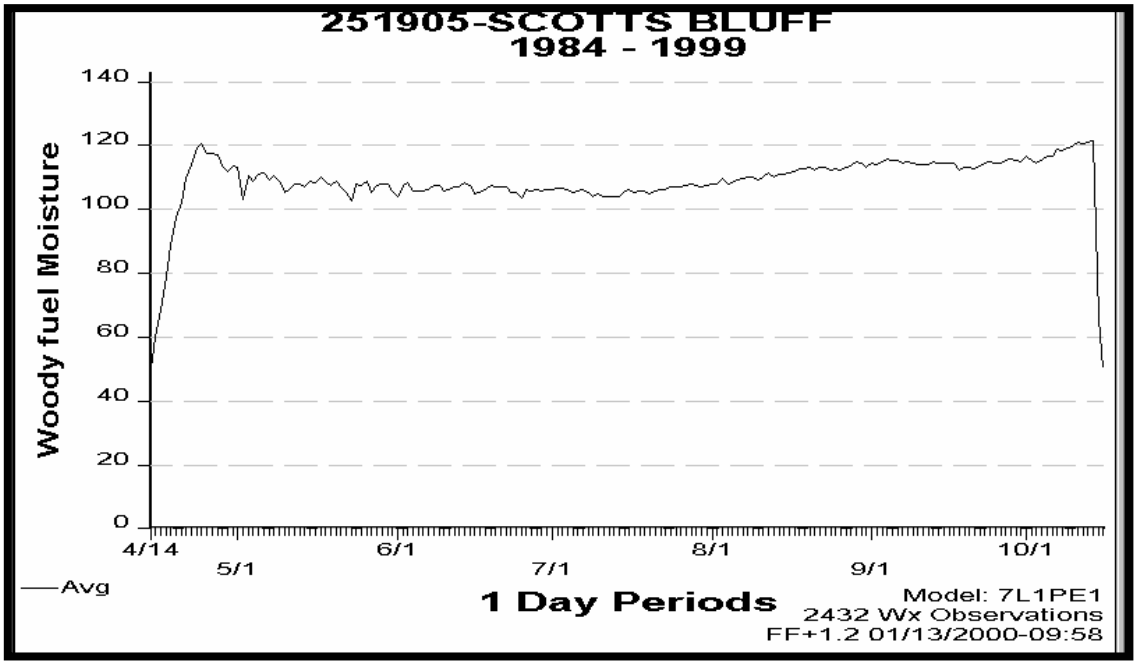
Weather data from National Weather Service Data 1969-1998.

lxilxilxi

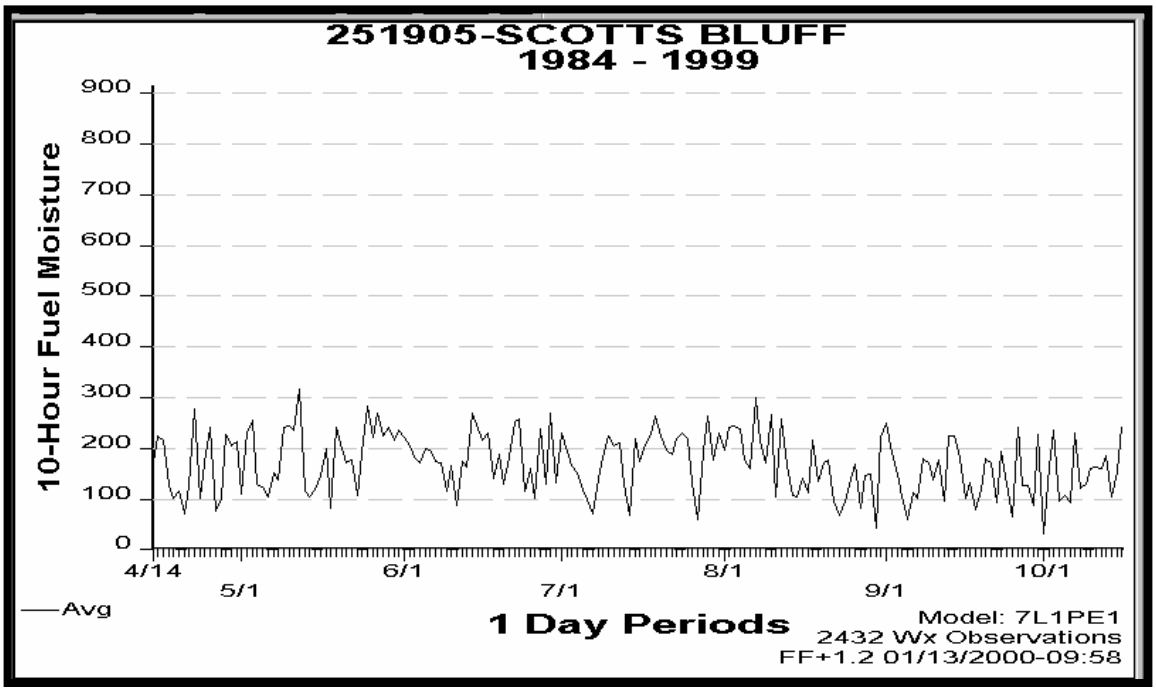
[1] Normal indicates the value with an equal number of occurrences both above and below the normal for the period of record. It is less subject to variation from unusually large or small outlying values than the average.

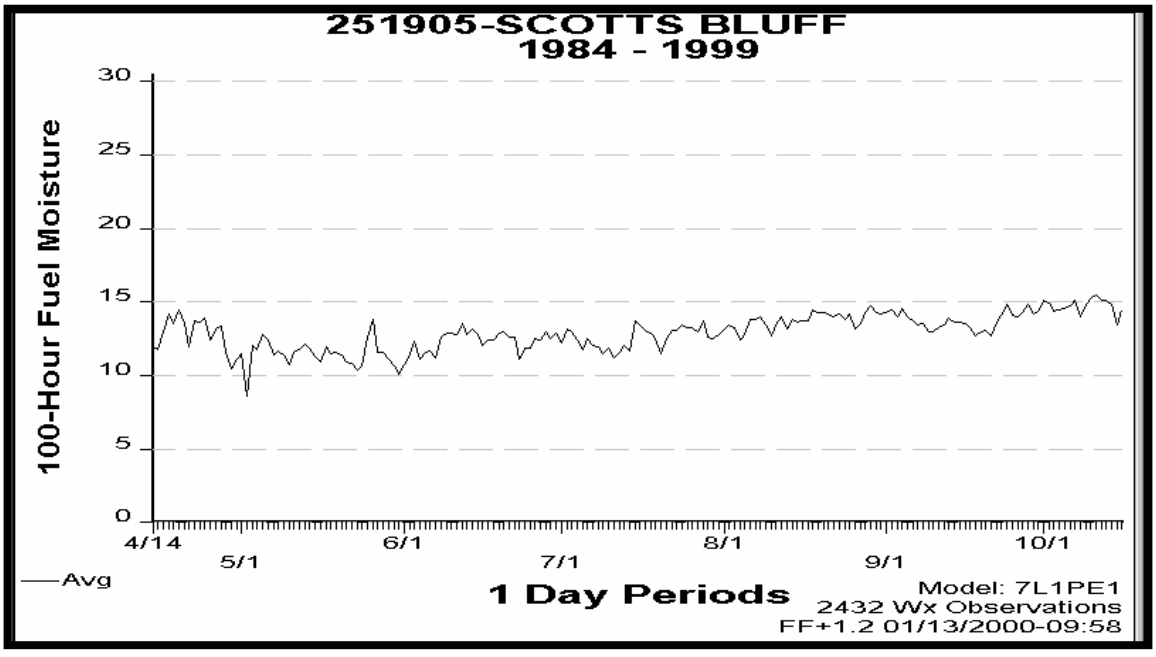
SEASONAL GRAPHS OF AVERAGE HERBACEOUS AND WOODY FUEL MOISTURE



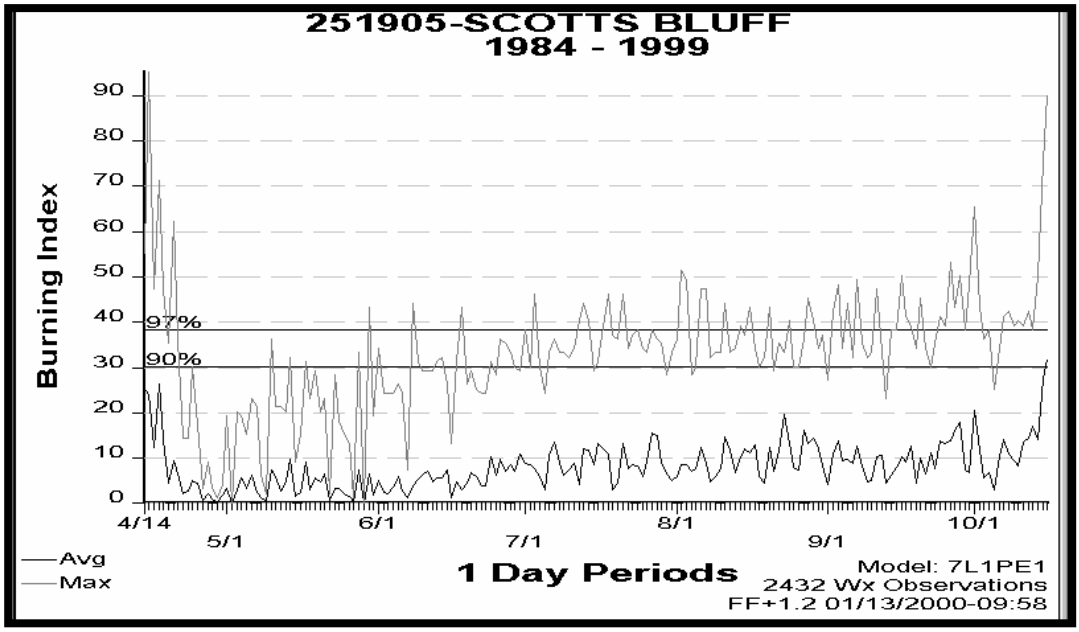


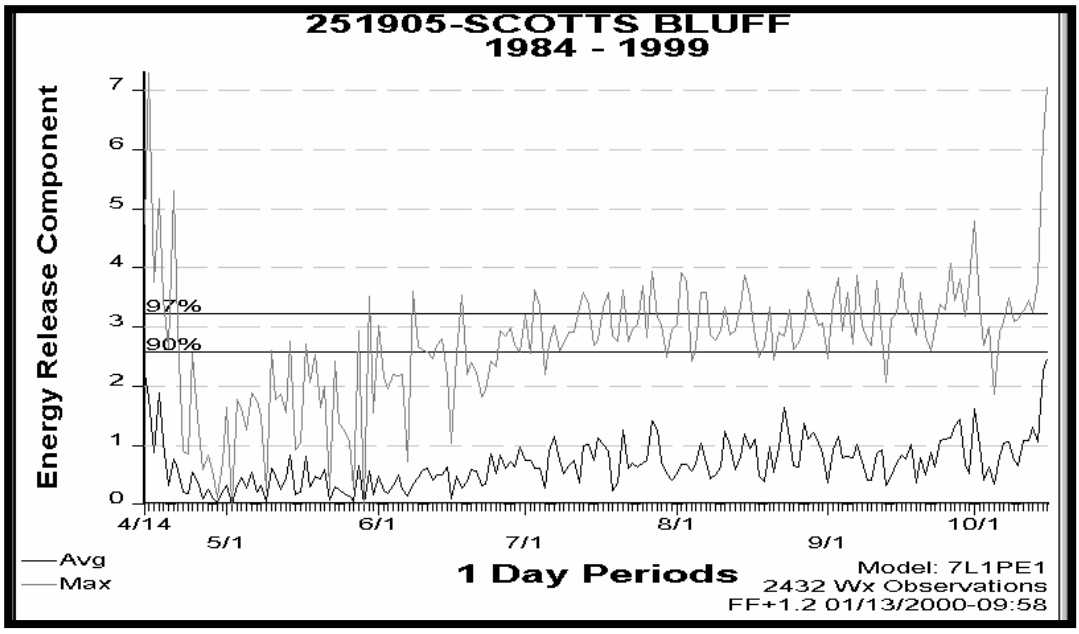
SEASONAL GRAPHS OF AVERAGE 10 AND 100-HOUR DEAD FUEL MOISTURE

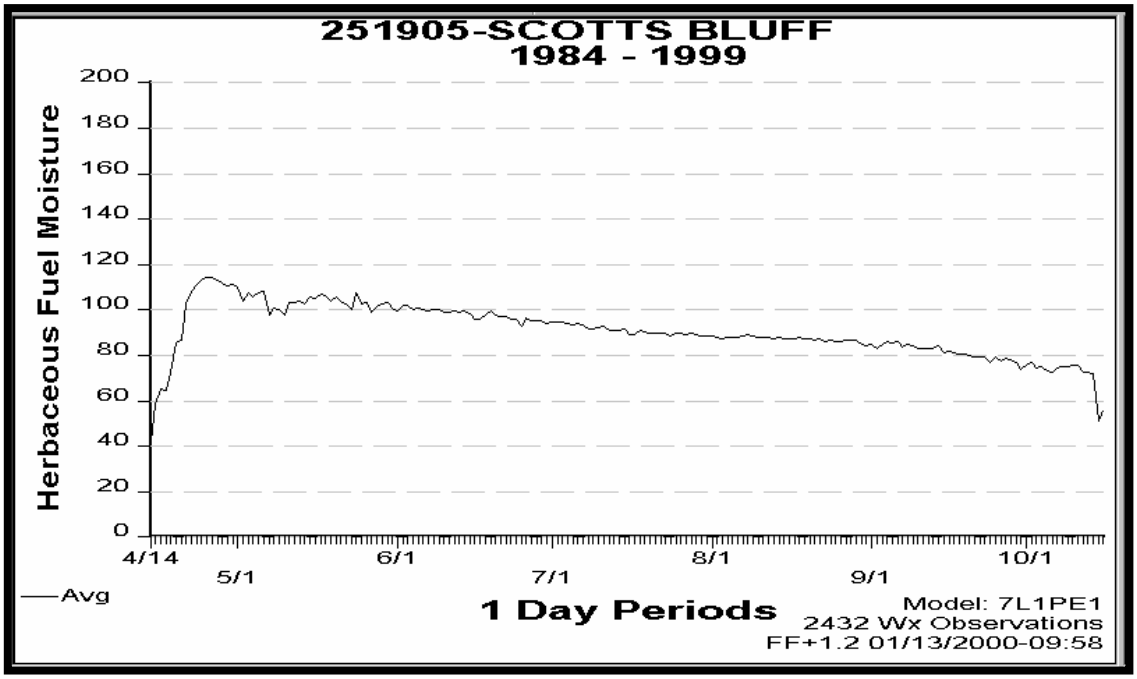




SEASONAL GRAPHS OF AVERAGE BURN INDEX AND ENERGY RELEASE COMPONENT






251905-SCOTTS BLUFF
1984 - 1999
Herbaceous Fuel Moisture
200
180
160
140
120
100
80
60
40
20
0
4/14
5/1
6/1
7/1
8/1
9/1
10/1
Avg
1 Day Periods
Model: 7L1PE1
2432 Wx Observations
FF+1.2 01/13/2000-09:58

PRECIPITATION (inches) 1998 SCOTTSBLUFF, NE (BFF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	0.72	0.52	0.51	1.08	2.44	2.01	0.72	1.26	0.79	3.02	0.40	0.32	13.79
1970	0.57	0.18	0.93	2.26	1.38	2.49	1.10	0.40	0.34	1.57	0.38	0.39	11.99
1971	0.23	0.44	1.31	1.71	4.73	2.47	1.46	1.47	2.09	0.69	0.33	0.13	17.06
1972	0.35	0.25	0.69	2.91	1.54	4.43	3.77	1.71	1.64	0.79	1.75	0.77	20.60
1973	0.58	0.43	1.97	2.24	0.80	0.88	3.69	0.09	4.22	0.74	1.36	1.24	18.24
1974	0.57	0.10	1.99	0.35	0.79	0.98	0.66	1.58	0.94	0.48	0.42	0.18	9.04
1975	0.32	0.46	1.73	1.78	2.25	1.47	1.60	0.47	0.26	0.74	0.45	1.18	12.71
1976	0.96	0.29	0.36	2.48	2.27	1.31	0.25	0.78	0.22	0.35	0.35	0.10	9.72
1977	0.52	0.02	2.04	2.12	2.07	4.06	1.22	0.63	0.39	0.13	0.91	0.82	14.93
1978	1.26	1.17	0.68	1.24	4.37	2.41	4.82	1.25	0.09	0.74	0.62	1.54	20.19
1979	0.74	0.10	1.22	0.90	1.33	2.59	3.17	2.51	0.74	1.66	1.60	0.49	17.05
1980	1.21	0.99	2.16	0.57	2.82	0.79	1.07	0.47	0.47	0.76	0.57	0.15	12.03
1981	0.69	0.14	0.59	1.47	2.75	2.54	3.54	1.10	0.39	0.34	0.26	0.19	14.00
1982	0.32	0.20	0.46	0.50	2.93	6.63	4.78	1.66	1.78	1.22	0.80	0.57	21.85
1983	0.29	0.04	1.94	2.33	4.20	1.81	0.69	1.23	0.13	0.68	1.75	0.60	15.69
1984	0.44	0.50	1.47	3.89	1.23	1.23	1.80	0.57	0.45	0.88	0.28	0.50	13.24
1985	0.64	0.20	0.37	1.23	0.86	1.76	0.80	0.18	2.71	1.01	1.28	1.17	12.21
1986	0.07	1.93	0.83	2.49	1.51	5.55	4.00	1.01	1.86	1.42	0.81	0.26	21.74
1987	0.34	1.88	1.70	0.44	7.25	4.13	1.14	3.42	0.90	0.08	0.95	1.01	23.24
1988	0.80	0.11	1.11	2.27	5.19	2.29	0.85	0.80	0.97	0.11	0.46	0.40	15.36
1989	T	1.03	0.77	0.65	1.89	1.15	0.32	1.13	1.63	0.70	0.07	0.65	9.99
1990	0.59	0.72	2.64	1.75	2.94	1.14	3.10	1.23	0.97	0.99	1.25	0.36	17.68
1991	0.46	0.39	0.50	1.16	4.35	4.00	0.56	0.11	0.90	1.17	0.72	0.02	14.34
1992	0.81	0.86	1.22	0.34	2.03	3.00	2.96	1.65	0.17	1.15	0.98	0.66	15.83
1993	0.45	1.64	1.36	1.95	0.98	5.55	3.10	2.53	2.17	2.35	2.15	0.59	24.82
1994	0.59	0.77	0.73	1.96	1.10	2.80	2.56	0.45	0.66	2.76	0.64	0.95	15.97
1995	1.07	0.60	0.37	2.41	4.59	3.46	0.87	0.08	1.36	0.84	0.50	0.55	16.70
1996	0.83	T	1.03	0.91	4.48	1.02	2.06	2.24	2.44	0.42	0.89	0.22	16.54
1997	0.26	0.36	0.28	3.89	5.34	3.40	2.28	1.46	0.93	1.83	0.11	0.31	20.35
1998	0.20	0.64	1.30	1.53	1.46	2.32	3.38	1.19	0.41	2.76	1.20	0.86	17.25
POR= 107 YRS	0.41	0.48	0.91	1.77	2.77	2.73	1.79	1.21	1.20	0.93	0.51	0.50	15.21

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AVERAGE TEMPERATURE (°F) 1998 SCOTTSBLUFF, NE (BFF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	23.6	32.4	30.8	50.8	59.2	61.4	74.9	75.1	66.7	41.1	38.3	30.8	48.8
1970	24.5	33.0	30.4	41.4	56.9	64.5	72.9	73.2	57.3	42.6	36.0	25.7	46.5
1971	26.8	28.6	34.7	48.2	54.5	69.3	70.2	72.9	58.4	47.5	37.9	29.4	48.2
1972	24.9	33.4	41.7	46.0	56.5	68.2	70.0	71.0	61.1	48.8	30.1	20.4	47.7
1973	24.6	29.8	38.1	41.9	54.9	67.5	71.6	72.9	57.2	50.7	35.3	25.6	47.5
1974	19.6	33.9	38.9	47.4	58.1	69.5	76.5	68.3	56.4	52.1	36.3	28.1	48.8
1975	26.6	25.3	33.1	44.5	56.5	65.6	77.2	72.2	59.7	50.9	35.6	31.9	48.3
1976	25.1	37.2	36.6	49.1	58.2	68.1	76.4	72.2	63.1	47.3	34.7	32.2	50.0
1977	20.8	36.6	38.1	53.0	63.5	73.1	76.3	70.2	65.4	51.6	38.1	28.3	51.3
1978	18.3	22.0	40.5	49.6	56.6	69.0	74.9	70.5	66.2	51.6	33.8	18.9	47.7
1979	10.4	28.1	41.0	50.1	56.1	68.6	75.0	71.7	67.0	53.1	32.0	34.3	49.0
1980	23.1	29.7	36.1	49.4	58.6	72.3	78.2	73.1	66.3	51.6	40.8	37.0	51.4
1981	32.5	32.8	42.7	56.4	57.4	71.3	76.2	72.8	66.9	50.9	42.7	31.2	52.8
1982	22.5	27.7	37.6	43.9	55.6	62.8	72.8	74.2	62.1	48.5	34.2	27.9	47.5
1983	32.6	36.5	36.8	40.7	51.1	63.9	74.2	76.7	63.9	51.5	34.2	12.4	47.9
1984	27.3	35.5	37.4	42.2	58.8	66.8	74.8	76.4	59.9	46.2	37.6	24.8	49.0
1985	20.8	25.6	39.5	50.7	61.7	66.3	75.2	71.6	57.4	47.5	22.0	20.2	46.5
1986	32.9	27.9	44.3	47.3	55.3	69.5	72.6	70.9	59.6	48.5	35.2	28.7	49.4
1987	29.0	33.8	33.3	51.0	60.4	68.3	74.7	68.9	60.5	47.6	38.5	25.2	49.3
1988	18.1	30.4	35.9	46.8	58.2	72.7	74.6	72.6	60.4	50.4	37.2	28.1	48.8
1989	30.4	18.4	35.8	48.2	58.4	66.4	77.1	72.5	61.2	48.8	39.3	20.5	48.1
1990	32.3	29.8	37.4	46.8	54.3	70.4	71.7	71.1	65.9	48.8	39.1	20.6	49.0
1991	22.7	37.3	38.9	45.9	59.2	68.2	74.0	73.9	62.7	47.6	32.7	31.9	49.6
1992	31.2	37.8	41.2	50.4	59.7	65.9	68.6	67.1	62.4	49.8	30.8	18.6	48.6
1993	20.9	17.6	37.7	45.9	58.8	63.1	69.9	68.6	57.2	46.4	29.4	30.0	45.5
1994	27.8	26.7	40.6	47.3	62.6	71.1	71.3	73.4	64.9	49.2	35.9	29.4	50.0
1995	24.5	34.4	37.9	42.9	50.9	64.0	71.9	73.9	59.9	46.6	38.4	27.1	47.7
1996	21.4	31.0	32.9	46.9	56.4	69.1	72.3	71.0	60.2	47.8	31.9	27.6	47.4
1997	24.8	30.0	39.3	39.6	56.1	67.8	72.4	69.7	63.5	49.0	34.0	29.6	48.0
1998	28.8	34.8	34.6	45.9	58.8	62.2	74.9	73.2	68.1	48.3	39.8	26.2	49.6
POR= 106 YRS	25.5	29.1	36.4	46.7	56.9	66.9	72.9	71.6	61.7	49.7	36.4	27.6	48.5

SNOWFALL (inches) 1998 SCOTTSBLUFF, NE (BFF)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1969-70	0.0	0.0	0.0	21.6	1.0	2.9	6.6	2.0	10.2	17.6	T	0.0	61.9
1970-71	0.0	0.0	T	11.2	0.4	4.4	2.2	4.4	14.2	3.0	T	0.0	39.8
1971-72	0.0	0.0	T	1.0	3.4	1.3	4.1	2.3	1.0	6.2	0.0	0.0	19.3
1972-73	0.0	0.0	0.0	5.3	14.0	10.2	6.9	5.9	4.8	5.2	T	0.0	52.3
1973-74	0.0	0.0	T	4.6	12.2	11.8	9.9	1.1	17.9	1.7	0.0	0.0	59.2
1974-75	0.0	0.0	3.8	T	T	2.7	5.9	5.8	17.7	10.7	T	0.0	46.6
1975-76	0.0	0.0	0.0	6.1	4.7	15.5	12.0	5.5	5.9	0.9	0.0	T	50.6
1976-77	0.0	0.0	0.0	0.1	5.4	1.3	8.1	0.1	10.9	1.0	0.0	0.0	26.9
1977-78	0.0	0.0	0.0	0.4	6.3	11.8	14.9	15.3	1.6	0.8	3.4	0.0	54.5
1978-79	0.0	0.0	0.0	2.9	7.2	17.5	10.5	1.6	7.7	4.3	6.4	0.0	58.1
1979-80	0.0	0.0	0.0	3.8	13.5	5.3	17.1	10.6	23.5	3.9	0.8	0.0	78.5
1980-81	0.0	0.0	0.0	1.2	3.7	1.7	8.3	2.1	3.2	1.3	0.0	0.0	21.5
1981-82	0.0	0.0	0.0	0.6	0.2	1.8	4.4	3.8	2.8	2.1	T	0.0	15.7
1982-83	0.0	0.0	0.0	5.3	4.3	4.9	2.8	T	16.4	8.9	2.6	0.0	45.2
1983-84	0.0	0.0	T	0.0	18.5	7.9	4.8	2.7	13.5	13.3	1.2	0.0	61.9
1984-85	0.0	0.0	1.6	2.2	2.5	7.1	7.2	2.3	3.2	1.7	0.0	0.0	27.8
1985-86	0.0	0.0	5.1	0.3	17.5	18.1	0.5	16.0	6.0	12.5	1.0	0.0	77.0
1986-87	0.0	0.0	0.0	1.5	5.1	2.8	3.7	23.4	16.6	0.4	0.0	0.0	53.5
1987-88	0.0	0.0	0.0	0.3	5.8	17.0	14.6	2.9	10.6	11.6	T	0.0	61.8
1988-89	0.0	0.0	0.0	T	3.5	4.1	T	13.0	9.2	2.7	T	T	32.5
1989-90	0.0	0.0	T	2.0	0.6	11.6	7.0	8.6	18.6	6.0	1.5	0.0	55.9
1990-91	0.0	0.0	0.0	7.6	10.7	4.4	5.7	2.2	4.2	2.6	1.8	T	39.2
1991-92	0.0	0.0	0.0	5.9	4.7	0.1	7.8	1.0	6.6	T	0.0	T	26.1
1992-93	T	0.0	T	4.1	10.3	10.4	7.9	19.0	11.5	2.0	T	T	65.2
1993-94	T	0.0	2.5	3.3	11.1	6.2	7.1	8.9	0.1	8.7	0.0	T	47.9
1994-95	0.0	0.0	T	T	4.2	11.0	11.5	9.9	3.4	7.6	T	T	47.6
1995-96	0.0	0.0	0.5	1.8	3.5	6.2	11.0	T	7.8	2.7	T	0.0	33.5
1996-97	0.0	T	0.0	0.7	8.3	3.7	2.7			22.2	0.0	T	
1997-98	0.0	0.0	0.0	8.0	2.1	3.1	1.6	3.0	7.0	2.3	T	0.0	26.1
1998-	T	T	0.0	T	12.9	8.0							
POR= 54 YRS	T	0.0	0.4	2.5	5.3	6.5	6.4	5.6	8.5	5.0	0.9	0.0	41.1

WBAN : 24028

REFERENCE NOTES:

PAGE 1:
THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).

PAGE 2 AND 3:
H/C INDICATES HEATING AND COOLING DEGREE DAYS.
RH INDICATES RELATIVE HUMIDITY
W/O INDICATES WEATHER AND OBSTRUCTIONS
S INDICATES SUNSHINE.
PR INDICATES PRESSURE.
CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).

GENERAL:
T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE.
+ INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.
NORMALS ARE 30-YEAR AVERAGES (1961 - 1990).
ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM.
PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH.
POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING.
WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER OF YEARS INDICATED.
0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05.
CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET AND ON SATELLITE DATA FOR CLOUDS ABOVE 12,000 FEET.
THE NUMBER OF DAYS WITH CLEAR, PARTLY CLOUDY, AND CLOUDY CONDITIONS FOR ASOS STATIONS IS THE SUM OF THE CEILOMETER AND SATELLITE DATA FOR THE SUNRISE TO SUNSET PERIOD.

GENERAL CONTINUED:
CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS. WHEN AT LEAST ONE OF THE ELEMENTS (CEILOMETER OR SATELLITE) IS MISSING, THE DAILY CLOUDINESS IS NOT COMPUTED.
WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM. "36" INDICATES TRUE NORTH.
RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION.
AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2.
SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL.
A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65° F.
DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR.
DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY.
WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.

ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE "METAR" OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.

APPENDIX J: INTERAGENCY CONTACTS AND COORDINATION

Fire Management Agencies:

NPS - Northern Great Plains Fire Management Office	605-745-1156
Interagency Fire Dispatch - Custer, South Dakota	605-673-4434
North Platte National Wildlife Refuge	308-635-7851
Scottsbluff Rural Fire Department	308-635-1654
Scottsbluff City Fire Department	308-630-6231
Gering City Fire Department	308-436-2441
Scottsbluff City Fire Department	308-630-6231

Emergency Medical Services:

Valley Ambulance Service	308-635-0511
Gering City Fire Department	308-436-2441
Regional West Medical Center (Emergency Room)	308-630-1127

Law Enforcement:

Scotts Bluff County Sheriff's Office	308-436-6667
Gering City Police Department	308-436-5088
Scottsbluff City Police Department	308-632-7176
Nebraska State Patrol	308-632-1211

Emergency Management Agencies:

State Division of Emergency Management	402-471-7421
Scotts Bluff County Emergency Services Coordinator	308-436-6689
Nebraska Army National Guard (Gering)	308-436-6563

National Weather Service:

Fire Weather Forecaster - Rapid City, South Dakota	605-341-7435
NWS - Rapid City, South Dakota Office	605-341-7435
NWS - Cheyenne, Wyoming Office	307-772-2468
NWS - Cheyenne, Wyoming (Spot Weather Forecasts)	307-772-2227

Media:

Associated Press	Nebraska	800-642-9920
KDUH TV	Scottsbluff, Nebraska	308-632-3071
KSTF TV	Scottsbluff, Nebraska	308-632-6107
KNEB Radio	Scottsbluff, Nebraska	308-632-7121
KCMI Radio	Scottsbluff, Nebraska	308-632-5264
KMOR Radio	Scottsbluff, Nebraska	308-632-5667
KOLT Radio	Scottsbluff, Nebraska	308-635-1320
Star Herald Newspaper	Scottsbluff, Nebraska	308-632-9000
Gering Courier	Gering, Nebraska	308-436-2222

National Park Service:

Scotts Bluff National Monument Headquarters	308-436-4340
Superintendent's Residence	308-436-3019
Chief Ranger's Residence	308-436-2862
Resource Management Specialist's Residence	308-436-7767
Midwest Regional Office	402-221-3475
Pager	800-706-8799
Cell Phone (F. Bird)	402-630-0685
Fire Management Officer's Residence (W. Gabbert)	605-745-4266
Cell Phone	605-685-2530
Pager	605-355-1660
Prescribed Fire Specialists Dan Moreford	
Cell Phone	605-685-5231
Pager	605-399-8165