FIRE MANAGEMENT PLAN

MADISON WETLAND MANAGEMENT DISTRICT

Submitted by : _____

Assistant Refuge Manager — Date
Madison Wetland Management District

Concurred by: _____

Regional Fire Management Coordinator — Date
Mountain-Prairie Region

Concurred by: _____

Geographical Associate Regional Director — Date
Northern Ecosystems

Approved by: _____

Regional Director — Date
Mountain-Prairie Region

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I.
INTRODUCTION

A. Purpose and Need

U.S. Fish and Wildlife Service policy requires that an approved Fire Management Plan must be in place for all of Service lands with burnable vegetation. Service Fire Management Plans must be consistent with firefighter and public safety, protection values, and land, natural, and cultural resource management plans, and must address public health issues. Fire Management Plans must also address all potential wildland fire occurrences and may include the full range of appropriate management responses. The responsible agency administrator must coordinate, review, and approve Fire Management Plans to ensure consistency with approved land management plans.

Service policy allows for a wildland fire management program that offers a full range of activities and functions necessary for planning, preparedness, emergency suppression operations, emergency rehabilitation, and prescribed fire operations, including non-activity fuels management to reduce risks to public safety and to restore and sustain ecosystem health. This plan meets the Service requirement and updates the fire management plan submitted in 1991, and addresses all aspects of fire management.

B. Description of Refuge

1. Location

The Madison WMD (District) contains thousands of acres of grasslands in isolated management units and lies within the Prairie Pothole Region of the upper Great Plans in east central South Dakota. The District consists of nine counties: Brookings, Deuel, Hamlin, Kingsbury, Lake, McCook, Minnehaha, Miner, Moody. The District contains approximately 6,000 square miles. Figure 1 is a map of the entire District, while Figures 2-10 indicate the locations of the Waterfowl Production Areas (WPA's) by county.

Table 1: Land Management Categories - Madison Wet Land Mgt. Dist.

Management Unit	Number	Total Acres
Waterfowl Production Areas (WPAs) range in size from 16 - 1,100 acres	220	37,966 fee title
Wetland Easements	1,500	47,609
Grassland Easements	70	24,909
Conservation Easements (Former FmHA lands)	50	8,000

2. Climate

The continental climate of the Madison District is characterized by cold winters and hot summers, with rapid fluctuations of temperatures. This cool, dry, sub-humid climate has an annual average precipitation of 22 to 26 inches, and precipitation is normally heaviest in late spring to early summer. The average seasonal snowfall varies from 20 inches in the western counties to 40 inches in the eastern portion. The coldest temperatures vary from -30E to -40E to summertime highs up to 110E. Thunderstorms occur about 44 days each summer. Tornadoes and severe thunderstorms occur but are local in extent and of short duration. In summer, hailstorms occur in scattered small areas. In winter, snow and high winds bring blizzard conditions to the area. The prevailing wind is from the northwest, and the average wind speed is highest, 14 miles per hour, in spring. The growing season varies from 109 to 150 days.

3. Topography and Soils

This region of South Dakota lies within the Central Lowlands Province. The major land features associated with this area are products of the Pleistocene glaciations which formed the Missouri River and the prairie potholes sometime between 12,000 and 40,000 years ago.

There are two physiographic regions located in the District, the Coteau du Prairie and the James River Basin. The Coteau du Prairie is a glacial highland dotted with prairie potholes and lakes. The James River Basin is a large glacially-eroded valley which is drained by the James River.

The soils within the nine counties are mostly clay loams and silty clay loams. They are generally excellent for agricultural cropping where not too steep. They are moderate erodible, depending on slope. The soils support excellent stands of mid and tall grass species. Stands of warm season grasses four to six feet high are common following management activities such as prescribed burning or managed grazing.

The soil associations vary greatly according to the physiographic regions. The soils are derived from parent materials which include glaciolacustrine sediments, early Wisconsin glacial drift, middle Wisconsin glacial till, and late Wisconsin glacial drift-loess. Living organisms play an important part in soil formation. As a result of these grasses, the surface layer of many soils has a moderate or high content of organic matter.

The Coteau du Prairie was developed under the stagnant-ice conditions of the Middle Wisconsin age. The features of the stagnant ice are present. Ice-wall lakes with the associated collapse features are fairly common. The principal associations within this region are the Egan-Viborg-Wentworth-Worthing. They are generally deep, silty, and well drained with areas of poorly drained depressions.

The James River Basin consists of level to rolling, loamy soils that are moderately well drained. The principal associations within this region are the Niobell-Noonan-Williams, Barnes-Svea, and Bryant. The drainage

systems of these associations are poorly defined, and many terminate to form small basins.

4. Hydrographic Features

The wetlands in Madison District are extremely productive and very attractive to migratory waterfowl and resident wildlife. They serve as breeding and nesting areas for many migratory birds and as wintering habitat for many species of resident wildlife. Approximately 53,000 acres of wetlands exist in the District, and the area is drained by the East Vermillion and James Rivers.

5. Wildlife

a. Birds

Grassland birds are the predominant bird life in the State. Approximately 304 different bird species have been sighted in the Madison District (Appendix A). Approximately 183 bird species nest and/or migrate through the District. There are 57 neotropical nesting species within the District. All of the naturally occurring species are thought to have evolved under periodic disturbance of the prairies, such as fire.

The wetlands in the District provide breeding and migratory habitat for 67 species of marsh and water birds. The District hosts 30 species of waterfowl for migration or nesting. Responses by these species to disturbance is variable. Many use habitat following fire which have produced openings in dense vegetation.

b. Mammals

There are an estimated 55 mammal species found within the District. They range in size from the tiny pygmy shrew weighing only a fraction of an ounce to the large white-tailed deer weighing over 200 pounds (Appendix A).

Abundance varies with species , but prairie insectivores and New World species of mice common to prairie ecosystems are abundant, and species like the opossum and some species of bats are uncommon within the District.

The direct impacts of fire on wildlife include disturbance or infrequently mortality of individuals or groups of individual, particularly slow moving and or sedentary species. The larger mammals (deer, coyote, fox) will generally move away from fire. However the availability of suitable adjacent habitat is important for local populations. Uncontrolled wildfire has a potential for negative impacts on wildlife, conversely prescribed fire under the

correct prescriptions can be used as a tool to improve habitat.

c. Reptiles, Fish, and Amphibians

Thirty-three species of reptiles consisting of turtles, skinks, and snakes, occur in South Dakota. Twenty of these species are found within the District.

There are 17 species of amphibians that occur in South Dakota. They all could potentially occur within the District. These species consist of salamanders, toads, and frogs.

There are 100 species of freshwater fish that inhabit the waters and waterways of South Dakota. Sixty-eight of these species have the potential to occur in lakes and wetlands within the District.

d. Insects

Insect life and range of occurrence of insects are not well documented at the Madison District. Studies have shown that fire causes an immediate decrease in insect populations, followed by a gradual increase in numbers as the vegetation recovers. The insects eventually reach a high level in disturbed areas, then decline to near normal as conditions stabilize.

6. Endangered Species

The Madison District contains a number of threatened, and endangered species (Appendix B).

7. Cultural Resources

No cultural resources have been found in the Madison District. The District lies within the Coteau du Prairie Archeological Region. Documented occupation on the area spans a 10,000-year period. The probability that significant cultural resources are present on some of the native grassland is good. However, no above ground evidence on WPAs is documented at this time, and no historic structures have been recorded/identified on WPAs within the District.

8. Land Use, Values, and Improvements

The District has a headquarters building, shop buildings, and approximately 38,000 acres of fee title owned land that must by protected from the threat of fire. The headquarters, shop area, and the fee land are surrounded by publicly owned, privately owned, state owned. These lands are used for a variety of purposes, such

as croplands (corn, soybeans, wheat, etc), haylands, and pasturelands. There are also many residential homes and private building sites adjacent to many of the WPA's. These private, state, and public areas must also be protected from the threat of fire.

9. Socio-Political Climate

Agricultural communities are prevalent throughout the District. Adjacent land ownership to the WPAs is almost exclusively private. Private landowners generally have a low tolerance for wildfire. Landowner response to prescribed fire is varied. A good portion of the District residents have little concern for prescribed burning as field and ditch burning activities are common.

The overall social and economic environment can be affected by how the District uplands are managed. Often the affect is local, but when all District land units are combined, the affect is more widespread. Habitat management is often accomplished by authorizing local farmers and rancher to hay or graze the WPA. This is viewed as positive both socially and economically. Local farmers and ranchers prefer to graze or hay lands on the WPAs rather than seeing them "go up in smoke".

The majority of neighbors accept the fact that the Federal government owns land for waterfowl production, and most have a general appreciation for the value of wildlife. However, these neighbors expect the land to be managed for wildlife and not ignored. If a WPA is ignored, allowing the habitat condition to decline in quality and noxious weeds to increase, opinions quickly become negative. However, if the land is managed for the best interest of wildlife and habitat conditions are maintained, these opinions become positive and wildlife benefits both on and off the Service lands.

The majority of recreational uses on the WPAs are centered around hunting and birdwatching. Many of the WPAs offer good waterfowl hunting and birding opportunities. Hunters and birders come from all over the United States to visit the District. Occasional hunters comment negatively when they see black areas, whether due to burning, or farming, in their hunting areas. Negative impact to the local economy could result if habitat becomes less productive and wildlife populations decrease. The number of hunters and birders traveling to the area could decrease, depriving the local economy of recreational dollars.

The Conservation Reserve Program (CRP) is a farm program which restores highly erodible farmland back to grassland and cannot be grazed, hayed, or farmed. CRP lands have heavy fine fuel loadings and are a concern for fire suppression agencies.

C. **Habitat Types**

As part of the prairie pothole region, the District includes prairie communities with various types of native grasslands, riparian areas, and scattered woodland thickets. Woodland or forest communities can be found along the East Vermillion and Big Sioux Rivers, which run through the District. Wetland areas are dominant features in the District. These wetlands host a variety of aquatic plants and animals.

The Madison District is made up of two major ecosystems, the tall grass prairie in the eastern three-fourths of the District and the tall grass-mixed transition prairie in the western one-fourth of the District. Riparian woodlands and shelterbelts are also found in the district.

1. Tall Grass, Transitional Mixed Grass, Seeded Native Grass, and DNC

Grassland vegetation makes up approximately 93 percent of the 21,056 upland acres on WPAs in the Madison District. Of these grassland acres, approximately 28 percent is native grassland, 27 percent is seeded native grass, 26 percent DNC, and 12 percent is reseeded exotic grass and forb species.

The eastern three-fourth of the Madison District is in the tall grass prairie zone. Key native grassland species in the tall grass prairie are big and little bluestem, indiangrass, switchgrass, porcupine grass, sideoats grama, and tall dropseed. Some of the principal forbs are leadplant, groundplum, milkvetch, American licorice, white and purple prairie clover, the scurfpeas, wild onions, pussytoes, back sampson, perennial sunflowers, false boneset, and prairie rose. It is estimated that only 10-15 percent of this tall grass prairie has not been tilled.

The western one-fourth of the Madison District is tall grass - mixed grass transition prairie. The key native grassland species in the mixed grass prairie are western wheatgrass, big bluestem, and porcupine grass. Principal forbs include American vetch, goldenrod, yarrow, many-flowered aster, and prairie rose. The majority of this portion of the District has been farmed and it is estimated that only 15-20 percent has not been tilled.

Most grassland sites are partially invaded to various degrees by non native Kentucky bluegrass, smooth brome, quackgrass, and stands of native shrubs, mainly western snowberry and silverberry. Control of these species is the main goal of the District prescribed fire program.

2. Riparian Woodlands and Shelterbelts

Native woodland vegetation in the Madison District is primarily located within the Sioux and Vermillion River flood plains, and the

border of the larger lakes in the Coteau du Prairie. These woodlands are primarily deciduous trees and shrubs located where moisture conditions allow for their growth. There are also many shelterbelts and farmstead groves scattered throughout the District. The majority of these acres are trees planted by man. Some native willows and cottonwoods also occur.

Cedar trees are considered an invader species on grassland sites within the Madison District. Control of these trees with prescribed fire has proven effective in past years.

3. Wetland Vegetation

Wetland or aquatic vegetation covers approximately 40 percent of the acres managed by the Service within the Madison District. All four categories of wetland plants (free-floating, submergent, emergent, and amphibious) exist within the District on both private and public lands. Aquatic plants grow in four classes of wetlands: temporary, seasonal, semipermanent, and permanent wetlands. It is not uncommon for a single wetland to have all four categories of aquatic vegetation.

4. Noxious Plants

There are seven species of plants listed by the State of South Dakota as noxious. An additional 15 species have been declared noxious in one or more counties. The primary ones that are controlled on the District are Canada thistle, biennial thistles (e.g. musk and plumless), leafy spurge, wormwood sage, and annual sow thistle. These species often compete with and have a very negative effect on native plant species. Noxious weeds have been observed coming in on bare ground resulting from excessive mulch which smothered existing vegetation during periods of rest from grazing, haying, or fire.

State law dictates control efforts for noxious weeds and the District voluntary participates in control programs, including the use of herbicides, biological control, and prescribed fire. Prescribed fires or wildfires can increase the spread and density of some noxious weeds depending on several environmental and phenological factors.

D. Historical/Ecological Role of Fire

Fire, whether set or caused by lightning, has been a part of the prairie ecosystem for thousands of years. Grassland species of the northern great plains evolved under periodic disturbance and defoliation from buffalo and fire. This periodic disturbance kept the grasslands healthy for thousands of years and is needed to keep them healthy today. It has been one way that the prairie ecosystem has been continually maintained and restored. The District is located in this northern plains ecosystem, a geographical area which has been subjected to the effects of

fire for centuries.

Historic records describe huge prairie fires started by lighting or humans. Fires burned millions of acres as there were few natural fuel breaks and no suppression action was taken. Reports of early accounts by explorers viewed wild prairie fires as a feeling of danger, a risk, and a spectacle. There were also accounts of how the Sioux Indians set fire to the prairie to assist in killing buffalo and to provide lush new growth to attract buffalo. Fire frequency on the prairie grasslands ranges from 5-10 years to 10-20 years.

Managing natural areas is one of the primary objectives of the Fish and Wildlife Service. The maintenance of ecosystems and their dynamic processes helps ensure a functional natural environment. A natural processes, fire constitutes one of the greatest influences on the ecosystem. Fire may have a severe short term effect while it yields long term positive effects. Fire may expose the soil, kill or reduce vigor in some plants, invigorate some grass plants and woody shrubs, and quickly cycle mineral nutrients from organic to inorganic states by converting surface mulch, plant litter and standing growth to ash.

E. Refuge Fire History

Since the establishment of the Madison District in August of 1969, fires within the district have been suppressed and adjacent habitat has been fragmented from agricultural practices. These activities have significantly reduced the role fire played in prairie ecosystem. In recent years fire has been recognized as an essential management tool for managing a healthy mixed grass prairie.

Equipment and agricultural field burning account for the majority of human caused fire starts. The agricultural field burning season usually occurs during the fall and early spring and is widespread throughout the District. Private landowners are not subject to the same burning regulations as government agencies. Farm fields and road ditches are often ignited and left unattended. Physical barriers such as tilled fields and roads prevent any fire from burning a large acreage. Most wildfires are quickly extinguished without causing any significant damage. Typically, portions of one or two WPAs will be burned by wildfires every year.

Fire records for the Madison District exist from 1969 to present. Appendix C lists the prescribed fire and wildfire activity and size reported on the District during that time period. In the past 30 years there have been 21 reported wildfires on the District burning 392.1 acres for an average of .7 fires/year. These wildfires vary in size from .1 acre to 49 acres and were all human caused. Most of the wildfires on the District were suppressed by the local fire departments, and all were controlled within the first burning period.

In the same 30 year time frame, there have been 50 prescribed burns conducted on the District. In all, 1295 acres were treated for an average of 1.6 fires/year. The average of 1.6 fires per year is somewhat deceiving as no burns were conducted during the period from 1975 to 1978 and from the period from 1989 until 1996.

II. POLICY COMPLIANCE - GOALS AND OBJECTIVES

A. Compliance with Service Policy Statement

All Service areas with burnable vegetation are required to have approved fire management plans. This plan updates the fire management plan submitted in 1991, and addresses all aspects of fire management.

B. NEPA Compliance Statement

This plan meets NEPA/NHPA compliance. An Environmental Assessment addressing the use of fire was completed as part of the Upland Habitat Management Plan and was approved September 13, 1994. A copy of the Environmental Assessment and the FONSI are attached (Attachment 1). Regulations published in the Federal Register (62FR2375) January 16, 1997, categorically excludes prescribed fire when conducted in accordance with local and State ordinances and laws. Wildfire suppression and prescribed fire operations are both categorically excluded, as outlined in 516 DM2 Appendix 1.

C. Authorities Citation

1. 42 Stat. 857;16 U.S.C. 594, Protection Act of September 20, 1922. Authorizes the Secretary of the Interior to protect, from fire lands under the jurisdiction of the Department directly or in cooperation with other Federal agencies, states, or owners of timber

2. 47 Stat. 417; 31 U.S.C. 315, Economy Act of June 30, 1932. Authorized contracts for services with other Federal Agencies.

3. 69 Stat.66.67;42 U.S.C. 1856, 1856 a and b, Reciprocal Fire Protection Act of May 27, 1955. Authorizes reciprocal fire protection agreements with any fire organization for mutual aid with or without reimbursement and allows for emergency assistance in the vicinity of agency facilities in extinguishing fires when no agreement exists.

4. 16 U.S.C. 668 dd-668 ee, National Wildlife Refuge System Administrative Act of 1966, as amended.

5. 88Stat. 143; 42 U.S.C. 5121, Disaster Relief Act of May 22, 1974. Authorizes Federal agencies to assist state and local governments during emergency or major disaster by direction of the President.

6. 88 Stat. 1535; 15 U.S.C. 2201, Federal Fire Prevention and Control Act of October 29, 1974

7. Pub. L. 95-244, as amended by Pub. L. 97-258, September 13, 1982. 96 Stat. 1003 31 U.S.C. 6301-6308, Federal Grants and Cooperative Act of 1977.

8. 96 Stat.837, Supplemental Appropriation Act of September 10, 1982

9. Pub. L. 100-428, as amended by Pub. L. 101-11, April,1989, Wildfire Assistance Act of 1989

10. Department of Interior Departmental Manual, Part 620 DM-1, Wildland Fire Management (April 10, 1998)

11. U.S. Fish and Wildlife Service Manual, 621 FW1-3 (February 7, 2000)

D. Enabling Legislation and Purpose of Refuge (Mission Statement)

The District was established with the primary purpose of waterfowl production and maintenance:

".....as Waterfowl Production Areas" subject to "....all of the provisions of such Act [Migratory Bird Conservation Act] .....except the inviolate sanctuary provisions ...." 16 U.S.C. 718©) (Migratory Bird Hunting and Conservation Stamp Act)

" .... for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act)

"....for conservation purposes ...." 7 U.S.C. 2002 (Consolidated Farm and Rural Development Act).

E. Overview of Planning Documents

The District does not have an approved Master or Comprehensive Plan. Various operational plans for the District include objectives which pertain to fire management. The Mission Statement is included as Appendix D.

The 1994 Environmental Assessment for the management of uplands on the District addresses the use of prescribed fire as one of the management tools which is used to "reduce wildfire danger by removing buildups of heavy fuel, to remove heavy thatch that is reducing vegetative productivity and regrowth, and to prepare areas for other treatments such as interseeding, and seed harvesting" and to "be used to control or suppress target weed species."

The Fire Management Plan will provide direction to accomplish safety objectives during wildfire suppression actions and prescribed fire activities.

The Madison District Safety Plan objectives are:

1. Provide safe working conditions for employees
2. Provide safe environments for the visiting public
3. Protect and insure safety of government equipment
4. Define equipment availability and location
5. Identify responsibilities
6. Identify sources of help
7. Provide documentation
8. Promote a healthy safety attitude

F. Habitat Management Goals and Objectives

Wetland Management District goals and objectives are:

Goal 1: Provide and improve habitat diversity to benefit migratory birds.

Objective 1A: Provide assistance to private landowners and administer the Private Lands Program within the District.

Objective 1B: Annually manage habitats including wetland restorations, native grass planting, etc. on Waterfowl Production Areas (WPAs), as described in the approved Prescribed Action Management Alternative in the station Environmental Assessment.

Goal 2: Preserve, restore, and protect the natural diversity and abundance of native flora and fauna dependent on uplands and wetlands, within the prairie pothole region.

Objective 2A: Maintain an active acquisition program and annually inspect and vigorously enforce the provisions of Waterfowl Production Areas and wetland, grassland, and Conservation (FmHA) easements.

Objective 2B: Restore, where possible, all drained wetlands on WPAs and wetland, grassland, FmHA easements to restore prairie pothole habitat.

Objective 2C: Manage native sod on WPAs and plant native grasses on converted agricultural grounds to restore the natural diversity of flora and fauna of the tall grass prairie ecosystem.

Objective 2D: Monitor the occurrence of wildlife and plant species, through staff observations and approved studies on both public and private land, so that habitat requirements of the species may be known, and improvements to the lands may be implemented.

Objective 2E: Document the occurrence of threatened and endangered species, and other wildlife and plant species, in the Management District, through staff observation, participation and cooperation in surveys and studies.

Objective 2F: Control noxious weeds on WPAs, annually through the use of integrated pest management.

Goal 3: Provide visitors with a high quality recreational experience and provide environmental education on and off Service lands when possible.

Objective 3A: Provide consumptive and non-consumptive wildlife oriented educational experiences on and off Service lands when possible.

Objective 3B: Provide environmental education on and off Service lands, when feasible, to promote understanding and appreciation of wildlife and lands, and develop understanding of management activities.

Objective 3C: Continue with the development and distribution of wetland and grassland trunks for distribution to area schools.

Objective 3D: Re-develop the interpretive area on the Madison District, when funding and planning assistance is provided, to increase understanding of wildlife and wetlands and provide for a safe recreational experience.

Objective 3E: Provide law enforcement presence and assist state Game & Fish officials as requested, whenever possible, to protect the resource and provide for a safe recreational experience.

Objective 3F: Maintain fences, roads, parking lots and post boundaries annually to effectively manage WPA habitats and public use.

A complete copy of the District Goals and Objectives statement are on file at the District Headquarters.

III. REFUGE FIRE MANAGEMENT OBJECTIVES

A. Introduction

The goal of wildland fire management is to plan and make decisions that help accomplish the mission of the National Wildlife Refuge System. That mission is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. Fire management objectives (standards) are used in the planning process to guide management to determine what fire management responses and activities are necessary to achieve land management goals and objectives.

Service policy and the Wildland Fire Policy and Program Review direct an agency administrator to use the appropriate management response concept when selecting specific actions to implement protection and fire use objectives. The resulting Appropriate Management Response are specific actions taken in response to a wildland fire to implement protection and fire use objectives. With an approved Fire Management Plan, the Refuge staff may use wildland fire in accordance with local and State ordinances and laws to achieve resource management objectives (habitat improvement).

The following considerations influenced the development of the Districts fire

management goals and objectives. Section of this plan have or will establish that:

1. Fire is an essential natural part of the Districts native biotic communities.

2. Uncontrolled wildfire has the potential for negative impacts on and off the WPAs in the District.

3. Positive or negative effects of prescribed fire on vegetation, wildlife, and cultural resources often depend on burning conditions and plant phenology.

4. Rapid rates of speed, potentially long response time, and the large number of individual land units (WPAs) pose suppression problems and increase the likelihood of escape onto to adjacent lands.

5. Use of the "minimum tool" concept to minimize environmental damage is important throughout the District.

B. District Fire Management Goals

1. Protect life, property, and other resources from wildfire.

2. Use prescribed fire as a tool to accomplish District habitat management objectives.

C. District Fire Management Objectives

1. Safely suppress all wildfires using strategies and tactics appropriate to safety considerations and values at risk.

2. Minimize the impact and cost of fire suppression.

3. Use prescribed fire to the fullest extent possible within or near the District development zones, wildlife sensitive resources, and boundary areas to reduce the risk from wildfire damage.

4. Educate the public regarding the role of prescribed fire within the District.

5. Use prescribed fire to restore and perpetuate native wildlife species, by maintaining a diversity of plant communities.

Specific Fire Management Objectives can be found in the Prescribed Fire Section of this plan (Section XI, Subsection A).

IV. FIRE MANAGEMENT STRATEGIES

A. Implementation Strategies

1. Using the Appropriate Management Response concept, suppress all wildfires commensurate with values at risk. Strategies employing a range of suppression options will be considered, and minimum impact suppression techniques (MIST) will be utilized, where appropriate.

2. Conduct all fire management programs in a manner consistent with applicable laws, policies and regulations.

3. Due to the wide-spread land holding of the District, local fire agencies (volunteer fire departments) will be utilized for initial attack on wildfires. District equipment and personnel will be prepared and ready for response during fire season. Cooperative agreements with local fire agencies will be maintained to provide for suppression actions and ensure reimbursement is appropriately made. The District will provide assistance to local or Federal cooperators under the "closest resource" and "total mobility" principles in accordance with Service policy.

4. Utilize prescribed fire alone, or in combination with other management techniques, as a management tool for achieving hazard fuel and resource management objectives. To the greatest extent possible, hazard fuel reduction prescribed fires will be used only when they can accomplish resource management objectives. Resource management prescribed fire will be used to accomplish specific objectives established for individual land units.

5. Initiate cost effective fire monitoring which will tell managers if objectives are being met. Monitoring information will also be used to refine burn prescriptions to better achieve objectives.

B. Limits to Implementation Strategies

1. Use of the "minimum tool" concept to minimize environmental damage is important throughout the District. Heavy equipment (dozers, discs, and plows) will not be used for fire suppression except in life threatening situations without the express approval of the District Manager.

2. Smoke management will be carefully considered for all prescribed burns and will be addressed in all prescribed burn plans.

3. All fires occurring on the Refuge will be staffed or monitored until declared out.

4. Prescribed burning in areas where threatened, endangered, and candidate species exist will not be conducted if the prescribed fire will be

detrimental to the species or any adverse impacts cannot be mitigated, Section 7 clearance will be secured, as appropriate.

5. The use of prescribed fire to achieve management objectives must be conducted in a cost effective manner.

6. Aerial Retardants and foams will not be used within 300 feet of any waterway as described in the Guidelines for Aerial Delivery of Retardant or Foam near Waterways.

V. FIRE MANAGEMENT UNITS

The District is considered one management unit. All management concerns, fuels, fire environment, and values at risk are similar.

A. Fire Suppression

The District is a full suppression area.

Due to the large size of the District, travel time between the WPA's or from the headquarters to the individual WPA's varies from 5 minutes to over an hour. The low to moderate complexity of the grass fuels, the low wildfire frequency on the District, coupled with the distance across the District to potential wildfires, does not warrant the establishment and maintenance of an initial attack team and equipment at this time. Therefore, most wildfires on the WPA's are extinguished by Fire Department personnel or burn them selves out before the District is even aware of them. In these cases, the burn area is evaluated and any restoration work will be completed.

A range of possible options available for consideration by the Incident Commander are summarized in the following table:

Table 2: Appropriate Management Response

SITUATION	STRATEGY	TACTIC
1. Wildland fire on Refuge lands which does not threaten life, natural or cultural resources or property values.	Restrict the fire within defined boundaries established either prior to the fire or during the fire.	1. Holding at natural and man-made barriers. 2. Burning out. 3. Observe and patrol.
1. Wildland fire on Service property with low values to be protected. 2. Wildfire burning on to Service lands. 3. Escaped prescribed fire entering another unit to be burned.	Take suppression action, as needed, which can reasonably be expected to check the spread of the fire under prevailing conditions.	1. Direct and indirect line construction. 2. Use of natural and man-made barriers. 3. Burning out 4. Patrol and mop-up of fire perimeter.
1. Wildland fire that threaten life, property or sensitive resources. 2. Wildland fire on Service property with high values to be protected. 3. Observed and/or forecasted extreme fire behavior.	Aggressively suppress the fire using direct or indirect attack methods, holding the fire to the fewest acres burned as possible.	1. Direct and indirect line construction 2. Engine and water use. 3. Aerial retardant 4. Burn out and back fire. 5. Mop-up all or part of the fire area.

Low impact suppression tactics will be used when fire intensity and spread are minimal. If fire intensity is high and spread is fast, indirect attack methods will be used. All suppression efforts will be directed towards safeguarding life and property while protecting the District resources from unwanted fire effects.

Whenever possible, existing roads, wetlands, and natural barriers will be utilized as control lines, anchor points, escape routes, and safety zones. Burnout operations will use existing roads and natural barriers when possible. Any use of mechanical equipment to construct control lines, must be approved by the District Manager or his/her designee, and the area disturbed will be rehabilitated as soon as possible. Retardant use will be restricted near wetlands, streams, and stock ponds.

B. Prescribed Fire

The District will utilize prescribed fire to reduce the risks of hazard fuel buildups, to restore and perpetuate native wildlife species, and to help maintain a diverse plant community. By reducing the buildup of fuel, wildfire will be easier to suppress due to lower fireline intensities, etc.

C. Fuels and Values at Risk

The fuels on Service lands and those surrounding service lands can be categorized into four general categories: 1) wildland fuels, 2) agricultural row crops, 3) rural interface, and 4) urban interface. The wildland fuels are composed of three NFFL fuel models:

- Fuel Model 1 (Short Grass) which is characterized by cured continuous short grassland and savanna fuels with an average fuel depth approximately one foot

- Fuel Model 3 (Tall Grass) which is characterized by cured continuous tall grass prairie, marshlands, and wild grains with an average fuel depth of approximately 3 feet.

- Fuel Model 9 (Hardwood Litter) which is characterized by surface loose hardwood litter under stands of deciduous trees with an average fuel depth of 2-3 inches. This fuel type is typically is found in scattered pockets and is best represented in the shelterbelts and river bottoms of eastern South Dakota.

The private lands use for agriculture surrounding Service lands are subject to changing land use practices due to the following: crop rotation, agricultural commodity prices, variable livestock grazing practices, enrollment in Conservation Reserve Programs (CRP), and summer fallowing. The surrounding agricultural fuels are typically characterized as cultivated crop land or planted crop land. Planted crop land is characterized by one of the following NFFL fuel models:

- Fuel Model 1 9 (Short Grass) that is characterized by cured short herbaceous grain crops with an average fuel depth of approximately 1-2 feet (i.e. Soybeans, alfalfa, oats, millet, etc.).

- Fuel Model3 (Tall Grass) that is characterized by tall cured cultivated tall grains that have not been harvested with an average fuel depth of approximately 3 feet (i.e. corn, sunflowers, wheat, sudan grass, etc.) And land enrolled in the Conservation Reserve Program (CRP).

Several WPA's are located adjacent to urban and rural interface areas. The intermixture of wildland fuels, combined with urban and rural community sprawl has the greatest risk to threaten or destroy life and personal property. These fuel complexes generally consist of a combination of wildland fuels, agricultural fuels, structures, public utilities, hazardous fuels, commercial and residential facilities, out buildings, fences, etc.

Suppression of wildland fires on remote Waterfowl Production Areas (WPAs) and in urban interface areas is challenging. The scattered WPAs are spread over nine different counties. The District relies heavily on volunteer fire departments for suppression and notification of wild fires at remote WPAs

D. Expected Fire Behavior

1. Fuel Model L/Fire Behavior Model 1: Shortgrass

Fire spread is governed by the fine, very porous and continuous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured materials. Fuel loadings consist of fine dead fuels only average 1.5 -2 tons per acre. Fire behavior is directly related to the fine fuel moisture and windspeed. Spread rates with moderate to high windspeeds can reach 225 chains per hour or feet per minute, with flame length exceeding seven feet. Spot fires are generally not produced because fuels are consumed too quickly and thoroughly. Fire fronts tend to become irregular as topography, fuel loads, winds, and or natural barriers speed up or slow movements. Resistance to control is low to moderate, depending on windspeed.

2. Fuel Model N/Fire Behavior Model 3: Tallgrass.

This model displays high rates of spread under the influence of wind. Wind may drive fire into the upper heights of the grass and across standing water. Fuel loading consists of fine and coarse dead fuels, averaging three tons per acre. Spread rates with moderate to high windspeeds can reach 200 chains per hour, with flame lengths exceeding 20 feet. Short range spotting (up to 500 feet) is common. Resistance to control is very high to extreme.

3. Fuel Model E/Fire Behavior Model 9: hardwood litter

This model displays moderate to low fire intensity. Fires are carried by dead, loosely compacted leaves. Concentrations of dead downed woody material will contribute to more intense burning as well as moderate spotting. Fuel loads consist of leaves, needles, and small stems and branches, 3.5 tones per acre. Spread rates are generally slow, 7.5 chains per hour. Flame lengths average 2-3 feet. Resistance to control is low except during drought conditions.

E. **Effects of Drought**

Drought indicators are one tool used to help determine if fire behavior will be normal or extreme. The Palmer Drought Index (PDI) is one drought indicator that is used. The PDI varies from -6.0 to +6.0 and is used to measure the departure of the moisture supply. The PDI is based on precipitation and temperature data, as well as the local Available Water Content of the soil. Normal fire behavior generally occurs when the PDI is in the 49 to -.49 range. Severe drought is indicated by a range of -3.00 to -3.99 and extreme drought is considered to occur when the PDI is -4.00 of less.

Palmer Drought Index is on the Internet at: http://www.cpc.ncep.noaa.gov/ products/ analysis_monitoring/regional_monitoring/palmer.gif

F. Limits

1. All wildland fires will be managed using the Appropriate Management Response concept, commensurate with values at risk.

2. Prescribed burns will not be conducted when the PDI is -4.00 or less.

G. Impact of Fire Management Activities

The District is scattered throughout nine counties in a primarily rural agricultural setting. Agricultural crops, limited ranching, and outdoor recreational use generate most of the economic support to the area. Communities are generally small, distant from each other, and have isolated farmsteads scattered throughout the counties. Wildland fuels consisting of prairie grasslands, pasture, and CRP typically surround these farmsteads and communities where the land use is not in agricultural cropland. The cropland is a wildland fuel in itself when in a cured state, idle, or stubble condition. This composite of land uses provides the opportunity for wildland fire to pose a significant threat of large fire occurrence when weather and fuel conditions are right. Rural fire departments are few in number, generally poorly equipped and provide coverage to numerous townships. Although the general public maintains a heightened concern in regards to wildfire, most communities are increasingly becoming aware of prescribed fire and the District's aggressive use of prescribed fire to maintain habitat and reduce the risk of severe wildfire and its associated impacts. Nevertheless, the social and economic concerns related to the perceived potential loss of grazing, haying, hunting, and wildlife continues to be an ongoing educational issue.

Fire management actions, whether through preparedness, suppression or prescribed fire activities, have the potential to impact refuge lands, neighboring lands, and associated land management practices. These activities are directly related to each other in that they are all driven primarily by the availability or lack of hazard fuel accumulations. Impacts from the use of fire can be both beneficial as well as detrimental depending on the social, ecological, and economic values to be considered.

Preparedness activities require coordination with city, rural and volunteer fire departments establishing mutual aid agreements, identifying wildland-urban interface concerns, and developing plans to mitigate known hazards. Local private and community involvement can be paramount in the planning process particularly as we begin to enter the wildland-urban interface planning arena. Impacts will generally be viewed as positive due to an enhanced safety and potential increase for fuels treatment projects which may provide additional economic activity.

Suppression activities are facilitated through the annual preparedness planning process, providing direction for suppression actions to be implemented on the District as well as adjacent private lands that are covered under existing mutual aid agreements. Suppression impacts may run from nominal to severe depending on the location, habitat, soils, watersheds, access, tactics employed, and existing environmental conditions. Major concerns for refuge lands revolve around minimizing soil disturbance, protecting cultural and historic sites, providing adequate protection of District facilities and adjacent private land resources, and ultimately ensuring for the life safety of staff, visitors and the general public. Impacts to neighboring landowners may result in short term smoke impacts on human health and visibility, damaged fences, loss of hay and grazing, and

temporary depletion of water sites utilized as water sources during suppression operations. Worse case could result in loss of livestock, equipment or significant improvements (farmsteads).

Prescribed fire activities are planned and managed to minimize direct impacts to District lands as well as neighboring landowners and the general public. Nevertheless, downwind transport of smoke has the potential to impact homeowners, roadways, ans vistas. These issues are addressed in greater detail within each individual burn plan for mitigation measures. In the event of an escaped fire, potential for damage exists to adjacent lands and real property, crops or equipment. These impacts are no different from suppression impacts except that the results are attributable to management planning and direct application of wildland fire. Impacts as a result of losses attributable to a prescribed burn would have potential serious consequences from a social perspective, undermining the trust which the District has developed with neighbors over time.

Neighboring land management actions have the same potential to impact refuge management practices through current or future land use activities. Field burning has been a significant cause of wildfires impacting the District. Impacts could result in losses of improvements, grazing or hay contracts, costs incurred in suppression actions, and possible loss of habitat. The latter, in most cases might be consider beneficial depending on the location, time of year and planned future treatment of next prescribed fire application in light of the fact that fire historically occurred at all times of the year. Increased development of neighboring lands, aside from agricultural, may lead to greater wildland-urban interface issues, potential for greater economic losses, increased social issues such as smoke management, etc., and result in greater demands on fire management planning, implementing and budgeting. Changes in agricultural land uses that increase fuel loading over time will be problematic as well, requiring an increased focus on hazard fuel mitigation. The social views of neighboring landowners and general public that prescribed fire is a necessary tool may change over time and have the ability to curtail current levels of prescribed fire use if not addressed in a timely and proactive manner.

VI. FIRE SEASON

A. Refuge Fire Frequency

In the past 30 years there have been 21 reported wildfires on the District burning 392.1 acres for an average of .7 fires/year.

Fifty prescribed burns have been conducted on the District for average of 1.6 fires/year. The average of 1.6 fires per year is somewhat deceiving as no burns were conducted during the period from 1975 to 1978 and from the period from 1989 until 1996.

B. Fire Season

The fire season generally starts April 1 and runs through October 30.

VII. FIRE MANAGEMENT RESPONSIBILITIES

A. Refuge Staff Responsibilities

Four permanent Refuge employees and six temporary or term employees are stationed at the Madison District. All of these individuals have at least completed the basic fire training and are available to fight fire. Principal members of the District fire management organization are the District Manger, Collateral Duty Fire Management Officer, and Assistant Managers.

1. District Manager

- Responsible for the overall management of the District including the fire program.
- Insures that Department, Service, and Station policies are maintained and followed.
- Insures sufficient collateral duty firefighters meeting Service standards are available for the prescribed fire season.
- Follows up to insure that engines and fire equipment are maintained in a readiness state during the fire season.
- Supervises the resource management activities on land management units within the District, including the selection of objectives and tools to be used in achieving objectives (including prescribed fire).
- Supervises the writing of prescribed burn and approve the prescribed burn plans after technical review by the Zone FMO.

2. Collateral Duty Fire Management Officer

- Delegated the responsibility for coordination and supervision of the fire management program by the Madison District Manager.
- Supervises the District fire management staff.
- Responsible for planning, coordinating, and directing preparedness activities including:
  a. Fire training
  b. Physical fitness testing
  c. Fire cache and equipment inventories
  d. Insures Step-up plan is followed
  e. Coordinates with cooperating fire agencies
  f. Prepares annual Firebase budget request, approves and tracks use of fire management accounts
- Insures fire management policies are observed.
- Has lead responsibility for managing the fire program including:
  a. Writing prescribed burn plans
  b. As qualified, serves as prescribed burn boss

c. As qualified, serves as wildfire incident commander

d. Proposes annual hazard fuel reduction and resource management prescribed fire projects

e. Assists with fire effects monitoring.

f. Insures that engines and fire equipment are maintained in a readiness state during the fire season.

g. Completes DI-1202 (fire report) and submits it to the Zone FMO

h. Prepares the District fire prevention plan, and coordinates fire prevention with other employees.

i. Maintains liaison with Regional Fire Management Coordinator and Zone Fire Management Officer.

j. Updates the Fire Management Plan, maintains fire records, and reviews fire reports for accuracy.

3. Wetland Management District Biologist

The Madison District does not have a station Biologists at this time. The Refuge Manager and the Assistant Managers preform required duties.

- Coordinates fire monitoring program to determine if resource management prescribed fires accomplish objectives.
- Reviews all proposed burn units to ensure sound biological principles are being followed, resource management objectives are valid, and sensitive resources are not being negatively impacted.
- Provide technical/biological support to managers in selecting appropriate resource objectives and the best tool to use in accomplishing selected objectives, to include prescribed fire.

4. Seasonal and Collateral Duty Firefighters:

- Responsible for their personal protective equipment and physical conditioning.
- Qualify annually using the “Fitness Test” before April 1, or within 2 weeks of EOD date.
- Maintain assigned fire equipment in ready state and use required safety gear.
- Assist Collateral Duty Fire Management Officer in maintaining accurate records.

5. Wildfire Incident Commander (as assigned):

- The Incident Commander *is responsible for aspects of the management of the fire, including:*
  - *Providing a size-up of the fire to dispatch as soon as possible.*
  - *Using guidance found in the fire Management Plan or in the Delegation of Authority, determine the strategy and tactics to be used.*
  - *Determine the resources needed for the fire*
  - *Brief assigned resources on the strategy and tactics to be used, expected fire behavior, historic weather and fire behavior patterns, impacts of drought, live fuel moisture, escape routes and safety zones, and radio frequencies to be used.*
  - *Advising dispatch of resource needs on the fire*
  - *Managing all aspects of the incident until relieved or the fire is suppressed.*
- Ensure that personnel are qualified for the job they are doing.
- Submit information needed to complete DI-1202 (fire report) to the Zone FMO

6. Prescribed Burn Boss (as assigned):

- Implement approved prescribed burn plans within prescriptions.
- Assist with the administration, monitoring, and evaluation of prescribed burns.
- Document necessary information to complete DI-1202 (fire report) and submit to Collateral Duty FMO.

B. Cooperator Involvement and Standards

The Madison District currently has one Cooperative Agreement (Appendix E). This agreement is for the purpose of cooperating in suppression fires on lands within the boundaries of the Madison District headquarters. Mutual aid resources responding from fire departments to Service fires will not be required to meet Service fire qualification standards, but must meet the standards set by their own department.

Along with other land management agencies, the Service has adopted the National Interagency Incident Management System (NIIMS) Wildland and Prescribed Fire Qualification Subsystem Guide, PMS 310-1 to identify minimum qualification standards for interagency wildland and prescribed fire operations. PMS 310-1 recognizes the ability of cooperating agencies at the local level to jointly define certification and qualification standards for wildland fire suppression. Under that authority, local wildland fire suppression forces will meet the standards established for their agency or department. All personnel participating in prescribed fire management activities must meet Service fitness and training standards.

VIII. EQUIPMENT AND STAFFING NEEDS

A. Normal Unit Strength

A listing of equipment and cache items necessary to implement the fire management program can be found in Appendix F.

B. Personnel

The following minimum fire qualification positions have been identified and will be stationed at the District headquarters. This level of qualification will allow the District to take suppression action on Service lands close to the District headquarters and conduct prescribed burns.

TABLE 3: Fire Management Positions

Required Positions	Wildfire	Prescribed Fire
Incident Commander (ICT5)	1	
Burn Boss (RXB3)		1
Engine Boss (ENGB)	1	1
Engine Operator (ENOP)	2	2
Firefighter (FFT2)	2	4

In addition to collateral duty fire personnel, additional seasonal firefighters may be temporarily positioned at the District TO assist with the District's hazard fuel and resource management prescribed fire program.

IX. PREPAREDNESS

A. Staffing

The safety of firefighters and the public is the first priority. Persons engaged in fire suppression activities are exposed to a high element of risk. The Refuge Manager and fireline supervisors must make every effort to reduce the exposure to risk and enhance performance. One way is through formal and on-the-job training and improved physical fitness. The Service has adopted the training and fitness standards established in 310-1, and all firefighters must meet these and other standards established by the Service to participate in fire management activities.

All personnel involved in Fire Management activities are required to annually complete fire management refresher training in order to be qualified for fire management activities in that calendar year. Refresher training will concentrate on local conditions and factors, the Standard Fire Orders, LCES, 18 Situations, and Common Dominators. NWCG and other courses are available that meet the firefighter safety requirement; but, efforts will be made to vary the training and use all or portions of other NWCG courses to cover the required topics. Fire shelter use and deployment under adverse conditions, if possible, must be included as part of the annual refresher.

The establishment and training of an initial attack team is not planned at this time.

B. Pre-season Readiness Activities

1. Annual Refresher Training

All personnel involved in Fire Management activities are required to participate in wildland management refresher training annually in order to be qualified for fire management activities in that calendar year. Refresher training will concentrate on local conditions and factors, the Standard Fire Orders, LCES, 18 Situations, and Common Dominators. NWCG courses Standards for Survival, Lessons Learned, Look Up, Look Down, Look Around, and others meet the firefighter safety requirement; but, efforts will be made to vary the training and use all or portions of other NWCG courses to cover the required topics. Fire **shelter use and deployment** under adverse conditions, if possible, **must** be included as part of the annual refresher.

2. Physical Fitness

All personnel involved in fire management activities will meet the fitness standards established by the Service and Region. At this point in time, firefighters participating in wildfire suppression must achieve and maintain an **Arduous** rating. Firefighters participating in Prescribed Burns must achieve and maintain a **Moderate** rating. Information found in Appendix G provides specific instructions to administer the tests, a health screening questionnaire to aid in assessing personal health and

fitness of employees prior to taking the test, an informed consent form, and safety considerations. A trained and qualified American Red Cross Responder (or equivalent) who can recognize symptoms of physical distress and appropriate first aid procedures must be on site during the test.

Wildland fire fitness tests shall not be administered to anyone who has obvious physical conditions or know heart problems that would place them at risk. All individuals are required to complete a pre-test physical activity readiness questionnaire prior to taking a physical fitness test. They must read and sign the Par-Q health screening questionnaire, an informed consent form (Appendix G). If an employee cannot answer NO to all the questions in the PAR-Q health screening questionnaire, or is over 40 years of age, unaccustomed to vigorous exercise, and testing to achieve a Moderate or Light rating, the test administrator will recommend a physical examination. As noted below, all individuals over 40 years of age **must** receive an annual physical **prior** to physical testing.

3. **Physical Examinations**

In keeping with Service Policy, a physical examination is required for all new permanent employees and all seasonal employees assigned to arduous duty as fire fighters prior to reporting for duty. A physical examination may be requested for a permanent employee by the supervisor if there is a question about the ability of an employee to safely complete one of the work capacity tests. All permanent employees over 40 years of age who take the Pack or Field Work Capacity Test to qualify for a wildland or prescribed fire position are required to have an annual physical examination before taking the test.

4. Equipment

All firefighters will be issued the required personal protective equipment. All engines will be equipped with tools, firing devices, radios, and water handling accessories. All of the equipment will be inspected and serviced before the fire season and then periodically checked throughout the fire season. It will be the responsibility of the Burn Boss to ensure the equipment is checked prior to use on any prescribed burns.

Table 4: Annual Fire Management Activities

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Update Interagency Fire Agreements/AOP's	x											
Winterize Fire Management Equipment										x		
Inventory Fire Engine and Cache		x										
Complete Training Analysis	x											
Annual Refresher Training			x									
Annual Fitness Testing			x									
Pre-Season Engine Preparation			x									
Weigh Engines to verify GVW Compliance			x									
Prescribed Fire Plan Preparation			x									
Review and Update Fire Management Plan				x								

Prepare Pre-season Risk Analysis			x								
Weather Station Maintenance and Calibration									x		
Live Fuel Moisture Sampling						x	x	x	x		

Activities should be completed prior to the end of the month that is indicated.

C. Impacts of Regional and National Preparedness Levels

The effect of the Regional or national preparedness levels on the District activities is expected to be minimal. Most of the employees on the station are not Red-Card qualified at the Arduous level, so they will not qualify to participate in Regional or national wildfire operations. The out-of-area assignment of fire suppression equipment will be handled on a case-by-case basis depending on environmental conditions at the sation and if the equipment was available at that the time.

Large scale fire suppression activities occurring in various parts of the country can have an impact on local fire management activities. For example, resources may be limited to implement prescribed fire activities because the closest available resources may be assigned to fire suppression duties or Refuge personnel may be involved as well. Regional drought conditions may also tie-up local resources that would normally be able to assist with Refuge fire management activities. It may be necessary to go out of Region to get the resources needed to staff the Refuge engine during periods of extreme drought or high fire danger.

The Refuge is in the Rocky Mountain Area. During National and Regional Planning Levels IV and V, it is necessary to receive approval from the Regional Fire Management Officer and the concurrence of the Rocky Mountain Area Coordination Group to conduct prescribed burns during PL IV and the National Coordination Group during PL V. If the Rangeland Fire Danger Index is in the Very High or Extreme category, the local rural fire departments must be contacted and put on alert.

D. Step-Up plan

The District's Step-Up Plan can be found in Appendix H.

E. Emergency Presuppression and Severity Funding

Severity funding is different from Emergency Presuppression funding. Emergency Presuppression funds are used to fund activities during short-term weather events and increased human activity that increases the fire danger beyond what is normal. Severity funding is requested to prepare for abnormally extreme fire potential caused by unusual climate or weather events such as extended drought. Severity funds and emergency presuppression funds may be used to rent or preposition additional initial attack equipment, augment existing fire suppression personnel, and meet other requirements of the Step-up Plan.

Emergency Presuppression and Severity funds will be requested in accordance with the guidance provided in the Service's Fire Management Planning Handbook. As a general guide, Severity funding will be requested if a severe drought is indicated by a Palmer Drought Index reading of -4.0 or less or a Keetch-Byram Drought Index of 600 or greater and a long-range forecast calling for below average precipitation and/or above average temperatures. Drought Indices can be located at: http://www.boi.noaa.gov/fwxweb/fwoutlook.htm

X. WILDFIRE PROGRAM

A. Special Safety Concerns and Firefighter Safety

Smoke from wildland fires is a recognized health concern for firefighters. Incident Commanders and Prescribed Burn Bosses must plan to minimize exposure to heavy smoke by incorporating the recommendations outlined in the publication Health Hazards of Smoke (Sharkey 1997). The use of respirators is not recommended.

Rapid rates of speed, higher than average fuel loadings, potentially long response times pose suppression problems to firefighters.

B. Prevention Program

Most of the wildfires that occurred in the District since 1969 were human caused and could have been prevented (refer to previous section on fire occurrence/history). Human caused fires have the potential to be the most damaging because they can occur at a time of the year when fewer initial attack resources are available and fuels are cured. The agricultural field burning season, haying practices, harvest practices, and road ditch burning mainly occur in the late summer, early fall, and early spring of the year when conditions are favorable for fire.

In general, the public and visitors to the District are aware of fire prevention. In order to further reduce the possibility of wildfire and call attention to special conditions the following actions will be taken:

- closure when necessary
- public contacts through press releases and verbal contacts
- enforcement of regulation and prosecution of violators

- employee training and awareness
- implementation of State regulations and restrictions
- contacts with District cooperators and neighbors
- mowing of WPA parking lots in the fall to prevent vehicle parking from starting fires.

C. Detection

The District relies on neighbors, visitors, and cooperators to detect and report fires.

There may be occasions when unqualified personnel discover a wildland fire. When this occurs the employee should report the fire and request assistance before taking action to suppress or slow the spread of the fire. If the fire poses an imminent threat to human life, the employee may take appropriate action to protect that life before requesting assistance. The unqualified personnel will be relieved from direct on-line suppression duty or reassigned to non-fireline duty when qualified initial attack forces arrive.

D. Fire Reporting and Dispatching

All fires observed by District personnel occurring within or adjacent to WPAs in the District will be reported to headquarters. The Fire Dispatch Plan will then be implemented (Appendix H)

E. Fire Suppression

The majority of the wildfires occurring on the District will be suppressed by local Fire Departments. When Service personnel take initial attack action on a wildfire, the appropriate management response concept will be used.

The Maximum Management Area for Service lands without structures or other improvements is the boundary of the Area. For Service lands with structures or other improvements, the IC in consultation with the Project Leader will make the determination.

A Wildland Fire Situation Analysis (WFSA) will be completed when a wildland fire escapes initial attack (Appendix L).

F. Mop up Standards and Emergency Stabilization and Rehabilitation

The IC will be responsible for mop-up and mitigation of suppression actions taken on Refuge fires. The mop-up standards established in the Fireline Handbook will be followed. Refuge fires will be patrolled or monitored until declared out.

Prior to releasing all firefighters from a wildland fire the following actions will be taken:

- All trash will be removed.
- Firelines will be refilled and waterbars added if needed
- Hazardous trees and snags cut and the stumps cut flush.
- Disked firelines should be compacted as soon as possible to preserve the living root stock of natives grasses.
- Overturned sod resulting from plowing must be rolled back with a grader or by hand and compacted to preserve native grass root stock.

Other emergency stabilization and emergency rehabilitation measures may be taken in accordance with Chapter 5 of the Fire Management Handbook. Briefly:

- **Emergency stabilization** is the use of appropriate emergency stabilization techniques in order to protect public safety and stabilize and prevent further degradation of cultural and natural resources in the perimeter of the burned area and downstream impact areas from erosion and invasion of undesirable species. The Incident Commander may initiate Emergency Stabilization actions before the fire is demobilized, as delegated by the Agency Administrator, but completing emergency stabilization activities may be completed after the fire is declared out.

- **Rehabilitation** is the use of appropriate rehabilitation techniques to improve natural resources as stipulated in approved refuge management plans and the repair or replacement of minor facilities damaged by the fire. Total "rehabilitation" of a burned area is not within the scope of the Emergency Rehabilitation funding. Emergency Rehabilitation funding can be use to begin the rehabilitation process if other funding is committed to continue the rehabilitation throughout the life of the project (beyond the initial 3 years of Emergency Rehabilitation funding). Major facilities are repaired or replaced through supplemental appropriations of other funding.

- Because of the emergency nature of the fire event, the emergency stabilization section of the Emergency Stabilization and Rehabilitation Plan (ESR Plan) must be developed expeditiously and is frequently developed by a local unit or designated burned area ESR team. The

rehabilitation section of the ESR Plan is not considered an emergency, and is developed as other refuge land use plans. The refuge manager is responsible for preparing all ESR Plans. In order to be funded, ESR Plans must meet resource management objectives and be approved by the Project Leader and the Regional Director.

XI. PRESCRIBED FIRE PROGRAM

A. Program Overview

Service Policy directs the Refuge to use prescribed fire whenever it is an appropriate tool for managing Service resources and to protect against wildfire whenever it threatens human health, private property, or Service Resources (Fire

Management Handbook 2000).

The District first started using prescribed fire as a management tool in 1971. During the last ten years prescribed fire was not used on the District due to lack of required training, equipment, time, and personnel. However, in 1997, the use of prescribed fire was once again reinstate.

Resource management prescribed fire is used to restore, create, and maintain a diversity of plant communities in order to restore and perpetuate native wildlife species. Goals of the prescribed fire program include:

1. restoration of native prairie grass species
2. reduction/control on non native grasses, especially Kentucky bluegrass and Smooth brome
3. aid in control of noxious weeds particularly Canada thistle, leafy spurge, and wormwood sage
4. reduce dead fuel loadings (litter)
5. control of dense cattail growth in shallow wetlands
6. burning for site preparation of grass seeding projects
7. maintain/rejuvenate quality nesting cover for waterfowl

Program Objectives are:

1. Treat approximately 300 acres per year.
2. Implement a 3-5 year burn frequency on the Units selected for treatment.

B. Limits

Fire is a natural and essential part of the District's ecosystem. Native wildlife evolved with fire and have developed means of tolerating and/or benefitting from fires. However the sensitive nature of some of the species found on the District require that their habitats be protected from large wildfires especially where adjacent habitat is lacking. Prescribed burning in area where threatened, and endangered species exist will be conducted such that small to medium size burns (10-300 acres) can increase local habitat diversity by creating a mosaic of habitats and increase habitat interspersion and edge.

C. Burn Season

The normal prescribed burn season begins approximately April 1, depending on snow melt. The season continues until late fall, approximately October 30. Most units are not burned between May 30 and August 1 in order to avoid nesting birds. Some burning may occur during the winter depending on snow conditions. Winter burns are generally for cattail control in wetlands and for establishing blacklines to be used as control lines for future burn units.

D. Complexity

All burns in the Madison District fall within the low complexity category as determined by the R-6 Complexity Analysis (Appendix J). The size of the blocks are small, the fuels are uniform, and holding and smoke control are easily accomplished. Prescribed burn crew size will vary from 3 to 7 people depending on the unit being burned, with the average number of personnel required to conduct a burn on the District is 6-7. Most burns are staffed with a burn boss, 4-5 firefighters (FFT2), and two light engines

E. Planning

The managers of the District are responsible for supervising the development of resource management objectives for individual units in the District. Prescribed fire is just one of a combination of tools available. If needed, the Zone FMO or regional prescribed fire specialist will be consulted for assistance in accomplishing the desired objectives. The burn plan will document objectives and the plan of action for achieving them. Burn plans can be written by any qualified burn boss and should be submitted for review to the Zone FMO at least 60 days prior to the planned burn day.

Contingency planning can range from anticipating the simple injury to the actions to be taken should the complete loss of control of a situation due to an unanticipated weather event, control problems, and equipment failures. Contingency planning shall be an essential part of the Madison fire management program because of potential risk involved with prescribed burning. The essential components of all contingency plans will identify the following: Who, What, When, Where, as well as How a unanticipated problem will be managed.

All prescribed burn plans shall identify the following essential elements for contingency planning:

- Who has the authority to activate the contingency plan.
- Clearly defined trigger points.
- Special instructions for reporting an escaped fire and slopover.
- Who will be notified when the contingency actions are being implemented
- The location of values or resources requiring protection and an established priority for providing protection.
- Identify the initial action used to suppress the wildland fire, including the organizational structure, strategies, tactics, additional resources, health and safety concerns.
- Containment opportunities outside of the burn unit (i.e. fuel breaks, roads, and other areas).

Determining when to implement a contingency plan or declare a prescribed fire a wildland fire, will vary with every situation. There is no “one size fits all” standards for determining when a prescribed fire should be declared a wildland fire. Because of this, the following trigger points have been identified to determine when and where the contingency plan will be implemented:

- When five or more slopovers occur.
- When private property , cultural resources, structures, and other resource values are threatened.
- When the fire behavior predictions exceed the prescription parameters (Manditory).

The District managers will meet annually during the early winter. Potential burn units will be selected and a draft list will be reviewed for sound biological practices. A review of the previous years prescribed fire accomplishments, problem areas, and any monitoring results will also take place at this time.

F. Preparation and Implementation

The District managers will prioritize the units to be burned on a District-wide basis and will be responsible for preparing all fire equipment used for prescribed burning prior to April 1. Prescribed burn units may require preparation including; mowlines, disclines, and blacklines. There may be a need to notify the public to establish positive public relations. Preparation for burns will be handled on an individual basis and will be identified in the prescribed burn plan for that unit.

Multiple units may be conducted at the same time. The maximum number of simultaneous burns will depend on the cumulative impacts of smoke on sensitive targets. The Zone FMO or other qualified Prescribed Fire Manager will be available to coordinate the management of simultaneous burns. It is not required that a Prescribed Fire Manager be on-site during the burns. However, sufficient suppression forces must be available for each burn in the event of an escape.

G. Monitoring and Evaluation

Region 6 fire monitoring protocols have been adopted (Appendix K). If the resource management program is fully funded, a more quantitative monitoring program will be implemented. An increase in FTE would allow the establishment of vegetative transects in each of the habitat types being prescribed burned. Species composition and percent cover will be the primary information used to determine if burn objectives are being met and to monitor long term vegetation responses.

XII. ADDITIONAL OPERATIONAL ELEMENTS

A. Public Safety

Firefighter and public safety will always take precedence over property and resource protection during any fire management activity. Firefighter safety has been covered earlier. This section will deal with public safety.

Fire fronts in grass fuels are fast moving and may be dangerous. However due to the small size of most District units, entrapment is no too likely. Neighbors who

initiate their own suppression actions often lack proper training, equipment, and communications and may be at risk. The District staff will attempt to keep the fire scene (prescribed and wildfire) clear of people except for firefighters and cooperating volunteer fire departments. Burn areas are usually closed to the public during prescribed fires.

Smoke from a wildfire or prescribed burn could impair visibility on roads and become a hazard. Smoke from prescribed fires is part of the burn prescription and is the responsibility of the Burn Boss. Actions to manage smoke include: Use of road guards and pilot car, signing, altering ignition techniques and sequence, halting ignition, and suppressing the fire. During wildfires, the local law enforcement agency having jurisdiction is responsible for managing traffic hazards from smoke.

Wildfires which might escape from Service lands and spread to inhabited private property are also a concern. The local law enforcement agency having jurisdiction will maintain order at the scene and enforce evacuation orders. Service personnel may assist with the evacuation process in cooperation with the law enforcement officer in charge. Additionally, the District will continue where practical to use prescribed fire to manage hazard fuel in high risk areas.

B. **Public Information and Education**

Informing the public is an important part of fire suppression, fire prevention, prescribed fire, and the Service mission. During fires the IC or Burn Boss is responsible for providing fire information to the press and the public. The IC or Burn Boss may delegate this task as needed.

Informing the public is a vital element of the prescribed fire program. The following actions may be used to promote the prescribed fire program to the public:

- press releases
- attendance at local volunteer fire department meetings
- including the prescribed fire message in District interpretive publications and materials
- personal contact with bystanders during prescribed burns
- follow prescribed burn plans and preventing escapes
- developing a quantitative fire effects monitoring program and sharing the results with the public

C. Records and Reports

1. Wildland Fire

The Collateral Duty Fire Officer will complete all fire reports within 3 days and submit the DI-1202 (Fire Report) within 10 days to the Zone FMO.

2. Prescribed Fire

Individual prescribed burn plans will be the primary document used to record prescribed fire information. Burn plans will document personnel assignments, costs, fire behavior, weather, burn critique, and state air quality requirements information. Prescribed burns will also be documented on DI-1202 forms and submitted to the Zone FMO within 10 days of the completion of a burn.

D. Fire Critique and Review Process

1. Wildland Fire Critiques

Wildfires will be critiqued by the IC. The Regional Fire Management Coordinator and/or Zone FMO will conduct formal fire critiques in the event of :

- significant accident resulting in injury or death
- significant property or resource damage
- significant safety concerns are raised
- an extended attack was necessary

2. Prescribed Fire Critiques

Prescribed fires will be critiqued by the Burn Boss. The Regional Fire Management Coordinator and/or Zone FMO will conduct formal fire critiques in the event of :

- significant accident resulting in injury or death
- significant property or resource damage
- significant safety concerns are raised
- an extended attack was necessary due to an escape
- smoke management problems occur

3. Fire Management Plan Review

The Fire Management Plan will be reviewed annually. Minor changes can be made at that time. The plan must undergo a full review every five years or following planning exercises such as CCP development or the approval of a habitat management plan. The plan must be submitted for Regional review when major changes are made to the plan.

E. Cultural Resources and Section 107 Clearances

The District will implement its fire management program within the constraints of the Endangered Species Act of 1973, as amended, and will take appropriate action to identify and protect from adverse effects, any rare, threatened, or endangered species located within the District. U.S. Fish and Wildlife Service (Service) policy requires that State threatened and endangered species and Federal candidate species will be incorporated into any planning activities.

Fire Management activities at the District will be implemented in accordance with the regulations and directions governing the protection of cultural resources as outline in Departmental Manual Part 519, Code of Federal Regulations (36 CFR 800), the Archeological Resources Protection Act of 1979, as amended, and the Archeological and Historic Preservation Act of 1974. All fire management activities will be in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

No cultural resources have been documented in the District. The District lies within the Coteau du Prairie Archeological Region. Documented occupation on the area spans a 10,000-year period. The probability that significant cultural resources are present on some of the native grassland is good. However, no above ground evidence on WPAs is documented at this time, and no historic structures have been recorded/identified on WPAs within the District.

Currently wildfires are suppressed. However, historical evidence demonstrates that natural and artificial fires were regular events in the mixed grass prairie. In recent years, fire suppression has resulted in a steady buildup of grassland and riparian fuel loads, colonization of disturbed soils by invading plant species, and natural vegetative growth, increasing the chances of an uncontrolled wildfire that could potentially endanger the Refuge's cultural resources as well as surrounding private property. Although over 20 years of fire ecology research allows ecologists to predict impacts on biotic communities, the possible impacts of prescribed burning (and wildfires) on archeological resources are not well known. Research conducted in North Dakota indicated that fire-related impacts to buried artifacts are negligible, but effects on surface-exposed artifacts will be significant, depending on artifact type and size (Seabloom et al 1991).

Impacts to archeological resources by fire resources vary. The four basic sources

of damage are (1) fire intensity, (2) duration of heat, (3) heat penetration into soil, and (4) suppression actions. Of the four, the most significant threat is from equipment during line construction for prescribed fires or wildfire holding actions (Anderson 1983).

The following actions will be taken to protect archeological and cultural resources:

! Files and records of cultural resources should be consulted by the staff when planning prescribed burns, developing pre-attack plans, and performing other preparedness actions. The potential for adverse impacts to cultural resources will be evaluated prior to prescribed burning and in the selection of fire suppression strategies during wildfires.

! The Regional Archeologist will be contacted during the development phase of the burn plan writing process when cultural resources are suspected or known to exist in the project area.

! The South Dakota State Historic Preservation Officer (SHPO) will be contacted by the Regional Archeologist when it is known a planned management action may impact archeological or cultural resources. The SHPO has 30-days to respond. The Refuge will follow any programmatic archeological/cultural resources management plan that may be implemented in the future.

! Low impact wildfire suppression tactics (cold-trailing, use of foam/wet-water/water, use of natural and manmade barriers, change in vegetation, mowing, etc.) will be used to the fullest extent possible. Line construction for prescribed fire activities will follow the same principle. Maps indicating the known location of significant cultural resources will be consulted prior to laying out burn units, and whenever possible, before constructing fireline to halt the spread of a wildfire.

! Prescriptions for management ignited prescribed fires will take into account the presence of known cultural sites. Cooler fires with short residence time will be used in areas containing known cultural sites, whenever possible.

! Known surface sites will be marked, protected, and excluded from the burn, if possible. Foam will not be used in areas known to harbor surface artifacts.

! The use of mechanize equipment within the refuge must be approved by the District Manager on a fire by fire basis, and the use these resources will be considered in the approval process for any planned management actions. When the use of heavy equipment is authorized, its use will be monitored.

! The location of sites discovered as the result of fire management activities will be reported by the Collateral Duty FMO to the Regional Archeologist.

! Rehabilitation plans will address cultural resources and will be reviewed by the Regional Archeologist.

XIII. AIR QUALITY AND SMOKE MANAGEMENT GUIDELINES

District fire management activities which result in the discharge of pollutant (smoke, carbon monoxide, particulate, and other pollutants from fires) are subject to and must comply with all applicable Federal, State, and local air pollution control requirements as specified by Section 118 of the Clean Air Act, as amended in 1990.

The management of smoke is incorporated into the planning of prescribed fires. Sensitive areas are identified and precautions are taken to safeguard visitors and local neighbors. Smoke dispersal is a consideration in determining whether or not a prescribed burn is within prescription. Generally fine fuels and small burn size (20 -80 acres) generate low volumes of smoke for short duration of time (4-5 hours).

At this time, the State does not require a burn permit, unless there are special circumstances. The burn boss and or appointees are to take special care to notify neighbors, fire departments, and local law enforcement agencies on burn day. These and other actions are specific requirements of individual burn plans and will be included.

XIV. FIRE RESEARCH NEEDS

The District will continue to encourage fire related research projects on Service lands where research operations will not conflict with unit management objectives.

XV. CONSULTATION AND COORDINATION

All fire management program activities will be implemented in cooperation and coordination with the State of South Dakota, South Dakota Department of Environmental Health, and rural fire protection districts. Other agencies and organizations will be consulted with as needed.

General program consultation and coordination will be sought from the Zone FMO, the Regional Fire Management Coordinator, Regional Prescribed Fire Specialist, and the National Interagency Fire Center (NIFC).

XVI LITERATURE

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ROTHERMEL, R 1983. General Technical Report INT 143 - How to Predict the Spread and Intensity of Forest and Range Fires. USDA Forest Service. Intermountain Forest and Range Experiment Station. Ogden, Utah.

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SHEPPARD, G AND FARNSWORTH, A 1997. Fire Suppression in Threatened, Endangered, and Sensitive Species Habitat. Proceedings - fire Effects on Range and Endangered Species and Habitats Conference, Nov 13 - 16, 1995. Coeur d' Alene, Idaho. Wildlife Forever & Washington Foundation for the Environment. 337-340p. Fairfield, Washington.

APPENDIX A: WILDLIFE

APPENDIX B. THREATENED AND ENDANGERED SPECIES

Federally Threatened, Endangered Species found in Madison Wetland District

Piping plover (*Charadrius melodus*)	Threatened
Bald Eagle (*Haliaeetuus leucocephalus*)	Endangered
Peregrine falcon (*Falco peregrinus anatum*)	Endangered
Whooping crane (*Grus americana*)	Endangered
Eskimo curlew (*Numenius borealis*)	Endangered
American burying beetle (*Nicrophorus Americanus*)	Endangered
Western prairie fringed orchid (*Platanthera praeclara*)	Endangered

State Threatened, Endangered Species found in Madison Wetland District

Osprey (*Pandion haliaetus*)	Threatened
Redbelly dace (*Phoxinus eos*)	Threatened
Sicklefin chub (*Hybopsis meeki*)	Threatened
Sturgeon chub (*Hybopsis gelida*)	Threatened
Finescale dace (*Phoxinus neogaeus*)	Threatened
Longnose sucker (*Catostomus catostomus*)	Threatened
Trout-perch (*Percopsis omiscomaycus*)	Threatened
Plains topminnow (*Fundulus Sciadicus*)	Threatened
Blanding's turtle (*Emydoidea blandingi*)	Threatened
Northern redbelly snake (*Storeria occipitomaculata*)	Threatened
False map turtle (*Graptermys pseudogeographica*)	Threatened
Spiny softshell (*Apalone spinifera*)	Threatened
Lined snake (*Tropidoclonion lineatum*)	Threatened
Eastern hognose snake (*Heterdon playrhinos*)	Threatened
Mountain lion (*Felis concolor*)	Threatened
River otter (*Lutra canadensis*)	Threatened
Black bear (*Ursus americanus*)	Threatened
Swift fox (*Vulpes velox*)	Threatened
Central mudminnow (*Umbra limi*)	Endangered
Pearl dace (*Semotilus margarita*)	Endangered
Banded killfish (*Fundulus diaphanus*)	Endangered

APPENDIX C: FIRE OCCURRENCE

TABLE 1: FIRE OCCURRENCE 1969 -1998

Year	Number of Prescribed Fires	Prescribed Burn Acres	Number of Wildfires	Wildfire Burn Acres	Cause of Fire
1969	0	0	0	0	----
1970	0	0	0	0	----
1971	1	6	1	39	Human
1972	10	57	1	5	Human
1973	11	308	0	0	----
1974	1	10	0	0	----
1975	0	0	0	0	----
1976	0	0	1	5	Human
1977	0	0	0	0	----
1978	0	0	1	20	Human
1979	4	64	1	47	Human
1980	0	0	2	48	Human
1981	0	0	2	15	Human
1982	1	5	1	35	Unknown
1983	1	19	0	0	----
1984	4	86	1	20	Human
1985	5	112	0	0	----
1986	2	26	0	0	----
1987	6	240	0	0	----
1988	1	116	0	0	----
1989	0	0	0	0	----
1990	0	0	1	49	Human
1991	0	0	4	30	Human
Year	**Number of Prescribed Fires**	**Prescribed Burn Acres**	**Number of Wildfires**	**Wildfire Burn Acres**	**Cause of Wildfires**
1992	0	0	0	0	----
1993	0	0	1	20	Human

1994	0	0	0	0	----
1995	0	0	0	0	----
1996	0	0	0	0	----
1997	1	85	2	17.1	Human
1998	2	167	2	42	Human

APPENDIX D: MISSION STATEMENT - GOALS AND OBJECTIVES

APPENDIX E: COOPERATIVE AGREEMENT

Agreement No. FY99-01 CN: 64560-9-K001 Funding: 64560-9251-0000 Amount: $200.00/year

Cooperative Agreement

between

U. S. Fish and Wildlife Service

Madison Wetland Management District

and

Madison Fire Department

Madison, South Dakota

I. Purpose

This Cooperative Agreement is entered into between the U. S. Fish and Wildlife Service,

Madison Wetland Management District, hereinafter referred to as the Service, and the Madison Fire Department, hereinafter referred to as the Fire Department, for the purpose of cooperating in the suppression of fires on lands within the boundaries of the Madison Wetland Management District headquarters, located in Lake County, South Dakota.

II. Authority

The Fire Protection Act of September 20, 1922 (42 Stat. 857; 16 U.S.C. 594),

the Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66, 67; 42 U.S.C. 1856, 1856a and b), and the Department of Interior Appropriations Act.

III. Scope of Work

A. The Fire Department shall:

1. Furnish, at its own expense, firefighting equipment and labor for the suppression of fires on lands and buildings within the headquarter boundaries of the Madison Wetland Management District, located in Lake County, South Dakota.

2. The Fire Department will report any fire discovered to the Service as soon as possible upon taking suppression action.

B. The Service shall:

1. Provide, at its own expense, first response and initial attack with such equipment and labor as are available on wildland fires occurring on lands and buildings within the headquarter boundaries of the Refuge and on adjacent private lands.

2. Assist in wildland fire suppression on lands surrounding the District, not covered by this agreement, when requested by the Fire Department and deemed practical by the Project Leader. This assistance will be provided to the Fire Department at the Service's expense.

IV. Period of Performance

A. The terms of this agreement shall remain in effect from the date of execution through September 30, 1999, and may be renewed for a period of four (4) years from October 1, 1999, to September 30, 2003.

B. Annual renewal: See Section VII., Renewal.

V. Financial Administration

A. Funding: 64560-9251-0000 or 64560-9261-fire no. (a specific fire number may be issued for each incident)

B. The Fire Department may bill the Service an annual charge of $200.00 at the end of each fiscal year. Fiscal years run from October 1 through September 30.

VI. Project Officers

U. S. Fish and Wildlife Service
Thomas R. Tornow, Refuge Manager
Madison Wetland Management District
P.O. Box 48
Madison, South Dakota 57042
Telephone: (605) 256-2974

Madison Fire Department
Jerry Johnson, Fire Chief
Madison Volunteer Fire Department
116 W. Center P.O. Box 308
Madison, South Dakota 57042
Telephone: (605) 256-7523 Office
(605) 256-7531 Dispatch

VII. Renewal

This agreement may be renewed annually by execution of a Standard Form 30 citing the appropriation data from which monies will be obligated. It is mutually understood that subsequent year funds shall not be expended until the Standard Form 30 has been issued. Failure

of Congress to make such appropriations shall relieve the parties from any liabilities under this

agreement.

VIII. Modifications

Any change to this agreement shall not be binding unless said change is mutually agreeable to both parties, issued in writing, and signed by the Project Leader of the U. S. Fish and Wildlife Service and an authorized official of the Fire Department.

IX. Liabilities

A. Neither of the parties hereto will be responsible to the other for any loss, damage, personal injury, or death occurring in consequence of the performance of this agreement.

B. Repairs necessary to keep in operation any equipment covered by this agreement during the period of use hereunder shall be the responsibility of the owner of such equipment.

X. Termination

The Government, by thirty (30) days written notice, may terminate this agreement in whole or in part when it is in the best interest of the Government to do so. The Fire Department may also terminate the agreement by giving thirty (30) days written notice to the Government.

Madison Fire Department	U. S. Department of the Interior U. S. Fish and Wildlife Service
Signature: _____	Signature: _____
Name: _____	Name: _____
Title: _____	Title: _____
Date: _____	Date: _____

Reviewed: _____ Date: _____
Regional Fire Management Coordinator

Approved: _____ Date: _____
Associate Manager

APPENDIX F: NORMAL UNIT STRENGTH

Normal Unit Strength (NUS) is the amount of non-capitalized fire fighting equipment needed by a refuge to meet 70 percent of suppression needs. Currently the Madison District is equipped with the NUS to meet most fire needs. The fire cache (10 person equipment and PPE) has been built up over the last few years and will be maintained no lower than it's current level.

Table 1: Equipment

Item	Year Purchased	percent of Fire Funding	Have	GVW	Need/ Re-place	GVW
Engine Modules Heavy (500-1000 gallon) Medium (200-400 gallon) Light (50 - 150 gallon)			 1 2		 1 0	 18K
Slip-on Unit(s)						
Water Tender(s)			1		0	
Portable Pump(s) Standard Flot-a-pump			 1		 0	
Power saw(s)			2		0	
Mower(s)			1			
Tractor(s)			2			

ATV(s)			2			
Grader(s)						
Plow Unit/Disk			1			
Other (List)						

Other Equipment Available for Fire Suppression or Prescribed Fire operations **Not Fire Funded**	Use the table to the left to list capital equipment used for preparedness and initial attack or for prescribed fire activities funded wholly or in part by fire.
Type 3 Dozer	In the above table, Indicate the year purchased, if known, and the percent of fire funding (e.g.: The station purchased a tractor. Fire paid 25% and the station secured other funding for the remainder. Radios are listed on a separate inventory
Tractor trailer	

Table 2: Supplies and PPE

Item	Quantity	
	Need	Have
Hose, lightweight, lined 1.5" x 100'	9	
Hose, lightweight, lined 1" x 100'	9	
1" NH gated wye	2	
1.5" NH gated wye	2	
1.5" nozzle	2	
1" Forester nozzle	4	
Hydrant wrench, spanner	2	
Hose clamp	2	
flapper	6	7
Pulaski w/sheath	3	1
Shovel w/sheath	6	7
Rake	2	4
Combi tool	6	0
Drip Torch	2	4
Fusees	1 Case	1 Case
Safety Can: 3 Gallon	2	
Foam	15 gallons	1 gallon
Backpack Pump	6	3
Canteen, large	2	
Belt Weather Kit	2	2
Hard Hat	12	10
Goggles	12	11
Headlamps	12	
Fire Shelter w/Liner	12	15
Line Pack w/harness	12	11
Water Bottle	48	40
Ear Plugs	12 pks	1 box
Leather Gloves, Assorted sizes	24 pr	16
Sleeping Bags	10	
Pearsonal Gear Pak (Red Bag)	12	1
Personal First Aid Kit	12	14

Nomex Shirts	Enter	
Small	Desired	2
Medium	Number	1
Large	should have 18 pr	4
X-Large	(Men & Women)	5
XX-Large		1
Nomex Pants - Men’s		
28x30		
32x30		
32x34		
34x30		
34x32		
34x34		
36x30		1
36x32		
36x34		4
38x30		2
38x34		3
40x34		3
42x30		1
Nomex Pants - Women’s		
Size 10		
Size 12		1
Size 14		
Size 16		1

APPENDIX G: FITNESS

APPENDIX H: STEP-UP PLAN

The following Step-Up Plan will be a guide for preparedness operations on the Madison District. The plan uses the National Fire Danger Rating Systems (NRDRS) Burning Index (BI) gathered from the Internet sit for South Dakota weather.

Staffing Class	Burn Index
I	0-19 -- Low (L)
II	20-29 -- Moderate (M)
III	30-34 -- High (H)
IV	35-40 -- Very High (VH)
V	41 and above -- Extreme (EX)

TABLE 1: DISTRICT FIRE STEP-UP PLAN

Preparedness Actions	L	M	H	VH	EX
FIRE STAFF					
No full time fire staff at this time					
REFUGE STAFF FIREFIGHTERS					
Carry PPE while on duty					X
May assigned to engine				X	X
Tour of duty/schedule may be extended				X	X
FIRE EQUIPMENT					
Type 6 engines ready	X	X	X	X	X
1000 gallon Nurse Tank	X	X	X	X	X
ATV w/ 15 gallon sprayer				X	X
ATV w/10 gallon sprayer				X	X
Heavy Equipment				X	X
FIRE PREVENTION ACTIVITIES					
Restrict vehicles to parking lots/gravel roads				X	X
Post fire danger signs at high public use areas				X	X
MISC EMERGENCY PREPAREDNESS ACTIONS					
Notify Zone FMO and open emergency preparedness account				X	X
Temporary closures of WPA's for certain activities at the Refuge Managers discretion				X	X
Alert area volunteer fire departments of fire danger				X	X

The above Step-Up Plan may not apply when District resources are assigned to fires. Ready status is unstaffed, but filled with water, ready to respond. Resources assigned to fires may prevent some staffing actions. The Refuge Manager in consultation with the Zone FMO will determine whether to fill behind the dispatched resources.

APPENDIX I: DISPATCH PLAN

MADISON WETLAND DISTRICT DISPATCH PLAN

When report of smoke or fire is received, get as much information from the caller as possible.

Location of smoke or fire:
Location of caller:
Name and telephone number of caller:
Color of smoke:
Size of fire:
Type of fuel:
Character of the fire (running, smoldering, etc.):
Anyone fighting the fire?
Did they see anyone in the vicinity or vehicles leaving the area:
Weather at the fire location:

1. Check map location of fire and determination jurisdiction.

2. If fire is on a WPA, or threatening a WPA, dispatch small pumper (150 gallon) pumper and 2 qualified firefighters to the fire.

3. Notify Project Leader.

4. Notify nearest Fire Department, and/or Sheriffs (See attachments I and II).

5. If fire danger is high or extreme, Request a recon aircraft.

6. Maintain a log of all radio and telephone communications.

7. Remain on duty and dispatch further assistance as ordered from fire.

	Refuge Fire Personnel	Qualified	Home Phone	Fitness Test
_____	Tom Tornow	FFT2	483-3490	1/99
	Earl Hyink	FFT2	256-2790	1/99
	Sandy Uecker	FFT2	256-3038	2/99
	Gary Breuer	FFT2	256-9238	4/99
	Earl Kooiker	FFT2	256-2901	4/99
	Colleen Kolbeck	FFT2, RXB3	425-2244	----

Wade Briggs	FFT2	586-4321	4/99	
Jennifer Briggs	FFT2	586-4321		4/99
Noel Matson	FFT2	256-0204	4/99	
Jim Bjorkman	FFT2	983-9906	4/99	

Directory - Regional Office Phone

Refuges & Wildlife (RW) (303)236-8145
Maury Wright ext. 673

Regional Fire Management Coordinator (303)236-8145
Phil Street ext. 676

Prescribed Fire Specialist (303)236-8145
Vacant ext. 618

ND/SD Zone FMO Coordinator (701)768-2548 Brian McManus - J.Clark Salyer

ATTACHMENT I AMBULANCES, CLINICS AND HOSPITALS IN THE DISTRICT

Brookings County -- 911

Brookings Medical Clinic - 400 22nd Avenue, Brookings 692-6236
Brookings Hospital - 300 22nd Avenue, Brookings 692-6351
- Ambulance 692-2115
Volga Clinic - 210 Kasan Av., Volga 627-5701
White Family Practice Clinic 629-8211
White Ambulance Service - 629-3501

Deuel County -- 911

Deuel County Memorial Hospital - 701 3rd Ave. S, Clear Lake 874-2141
Clear Lake Medical Center - 302 5th St. W., Clear Lake 874-2131
Frazer Medical Center - 902 3rd Av. S, Clear Lake 874-8264
Jellesma Rural Health Clinic - 701 3rd Av. S, Clear Lake 874-8484
Barton Clinic - 320 SE 7th Ave., Watertown 886-8471
Brown Clinic - 506 SE 1st Ave., Watertown 886-8482
Medical Arts Clinic - 600 NE 4th St., Watertown 886-5808
Memorial Arts Center - 420 NE 4th St., Watertown 886-8431
St. Ann's Hospital - 400 10th Ave, Watertown 886-8491

Hamlin County -- 911

Bryant Ambulance - 785-3604

Bryant Clinic - Bryant 628-2318
Hayti/Lake Norton Ambulance - 300 N. Main, Lake Norton 785-3604
Estelline Community Hospital - 213 N. Main, Estelline 873-2222
- Ambulance 873-2500
Estelline Medical Center - N. Main, Estelline 873-

Kingsbury County -- 911

DeSmet Memorial Hospital - 306 Prairie Av SW, DeSmet 854-3329
- Ambulance 854-3329
Bell Medical Services - 115 2nd St. SE, DeSmet 854-3455
Lake Preston - Ambulance 847-4405
Lake Preston Clinic - 702 St. SE, Lake Preston 847-4484
Arlington Medical Center - 104 W. Birch, Arlington 983-3283
Arlington Ambulance 983-5301

Lake County -- 911

Madison Community Hospital - 917 N. Washington, Madison 256-6551
Interlakes Medical Center - 903 N. Washington, Madison 256-6951
Madison Community Medical Center - 903 N. Washington, Madison 256-4564
Northland Family Practice Clinic - 220 NE 9th St, Madison 256-3548

McCook County -- 911

McGreevy Clinic - 740 S. Hill, Salem 425-2855
Salem Family Medical Clinic - 741 S. Hill, Salem 425-3038
Ambulance Service - Metro, Sioux Falls 367-7222
McCook County Ambulance - 410 E. Drake, Salem 425-2085
Bridgewater Clinic - 208 N. Main, Bridgewater 729-2421

Miner County -- 911

Howard Community Health Center - 208 S. Main, Howard 772-4574
Miner County Ambulance Service - Howard 772-4501

Minnehaha County -- 911

Sioux Valley Hospital - 1100 S. Euclid Ave, Sioux Falls 333-1000
Avera McKennan Hospital - 800 E. 21st, Sioux Falls 339-8000
Central Plains Clinic - 1100 E. 21st St., Sioux Falls 335-2727
McGreevey Clinic - 6000 W. 41st St., Sioux Falls 336-2140

Moody County -- 911

Flandreau Municipal Hospital - N. Prairie, Flandreau 997-2433
Flandreau Medical Clinic - 309 N Prairie, Flandreau 997-2471

Moody Co. Ambulance & Rescue Service 997-2423

ATTACHMENT II Fire Departments and Police in the Madison District

Brookings County	Fire	Police	Sheriff
Brookings (911)	692-6326	692-2113	692-2932
Bruce (911)	627-9113	627-2932	692-2932
Sinai (911)	826-4291	N/A	692-2932
Volga (911)	627-9113	627-2932	692-2932
White (911)	629-8171	629-3001	692-2932

Deuel County			
Altamont (911)	874-2700	874-8211	874-8405
Astoria (911)	832-4001	N/A	874-8405
Brandt (911)	876-2001	874-8211	874-8405
Clear Lake (911)	874-2700	874-8211	874-8405
Gary (911)	272-5600	272-5241	874-8405
Goodwin & Bemis (911)	795-3911	874-8211	874-8405

Hamlin County			
Castlewood	793-2331	793-2526	783-3232
Estelline	873-2500	873-2200	783-3232
Hayti	783-3606	783-3373	783-3232
Hazel	628-2211	628-2323	783-3232
Lake Norton	785-3604	785-3481	783-3232
Bryant	628-2121	783-2931	783-3232

Kingsbury County			
Arlington (911)	983-5301	983-5301	854-3339
DeSmet (911)	854-3336	854-3731	854-3339
Lake Preston (911)	847-4403	847-4444	854-3339
Hetland	983-5301	854-3339	854-3339
Manchester	546-2288	N/A	854-3339
Oldham (911)	482-8111	854-3339	854-3339
Erwin	847-4403	854-3339	854-3339

Lake County			
Madison (911)	256-7523	256-7531	256-7615
Ramona (911)	911	911 256-7615	
Chester (911)	489-2301	911 256-7615	
Wentworth (911)	483-3135	911 256-7615	

Winfred (911)	485-2677	485-2677	256-7615
Nunda (911)	586-4131		

McCook County

Bridgewater (911)	729-2331	N/A	425-2761
Canistota (911)	296-3401	296-3311	425-2761
Montrose	363-5000	363-3730	425-2761
Salem (911)	425-2315	367-7222	425-2761
Spencer (911)	246-2777	N/A	425-2761

Miner County

Carthage	772-4501	772-4501	772-4501
Fedora/Roswell	527-2400	N/A	772-4501
Howard (911)	772-4501	772-4501	772-4501

Minnehaha County

Colton (911)	446-3215	N/A	367-4300
Hartford (911)	528-3511	N/A	367-4300
Humbolt (911)	363-3418	N/A	367-4300
Sioux Falls (911)	367-7173	367-7212	367-4300

Moody County	Fire	Police	Sheriff	
Colman/Egan	997-2423		997-2423	997-2423
Flandreau	997-2423		997-2423	997-2423

ATTACHMENT III Radio call signs:

Brookings County	Radio	Telephone
CO Dale Gates	6-5	688-6121
Sheriff	6-1	692-2932
Fire	6-9	
Deuel County		
CO Dave Bartling	23-5	874-8405
Sheriff	23-1	874-8405
Hamlin County		
CO Kraig Haase	32-5	783-2111
Sheriff	32-1	783-3232
Kingsbury County		
CO Shane Vanbockern	42-5	847-4378
GF&P Paul Coughlin		854-9105
Sheriff	42-1	854-3339
Lake County		
CO Mike Kintigh	43-5	256-5005
Sheriff	43-1	256-7615
McCook County		
CO Floyd Demaray	46-5	425-2867
Sheriff	46-1	425-2761
Miner County		
CO Jeff Grendler	51-5	772-4578
Sheriff	51-1	772-4501
Minnehaha County		
CO Mark Smedsrud	1-5	362-2700
Sheriff	1-A9 & 1-A14	335-4300
GF&P Regional Office	1-50	362-2700
Moody County		
CO Doug Day	52-5	997-2211
Sheriff	52-1	997-2423

US Fish & Wildlife

SRA Robert Prieskat	FWL-1		224-1001
SA Dan Smoot	FWL-3		330-4318
Madison District		W43-5	256-2974
Dave Gilbert	Unit 1		
Tom Tornow		Unit 2	
Sandy Uecker	Unit 3		
Earl Hyink		Unit 4	
Gary Breuer		Unit 5	
Colleen Kolbeck		Unit 6	
Earl Kooiker	Unit 7		
Jim Bjorkman	Unit 8		
----		Unit 9	
Noel Matson		Unit 10	
Jennifer Briggs	Unit 11		
----		Unit 12	
Wade Briggs		Unit 13	
----		Unit 14	
Derris Buus		Unit 15	

Madison Wetland Management District Fire Personnel

Name	Title	Fire Qualification
1. Tom Tornow	Project Leader	FFT2
2. Earl Hyink	Bio. Tech (WL)	FFT2
3. Sandy Uecker	Asst. Manager	FFT2
4. Colleen Kolbeck	Asst. Manager	Burn Boss
5. Gary Breuer	Tractor Operator	FFT2
6. Noel Matson	Bio. Tech (PL)	FFT2
7. Jennifer Briggs	Bio. Tech (PL)	FFT2
8. Wade Briggs	Coop./Tractor Oper.	FFT2
9. Earl Kooiker	Tractor Operator	FFT2
10. Jim Bjorkman	Tractor Operator	FFT2

APPENDIX J: COMPLEXITY

Prescribed Fire Complexity Worksheet

Using the attached criteria, rate each element on a scale of 0 to 9, then multiply by the weighting factor (shown in parentheses in first column) to determine the weighted subvalues. Add the subvalues to determine the total weighted value which is used to determine the complexity of the prescribed burn.

PRESCRIBED FIRES:

COMPLEXITY ELEMENT/ (WEIGHTING FACTOR)	RATING VALUE	WEIGHT SUBVALUE	LOW BURN COMPLEXITY	HIGH BURN COMPLEXITY
1. Potential for escape (10)			Very low probability.	High probability.
2. Values at risk (10)			Very little risk to people, property, resources.	Great risk to people, property, resources.
3. Fuels/fire behavior (6)			Mostly uniform and predictable.	Great variability & unpredictability. Prescription includes very low fuel moisture conditions.
4. Fire duration (7)			Fire generally of short duration & require little management.	Fires of long duration & require continuous management.
5. Smoke/air quality (7)			Smoke impacts are low or insignificant.	Smoke sensitive areas frequently affected.
6. Ignition methods (3)			Simple & rarely hazardous.	Highly technical or frequently hazardous.
7. Management team size (3)			Burn requires a few generalized positions.	Burn requires large team of separate, specialized positions.
8. Treatment objectives (5)			Objectives simple & easy to achieve. Prescriptions are broad & encompass safe burning conditions.	Objectives are difficult to achieve. Prescriptions are restrictive or burning conditions are risky.
Total Weighted Value:				

Low Complexity:50 - 115 Total Weighted Value Points - Management Level: RXB3

Normal Structure:116 - 280 Total Weighted Value Points - Management Level: RXB2

Complex Structure:281 - 450 Total Weighted Value Points - Management Level: RXB1

Prepared by (RXBB/FMO) Date

PRESCRIBED FIRE COMPLEXITY ELEMENT RATING CRITERIA

Complexity elements are used to define the relative complexity of a prescribed fire project. For the 8 complexity elements listed, users assign a complexity score of 0, 1, 3, 5, 7 or 9, based upon the rating criteria described for each numeric score. Even numbers or numbers greater than 9 are not permitted. If a specific prescribed burn does not precisely match the stated criteria in every respect, a station will have to use its best judgment determine which rating is most appropriate. Each prescribed burn does not have to meet all listed rating criteria for a particular numeric score to qualify for that rating. Each higher rating category includes all the rating criteria listed for the previous categories.

These rating criteria will be used for all management ignited prescribed fires (prescribed burns), regardless of size. The complexity score will be included on the Fire Report (DI-1202) in the "Remarks" section. Post-fire complexity ratings are used to compile a summary complexity score for the normal prescribed fire year, which is used in the FireBase budget analysis for funding and staffing needs.

COMPLEXITY ELEMENTS

1. POTENTIAL FOR ESCAPE:

Score	Criteria
[0]	No potential for prescribed fire escape. Burn unit surrounded by non-burnable fuel or water.
[1]	Little potential of spot fires outside burn unit. If occurring, only one to two totaling no more than 0.25 acre. Spots can be controlled utilizing on-site holding forces.
[3]	Potential for multiple spot fires (more than two) outside the burn unit totaling less than 1 acre, but still controllable utilizing on-site holding resources. One or two dangerous fuel concentrations exist near the burn unit perimeter, and are expected to result in limited torching and spotting potential.
[5]	Potential for multiple spot fires outside the burn unit totaling more than 1 acre, requiring greater than average holding capability along certain sections of burn perimeter. Additional holding resources may be needed to control if escape occurs. Fuel outside burn unit is continuous, with limited fuel breaks. Engines and heavy equipment are primary suppression tools.
[7]	An escaped fire will exceed the capability of the holding resources on site. Additional resources will need to be requested for suppression. Escaped fire will cause implementation of contingency plan, and prescribed burn will be declared a wildfire. Fuel outside burn unit may be continuous and heavy with no fuel breaks making suppression efforts difficult. Engines and heavy equipment are primary suppression tools. Probability of Ignition greater than 70 percent.
[9]	Good potential for multiple fire escapes. An escaped fire will exceed the capability of the holding resources on site and additional resources will need to be requested. Escaped

fires will cause implementation of contingency plan and prescribed burn will be declared a wildfire. Fuel outside the burn unit is extensive and heavy, making suppression actions difficult. Prescription calls for fireline intensity and fuel moisture in the primary fuel model that are known to cause serious spotting potential. Probability of Ignition greater than 85 percent. Wind speeds at the upper end of prescription.

2. VALUES AT RISK

Score Criteria

[0] No risk to people, property, cultural and natural resources, either inside the designated burn unit or in the event of fire escape.

[1] Burn is in an area infrequently visited by people and contains no historic structures, buildings, sensitive biological communities, T&E species, or habitats that could be damaged by prescribed fire. The area adjacent to the burn may contain a few locally significant natural or cultural resources, or structures that could be damaged by fire escapes.

[3] Burn is in an area occasionally visited by people, and may be adjacent to a primary field unit road. The burn unit contains structures, cultural resources, sensitive biological communities, or T&E habitat that must be protected from fire.

[5] Burn is in an area that receives moderate use. Public safety is a major concern addressed in the burn unit plan, but still requires a minor commitment of project resources. The unit may contain several significant structures; there may be one or two primary natural or cultural resources (as identified in the station fire management plan) inside or immediately adjacent to the burn unit which must be protected from fire. - OR - the area adjacent to the burn unit contains one or two cultural or natural resources, or structures valued between $50,000 and $250,000 that could be threatened by fire escapes.

[7] Burn is in an area that receives moderate use, and protecting public safety requires a modest commitment of project resources. The burn unit may contain several significant structures, and contain or be immediately adjacent to several sensitive biological communities or habitats (as identified in station fire management plan) that must be protected from fire. - OR - the area adjacent to the burn unit contains three or more cultural or natural resources or developed sites with structures valued between $250,000 and $500,000 that could be threatened by fire escapes.

[9] The burn unit is in an area of concentrated public use, and protecting public safety requires a major commitment of project resources. The unit may contain several major structures (such as residences, historic buildings) and there may be critical natural or cultural resources (such as threatened or endangered species, or major archeological artifacts) inside the burn unit that must be protected from fire. - OR - the area adjacent to the burn unit contains critical natural or cultural resources or developed sites with structures valued at more than $500,000.

3. FUELS/FIRE BEHAVIOR

Score Criteria

[1] Fuels are uniform, and fire behavior is easily predicted using the standard fire behavior models and prediction systems (BEHAVE PROGRAM). Terrain is mostly flat, or the slope is uniform.

[3] Fuels within the primary model vary somewhat in loadings and arrangement, but are still well represented by one of the standard fire behavior fuel models. There may be small areas of secondary fuel types present, mostly away from the burn unit perimeter. The terrain contains low relief, and slope and aspect cause minor variations in fire behavior. The fire behavior variations present no difficulties in carrying out the burn, and the predominant fire behavior still can be predicted easily under most prescription conditions.

[5] Considerable variation exists within the primary fuel complex. Prescriptions may be based on two fuel models, or may require a customized model in addition to or in place of a standard model. A few areas of unusual fuel concentrations or atypical fuels not well represented by the prescription-based models may exist on or near the burn unit perimeter. The terrain contains significant relief, but the variations present only minor control problems, and no problems in meeting burn unit objectives. Fire behavior can still be predicted using standard fire behavior prediction systems.

[7] Major variations in the fuel complex require **two or more** fuel models, and may require several customized models. High fuel concentrations and atypical fuels not well represented by the prescription-based models may be common on or near the burn unit perimeter. The terrain encompasses two or three major vegetative communities through a broad elevational gradient. Variations in slope and aspect have major effects on fuels, fire weather and fuel moisture. The resulting variations in fire behavior may present moderate fire control problems and minor problems in meeting the overall burn unit objectives. Fire behavior cannot be predicted well using standard fire behavior prediction systems without application of adjustment factors.

[9] The burn unit contains highly variable fuels throughout, making it difficult to utilize standard or customized fuel models. The terrain encompasses more than three major vegetative communities through an elevation gradient so broad that more than one climate zone may be present. Wide variations in slope, aspect and elevation have major effects on fuels, fire weather and fuel moisture. The resulting variations in fire behavior may present major fire control problems and moderate problems in meeting overall burn unit objectives. Fire behavior cannot be predicted well without the aid of local experts (Fire Behavior Analysis).

4. FIRE DURATION

Score Criteria

[1] Entire burn unit will be burned in one burning period. Some minor residual burning may continue inside the unit, but requires no continued resource commitment. Primarily 1-hour fuels.

[3] Complete burnout of burn unit requires 1 to 3 days. Some minor residual burning may continue inside the unit, but requires no continued resource commitment. Primarily 10-

hour fuels.

[5] Complete burnout of burn unit requires 2 to 3 days. Significant residual burning inside the burn perimeter may continue for up to 3 days, requiring small holding crew. Primarily 100-hour fuels.

[7] Complete burnout of burn unit requires 3 days to 1 week. Significant residual burning inside the burn perimeter may continue up to another week, requiring a holding crew on site during the burning period. Primarily 1,000-hour fuels.

[9] Complete burnout of burn unit requires more than 1 week. Significant residual burning may continue for up to another 3 weeks along most of the burn unit perimeter, requiring a complete holding crew on site.

5. AIR QUALITY

Score Criteria

[1] Burn is remote from developments or visitor use areas or is of such small size that smoke impacts are insignificant. No critical targets are present. Critical targets are areas that are unusually sensitive to smoke impacts. These include areas such as airports, highways, air quality non-attainment areas, and hospitals in which health and safety are quickly and severely impacted by even minimal amounts of smoke, targets that already have an air pollution or visibility problem, and any targets where the impact of smoke will be compounded by the presence of emissions from other sources. Burning is outside the non-attainment areas, and RACM/BACM eliminates any impacts to these areas.

[3] One or more minor developments or visitor use areas may experience noticeably impaired visibility and increased particulate concentrations, but not in excess of secondary Federal standards. The impairment is expected to last no more than 3 days. No critical targets are present. There are no impacts to non-attainment areas.

[5] Several communities or visitor use areas may experience significantly impaired visibility (as defined in State, county, or field station visibility standard) or particulate concentrations exceeding secondary Federal standards. The impairment is expected to last no more than 1 week. Not more than one health-related complaint is likely to be received from health or medical authorities. No critical targets are present. Smoke trajectory is important, but broad.

[7] One town (more than 20,000 people) or one major visitor use area may experience significantly impaired visibility (as defined in a State, county or field station visibility standard) or particulate concentrations exceeding secondary Federal standards. The impairment is expected to last not more than 1 week. One to three critical targets are present. Smoke trajectory is critical. Mixing height and transport wind speed may be important.

[9] Several towns (each of 20,000 people or more) or several major visitor areas may experience significantly impaired visibility (as defined in State, county or field station visibility standard) or particulate concentrations exceeding secondary Federal standards.

The impairment is expected to last more than 1 week. Any impact likely to result in a violation of a primary Federal air quality standard would also qualify. Smoke trajectory, mixing height, and transport wind speed are critical.

6. IGNITION METHODS

Score Criteria

[1] Burn is ignited using drip torches, fusees, or other simple ground methods. Ignition requires not more than two personnel. Ignition patterns are simple, with no chance for confusion or hazardous situations to develop.

[3] Burn is ignited using simple ground methods or Terra Torch device (or equivalent). Ignition requires three to four personnel who may work in small teams igniting separate areas simultaneously. Ignition patterns may be complex enough to require detailed planning, but there is only minor chance of confusion. Ignition team is not expected to become involved in hazardous situations.

[5] Burn is ignited using a combination of ground methods, or both ground and aerial methods. Ignition requires four to six personnel working in teams to ignite separate areas simultaneously. Burn and ignition complexity requires separate position for ignition specialist. Ignition patterns require detailed planning, coordination between teams, and considerable attention to avoid confusion. Ignition teams may be exposed to hazardous situations for short periods.

[7] Ignition methods are tailored to accomplish different results in different sections of the burn. Burn unit may be composed of several fuel types requiring different ignition techniques and patterns. Ignition team(s) is composed of six to eight personnel, who may ignite separate areas simultaneously. Several ignition specialists may be required for different segments of the burn. Ignition methods require detailed planning and coordination often including an ignition specialist in aerial command post. Ignition teams are frequently exposed to hazardous situations due to fuels, fire line intensity, and complex terrain. Ignition methods or patterns are subject to revision by burn boss to achieve desired results or due to changing conditions.

[9] Burn requires a combination of complex aerial and ground techniques, often including helitorch, in complex, hazardous terrain and fuels. Ignition team is composed of more than eight personnel. Ignition methods require detailed planning by experts with extensive experience in specialized techniques. Ignition methods are subject to frequent revision by burn and ignition bosses due to changing or uncertain conditions. Detailed coordination is imperative to avoid placing team members in unacceptably dangerous situations.

7. MANAGEMENT TEAM SIZE

Score Criteria

[1] Burn team consists of two to three personnel, with the burn boss holding several overhead positions.

[3] Burn team consists of four to six personnel, including separate positions for Burn Boss and Holding Specialist.

[5] Burn team consists of seven to nine personnel, including separate positions for Burn Boss, Ignition Specialist, and Holding Specialist.

[7] Burn team consists of 10-12 personnel, including Burn Boss, Ignition and Holding Specialist, Aircraft Manager (aerial ignitions), and a Fire Weather Observer.

[9] Burn team consists of more than 12 personnel, including Burn Boss Type I, Holding Boss, Ignition Specialist, Aircraft Manager, Weather Observer, and several ignition and holding foremen.

8. TREATMENT OBJECTIVES

Score Criteria

[1] Objectives are limited to fuel reduction or maintenance burning and are easily achieved (e.g., removing cured grasses from grasslands or field maintenance). Prescriptions are broad and encompass safe burning conditions.

[3] Objectives are limited to dead and downed fuel reduction, or simple habitat restoration projects involving minor changes to vegetation. May involve two or three different fuel models. Objectives are easy to achieve using relatively low-intensity surface fires and simple burning patterns. Range of acceptable results for the burn objectives are broad.

[5] Objectives include dead and downed fuel, and live fuel reduction burns or change to structure of vegetative/habitat communities. Also include habitat conversion projects requiring changes in the composition of two or more vegetation types. Objectives and results are broad and could be moderately difficult to achieve, and may often require moderate intensity fires involving living fuels. Burning patterns are moderately complex. Flame lengths or scorch heights are critical to meet burn objectives.

[7] Objectives include living and dead fuels. Include habitat restoration projects requiring changes in the structure and composition of two or more vegetative habitats. Narrow burn parameters (prescription) fire behavior, smoke dispersal, operational constraints, and other burn criteria present a limited opportunity of project success with a single burn. The chance of success is heavily dependent on careful planning and precise timing.

[9] Objectives include living and dead fuels. Fuel reduction, ecological considerations, and political or operational constraints may be conflicting, requiring careful prioritization of objectives and expert planning. The prescription may require a combination of different fire intensities that makes it difficult to achieve objectives. The prescription criteria and window of opportunity are narrow. Burn objectives are specific, and range of results narrow. Project includes a major change in structure and composition of burn area. The prescription requires burning under risky conditions that could lead to fire escape.

APPENDIX K: RECOMMENDED FIRE MONITORING STANDARDS

REGION 6

The following are the recommended standards to be used when planning, implementing, and evaluating prescribed burns. These should be viewed as minimum values to be monitored and the information contained in this check list incorporated into a monitoring record sheet.

Planning and Preparation

Environmental Conditions Prior to the Burn

____ Photo Points Established

____ Fuel

- ____ Model(s)
- ____ Loading (By Size Class)
- ____ % Cover (Type/Model)
- ____ Continuity
- ____ Crown ratio
- ____ Depth of Fuel Bed
- ____ Other

____ Air Temperature (Maximum - Minimum to develop trends)

____ Relative Humidity (Maximum - Minimum to develop trends)

____ Wind Speed and Direction (Eye-level/20 Foot)

____ Fuel Moisture

- ____ Dead Fuel Moisture (Use of Fuel Sticks and/or Drying Ovens highly recommended)
- ____ Live Fuel Moisture (Fuel Models 2,4,5,7,10)

____ Soil Moisture (Dry, Moist, Wet)

____ Drought Indicator (Track One or More)

Execution

Environmental Conditions During the Burn

____ Date/Time

____ Air Temperature (Every 30 minutes)

____ Relative Humidity (Every 30 minutes)

____ Wind Speed and Direction (Eye Level) (Every 30 minutes)

____ Cloud Cover

____ Fuel Moisture (Indicate How Determined: Calculated, Actual)

____ Dead Fuel Moisture (Using above values, calculate every 30 minutes utilizing Tables and Worksheets, Nomograms, BEHAVE, etc.)

____ Live Fuel Moisture (Fuel Models 2,4,5,7,10 - Collect immediately prior to the burn and evaluate later)

Fire Behavior

____ Flame length (Head, Flank, Backing)

____ Rate of Spread (Forward, Flank, Backing)

____ Resistance to Control

____ Spotting Distance

Smoke/Air Quality

____ Mixing/Dispersal (Good, Fair, Poor)

____ Trajectory of Column (Surface/Upper Level)

____ Duration (Active Burning/Smoldering)

____ Problems

Note: It is recommended that photos be taken to document smoke dispersal.

Post Burn

First Order Fire Effects

____ Photo Point
____ Percent of Area Burned
____ Percent of Fuels Consumed (By Fuel Loading Size Class, when possible)
____ Percent of Thatch/Duff Consumed
____ Scorch Height
____ Mortality

Note: The information in the first two categories will be used to determine the amount of particulate matter produced, and may/will be used by State Air Quality Regulators.