

FIRE MANAGEMENT PLAN
FOR
KULM WETLAND MANAGEMENT DISTRICT
KULM, NORTH DAKOTA

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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 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.

The purpose of this plan is to provide a detailed program of action that provides direction to managers as they implement the Refuge's fire management program and to meet the Service's requirement that a Fire Management Plan be completed for all areas with burnable vegetation.

B. Description of Refuge

1. Location

Kulm Wetland Management District (District) is located in south-central North Dakota in the heart of the Prairie Pothole Region, which includes prairie communities with various types of native grasslands, riparian areas, and scattered woodland thickets (Figure 1). Other dominant features in the District include wetland areas with a variety of aquatic plants, which are correlated with such factors as water permanence, water depth, salinity and land use. Dense stands of cattail dominate some of these sites. Agricultural communities are prevalent throughout the area and include croplands, haylands, grasslands, shelterbelts and other tree plantings, and large areas of Conservation Reserve Program (CRP). CRP is a farm program which restores highly erodible farmland to grassland and cannot be grazed, hayed, or farmed.

The District consists of one administrative unit, administered from the headquarters office located at Kulm, North Dakota (Figure 2). The

District contains 184 fee title Waterfowl Production Areas, totaling 43,957 acres in four counties (Logan, LaMoure, Dickey and McIntosh) and one 640 acre Wildlife Development Area (WDA). WDA's are tracts of land that were purchased by the Bureau of Reclamation as mitigation for wetland losses during the construction of the Garrison Diversion Project and managed as a WPA.

Figure 1: Location of Kulm Wetland Management District

Figure 2: Kulm Wetland Management District

Headquarters	
Wetland Management District Boundary	

2.

Climate

The District's climate is characterized by short, mild summers and long, cold winters, with rapid fluctuations of temperatures. Summer high temperatures are normally in the 80's with recorded highs reaching into the 100's, while low temperatures commonly drop below -30 degrees Fahrenheit in the winter. January is the coldest month and July is the warmest. The average yearly precipitation for this part of the state is 19.44 inches with most of this falling as rain between April and September. Intense thunderstorms occur frequently in summer. In the winter, snow and high winds bring blizzard conditions to the area. The frost free season generally runs from May 20 - September 15. The prevailing wind flow is from the northwest with an average daily speed of 10 mph. Winds are usually sustained strong breezes rather than occasional gales. Wind speeds are usually highest during the afternoon and lowest at night. Winds of 25-30 mph often lasting for 6 hours and for as long as 15 hours have been recorded. Sustained gusts of 35-50 mph are not uncommon.

Table 1: Long Term Mean Precipitation and Temperature

Month	Mean Precipitation Inches	Mean Temperature Fahrenheit	Vegetative Stage
January	.48	2	C
February	.49	6	C
March	.79	27	C
April	1.93	42	T
May	2.70	54	G

June	3.75	68	G
July	2.74	70	T
August	2.52	68	T
September	1.83	61	C
October	1.11	47	C
November	.62	32	C
December	.48	17	C
Annual	19.44	41	C

C=cured, T=transition, G=green up

3. Topography and Soils

The District is composed of three major physiographic regions, which include the Southern Drift Plain, the Missouri Coteau and the Coteau Slope. The Drift Plain covers most of Dickey and LaMoure Counties except where it meets the Missouri escarpment which is in the extreme western part of these counties. Where the Drift Plain meets the Missouri escarpment there is a 300-400 foot elevation change forming the eastern edge of the Missouri Coteau. The Missouri Coteau is characterized by non-integrated drainage and thick glacial till, sometimes called knob and

kettle country. The maximum elevations in the Missouri Coteau is 2,550 feet above sea level. The third physiographic feature, the Coteau Slope is best described as flat to rolling, thin glacial drift with integrated drainage that flows to the Missouri River. The wetland basins in the Missouri Coteau are on the average larger and deeper than those on the Drift Plain.

Soil erosion resulting from suppression or prescribed fire actions is generally not a problem anywhere in the District. Occasionally local cooperators use disc lines as a fire suppression tactic. Disc lines on District land for suppression purposes are not recommended due to noxious weed invasion and soil erosion on slopes.

4. Hydrographic Features

The wetlands in Kulm WMD 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. The James River flows through the eastern portion of the District.

5. Wildlife

a. Insects

Insect life and range of occurrence of insects are not well documented at the District. Fire causes an immediate decrease in insect populations (except ants, other underground species, and flying insects), followed by a gradual increase in numbers as the vegetation recovers. The insects eventually reach a population level higher than adjacent areas, then decline to near present levels as vegetation and soil litter stabilize (Higgins, Kruse, and Piehl 1986).

b. Reptiles and Amphibians

Several species of reptiles and amphibians have been documented on the District but comprehensive surveys of all units have not been done. Six fish, two frog, two toad, one salamander, three snake, and two turtle species are relatively common in the District. A listing of reptiles, amphibians, and fish common to the District can be found in Appendix A.

c. Mammals

Comprehensive inventories of mammal species have not been completed for all units in the District. The District's upland habitats support healthy populations of white-tailed deer along with coyote, fox, muskrat and beaver. Several species of small mammals are also common, including; deer mice, ground squirrels, voles and shrews (Appendix A).

Generally, the direct impacts of fire on wildlife include disturbance or infrequent mortality of individuals or groups of individuals, particularly slow moving and or sedentary species. The District's larger mammals (deer, coyote, fox) will generally move away from fire. However the availability of suitable adjacent habitat is important for local populations. Without the presence of suitable adjacent habitat extensive fall prescribed burning is generally not conducted.

Fire in the mixed grass prairie has shown to generally favor deer and other mammals (Coppock and Detling, Herman and Wright, and others). Information concerning the effects of fire on wildlife can be reviewed in *The Effects of Fire in the Northern Great Plains*, prepared by Higgins, Kruse, and Piehl (1988).

d.

Birds

Two hundred and nineteen species of birds have been observed on the District (Appendix A). Of these, 112 species are known to nest on the District. Spring and fall migrations find spectacular numbers of waterfowl passing through the area and the District is an important stop for many on the journey north or south. Numbers of upland birds are cyclic but populations are normally present.

Bird species evolving with fire may show fire adapted behavior and responses, whereas other species exposed infrequently to fire in their evolutionary history may be severely inhibited by it (Best 1979). Research conducted on lands similar to those found in the District from 1969-1971 concluded a greater variety of nesting bird species was found on burned areas, duck and sharptail grouse production was higher on burned areas, hatching success of ducks was higher on burned areas, and there was a marked increase in plant variety after burning (Kirsch and Kruse 1972). Another study conducted on lands adjacent to the lands in the District concluded duck nesting success was significantly greater in fall burned plots than in spring burned plots for all species (duck) and

years combined. Results suggested that vegetation structure and duck nesting response to spring and fall burns became similar after the third post fire growing season (Higgins 1986).

6. Threatened and Endangered Species

The District contains a number of Federally Listed threatened, endangered, and candidate species. A complete listing can be found in Table 2.

Table 2: Threatened, Endangered, Candidate Species

Species	Status
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Special Status
Peregrine falcon (<i>Falco peregrinus</i>)	Endangered
Whooping crane (<i>Grus Americana</i>)	Endangered
Firefly (<i>Pyroactomena sinuata</i>)	Endangered
Piping plover (<i>Charadrius melodus</i>)	Threatened
Black tern (<i>Chlidonias niger</i>)	Candidate
Ferruginous hawk (<i>Buteo regalis</i>)	Candidate

Baird's sparrow (<i>Ammodramus bairdii</i>)	Candidate
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Candidate
Dakota skipper (<i>Hesperia dacotae</i>)	Candidate

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

Studies conducted at Lostwood NWR, North Dakota found that piping plover nesting success increased as a response to prescribed burning on beaches (Smith, Murphy, Michaelson, Viehl 1993). Increases were attributed to the reduction of live and residual vegetation.

Baird's sparrows have been observed in the Coteau areas of the District. Baird's sparrows nest in extensive idle or lightly grazed mixed grass prairie in the prairie pothole region. Baird's sparrow populations increased on areas treated with at least three prescribed burns over a 12 year period at Lostwood NWR, North Dakota (K. Smith, personal conversation).

The Dakota skipper has been observed in the Coteau areas of the District. Baseline surveys for Dakota skippers have not been done at the present time. The District contains large areas of suitable habitat. Confirmed sites where Dakota skippers are found will be protected from large wildfires, especially during skipper egg, larval, and pupal stages. Additionally, confirmed skipper sites will be treated with prescribed fire very carefully. Mosaic unit management, time of year, rotational schedules, and intensity of the burns should be considered. Fire is not recommended on small sites (Royer 1992). However Dakota skippers and other native prairie butterflies can recolonize from adjacent unburned suitable habitat, if timing has allowed host plants to recover (Moffat and McPhillips 1993).

Dakota skippers were found only on native prairie sites treated with 3-4 prescribed burns and light grazing at Lostwood NWR, North Dakota (Smith personal conversation).

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

7. Cultural Resources

Little of the District has been surveyed for archeological resources. The database maintained at the Regional Office lists several recorded but unevaluated sites. None of these sites are listed as having specific significance or status.

8. Land Use, Values, and Improvements

Farming and ranching is the primary industry. Farmsteads and homesite are scattered through out the area. While developments can generally be protected from fire damage, dispersed improvements, particularly fences and predator exclosure fences, are likely to be damaged by fires. The District has approximately 300 miles of fence valued at close to \$3,000,000. Values of building and other structures at District Headquarters is on file at the Headquarters.

9. Socio-Political Climate

The District covers a four county area, with small rural towns scattered throughout the region. The main industry in the area is agriculture and most all other industry is also agriculture related. Adjacent landownership to the District is almost exclusively private. The overall social and economic environment can be affected by how the uplands on the District are managed. Often the affect is local, but when all District land units are combined, the affect is more widespread.

Private landowners generally have a low tolerance for prescribed burning. Due to the dominance of livestock throughout the District and view of all grass as "food for cows", landowners in most areas of the District have a relatively low tolerance for the use of prescribed fire, although public information and education programs have made in roads into ingrained fire attitudes. Habitat management is often accomplished by authorizing local farmers to hay or graze on District units. This is viewed as positive both socially and economically. Local farmers and ranchers prefer to hay or graze lands on the District rather than seeing them "go up in smoke".

The majority of recreational uses on the District are centered around hunting and birdwatching. Many of the District's WPA's offer excellent waterfowl hunting and birding. Hunters and birders come from all over the United States to visit the District. Annual visitation is estimated at 47,500 per year. Occasionally hunters comment negatively when they see black, burned areas 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 recreation dollars.

C. Habitat Types

Comprehensive surveys within the District have not been completed, a partial species list can be found in Appendix B.

a. Grasslands

The District is in the eastern mixed grass prairie region of North Dakota. Uplands are divided into high prairie, mid prairie, and low prairie, and lowlands into meadow and marsh (Dix and Smeins, 1967).

High prairie sites are usually on well drained soils. Brush species, except for Rosa, are nearly always absent. Grass stands are usually dominated by various combinations of grasses and herbs, including; blue grama, needle and thread, fringed sage, narrow leaved blazing star, prairie wild rose, hairy golden aster, pasque flower, threadleaf sedge, and Missouri goldenrod.

Mid prairie sites are usually on level to slightly sloping terrain. Stands on these sites are dominated by various combinations of green needlegrass, Kentucky bluegrass, needle and thread, western wheatgrass, wolfberry, northern bedstraw, chickweed, white sage, yellow sedge, stiff sunflower, and silver leaf scurf pea. The mid prairie sites are vegetatively the most complex communities in the area.

Low prairie sites are on moderately drained soils. Dominant species include big bluestem, little bluestem, Baltic rush, cordgrass, switchgrass, blackeyed Susan, and Maximilian's sunflower. Less common species of these sites are smooth aster, prairie dropseed, wild licorice, and Canada anemone.

b. Wetlands

Lowland meadow sites are poorly drained and the water table is usually within the rooting depths of most plants. Water is usually present in the marsh sites, and in these depressions or potholes, soils are usually inundated for extended periods. Dominant species of meadows on the area are northern reedgrass, narrow leaved sedge, foxtail barley, cordgrass, Baltic rush, smooth aster, wild mint, fowl bluegrass and hedge nettle.

Lowland marsh sites are dominated by slough sedge, white top, common cattail, hybrid cattail, hardstem bulrush, softstem bulrush, spikerush, common smartweed, sloughgrass, water plantain, bur reed, water parsnip, and tall mannagrass. Cattails are a significant management problem for maintaining productive wetlands in the District. Wetlands become choked with dense stands of cattail. Prescribed fire is used with some degree of success in opening up cattail choked wetlands, especially when used in combination with flooding.

c. Dense Nesting Cover

Seeded grasses Portions of the upland areas of the District have been seeded to dense nesting cover (DNC). DNC is composed of intermediate wheatgrasses, alfalfa, big bluestem, and sweet clover. DNC areas have proven very attractive to nesting waterfowl and are known to show increased nest success within their confines. Wildfire or prescribed fire can negatively effect the alfalfa component of DNC if burned during the active growth stage.

d. Noxious Weeds

Leafy spurge, Canada thistle, and wormwood are the three most common noxious weeds found throughout all vegetative types. State law dictates control efforts for noxious weeds and the District voluntarily participates in control programs, including the use of prescribed fire. Herbicides applied in the fall followed by spring burning provided the best control of leafy spurge density and seed germination on similar sites in North Dakota (Hull-Sieg 1994). Prescribed fires or wildfires can increase the spread and density of some noxious weeds depending on several environmental and phenological factors. Initial results of late fall burning for control of wormwood at nearby Audubon NWR, North Dakota have been very positive (Hultburg, personal conversation).

e. Trees

Riparian woodlands, planted shelter belts, and single trees are scattered throughout the District. The majority of these areas are associated with river valleys. Trees common and or native to the area are bur oak, cottonwood, green ash, hackberry, Siberian elm, cedar, and Russian olive. Bur oak regeneration is declining, due in part to fire exclusion. Cedar trees are valued by some of the public for aesthetic reasons and by upland game for winter cover. Specific efforts are made to protect cedar trees during prescribed burns. Russian olive is considered an invader species on grassland sites due to lack of fire. Control of Russian olive trees with

prescribed fire has been effective at the District if the trees are very young.

f. Shrubs

Shrubs common to the area are western snowberry, silverberry, prairie wild rose, thorn apple, chokecherry, Juneberry, wild black currant, and willow. The exclusion of fire has led to extensive shrub invasion of grassland sites primarily by western snowberry and silverberry.

D. Historical/Ecological Role of Fire

Wildfire is one of the primary natural forces which created native prairie. Historic records describe huge prairie fires started by lightning or humans. Fires burned millions of acres as there were few natural fuel breaks and no suppression. Wright, and others (1978) believe that fire frequency in the prairie grasslands is on the order of 5-10 years. Other studies indicate that a longer frequency of 10-20 years may be more accurate. Between 1941 and 1981, research indicates lightning-caused fires occurred as frequently as once every 12 years on 9,603 acres of privately owned pasture in the Missouri Coteau of Stutsman County, an area adjacent to and characteristic of lands in the District, (Higgins 1984).

Historical records for the area indicate shrubs occupied draws, ravines, depression areas, fire shadows around wetlands, and river/creek valleys (Higgins). The exclusion of fire has resulted in expansion of shrubs from their historic sites. Shrubs occupy as much as 30-50% of some District uplands. Reducing the density of shrubs has required 3-4 prescribed burns over a 10-12 year period at Lostwood NWR, ND. (Smith, personal conversation). Other ecological effects and the role of fire can be found in this section.

E. Refuge Fire History

Prior to the 20th century the role of fire in the northern plains had been one of continued restoration of the prairie ecosystem. Fire restored vigor to plant growth, increased seed production, released nutrients, and reduced accumulated litter. This included the area now designated as Kulm Wetland Management District.

Since the early 20th century and the establishment of the District, nearly all fires within the boundaries have been suppressed and adjacent habitat has been fragmented from agricultural practices. These activities have significantly reduced the role fire plays as a vital element of the prairie ecosystem in the District. In more recent years there has been an accumulation of knowledge, now being translated into management practices, which recognizes fire as an essential process of the mixed grass prairie.

Very little local data exists for the District. Fire records of the District exist from 1976 to present, however detailed information is lacking and difficult to obtain. Prior to the mid-1980's good records on wildfire occurrence was not kept on the District. Historic fire records contained within the Service's Fire Management Information System (FMIS) database only go back to 1985.

Fires occur annually on the District, that are either extinguished by local RFD's or are natural outs and go unreported. Equipment and agricultural field burning account for a majority of human-caused starts. The agricultural field burning season occurs during spring and fall, and is widespread throughout the District. Private landowners are not subject to the same burning regulations as government agencies. Farm fields are often ignited and left unattended, commonly resulting in wildfires.

Table 3: Kulm Wetland Mgt. District Wildfire History 1985-1998

Year	Number of Wildfires	Acres
1985	2	230
1986	1	2
1987	0	0
1988	0	0
1989	1	652

1990	4	11
1991	0	0
1992	0	0
1993	1	44
1994	0	0
1995	0	0
1996	0	0
1997	0	0
1998	0	0

Table 4: Wildfire Cause by Category

Cause	Number of Fires	Acres
-------	-----------------	-------

Lightning	1	26
Exhaust	1	2
Smoking	1	652
Land Clearing	1	44
Right -of-Way Burning	1	25
Unknown	4	293
Total	9	1,042

II. POLICY COMPLIANCE - GOALS AND OBJECTIVES

A. Compliance with Service Policy

U.S. Fish and Wildlife Service Fire Management Handbook and the Departmental Manual (620 DM-1) requires that all refuges with burnable vegetation have an approved fire management plan. This plan meets that requirement and provides fire management guidelines for the Refuge.

B. NEPA Compliance

This plan meets the requirements established by the National Environmental Protection Act (NEPA). An Environmental Assessment for the District's Upland Management Plan including the use of prescribed fire was prepared in 1994. A

copy of the Environmental Assessment and Finding of No Significant Impact (FONSI) is 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. Copies of this plan will be circulated to cooperators and other interested parties.

C. Authorities Citation

Authority and guidance for implementing this plan are found in:

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, Wildland Fire Management (April 10, 1998)

D. Other Regulatory Guidelines

Fire Management activities within the Refuge will be implemented accordance with the following regulations and directions:

- # Departmental Manual Part 519 (519DM)
- # Code of Federal; Regulations (36CFR 800)
- # The Archaeological Resources Protection Act of 1979
- # The Archaeology and Historical Preservation Act of 1974, as amended
- # National Historic Preservation Act of 1966
- # The Endangered Species Act of 1973, as amended
- # The Provisions of the Clean Air Act, as amended 1990

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

The District consists of one administrative unit, which includes four counties (Logan, LaMoure, Dickey and McIntosh) in South-Central North Dakota. The District was established administratively as a grouping of small tracts of land called Waterfowl Production Areas (WPAs) acquired through authorization and funding from Migratory Bird and Conservation Stamp Act. These WPAs were purchased with the primary purpose of waterfowl production and maintenance.

Easement Refuges (private land) were established by executive order with the intent of providing rest areas for waterfowl and other migratory birds. Easement Refuges in the District are: Bone Hill Creek NWR, Dakota Lake NWR and Maple River NWR. The Service has no fire suppression responsibility on these refuges.

F. Overview of Planning Documents

At present the District does not have an approved Comprehensive Conservation Plan (CCP). The Upland Management Plan was completed in 1994. Various other operational plans have been developed for the District include objectives which pertain to fire management.

The District Safety Plan objectives are:

- # Provide a safe working environment for both employees and visitors when conducting business on the District.
- # Provide a safe and healthful environment for both employees and

- visitors to the District.
- # Identify procedures for handling situations of an emergency nature.
- # Outline safe procedures and techniques for station activities.
- # Identify precautionary measures concerning any unabated hazards or situations unique to the District.

III. REFUGE FIRE MANAGEMENT OBJECTIVES

A. Habitat Management Goals and Objectives

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.

The primary goal is to provide for firefighter and public safety, property, and natural resource values. 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).

This document addresses that issue by providing direction for the fire management program at the District that will help achieve resource management objectives for the District as defined in the Kulm WMD Conceptual Plan Goal and Objectives Statement (1991) (Appendix C).

District goals and objectives include managing endangered species, migratory birds, public use and recreation, and optimizing abundance and diversity of wildlife and plant species. Complete copies of the Districts Goals and Objectives are on file at the District Headquarters.

B. Fire Management Goals

The following considerations influenced the development of the District's fire

management goals and objectives. The previous sections of this plan have established that:

- # Fire is an essential natural part of the District's native biotic communities.
- # Uncontrolled wildfire has the potential for negative impacts on and off the District.
- # Positive or negative effects of prescribed fire on vegetation, wildlife, and cultural resources depend on burning conditions and plant phenology.
- # Rapid rates of spread, potentially long response times, and the large number of individual land units (WPA's) pose suppression problems and increase the likelihood of fires escaping onto adjacent lands.
- # Use of the "light hand on the land" concept to minimize environmental damage is important throughout the District.

District Fire Management Goals

1. Protect life, property, and 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 District development zones, wildfire sensitive resources, and boundary areas to reduce the risk from wildfire damage by reducing hazardous levels of fuels. Treat 2,500 acres annually.
4. Create an informed public regarding the role of prescribed fire to manage District resources.
5. Use prescribed fire to restore and perpetuate native wildlife species by maintaining a diversity of plant communities. Treat 2,500 acres annually.

IV FIRE MANAGEMENT STRATEGIES

A. Implementation Strategies

The following will be employed to meet fire management objectives.

1. Conduct all fire management programs in a manner consistent with applicable laws, policies and regulations.
2. Suppress all wildfires in a safe and cost effective manner consistent with resources and values at risk. Minimum impact strategies and tactics will be used when possible.
3. Due to the wide-spread land holdings of the District (4 counties 184 units), local volunteer fire departments will be utilized for initial attack on wildfires in remote areas of the District. District initial attack equipment and personnel will be distributed to maintain a maximum response time of one hour to fires on the District during the fire season.
4. Utilize prescribed fire as a management tool for achieving hazard fuel and resource management objectives. To the greatest extent possible, hazard fuel prescribed fires will be used only when they can compliment resource management objectives. Resource management prescribed fire will be used to accomplish specific objectives established for individual land units.
5. A cost effective fire monitoring program will be initiated to 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. Heavy equipment (dozers, discs, plows, and graders) will not be used for fire suppression except in life threatening situations, without the approval of the Project Leader.
2. Prescribed burning in areas where threatened, endangered, and candidate species exist will not be conducted if the prescribed fire is detrimental to the species or any adverse impacts cannot be mitigated.
3. 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.

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

C. Appropriate Management Response

Using the Appropriate Management Response concept, suppress all wildfires in a safe, cost effective manner consistent with resources and values at risk. Minimum impact suppression tactics will be used when possible.

Table 5: 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 or 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.

V. FIRE MANAGEMENT UNIT

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. Suppression strategies, management restrictions, fuels, fire environment, and values at risk are similar throughout the District. Thus all lands within the District will be managed as a single fire management unit for both wildfire suppression and prescribed fire operations. Information regarding the District's fire history, fuel types, values at risk, fire behavior, fire effects, and fire weather is discussed in previously or will be discussed in this section of this plan.

A. Fuels and Expected Fire Behavior

1. Fuel and vegetation types and characteristics of the District and surrounding area are:
 - a. NFFL Fire Behavior Model 1 (western grasslands): Approximately 40% of the total burnable acres fit this fire behavior model. Perennial grasses are the primary fuel, loadings are heavier than NFDRS Model A (annual grasses), and the fuel quantity is more stable from year to year. Decomposition rates of grass fuels are slow which leads to heavier than natural fuel loadings if fire is absent. Invading woody plants are mixed in the grasses throughout 50-70% of the units. This fuel model also fits some of the private lands adjacent to District lands, particularly grazed pastures and hayland.
 - b. NFFL Fire Behavior Model 3 (tall grass): Approximately 55% of the acres of the District fit this fire behavior model. Described as tall grass, perennial grasses, and or marshland grasses approximately 3 feet tall, one third of the aerial portion of the plant is usually dead. Invading woody plants are mixed with these fuels, throughout 50-70% of many of the upland areas. This fuel model fits adjacent private land enrolled in the Conservation Reserve Program (CRP). CRP is a major concern for fire suppression agencies in this area.
 - c. NFFL Fire Behavior Model 9 (hardwood leaf litter): Approximately 1% of the acres of the District fit this fuel model. Riparian woodlands, wooded draws, and planted shelter belts are included in this model.

Table 6: Fuel Models

Fuel Model	Acres
NFFL Model 1 - Short Grass	17,583
NFFL Model 3 - Tall Grass	24,176
NFFL Model 9 - Hardwood Leaf Litter (Fall)	440
Open water, Administrative sites, Other	1,758

2. Fire Behavior

- a. 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 material. Fuel loading consists of fine dead fuels only, but 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 255 chains per hour, with flame lengths 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.

- b. 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 3 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.
- c. 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 tons 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.

B. Effects of Fire Management Activities

Farmsteads and homesites are scattered through out the area, and land use includes croplands, haylands, grasslands, shelterbelts and other tree plantings, and large areas of Conservation Reserve Program (CRP). While the risk of a wildfire or prescribed fire escaping Service lands is moderate, the dispersed nature of the Waterfowl Production Areas does create situations where an escaped prescribed fire or a wildfire could leave Service land and damage adjacent private structures, equipment, or agricultural lands. Developments can generally be protected from fire damage, however, dispersed improvements are more likely to be damaged by a fire.

Intensive farming and grazing on adjacent lands create barriers to fire spread during portions of the year. Access for light and medium engines is fair to good to Service and neighboring lands. Roads and trails are generally available in most areas, but a few large areas without trails and roads exist in this area of the state. These barriers also protect Service lands from fires that may start on private lands and spread to isolated WPA. The isolated nature of some WPAs make access difficult in the event of a wildfire.

The majority of recreational uses on the District are centered around hunting and birdwatching. Hunters and birders come from all over the United States to visit the District. Annual visitation is estimated at 47,500 per year. A wildfire at the wrong time of year could impact hunting or birdwatching, negatively impacting the local economy. The number of hunters and birders traveling to the area could decrease, depriving the local economy of recreation dollars, but the impact would be short-lived.

VI. FIRE SEASON

A. Refuge Fire Frequency

Fire records for the District are not complete. Based on the records available, certain trends appear. The District averages one wildfire every other year. The fires that were reported ranged in size from 2 acres to 652 acres. The average size was 115 acres.

B. Fire Season

The fire season can depend on several factors, many environmental. Green up of cool and warm season grasses is dependent on precipitation and soil moisture. Drought years often produce little or no green-up for the entire year. Year to year variations in green up and curing of grasses effect fire danger throughout the growing season.

The District fire season as determined by Firefamily analysis of the District is 130 days, from April 1 to June 9 and August 9 to October 7 (Appendix D).

VII. FIRE MANAGEMENT RESPONSIBILITIES

A. District Staff Responsibilities

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.

As the present time there are no fire funded employees. Principal members of the District fire management organization are the Project Leader, the Assistant Manager who serves as the collateral duty Fire Management Officer, Bio-Technicians, the Administrative Support Assistant, and the Tractor Operator.

1. Project Leader

- # Responsible for the overall management of the District including the fire program
- # Insures that Department, Service, and District policies are maintained and followed.
- # Within budget and staffing restrictions, insures sufficient collateral duty firefighters meeting Service standards are available for initial attack
- # Works with the assistant Manager in selecting objectives and tools to achieve them including prescribed fire.
- # Approves prescribed fire plans after technical review by the Zone Fire Management Officer
- # Serves on fire management team for both suppression and prescribed fire operations, as qualified

2. Assistant Managers

- # 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 plans for their units.
- # Serves on fire management team for both suppression and prescribed fire operations, as qualified

3. Bio-Technicians

- # Prepares prescribed burn blocks for burns
- # Conducts monitoring in burn blocks and elsewhere to determine success of fire management program
- # Serves on fire management team for both suppression and prescribed fire operations, as qualified

4. Collateral Duty Fire Management Officer:

- # Delegated the responsibility for coordination of the fire management program.
- # Provides guidance to the Project Leader concerning the District fire management staff
- # Responsible for planning, coordinating, and directing preparedness activities including:
 - a. fire training
 - b. physical fitness testing
 - c. annual refresher training
 - d. fire cache and equipment inventories and maintaining readiness of engines and fire equipment cached at the District
 - e. Assists with preparing annual Firebase budget request, and approving and tracking use of Firebase accounts.
- # Insures fire management policies are observed.
- # Has lead responsibility for managing the prescribed fire program including:
 - a. as available, serves as prescribed burn boss.
 - b. proposes annual hazard fuel reduction and resource management prescribed fire projects.

- # Assists with fire effects monitoring.
- # Maintains liaison with Regional Fire Management Coordinator and Zone Fire Management Officer.
- # Updates the Fire Management Plan, maintains fire records, and reviews fire reports for accuracy.
- # Serves on fire management team for both suppression and prescribed fire operations, as qualified

5. Seasonal and Collateral Duty Firefighters:

- # Responsible for their personal protective equipment and physical conditioning.
- # Successfully completes the pack test before April 1 or within two weeks of EOD date.
- # Maintains assigned fire equipment in ready state and use required safety gear.
- # Assists Collateral Duty Fire Management Officer in maintaining accurate records.
- # Serves on fire management team for both suppression and prescribed fire operations, as qualified

6. Wildfire Incident Commander (as assigned):

- # The incident commander (IC) will be responsible for the safe and efficient suppression of the assigned wildfire.
- # Fulfills the duties described for the IC in the Fireline Handbook (PMS 410-1).
- # Ensures that personnel are qualified for the job they are doing.
- # Submits information needed to complete fire report (DI-1202) and requisitions for supplies and materials used during suppression efforts to the Collateral Duty FMO within 3 days of the fire being declared out.

7. Prescribed Burn Boss (as assigned):

- # Implements approved prescribed burn plans within prescriptions.
- # Assists with the administration, monitoring, and evaluation of prescribed burns.
- # Documents necessary information to complete fire report (DI-1202) and requisition materials and supplies used during prescribed fire activities and submits to Collateral Duty FMO within 3 days of the fire being declared out.

B. Cooperator Involvement and Standards

Due to the wide-spread nature of Service lands throughout the District, the District will rely heavily on local fire departments. The District will maintain agreements with the local fire departments.

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

Type 6 Engines are the primary initial attack resource on the District because of the predominance of fine fuels. Currently the District maintains two light, Type 6 engines (250 gallon) the headquarters location. Earth moving equipment is available but not recommended for use due to resource damage concerns. A complete listing of equipment and supplies can be found in Appendix E.

B. Personnel

A listing of personnel needed to meet the District’s initial attack needs and carry-out the prescribed fire program are listed in Table 7.

Table 7: Staffing Needs

Position	Wildfire	Prescribed Fire
Incident Commander (ICT5)	1	
Engine Boss (ENGB)	2	2
Engine Operator (ENOP)	2	2
Advanced Firefighter (FFT1)	1	
Firefighters (FFT2)	4	4
Prescribed Burn Boss (RXB3)		1

Note: A person may be qualified for more than one position.

IX. PREPAREDNESS

The Collateral Duty FMO and the District Manager are responsible for coordinating preparedness actions. Specific duties are assigned in the Step Up Plan.

A. Staffing

Only qualified employees meeting the fitness and training requirements of assigned positions will be dispatched to fires (Appendix F). Employees not meeting requirements may assist in support capacities, but will not be permitted on the fire line. The Service Fire Management Handbook and NWCG Guidelines should be referred to for specific policy guidance.

In addition to collateral duty fire personnel, the District needs to maintain a seasonal engine crew during the fire season. Fire crew members will, at a minimum, be qualified at the Firefighter Type 2 level for fire suppression. Certain fire crew members will be targeted for prescribed burn boss qualification (RXB3) in order to assist in the District’s hazard fuel and resource management prescribed fire program. Currently, none of these positions are located at the District, but hopefully in the future positions can be added so they are on site and available to assist the District.

Additional firefighters may be temporarily positioned at the District, or existing fire crew seasons may be extended using severity or emergency preparedness funding when very high or extreme fire conditions warrant.

B. Pre-season Readiness Activities

Table 8: Annual District 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									

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

Annual Refresher Training

All personnel involved in fire management activities are required to participate in annual 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 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.

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 First Responder (or equivalent) who can recognize symptoms of physical distress and administer 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 known 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.

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. The cost of the examination will be born by the Service, and the results are to be sent to the Regional Personnel Department.

C. Drought Indicators and Other Impacts on Station Activities

As indicated previously, periods of drought can greatly impact fire behavior and resistance to suppression. For that reason the North Dakota Rangeland Fire Danger Index, Palmer Drought Index, and the Keetch-Byram Drought Index will be monitored at a minimum on a weekly bases throughout the year. All are available on the Internet at <http://ndc.fws.gov>. The Refuge fire staff can also contact the North Dakota Dispatch Center (701-768-2552) during periods of high fire danger to track indices and anticipate possible fire activity. Preparedness actions have been identified in the Step-Up Plan to respond to unusual conditions associated with drought and other factors (See following section).

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 Northern Rockies 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 Northern Rockies Area Coordination Group to conduct prescribed burns during PL IV and the National Coordination Group during PL V.

D. Step-Up plan

Step-up Plan is found in Appendix H.

E. Severity and Emergency Presuppression 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 increase 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 or strong windstorms. 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 forecasts 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

The primary fuels are grass, which when combined with moderate to strong winds can exhibit high rates of spread. Firefighters must be constantly aware of their escape routes and safety zones and must stay in communications with each other

at all times. Spot weather forecasts should be requested early on in the initial attack phase of wildland fire suppression operations.

Smoke from wildfires and prescribed fires is a recognized health concern for firefighters. Prescribed burn bosses and wildfire incident commanders must plan to minimize exposure to heavy smoke by incorporating the recommendations outlined in the publication Health Hazards of Smoke (Sharkey 1997).

Wetlands can pose safety problems due to the possibility of getting stuck in an area with heavy concentrations of flashy fuel.

B. Prevention Program

A majority of the wildfires occurring in the District since 1985 were human caused and thus could have been prevented (see previous section on fire 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 occurs in spring and fall, and is the cause of a majority of the wildfires that occur on the District.

In general the public and visitors to the District are very aware of fire prevention. As a reminder the District will do the following:

- # signing
- # closures when necessary
- # public contacts through press releases and verbal contacts
- # enforcement of regulations and prosecution of violators
- # employee training and awareness
- # implementation of State regulations and restrictions
- # contacts with District cooperators and neighbors

C. Detection

The District relies on neighbors, visitors, and cooperators to detect and report fires. In addition, the step up plan provides for increased patrols by District personnel during periods of very high to extreme fire danger.

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 occurring within or adjacent to WPA's observed by District personnel will be reported to the appropriate District headquarters or the Collateral Duty FMO. The person receiving the report will be responsible for implementing the Fire Dispatch Plan (Appendix I).

E. Fire Suppression

1. General

Kulm WMD is a full suppression area. All suppression efforts will be directed towards safeguarding live while protecting the District's resources and external private land and development from harm. The District relies on mutual aid resources to suppress certain wildfires.

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.

Mutual aid resources responding from fire departments to District fires will report to the IC (in person or by radio) and receive their assignment and will be the first priority for release.

2. Initial Attack

The most qualified fire individual will act as the Incident Commander (IC) on all fires staffed by Service employees within the District until a qualified IC arrives. The person will perform all the duties normally associated with the IC position. The IC will be responsible for all aspects of the management of the fire. The IC will select the appropriate suppression strategies and tactics based on those identified in the fire management plan.

Plows or other heavy equipment which may cause ground disturbance will not be used without the permission of the Project Leader

F. Escaped Fires/Extended Attack

The IC will notify the Zone FMO whenever it appears a fire may escape initial attack efforts, escape Service lands, or when fire complexity may exceed the existing capabilities. The Zone FMO will be responsible for coordinating extended attack actions including:

- # Assist the Project Leader Complete Wildland Fire Situation Analysis (WFSA) and Delegation of authority, if necessary (Appendix J).
- # Assignment or ordering of appropriate resources.

G. Mop up Standards and Emergency Stabilization and Rehabilitation

The IC will be responsible for mop-up and mitigating suppression impacts incurred on Complex fires. The mop-up standards established in the Fireline Handbook will be followed. Complex fires will be patrolled or monitored until declared out.

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

- G All trash will be removed.
- G Firelines will be refilled and waterbars added if needed.
- G Hazardous trees and snags cut and the stumps cut flush in accordance with the MIST concept.
- G Disked firelines should be compacted as soon as possible to preserve the living root stock of natives grasses.
- G 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:

- G **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 emergency stabilization activities may be completed after the fire is declared out.

G **Rehabilitation** is the use of appropriate rehabilitation techniques to improve natural resources as stipulated in approved Complex 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.

G 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 Complex land use plans. The Project Leader 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.

H. **Wildland Fire Use to Achieve Resource Management Objectives**

The District has elected not to use wildland fire use for resource benefit for the following reasons:

- # rapid rates of spread in predominant grass fuels would create high probability of escape to private land
- # conflicting land uses within the District; haying and grazing
- # small size of Service land units creates high probability of escape to private land

XI. **PRESCRIBED FIRE PROGRAM**

A. **Program Overview**

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 be ignored. If a District land unit is ignored, allowing the habitat condition to decline in quality and noxious weeds to increase, public opinion 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 District managed lands.

The 1994 Environmental Assessment for Upland Management on Kulm WMD addressed the use of prescribed fire as one of the land management tools. Prescribed burning was found to be one of the simplest, least expensive, most cost effective practices that can be used to improve and restore grasslands. Prescribed fire will be used for restoration of native prairie grass species, reduction of non

native grasses, and hazard fuels reduction. Environmental impacts of the prescribed fire program are also discussed in previous sections of this Fire Management Plan.

Selective management of a particular species depends on the date of the fire in relation to the phenology of the particular species (Higgins, Kruse, Piehl 1986). Large wildfires could have negative effects on certain grass species depending on the time of year and drought conditions. On the other hand, prescribed fires, appropriately timed, can be used to manage District grasslands. Research conducted on the District found a marked increase in species diversity after prescribed burning (Kirsch, Kruse 1972). Most of the wetlands are potentially burnable at one time or another. Many of the prescribed burns conducted in the District are adjacent to water resources; some, such as cattail reduction burns, take place right over water or ice. Post fire erosion and wind born ash deposition impacting water resources is not a concern for the type and scale of burns conducted on the District. Burn size is generally small (average 170 acres) and grass fuels do not produce heavy volumes of ash as compared to forest fuels. Supporting documentation regarding fire effects on water resources can be found in *Effects of Fire on Water: A State of the Knowledge Review* (1979).

The District has been using prescribed fire periodically as a management tool since 1968 (District files). Records are very limited for activities occurring prior to 1985. From 1985-1998, 2,441 acres have been prescribed burned during 35 burns. The average burn size was 69 acres (Table 9).

Table 9: District Prescribed Fire History 1985-1998

Year	Number of Prescribed Burns	Acres Treated
1985	13	738
1986	8	387
1987	13	1,071
1988	0	0
1989	0	0
1990	1	245
1991	0	0
1992	0	0
1993	0	0
1994	0	0
1995	0	0
1996	0	0
1997	0	0
1998	0	0
Total	35	2,441

B. Prescribed Fire Objectives

1. Resource Management Prescribed Fire

a. Goals of the Prescribed Burn Program

Resource management prescribed fire will be used to restore, create, and maintain a diversity of plant communities in order to restore and perpetuate native wildlife species. Goals of resource management burns include:

1. Restoration of native prairie grass species. Generally, all of the grassland sites are partially invaded to various degrees by non-native Kentucky bluegrass, smooth brome, quackgrass, and stands of native shrubs, mainly western snowberry, silverberry, and chokecherry. The control of these species is the primary goal of the District prescribed fire program.
2. Maintain/rejuvenate quality nesting cover for waterfowl
3. Reduction/control of non-native grasses, especially Kentucky bluegrass

4. Control of woody species invasion of grasslands, especially western snowberry
5. Aid in control of noxious weeds particularly leafy spurge and wormwood
6. Control of dense cattail growth in shallow wetland
7. Assist the District farming program by burning small grain stubble and burning for site preparation of grass seeding projects

b. Prescribed Burn Plan Objectives

1. Establish a 3-5 year burn frequency on 8 - 12 land management units.
2. Treat approximately 2,000 acres annually to achieve the above management goals

2. Hazard Fuels Reduction Program

The District hazard fuel reduction program will use prescribed fire within or near District development zones, sensitive resources that may be impacted by wildfire, and specific WPA boundary areas to reduce the risk from wildfire damage. WPA burn units will be selected based on values at risk on adjacent land, probability for escape from Service lands, and fuel loadings. Fuels in hazard fuel sites have 6-10 inches of accumulated litter and/or high densities of shrubs. The large volume of litter and shrub component causes control problems during suppression actions. High litter loadings allow wildfires to carry even during full green-up conditions.

a. Hazard Fuel Management Goals

1. Reduce accumulations of dead vegetation (litter) that contribute to excessive fuel loadings exceeding 2-3 tons per acre.
 2. Reduce woody shrub component
- b. Hazard fuel prescribed fire program objectives
1. Treat approximately 600 acres per year
 2. Burn units once every 5-8 years depending on fuel accumulations and resource management considerations
 3. Reduce dead fuel loadings (litter) of 2-3 tons per acre by approximately 75% or better

4. Reduce woody shrub component by 50%

C. Limits

1. Most units will not be burned between May 30 and August 1 in order to avoid burning during nesting season.
2. To the greatest extent possible, hazard fuel burns will only be used when they can complement resource management objectives.
3. The use of heavy equipment that may cause ground disturbance is not permitted, with the following exceptions:
To insure the fire remains on Service lands
With the expressed permission of the Project Leader or his acting.
4. Each prescribed burn unit requires an open burning permit from the North Dakota Department of Environmental Health (Appendix K)
5. At the current level of staffing and within the current funding levels, the District can not achieve the desired prescribed fire objectives. The District has the necessary equipment to field one prescribed burn crew on a single day but there is not adequate District staff. With outside assistance, the District can meet the objectives and could double the number of prescribed burns.
6. Kulm WMD is within the Northern Rockies Interagency Fire Coordination Area. Prescribed fires cannot be ignited when the Northern Rockies Area is in fire danger preparedness levels IV or V and/or the National Preparedness level is IV or V without the approval of the Northern Rockies Coordination Group. When the North Dakota Rangeland Fire Danger Index is in the Very High or Extreme category, verbal permission must be obtained from the local rural fire protection district chief.
7. Multiple units may be conducted at the same time within the District. 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 the Prescribed Fire Manager be on-site during the burns. Sufficient suppression forces must be available for each burn in the event of an escape.
8. Temporary air quality impacts from smoke may occur, but are mitigated by the fuel type (light flashy fuels), small burn unit size, and consultation with state air quality personnel. Burns will not be conducted that may adversely impact District neighbors.
9. 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.

D. Burn Season

The normal prescribed burn season begins approximately April 1, depending on snowmelt and continues until late fall. When a particular unit is burned depends on burn objectives. Most units will not be burned between May 30 and August 1 in order to avoid burning nests. Some burning will occur during the winter depending on snow conditions. Winter burns are generally for cattail control in wetlands and for burning blacklines to be used as control lines for future burn units.

E. Complexity

The majority of burns in the District fall within the low complexity category as determined by the Region 6 Fish & Wildlife Service Complexity Analysis (Appendix L). The average number of personnel required to conduct a burn on the District is 5-6. Most burns are structured with a burn boss, 3-4 prescribed fire crew members (FFT2's), and two light engines.

F. Planning

Escaped prescribed fires pose a threat to adjacent life and property, but proper planning and well written burn plans with sound prescriptions, a listing of needed personnel, and contingency planning will mitigate this threat.

Contingency planning is an integral part of the prescribed fire planning process, and begins with the first visit to the burn unit. It is important to identify in advance, circumstances or conditions that may require the implementation of the contingency plan. Each prescribed burn plan will include a section that thoroughly addresses the actions to be taken in the event a prescribed burn must be suppressed or managed as a wildfire.

The contingency plan will identify:

1. The individual(s) who has the authority to activate the contingency plan.
2. Clearly defined conditions (“trigger points”) that indicate the contingency plan should be activated.
3. A listing of those to be notified or contacted.
4. Who assumes the duties of the Incident Commander and what are the roles of others.
5. The location of values at risk and other resources requiring protection
6. The preferred strategies and tactics.
7. The location of containment lines or natural fuel breaks outside the burn unit.
8. The location of water refill points, staged equipment, etc.
9. Contingency forces (Type, number, location).

A prescribed burn will not be implemented unless all contingency forces are confirmed as being on-site or in standby status, as specified in the plan.

Planning is a multi-step process. Outlined below are the various steps that must be taken to insure that the use of fire is appropriate to achieve resource management

objectives and the plan is well thought out. It is important to remember that the use of prescribed fire is just one of a combination of tools available.

1. The District Project Leader is responsible for supervising the development of resource management objectives for individual units. The Project Leader and other staff members will select the appropriate management tool needed to meet the objectives. If needed, the Zone FMO or Regional Fire Management Specialist will be consulted for assistance in accomplishing the desired objectives.
2. Potential burn units will be selected and a draft list will be reviewed for sound biological practices by the Project Leader. A review of the previous years prescribed fire accomplishments, failures, and any monitoring results will also take place at this time.
3. The Project Leader will submit the identified projects to the Regional Fire Management Coordinator for inclusion in the Firebase funding process and burn plans will be written for the various units.
4. Burn plans can be written by any qualified burn boss or other knowledgeable individual. Once written and approved, a burn plan is valid for three years, provided the conditions outline in the plan do not change. The burn plan will document objectives and outline the plan of action for achieving them. Burn plans will be submitted for technical review to the Zone FMO after which they will be returned to the station for final approval by the Project Leader.
5. Individual prescribed burn plans will be the primary document used to record prescribed fire information. Burn plans will be used to document State air quality requirements, personnel assignments, costs, fire behavior, weather, and burn critique information.
6. Taskbooks and requisitions for supplies expended during the burn will be completed within three days of the burn being declared out. Prescribed burns will also be documented on a DI-1202 and submitted to the Zone FMO within 10 days after the burn is declared out.

G. Preparation and Implementation

The Collateral Duty FMO will be responsible for preparing all fire equipment used for prescribed burning prior to April 1. The District Manager will prioritize the units to be burned and will make individual assignments for the preparation and implementation. Prescribed burn units may require preparation including; mow lines, disc lines, black lines, and public relations. Preparation for burns will be handled on an individual basis and will be identified in the prescribed burn plan for that unit.

H. Monitoring and Evaluation

Burn prescriptions and timing are based on past research (Higgins, Smith, Kruse, Kirsch, and others), some of which is site specific to the District. Pre and post-burn evaluations are generally limited to several photo points. Burn day

evaluations using the Region 6 Monitoring Guidelines will document temperature, relative humidity, wind speed, fine fuel moisture, rate of spread, flame length, smoke dispersal, percent litter reduction, and percent scorch of woody species (Appendix M).

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 is covered in section X. A. (WILDFIRE PROGRAM - Special Safety Concerns and Firefighter Safety). This section will deal with public safety.

Fire fronts in grass fuels are fast moving and dangerous. However due to the small size of most District units, entrapment is not considered to be a big threat to sportsmen/visitors who may be in the area. Neighbors who initiate their own suppression actions lack proper training, equipment, and communications and may be at risk. The District staff will make every effort to keep the fire scene (wildfire and prescribed fire) clear of people except for Service 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. During wildfires, the local law enforcement agency having jurisdiction is responsible for managing traffic hazards from smoke. 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. In the event Service personnel can not control traffic on area roads, the County Sheriff will be requested to assist.

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 fuels in high risk areas.

B. Public Information and Education

An informed public is key to the successful implementation of fire management activities including wildfire suppression, fire prevention, prescribed fire, and the over-all Service mission. During wildfires the IC is responsible for providing fire information to the press and the public. The IC may delegate this task as needed.

It is especially important that the public be informed and become knowledgeable about the prescribed fire program. The following actions will 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
- # Following prescribed burn plans and preventing escapes
- # Developing a quantitative fire effects monitoring program and sharing results with the public

C. Records and Reports

The IC and the Prescribed Burn Boss will complete all reports and requisition needed supplies within 3 days of the fire being declared out and submit them to the Project Leader. After approval from the Project Leader the DI-1202 will be submitted to the Zone FMO within 10 days for entry into the computer database. The Collateral Duty FMO will ensure that all expenses and/or items lost on the fire are reported, that the timekeeper is advised of all fire time and premium pay to be charged to the fire, that expended supplies are replaced and taskbooks are completed.

D. Fire Critique and Review Process

The Fire Management Plan will be reviewed annually to ensure the fire program advances and evolves with the Service's and the Wetland Management District's mission. Minor pin and ink changes can be made in the body of the plan and information in the various Appendices can be updated as necessary without the plan being submitted to the Regional Office. Major revisions to the plan are subject to review and approval at the Regional level.

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

- # Significant injury/accident/fatality
- # Significant property or resource damage
- # Significant safety concerns are raised
- # Extended attack is necessary

Prescribed fires will be critiqued by the burn boss and documented in the burn plan. The Regional Fire Management Coordinator and/or Zone Fire Management Officer will conduct formal fire critiques in the event of:

- # Significant injury/accident/fatality
- # An escape prescribed fire occurs off refuge
- # Significant safety concerns are raised
- # Smoke management problems occur

XIII. CULTURAL RESOURCES AND SECTION 106 CLEARANCES

Fire Management activities at the Refuge 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.

Little of the District has been surveyed for archeological resources. The database maintained at the Regional Office lists several recorded but unevaluated sites. None of these sites are listed as having specific significance or status.

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 North 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 Project Leader 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 Project Leader to the Regional Archeologist.
- ! Rehabilitation plans will address cultural resources and will be reviewed by the Regional Archeologist.

XIV. AIR QUALITY AND SMOKE MANAGEMENT GUIDELINES

District fire management activities which result in the discharge of pollutants (smoke, carbon monoxide, particulates, 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 1990.

The North Dakota State Department of Health, Environmental Health Section implements the requirements of the Clean Air Act. Permits to open burn are required under the authority of the North Dakota Air Pollution Control Rules (Article 33-15, North Dakota Administrative Code). Written requests are submitted by the District to the Department of Environmental Health for each planned prescribed burn (Appendix J). Requests must identify acres, location, and purpose of the burn. The State grants approval in letter form and also notifies local and district Environmental Health Practitioners. Smoke complaints are also investigated by the State Department of Environmental Health. To date the State has received no complaints concerning smoke from the District's prescribed fires or wildfires.

The management of smoke is incorporated into the planning of prescribed fires, and to the extent possible, in suppression of wildfires. Sensitive areas are identified and precautions are taken to safeguard visitors and local neighbors. District personnel will take special care to notify neighbors, fire departments, and local law enforcement agencies on burn days. These actions are specific requirements of individual burn plans. Smoke dispersal is a consideration in determining whether or not a prescribed burn is within prescription. Generally the fine grass fuels and small burn size (80-600 acres) generate low volumes of smoke for short duration (4-5 hours).

Smoke from wildfires and prescribed fires is a recognized health concern for firefighters. Prescribed burn bosses and wildfire incident commanders 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.

XV. 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. At present there are no specific issues which the District staff feel need research.

XVI. CONSULTATION AND COORDINATION

All fire management program activities will be implemented in cooperation and coordination with the State of North Dakota, North 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 North Dakota Refuges FMO, the Regional Fire Management Coordinator, Regional Prescribed Fire Specialist, and the National Interagency Fire Center (NIFC).

The following were consulted in the development of this plan:

Phil Street, Region 6 Fire Management Coordinator
Carl Douhan, Region 6 Prescribed Fire Specialist
Brian McManus, ND/SD Zone FMO
Mike Granger, FMO, CM Russell NWR
Maure Sand, FMO, State of North Dakota

XVII. LITERATURE CITED

ANDERSON, B.A. 1983. Archaeological Considerations for Park and Wilderness Fire Management Planning. Paper presented at Wilderness Fire Symposium at the University of Montana, Missoula. Unpublished. 13pp

ANDERSON, H.E. 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Forest Service. 22 p. Ogden, Utah

HESTER, J.J. 1989. Archeological Sites Protection and Preservation Notebook Technical Notes. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. 6pp.

HIGGINS, K.F. 1986. Effects of Fire in the Northern Great Plains. U.S. Fish and Wildlife Service and Cooperative Extension Service South Dakota State University, EC 761. Brookings. 47 pp

HIGGINS, K.F. 1986. Interpretation and Compendium of Historical Fire Accounts in the Northern Great Plains. U.S. Fish and Wildlife Service, Resource Publication 161. Washington, D.C. 39 pp.

HIGGINS, K.F. 1986. A Comparison of Burn Season Effects on Nesting Birds in North Dakota Mixed-Grass Prairie. U.S. Fish and Wildlife Service. Prairie Naturalist Publication 18 (4) Woodworth, ND. 219-228 pp

HIGGINS, K.F. 1984. Lightning Fires in North Dakota Grasslands and in Pine Savanna Lands of South Dakota and Montana. U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center. *Journal of Range Management* 37 (2) 79 pp

HIGGINS, K.F. 1992. Waterfowl Production on the Woodworth Station in South-central North Dakota, 1965-1981. U.S. Fish and Wildlife Service. Resource publication 180. 79 pp.

HOISTAD, KRESL, VANIMAN. 1994. Draft Environmental assessment of Upland Management on Arrowwood National Wildlife Refuge and Wetland Management Districts. U.S. Fish and Wildlife Service. 28 and 22 p.

HULL-SIEG, C. 1994. Herbicides and Fire Effects on Leafy Spurge Density and Seed Germinations. U.S.D.A. Forest Service, Rocky Mountain Station. Leaflet 1 pp.

KIRSCH, L. 1978. Grazing and Haying Effects on Habitats of Upland Nesting Birds. U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center. North American Wildlife and Natural resources Conference Proceedings. 486-497 p.

KIRSCH, L. 1972. Prairie Fires and Wildlife. Bureau of Sport Fisheries and Wildlife, Northern Prairie Wildlife Research Center. Tall Timbers Fire Ecology Conference Proceedings. 289-303 p.

KRUSE, A. Effects of Prescribed Fire Upon Wildlife Habitat in Northern Mixed-Grass Prairie. U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center. 1988 Interior West Fire Council Meeting Proceedings. 182-193 p.

MOFFAT, M. 1993 Management for Butterflies in the Northern Great Plains: A Literature Review and Guidebook for Land Managers. U.S. Fish and Wildlife Service, Ecological Services, South Dakota State Office. SD-ES-93-05. 19 pp.

SMITH, K. 1992 Habitat and Predation Management for Nesting Piping Plovers at Lost Wood National Wildlife Refuge, North Dakota. U.S. Fish and Wildlife Service, Lost Wood NWR. *Prairie Naturalist* 25 (2): June 1993. 139-147 p.

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.

SEABLOOM, R.W., et al 1991. Effects of Prairie Fire on Archeological Artifacts. *Park Science* Volume 11-Number 1. 3pp.

SHARKEY, BRIAN ed. 1997. Health hazards of smoke: recommendations of the April 1997 Consensus Conference. Tech. Rep 9751-2836-MTDC. USDA Forest Service. Missoula Technology and Development Center. Missoula, Montana. p4-5.

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.

WESTOVER, D. 1987. Satellites Sense Rangeland Wildfire Hazard. Nebraska National Forest. Fire Management Notes, Volume 48, Number 1. 9-11 p.

WRIGHT, H. 1980. Fire Ecology and Prescribed Burning in the Great Plains - A research review. U.S. Forest Service Gen Tech Rep INT-77. 66 p.

_____ 1979. Effects of Fire on Water: A State of the Knowledge Review. USDA Forest Service GTR WO-10

_____ 1999. Fireline Handbook - NWCG Handbook, National Wildfire Coordinating Group. Washington, D.C.

ATTACHMENT: Environmental, Social, and Economic Analysis of the Management of Upland Habitats on Kulm WMD

APPENDIX A: WILDLIFE

Table 1: Reptiles, Amphibians, and Fish

Table 2: Mammals

Table 3: Birds

APPENDIX B: VEGETATION

APPENDIX C: CONCEPTUAL PLAN GOALS AND OBJECTIVES STATEMENT

APPENDIX D: FIRE OCCURRENCE

APPENDIX E: 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.

Table 1: Equipment

Item	Year Purchased	percent of Fire Funding	Have	GVW	Need	GVW
Engine Modules Heavy (500-1000 gallon) Medium (200-400 gallon) Light (50 - 150 gallon)			0		0	
Slip-on Unit(s) 250 gallon	1974 1997	100 100	2			
Water Tender(s)			0		0	
Portable Pump(s) Standard Flot-a-pump	1990	100	1			
Power saw(s)						
Mower(s)						
Tractor(s)						

ATV(s)						
Grader(s)						
Plow Unit/Disk						
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.					
Power Saw (1 each)	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					
Mower (2 each)						
Tractor (2 each)						
ATV (1 each)						
Plow (1 each)						

Table 2: Supplies and PPE

Item	Quantity	
	Need	Have
Hose, lightweight, lined 1.5" x 100'	9	12
Hose, lightweight, lined 1" x 100'	9	8
1" NH gated wye	2	0
1.5" NH gated wye	2	2
1.5" nozzle	2	0
1" Forester nozzle	4	5
Hydrant wrench, spanner	2	3
Hose clamp	2	0
flapper	4	6
Pulaski w/sheath	2	3 wo/sheath
Shovel w/sheath	3	3 wo/sheath
rake	2	3
Combi tool	2	0
Drip Torch	2	10
Fusees	1 Case	1 Case
Safety Can: 3 Gallon	2	6 ea. 5-gallon cans
Foam	15 gallons	15 gallons
Backpack Pump	3	2
Canteen, large	2	2
Belt Weather Kit	2	2
Hard Hat	6	7
Goggles	6	7
Headlamps	6	7
Fire Shelter w/Liner	6	7
Line Pack w/harness	6	7
Water Bottle	24	16
Ear Plugs	12 pks	12 packs
Leather Gloves, Assorted sizes	12 pr	21 pr

Sleeping Bags	6	7
Personal Gear Pak (Red Bag)	6	7
Personal First Aid Kit	6	7
Nomex Shirts Small Medium Large X-Large	Enter Desired Number should have 18 pr (Men & Women)	21
Nomex Pants - Men's 28x30 32x30 32x34 34x30 34x32 34x34 36x30 36x32 36x34 38x34 40x34		21
Nomex Pants - Women's Size 10 Size 12 Size 14 Size 16		0

APPENDIX F: QUALIFICATIONS

Name	Title	Qualifications	Phone Number
George Maze	Refuge Operations Specialist	ENGB, ENOP, FFT1, FFT2, RXT2, RXB3	710-647-2866

APPENDIX G: FITNESS

APPENDIX H: STEP-UP PLAN

The Rangeland Fire Index is calculated daily during fire season by the National Weather Service in Bismarck, North Dakota. Greenness factors of fuels are calculated by an Advanced Very High Resolution Radiometer (AVHRR) onboard NOAA weather satellites. Satellite calculated greenness factors are combined with forecasted windspeed and relative humidities. The data is accurate enough to calculate greenness factors and fire danger ratings on a county by county basis.

When fire dangers are high or extreme the Collateral Duty FMO and or District Manager will monitor current and predicted fire weather reports, and take appropriate actions as listed in the following table:

PREPAREDNESS ACTION	RANGELAND INDEX				
	Low	Mod	High	V High	Ext
Maintain Radio Contact	X	X	X	X	X
Maintain Response Time of: (minutes)	60	60	45	5	5
Fire-ready engines at Refuge Headquarters *	X	X	X	X	X
Carry PPE while on duty, wear nomex and boots				X	X
Tour of duty changed at Manager's discretion				X	X
Restrict vehicles to paved/gravel roads					X

Detection patrol conditional				X	X
Refuge fire ban conditional				X	
Refuge fire ban mandatory					X
Preposition Service and Interagency Resources					X
Notify North Dakota Dispatch Center					X

L=low, M=medium, H=high, VH=very high, EX=extreme

Notes: * Ready status is unmanned, but filled with water and ready to respond.

Step up plan does not apply when refuge resources are assigned to fires. Resources assigned to fires may prevent some staffing actions-FMO and or Manager should determine whether to fill behind dispatched resources.

Once an emergency preparedness account is established/available the Collateral Duty FMO or Manager may authorize overtime for Very High or Extreme step up actions that can not be met with regularly scheduled employees. Collateral duty firefighters may be assigned emergency preparedness duties if needed. Backfill behind employees may be authorized.

APPENDIX I: DISPATCH PLAN

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

Location of the Fire:

Location of the Person Reporting the Fire:

Name: _____ Phone Number of the Person:

Color of Smoke (White, black, gray):

Size of the Fire (Small, medium, large):

Type of Fuel (Grass, brush, trees):

Character of fire (Smouldering, creeping, running):

Is there anyone at the fire (Yes, No, Not Sure):

Did you see anyone leaving the area: _____ Description:

- # Check map location and ownership and protection area
- # If the fire is on or threatening District lands, dispatch engine and qualified crew. Highest suppression qualified person arriving on the scene first will be in charge and perform the duties of the IC until the fire is out or until relieved by qualified individual.
- # Notify Project Leader
- # Maintain log of all radio and telephone conversations (Attached)
- # Remain on duty and perform dispatching duties until relieved or released.

WILDLAND FIRE SITUATION ANALYSIS

Incident Name:
Jurisdiction:

Date and Time Completed:

This page is completed by the Agency Administrator(s).

Section I, WFSA Information Page

- A. Jurisdiction(s): Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.
- B. Geographic Area: Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.
- C. Unit(s): Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.
- D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.
- E. Fire Name: Self-explanatory.
- F. Incident #: Identify the incident number assigned to the fire.
- G. Accounting Code: Insert the local unit's accounting code.
- H. Date/Time Prepared: Self-explanatory.
- I. Attachments: Check here to designate items used to complete the WFSA. "Other could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I. Wildland Fire Situation Analysis		
To be completed by the Agency Administrator(s)		
A. Jurisdiction(s)	B. Geographic Area	
C. Unit(s)	D. WFSA #	
E. Fire Name	F. Incident #	
G. Accounting Code:		
H. Date/Time Prepared _____ @ _____		
I. Attachments		
- Complexity Matrix/Analysis *	_____	
- Risk Assessment/Analysis *	_____	
Probability of Success *	_____	
Consequences of Failure *	_____	
- Maps *	_____	

- Decision Tree **	_____	
- Fire Behavior Projections *	_____	
- Calculations of Resource Requirements *	_____	
- Other (specify)	_____	
* Required ** Required by FWS		

This page is completed by the Agency Administrator(s).

Section II. Objectives and Constraints

A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

- B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

II. Objectives and Constraints
To be Completed by the Agency Administrator(s)
<p>A. Objectives (Must be specific and measurable)</p> <ol style="list-style-type: none"> 1. <i>Safety</i> <ul style="list-style-type: none"> - Public - Firefighter 2. <i>Economic</i> 3. <i>Environmental</i> 4. <i>Social</i> 5. <i>Other</i> <p>B. Constraints</p>

This page is completed by the Fire Manager and/or Incident Commander.

Section III. Alternatives

A. Wildland Fire Management Strategy: Briefly describe the general wildland fire

strategies for each alternative. Alternatives must meet resource management plan objectives.

- B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."
- C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.
- D. Final Fire Size: Estimated final fire size for each alternative at time of containment.
- E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.
- F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.
- G. Risk Assessment - Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.
- H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.
- I. A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

III. Alternatives (To be completed by FMO / IC)			
	A	B	C
A. Wildland Fire Strategy			

G. Risk Assessment			
	- Probability of success	_____	_____
	- Consequence of failure	_____	_____
H. Complexity			
I. Attach maps for each alternative			

This page is completed by the Agency Administrator(s), FMO and/or Incident Commander.

Section IV. Evaluation of Alternatives

A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, - 100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and consistent with prescriptions and objectives of the fire management plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of: pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV. Evaluation of Alternatives

To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander

A. Evaluation Process	A	B	C
<p>Safety Firefighter Aviation Public</p>			
<p><i>Sum of Safety Values</i></p>			
<p>Economic Forage Improvements Recreation Timber Water Wilderness Wildlife Other (specify)</p>			
<p><i>Sum of Economic Values</i></p>			

Environmental Air Visual Fuels T & E Species Other (specify)			
<i>Sum of Environmental Values</i>			
Social Employment Public Concern Cultural Other (Specify)			
<i>Sum of Social Values</i>			
Other			

This page is completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.

Section V. Analysis Summary

- A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.
- B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the

attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.

- C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

Section IV. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) is mandatory.

V. Analysis Summary			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
Alternatives	A	B	C
A. Compliance with Objectives Safety Economic Environmental Social Other			
B. Pertinent Data Final Fire Size Complexity Suppression Cost Resource Values Probability of Success Consequences of Failure			

C. External / Internal Influences	
National & Geographic Preparedness Level	_____
Incident Priority	_____
Resource Availability	_____
Weather Forecast (long-range)	_____
Fire Behavior Projections	_____

VI. Decision	
The Selected Alternative is: _____	
Rationale:	
_____	_____
Agency Administrator's Signature	Date/Time

This Section is completed by the Agency Administrator(s) or designate.
Section VII. Daily Review

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

Section VIII. Final Review

This Section is completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.

VIII. Daily Review
To be completed by the Agency Administrator(s) or Designate
Selected to be reviewed daily to determine if still valid until containment or control

			P R E P A R E D N E S S	L E V E L	I N C I D E N T	P R I O R I T Y	R E S O U R C E	A V A I L A B I L I T Y	W E A T H E R	F O R E C A S T	F I R E	B E H A V I O R	P R O J E C T I O N S	W F S A	V A L I D			
			Date	Time	By													
If WFS A is no longer valid, a new WFS A will be completed!																		
VIII. Objectives								Final Review										

The elements of the selected alternative were met on: _____ <div style="text-align: right; margin-right: 100px;">Date</div> <div style="text-align: right; margin-right: 50px;">Time</div>
By: _____ <div style="text-align: center; margin-top: 5px;">(Agency Administrator(s))</div>

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response "yes" or "no."
2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.
3. If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.
4. Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

GLOSSARY OF TERMS

Potential for blow-up conditions - Any combination of fuels, weather, and topography excessively endangering personnel.

Rate or endangered species - Threat to habitat of such species or, in the case of flora, threat to the species itself.

Smoke management - Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Extended exposure to unusually hazardous line conditions - Extended burnout or backfire situations, rock slide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.

Disputed fire management responsibility - Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

Disputed fire policy - Differing fire policies between suppression agencies when the fire

involves multiple ownership is an example.

Pre-existing controversies - These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Have overhead overextended themselves mentally or physically - This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.

FIRE COMPLEXITY ANALYSIS

				Yes/No
A.	FIRE BEHAVIOR: Observed or Predicted			
	1. Burning Index (from on-site measurement of weather conditions). Predicted to be above the 90% level using the major fuel model in which the fire is burning.	___	___	
	2. Potential exists for "blowup" conditions (fuel moisture, winds, etc.)	___	___	
	3. Crowning, profuse or long-range spotting.	___	___	
	4. Weather forecast indicating no significant relief or worsening conditions.	___	___	
	Total	___	___	
B.	RESOURCES COMMITTED			
	1. 200 or more personnel assigned.	___	___	
	2. Three or more divisions.	___	___	
	3. Wide variety of special support personnel.	___	___	
	4. Substantial air operation which is not properly staffed.	___	___	
	5. Majority of initial attack resources committed.	___	___	
	Total	___	___	
C.	RESOURCES THREATENED			
	1. Urban interface.	___	___	
	2. Developments and facilities.	___	___	
	3. Restricted, threatened or endangered species habitat.	___	___	
	4. Cultural sites.	___	___	
	5. Unique natural resources, special designation zones or wilderness.	___	___	
	6. Other special resources.	___	___	
	Total	___	___	
D.	SAFETY			

1.	Unusually hazardous fire line conditions.	___	___	
2.	Serious accidents or facilities.		___	___
3.	Threat to safety of visitors from fire and related operations.		___	___
4.	Restricted and/or closures in effect or being considered.		___	___
5.	No night operations in place for safety reasons.	___	___	
	Total		___	___
E. OWNERSHIP				Yes/No
1.	Fire burning or threatening more than one jurisdiction.	___	___	
2.	Potential for claims (damages).		___	___
3.	Conflicting management objectives.		___	___
4.	Disputes over fire management responsibility.		___	___
5.	Potential for unified command.		___	___
	Total		___	___
F. EXTERNAL INFLUENCES				
1.	Controversial wildland fire management policy.	___	___	
2.	Pre-existing controversies/relationships.		___	___
3.	Sensitive media relationships.		___	___
4.	Smoke management problems.		___	___
5.	Sensitive political interests.		___	___
6.	Other external influences.		___	___
	Total		___	___
G. CHANGE IN STRATEGY				
1.	Change in strategy to control from confine or contain.		___	___
2.	Large amount of unburned fuel within planned perimeter.		___	___
3.	WFSA invalid or requires updating.		___	___
	Total		___	___
H. EXISTING OVERHEAD				
1.	Worked two operational periods without achieving initial objectives.		___	___
2.	Existing management organization ineffective.		___	___
3.	IMT overextended themselves mentally and/or physically.		___	___
4.	Incident action plans, briefings, etc., missing or poorly prepared.		___	___
	Total		___	___

Signature _____

Date _____ **Time** _____

APPENDIX K: NORTH DAKOTA OPEN BURNING PERMIT

APPENDIX L: COMPLEXITY

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.

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

APPENDIX M: MONITORING STANDARDS

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.