FIRE MANAGEMENT PLAN

KIRWIN NATIONAL WILDLIFE REFUGE

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I. INTRODUCTION

A. Purpose and Need

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

Service policy allows for a wildland fire management program that offers a full range of activities and functions necessary for planning, preparedness, emergency suppression operations, emergency rehabilitation, and prescribed fire operations, including non-activity fuels management to reduce risks to public safety and to restore and sustain ecosystem health.

This plan fulfills these requirements and provides the guidance necessary for managing fire to achieve the resource management objectives Kirwin National Wildlife Refuge.

B. Description of Refuge

Kirwin National Wildlife Refuge was authorized under a General Plan approved by the Secretary of the Interior on June 17, 1954 and was established to provide habitat for and facilitate the management of the Nations's migratory bird resources. Basic authority for the refuge stems from the Fish and Wildlife Coordination Act, which authorized the establishment of wildlife areas on Federal water projects. The refuge is an overlay on the Bureau of Reclamation's Kirwin Reservoir project. Public use of the refuge is also an important refuge purpose. The refuge receives approximately 100,000 visits annually, and public use, particularly on the reservoir itself, is increasing.

Kirwin consists of 10,778 acres (Table 1). The Reservoir contains 5,079 acres at conservation pool. Due to fluctuating water levels, the 5,079 acres within the conservation pool boundary generally alternates between water, mudflats, annual vegetation, timber/brush, and croplands. The topography of the Refuge is rolling with grass-covered hills nearly 200 feet higher than the riparian creek bottoms. Land above the conservation pool is reseeded native grasslands.

Table 1 - Land Use Types

Land Use Type	Acres
Conservation Pool	5,079
Grassland	3,750
Riparian and Shelterbelt	450
Cropland	1,500

1. Location

The Refuge is located in north central Kansas in Phillips County, just west of the town of Kirwin. The reservoir is fed by the North Fork of the Solomon River and by Bow Creek (Figures 1 & 2).

2. Climate

The climate in north-central Kansas is noted for its extremes and sudden changes. It is characterized by large daily and annual variations in temperature. Winters are generally short, but often severe. The coldest temperatures occur from December to February. Warm summer temperatures prevail for about six months of the year. Spring and fall are relatively short.

The mean annual air temperature is 54 deg. F with extremes ranging from -40 deg. F to 120 deg. F. The frost-free growing season averages about 165 days.

The annual precipitation amounts vary widely. From 1955 to 1994, the annual average precipitation was 23.6 inches, with a range of 12.98 inches received in 1956 to 38.06 inches received in 1993. Precipitation is generally in the form of rain occuring primarily during the summer, and often occurs in association with small but intense storm cells with heavy lightning activity and strong winds. These conditions commonly produce very spotty rainfalls in localized areas. Dry lightning is not uncommon, especially in drought years. Hail and/or tornados may also be associated

with storms.

3. Topography and Soils

The Refuge is located in the Rolling Plains and Breaks major land resource area. The soils generally are deep or moderately deep, are nearly level to strongly sloping, and have a silty or loamy subsoil. The highest elevation, about 2,320 feet above sea level, is in the northwestern part of Phillips County, near Prairie View. The lowest, about 1,650 feet, is in an area along the North Fork of the Solomon River, in the eastern part of the county near the town of Kirwin. Refuge elevation varies from 1,693 (dead pool elevation) to 1,830 m.s.l..

A soil survey of Phillips County was completed by the U. S. Department of Agriculture in 1984. The Refuge contains soils from three series, with 21 individual soil types identified. The Refuge contains areas of highly-erosive soils subject to both wind and water erosion.

4. Hydrographic Features

Kirwin Dam was completed in August 1955. The Reservoir is a man-made impoundment created primarily for flood control and irrigation. Inflows are received from the North Fork of the Solomon River and its tributaries and Bow Creek, with a combined drainage area of 1,373 square miles in northwestern and north-central Kansas. Table 2 lists the elevation data for the Reservoir.

Table 2 - Reservoir Capacity Data

	Dead	Inactive	Conservation	Flood
Elevation (feet)	1,693.00	1,697.00	1,729.25	1,757.30
Total storage (ac ft)	6,385.00	9,785.00	99,435.00	314,550.00
Surface acres	720.00	1,010.00	5,079.00	10,640.0

Water rights are held by the Irrigation District. A petition of organization and an application for water rights were filed with the Division of Water Resources, State of Kansas, by the District on April 22, 1948 and

approved on September 25, 1948. The application is for the maximum use of 35,600 acre-feet of water annually and in addition the storage of all flows of the North Fork of the Solomon River to a maximum quantity of 80,000 acre-feet. The Army Corps of Engineers also reserves the right to store up to 220,000 acre-feet of water for flood control purposes. The Service has no water rights or water control capability on the Reservoir.

5. Wildlife

a. Birds

Due to the Refuge's location near the geographical center of the continental United States, it falls within the extreme ranges of bird species from all areas of the country. To date 200 species of birds have been identified on the refuge. There is the possibility that an additional 65 bird species may also visit the Refuge. Fifty species are confirmed nesters. A listing of birds found on the Refuge can be found in Appendix A.

The Refuge primary bird use is by waterfowl during migration. Fall migration will bring large numbers of waterfowl (up to 70,000 Canada geese, 40,000 white-fronted geese, and 220,000 ducks) to the Refuge annually. The numbers of waterfowl begin to build during September and, depending on the weather, will increase throughout the fall. In a mild year the numbers will hold through the winter. When the Reservoir freezes, the numbers will diminish accordingly. The Number of waterfowl using the Refuge drops off dramatically after April first. The majority of the Canada geese using the Refuge are from the tallgrass population. This population migrates from breeding grounds in the Canadian Arctic to wintering areas in Kansas, Oklahoma, and Texas.

Depending on water conditions, the Refuge supports large numbers of water birds. Nesting species include double-crested cormorants, great blue herons, cattle egrets, and killdeer. In recent years up to 75 cormorant nest and 25 great blue heron nest have been confirmed on the west side of the Refuge. This nesting occurs in the Riparian habitats.

Kirwin Refuge lists 25 raptor species on the current bird list. There are six species that have been confirmed as nesting on the Refuge, including red-tailed hawk, Swainson's hawk, and barn, screech, burrowing, and great-horned owls.

Upland game and Passerine species are abundant and popular

species both for non-consumptive bird watching and consumptive hunting uses. Grasslands and croplands provide critical habitat for many species in these groups, and riparian areas are important to other members.

a. Mammals

Thirty-four species of native mammals are known to occur on Kirwin Refuge at the present time. Seven species are listed as locally common and nine are listed as possibly occurring in the area. One State species in need of conservation, the eastern spotted skunk, is known to rarely occur in the area.

b. Reptiles and amphibians

Thirty nine species of reptiles and amphibians potentially occur in Phillips County. There are confirmed reports of two State species in need of conservation, the eastern and western hog-nosed snake.

c. Fish

Currently, there are populations of walleye, largemouth bass, channel and flathead catfish, bullhead, black and white crappie, white bass wiper, bluegill, and green sunfish. Carp and drum are present. The fisheries are managed by the Kansas Department of Wildlife and Parks through a cooperative agreement with the Service.

6. Endangered Species

There are five Federally listed species of threatened and endangered birds that use the Refuge. The Bald eagle, recently de-listed (1999), is also visible and common. Bald eagle numbers peak in the fall and winter during the waterfowl migration. In recent years Bald eagle numbers have been into the 50's with a 1995 peak of over 100 individuals.

Whooping cranes are infrequent visitors to the Refuge but are sighted almost annually in Phillips and surrounding counties. Whooping crane use appears to increase during periods of low water when there is more open areas and the habitat more suitable.

Peregrine falcons are an uncommon visitor to the area, passing through during migration in the spring and fall.

Interior least terns are occasional visitors to the Refuge. Nesting has been confirmed with young produced in 1974,1976, and 1980. This was during periods of low water levels, the nest were located in open rocky shorelines and islands.

Piping plovers are occasional visitors to the Refuge during spring and fall migration. The plover occurs in sandy areas bordering vegetation and open shorelines. Piping plover use is often determined by the presence or absence of large open shoreline areas.

In addition to the Federally listed species, the Refuge provides habitat utilized by two State-listed species, Snowy plovers and white-faced ibis are rare visitors to the Refuge. Six State listed birds species in need of conservation (golden eagle, red-shouldered hawk, ferruginous hawk, prairie falcon, long-billed curlew, and bobolink) have been documented on the Refuge.

The Refuge hosts one of the few remaining black-tailed prairie dog colonies in Phillips County, Kansas. Black-tailed prairie dogs are a species in decline and were recently listed as a threatened species, due to unique association with other animals and plants.

The Refuge is outside the range of any Federally-listed endangered, threatened, or candidate plant species. A complete listing can be found in Appendix B.

8. Cultural Resources

Approximately fifteen percent of the Refuge has been inventoried for cultural resources. In May 1947, prior to construction of the Kirwin Dam, an archeological and paleontological resource survey was conducted by the Smithsonian Institution. Nine sites have been identified and recorded on the Refuge. One is a historic site, Camp Kirwin, a U.S. Government encampment established circa 1865 for the protection of government surveyors working in the area. Registered fossil quarries are located on the Refuge. Scattered Native American campsites and artifacts occur (Osborn et.al. 1979). Many of these resources are located in areas closed to recreational use.

8. Land Use, Values, and Improvements

The lands bordering the refuge are almost entirely held in private

ownership. The primary use is farming and grazing. A scout camp is locate to the south of the Refuge. In addition to the headquarters development, several developed campsites and other recreational improvements are located within the refuge. Other values include interpretive kiosks and fencing. A listing of Service owned capital improvements and their value can be found in Appendix C.

9. Socio-Political Climate

Today, grazing and farming are the primary use and economic industry of the north western Kansas. Society places a high value on suppressing any fires which might threaten vegetation used both for soil stabilization and economic production.

C. Habitat Types

The flora of the Refuge is primarily composed of native grasses, sedges, forbs, and trees. Prairie, consisting of big bluestem, little bluestem, indiangrass, switchgrass, sideoats grama, blue grama, buffalograss, alta fescue, reed canarygrass, sand lovegrass, sand dropseed, tall dropseed, western wheatgrass, dominate the Refuge grasslands. Smooth Brome has been planted in areas. Encroachment of woody vegetation into grasslands is a continuing problem.

The Refuge has about 350 acres of riparian habitat primarily located along the drainage of the North Fork of the Solomon River and Bow Creek as well as along several other drainage entering the Refuge. These woodlands are composed of cottonwood, willow, green ash, and other remnant hardwoods with a few scattered exotics including Siberian elm and Russian olive. Many of the riparian areas are subject to flooding. During periods of low water the acreage of riparian habitat increases.

Shelterbelts made up of Osage orange, eastern red cedar, and Siberian elm are present throughout the Refuge. Most plantings were done prior to or shortly after Government acquisition. In the mid-1970's, eastern red cedar were planted in areas of grassland under a cooperative agreement between the Service and the Department. Other tree plantings for wildlife were conducted by the Kansas Forestry, Game and Fish Commission, the predecessor of the Kansas Department of Wildlife and Parks. The shelterbelts provide a seed stock for encroachment of woody vegetation into grasslands.

State designated noxious weeds present on the Refuge include Johnsongrass, musk thistle, Canada thistle, and field bindweed. Musk thistle is the most

persistent problem in the grasslands. It has spread throughout the Refuge and competes with native grassland species. Biological control agents for musk thistle have been released and are established on the refuge. Other noxious weeds are controlled using mechanical and chemical methods.

D. Historical/Ecological Role of Fire

Wildfire is one of the primary natural forces that created native prairie and savannah. Historic records describe huge prairie fires started by lightning or humans. Fires consumed millions of acres of prairie vegetation as there were few natural firebreaks and no suppression. Wright and Baily (1982) estimated fire frequency in pre-settlement tallgrass prairie ranged from every 5 - 10 years; however, Hulbert (1973) estimated fire frequency to be two to five times every ten years.

Historical reviews indicate the July-August period, to varying degrees, is the seasonal fire peak (Hamilton 1996). Moore (1972) reports for the southern plains region that October and then July-August are the peak fire seasons with a smaller season in April-May. The latter generally corresponds with the lightning season. Obviously, lightning was an important source of fire in the central grasslands. However, fires occurring during July and August are generally small due to the prairie grasses and forbs still being relatively green.

On the other hand, fires occurring during the dormant season of spring and fall were much larger prior to the settlement of the plains by European man. Most fires occurring in the fall were started by aboriginal people for a variety of reasons, including; providing safe camping areas, driving big game animals, luring big game animals to green vegetation for hunting purposes, and even destroying enemy camps.

The Great Plains are known for large, extreme grass fires. Large fires are becoming less common due to manmade fuel breaks and suppression, but do occur several times annually in the state of Kansas. Although large fires may occur at anytime, large fires generally occur when one or more excellent growing seasons is followed by a dry, open winter and/or drought. The varied terrain and intense, fast fires help create circumstances with great potential for injury and resistance to control. The winter and spring of 1996 demonstrated the potential danger of wildfires in Kansas. The entire state of Kansas was under a complete burn ban throughout this period due to the extreme weather conditions and lack of precipitation for an extended period of time.

E. Refuge Fire History

The fire season in north-central Kansas generally corresponds with weather patterns which produce lightning. Although lightning has been known to occur in about every month of the year, lightning is most prevalent beginning early April and continuing through September. Not every thunderstorm is accompanied by rain, but winds are common during most lightning producing storms. Dry lightning is most likely to occur during drought years.

National Weather Service's Rangeland Fire Index indicates that high to extreme fire danger ratings can occur every month of the year, with high to extreme fire danger indices posted for five or more consecutive days during those periods. Fires occurring outside the normal fire season do not occur with the same frequency as during the fire season, but tend to exhibit extreme fire behavior with high potential for escape and threat to life, property, and resources. This is primarily due to the seasonal curing of fuels and higher than average wind speeds.

Equipment use has been the primary historic cause of wildfire occurring on the refuge. But the increase in recreation and use of catalytic converter equipped vehicles within the tall grass areas of the Refuge poses a severe threat. A summary of recorded fires for the past 20 years is contained in Appendix D.

II. POLICY COMPLIANCE - GOALS AND OBJECTIVES

A. Compliance with Service Policy

U.S. Fish and Wildlife Service policy requires that an approved Fire Management Plan must be in place for all of Service lands with burnable vegetation. This plan provides fire management guidelines for the Refuge.

B. NEPA Compliance

This plan meets the requirements of the National Environmental Protection Act (NEPA). The Refuge was one of the first to complete their Comprehensive Management Plan (Now known as a Comprehensive Conservation Plan). As part of the planning process, an Environmental Assessment was completed and a Finding Of No Significant Impact (FONSI) was signed by the Regional Director. The use of fire to achieve resource management goals and objectives was discussed in both the EA and the CMP. A copy of the CMP is on file at the Refuge. A copy of the Compatibility Determination can be found as Attachment 1.

Regulations published in the Federal Register (62FR2375) January 16, 1997, categorically excludes prescribed fire when conducted in accordance with local and State ordinances and laws. Wildfire suppression and prescribed fire

operations are both categorically excluded, as outlined in 516 DM2 Appendix 1.

C. Authorities Citation

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 621 DM, Wildland Fire Management (April 10, 1998)

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

Kirwin National Wildlife Refuge was authorized under a General Plan approved by the Secretary of the Interior on June 17, 1954 and was established to provide habitat for and facilitate the management of the Nations's migratory bird resources. Basic authority for the refuge stems from the Fish and Wildlife Coordination Act, which authorized the establishment of wildlife areas on Federal water projects.

E. Overview of Planning Documents

The Comprehensive Management Plan and supporting Environmental Assessment have been completed for the Refuge. Other planning functions are on-going. When the various management plans are completed, the Fire Management Plan will be reviewed to ensure that the goals and objectives identified in this plan are still current and valid.

F. Habitat Management Goals and Objectives

1. Goals

- To enhance and maintain migratory bird populations, emphasizing resting and feeding habitat for waterfowl and other water birds, while providing nesting and breeding habitat for grassland nesting species, and habitat for migrant raptors and neotropical migrants.
- To enhance and maintain habitat for threatened and endangered species.
- To enhance and maintain native mixed-grass prairie.
- To enhance and maintain riparian areas in Bow Creek and the North Fork of the Solomon River.
- To enhance and maintain diverse wetlands.
- To provide natural and domestic food crops for waterfowl and resident wildlife
- To maintain plant and animal diversity by providing habitat for resident and migratory species.
- To provide effective wildlife and ecosystem-based education.

! To provide wildlife-oriented recreation.

III. REFUGE FIRE MANAGEMENT OBJECTIVES

A. General

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

Responses are specific actions taken in response to a wildland fire to implement protection and fire use objectives. With an approved Fire Management Plan, the Refuge staff may use wildland fire in accordance with local and State ordinances and laws to achieve resource management objectives (habitat improvement).

The following considerations influenced the development of the Refuge's fire management goals and objective. These observations are established in various sections of this plan.

1. Fire is an essential natural part of the Refuge's biotic communities.

2. Uncontrolled wildfire has potential for negative impacts on and off the Refuge.

3. Rapid rates of spread, fire suppression resource response times, and the lack of fuel breaks pose significant suppression problems and increase the likelihood of escape onto adjacent lands.

4. Large fires could adversely effect migratory bird populations.

5. Use of the "minimum tool" concept to minimize environmental damage is important throughout the Refuge, especially in the Natural Area.

B. Kirwin Fire Management Goals:

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

2. Use prescribed fire as a tool to enhance vegetative communities and to accomplish other refuge management objectives, such as limiting impacts of wildfires.

C. Kirwin Fire Management Objectives:

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

2. Prevent human-caused wildfires.

3. Minimize the impact and cost of fire suppression.

4. Manage the risks associated with hazard fuels.

5. Use prescribed fire to the fullest practical extent to restore the natural fire regime and vegetative communities.

6. Use prescribed fire when it is the most effective and efficient means for achieving management objectives.

7. Inform the public regarding the natural role of fire within the prairie ecosystem.

IV FIRE MANAGEMENT STRATEGIES

A. Implementation Strategies

The following strategies will be employed to meet fire management objectives.

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

suppression techniques (MIST) will be utilized, where appropriate.

2. Maintain an Initial Attack organization capable of initiating initial attack action to suppress Class A, B, and C wildfires. Initial Attack equipment and personnel will maintain a minimum response time of 1 hour to all Refuge fires during the fire season.

3. Maintain Cooperative Agreements with local fire agencies to promote prevention, suppression, and prescribed fire activities. Provide assistance to local or federal cooperators under the "total mobility" and "closest resources" principles in accordance with Service policy.

4. Prepare and implement an effective fire prevention plan to minimize fires, particularly fires occurring outside the fire season when adequate suppression resources may not be available.

5. Prepare and implement a long-term hazard fuel management plan for the entire Refuge which will compliment other resource objectives. Prepare treatment alternatives, prescriptions and rotations based on existing and future research. Investigate the use of mechanical treatments (i.e. fuel breaks along boundaries and roads) to increase cost effectiveness.

6. Utilize prescribed fire as a management treatment for achieving hazard fuel reduction and resource management objectives. Prescribed fire will be used in a manner that approximates pre-European settlement fire frequencies to the extent practical.

7. Initiate fire effects research and/or monitoring which will provide a better understanding of local fire effects and provide the basis for improving future fire prescriptions and integrating the use of prescribed fire with other land management treatments to achieve habitat objectives.

8. Integrate fire ecology, management, and prevention themes into existing interpretive and education programs.

B. Limits to Implementation Strategies

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

2. Suppression strategies that will cause minimum disturbance to soils must be used to reduce the possibility of soil erosion.

3. Sensitive resources must be protected. Section 7 clearance will be secured, as appropriate.

4. Heavy equipment (dozers, discs, plows, and graders) will not be used for fire suppression except in life threatening situations without the express approval of the Project Leader or his/her designee.

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

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

C. Appropriate Management Response

Table 3: 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. Wildland fire burning on to Service lands. 3. Escaped prescribed fire entering another unit to be burned.	Take suppression action, as needed, which can reasonably be expected to check the spread of the fire under prevailing conditions.	1. Direct and indirect line construction 2. Use of natural and man-made barriers. 3. Burning out 4. Patrol and mop-up of fire perimeter.
1. Wildland fire that threaten life, property or sensitive resources. 2. Wildland fire on Service property with high values to be protected. 3. Observed and/or forecasted extreme fire behavior.	Aggressively suppress the fire using direct or indirect attack methods, holding the fire to the fewest acres burned as possible.	1. Direct and indirect line construction 2. Engines and water use 3. Aerial retardant 4. Burning out and back fires 5. Mop-up all or part of the fire area.

D. Impacts of Fire Management Activities

Kirwin National Wildlife Refuge is located in a rural environment and is surrounded by agricultural activities which include farming of a variety of grains as well as livestock grazing operations. Fire management activities may adversely impact neighboring lands in the event of an escaped prescribed burn. The loss the neighbors may experience in the event of an escaped prescribed burn would be in the form of lost pasture land and associated supplies (fencing, fence posts, water tanks, etc.) for livestock grazing or a loss of grain products in the case of a ripened field being burned. Neighbors and their land use practices impact the Refuge's lands and fire management activities in both positive and negative ways. The land use practice of livestock grazing aids the Refuge's fire management activity in such a way that it provides for good secondary control lines because of the extensive grazing that takes place on these lands. Also, grain fields can provide for excellent secondary control lines if they are tilled or contain immature, green crops in them. However, the opposite effects can be had with the

same land use practice. After harvesting grain fields, some neighbors choose to burn their grain stubble for weed control or to aid in tilling operations which can and does adversely affect Refuge lands by bringing wildland fires onto the Refuge lands when these "controlled" burns escape. This can also be said for lands enrolled in the Conservation Reserve Program. The lands enrolled in this program provide another opportunity for escaped controlled burns to enter Refuge lands while also providing for heavy fuel loadings bordering Refuge prescribed burn operations. This can hinder suppression efforts on an escaped prescribed burn and add to the economic loss of the neighbor.

The city of Kirwin is located less than one mile from Refuge boundaries and several farmsteads and other cultural resources are located less than one mile from Refuge boundaries with a few right on the property line. Also located along Refuge boundaries are several county roads and a highly traveled State Highway (K-9). Some of these local features can be directly threatened by fire management activities performed on the Refuge and all of them can be adversely affected by fire management indirectly through a temporary decline in air quality (smoke). Efforts will be made to reduce the impacts of Refuge fire management activities on these and other local resources through smoke management and monitoring.

The Service has a Memorandum of Understanding (MOU) in place with both the Kirwin Rural Volunteer Fire Department and the Phillipsburg Rural Volunteer Fire Department regarding wildland fire suppression activities. The MOU states the Service will "provide, at its own expense, first response and initial attack with such equipment and labor as are available on wildland fires occurring on lands within the boundaries of the Refuge and on adjacent private lands." Also, the Service will "assist in wildland fire suppression on land surrounding the Refuge, not covered by this agreement, when requested by the Fire Departments and deemed practical by the Refuge Manager." This assistance will be provided "at the Service's expense." The MOU also states the Fire Departments will "furnish, at their own expense, firefighting equipment and labor for the suppression of fires on lands within the boundaries of the Kirwin National Wildlife Refuge" and the Fire Departments "will report any fire discovered on Service lands to the Service as soon as possible upon taking suppression action." These MOUs will aid the Service and Fire Departments in reducing the adverse affects of wildland fire on private and Service owned natural and cultural resources.

Figure 3: Kirwin National Wildlife Refuge Fire Management Unit Map

MAP KEY	
COLOR	UNITS
	UPLAND GRASSLAND
	RIPARIAN ZONE
	NATURAL AREA
	STRUCTURAL INTERFACE

V. FIRE MANAGEMENT UNITS

The refuge is broken into four Fire Management Units based on predominant fuel types, management restrictions, values at risk, and typical suppression strategies (Figure 3).

A. Upland Grassland Unit

1. Predominant Fire Environment

Level to gently rolling topography. Vegetation is predominantly mid-grass prairie with scattered brush and trees. Vegetation is continuous with gravel roadways serving as fuel breaks. Fires can be moderately intense with extreme rates of spread.

2. Predominate Fuel Model and Expected Fire Behavior

Fuel Model 3: Tall grasses. This is the most common grassland throughout most of Kansas. Fuel loadings are generally directly proportional to moisture availability. The heaviest loadings are found in marshes and drainages. These fuels can exhibit extreme rates of spread and flame lengths with average winds and minimal drying. Resistance to control can be very high.

Fine fuels, mostly grasses, are the primary fuel in most cases. Heavy fuels typically only become a factor during periods of drought. The fineness of these fuels combined with well drained sandy soils, high average winds, and low humidity can produce high fire danger situations despite recent precipitation or time of year. Under normal daytime conditions, fires can exhibit high rates of spread and flame lengths in excess of 4 feet. Conversely, diurnal temperature and humidity changes, particularly during the winter, spring, and fall, produce low fire activity at night, and may completely extinguish a fire.

3. Access and Response Time

Access is available to 4-wheel drive vehicles via refuge roads. Vehicle travel off roads is generally possible. Response time is not expected to be more than 1 hour, and generally considerably less.

4. Values at Risk

The primary concern would be escape of fire from this unit onto private property, into refuge campgrounds and vehicle parking areas, or into the refuge wildland/structural interface area. Escape into these areas could pose a serious threat to life and property. Another concern is that this fire management unit is the primary source of forage and nesting/resting cover for the Refuges wildlife population and domesticated cattle herd. Loss of

these grasses due to an ill-timed wildfire would force management to alter management options such as lowering grazing AUM's.

This unit also serves as habitat for a wide variety of native wildlife species. Small fires pose no significant impact. Large fires during nesting season or during the dormant season may impact breeding success. Bare soils could lead to increased soil loss due to wind erosion. A final concern would be the loss of improvements including fences and other structures within the unit.

5. Management Restrictions

There are no restrictions other than Service policy.

6. Suppression Strategies

Primary suppression strategy would be aggressive direct attack with engines. Indirect attack may be used to protect values at risk and/or if engines are unable to suppress the head of the fire directly because of extreme fire behavior.

B. Solomon River and Bow Creek Riparian Unit

1. Predominant Fire Environment

Topography ranges from level riverbanks to steep slopes. Vegetation is variable and includes brush and hardwood along riverbeds. Most fires in this unit exhibit low to moderate intensity due to moisture levels, however, past fire suppression has allowed the buildup of large amounts of woody fuels and ladder fuels with potential for high intensity surface and crown fires under severe drought conditions when the fuels would be exposed.

2. Predominate Fuel Model and Expected Fire Behavior

Fuel Model 8/9: Hardwoods growing in riparian areas with an understory which may be any combination of brush, grass, or litter. Fire intensity is generally low to moderate, increasing to high during periods of drought or time of year. The acreage of this fuel model is highly variable due to the water levels in the Reservoir.

Fuel Model 5/6: Short to mid height brush and shrubs growing over a light grass understory. This model is found mainly in the reservoir bottom as water levels recede from the conservation pool levels. These fuels have

been known burn intensely with moderate wind. Resistance to control under those circumstances is high.

Fires in timbered areas generally exhibit low to moderate fire intensity under normal circumstances. However, summer drought makes all fuels available and produces the likelihood crowning and extreme fire behavior. Increases in live and dead fuel loadings due to fire suppression has served to increase fire intensity in these areas over the years. There are many areas where intense stand replacement fires with torching or crowning activity is likely under climate conditions which would have historically resulted in a surface fire of moderately intensity.

3. Access and Response Time

Access is available to 4-wheel drive vehicles via refuge trails. Vehicle travel off trails may be possible in some areas, but most areas are too densely vegetated or the soils are to wet for direct vehicle access. Boat access is also possible. Response time is not expected to be more than 1 hour.

4. Values at Risk

The primary concern would be escape of fire from this unit onto private property, refuge campgrounds and parking areas, or into the refuge wildland/structural interface area. Escape into these areas could pose a serious threat to life and property.

Maintenance of water quality and aesthetic quality is a high priority.

This unit also serves as habitat for a wide variety of native wildlife species. Small fires pose no significant impact. Large fires during nesting season or during the dormant season may impact breeding success or increase soil loss due to wind and water erosion.

5. Management Restrictions

Due to access problems the use of minimal impact fire suppression tactics will be used whenever possible.

6. Suppression Strategies

Suppression strategy will be determined by circumstances.

Low to moderate intensity fires will be directly attacked by hand crews and engines (provided access is possible). Indirect attack and containment strategies will be used on intense fires or where steep terrain or dense undergrowth does not allow for a safe direct attack.

C. Structural/Interface Unit

1. Predominant Fire Environment

Topography is generally flat to gently rolling. Vegetation is primarily short to mid grasses interspersed with brush, trees, and windrows. Fire behavior is generally similar to that of the Upland Grassland Unit (see above), but may experience more intensity and spotting due to cedar windrows. Structural improvements such as buildings, flammable liquids, and electrical lines may also greatly increase fire intensity and spotting.

2. Primary Fuel Model and Expected Fire Behavior

Fuel Model 2: Light or short grasses with a partial overstory, generally Eastern Red Cedar on plains, and hardwoods in riparian areas. Fire suppression is not normally difficult in this fuel type, but drought conditions can produce crowning and extreme fire behavior. Resistance to control is generally moderate, but may range to extreme during periods of drought. The vegetative structure and fuel loading of these areas are changing due to suppression of past fires, and exclusion of prescribed fire practices. These changes make fire suppression more difficult and increase fire intensity, torching, and the likelihood of stand replacement fires.

3. Access and Response Time

Access is available to 4 wheel drive vehicles via refuge roads. Vehicle travel off roads is generally possible. Response time should be less than 1 hour, and generally considerably less.

4. Values at Risk

The primary concern would be threat of damage to life or property in refuge headquarters and residence areas. Another concern would be the loss of improvements including fences and windmills within the unit.

5. Management Restrictions

There are no restrictions other than Service policy. Service policy restricts firefighters from engaging in structural firefighting activities, but not in structural (exposure) protection.

6. Suppression Strategies

Primary suppression strategy within the unit will be aggressive direct attack. Indirect attack may be used to prevent a wildfire from spreading into this unit, or to protect structures. Protection of life and property will be the overriding priority.

D. Natural Area Unit

1. Predominant Fire Environment

Terrain ranges from flat to steep slopes. Aspect is variable. The vegetation ranges from that found in the Upland Unit those found in the River and Riparian Unit (see above).

2. Predominate Fuel Model and Expected Fire Behavior

Fuel Model 3: Heavy or tall grasses. Fuel loadings are generally directly proportional to moisture availability. The heaviest loadings are found in marshes and drainages. These fuels can exhibit extreme rates of spread and flame lengths with average winds and minimal drying. Resistance to control is very high to extreme.

3. Access and Response Time

Vehicle access to the area on trails is generally possible. Vehicle access off trails may be limited by moist soil, dense vegetation, or soft and steep sand dunes. Response time should be not more than 1 hour if vehicle access is possible.

4. Values at Risk

The primary concern would be escape of fire from this unit onto private property or into the refuge wildland/structural interface area. Escape into these areas could pose a serious threat to life and property.

This unit serves as habitat for a wide variety of wildlife species. Small fires pose no significant impact. Large fires during nesting

season or during the dormant season may impact breeding success.

There are also a number of grazing special use permits that are approved for individual habitat units within this fire management unit. Cattle loss could occur should a wildfire burn this unit if it is being grazed. Loss of expected forage could occur should a fire burn the unit prior to being grazed.

A final concern would be the loss of improvements including fences within the unit.

5. Management Restrictions

Minimal impact strategies and tactics will be used.

6. Suppression Strategies

Suppression strategy will be determined by the values at risk. If no values are at risk, a confine or contained strategy by hand crews or engines will be used to suppress the fire by restricting the fire within the unit.

If the fire has potential to escape to private property or to significantly impact wildlife or improvements, a contain strategy will be utilized (subject to management restrictions) to protect private property and/or minimize reduction of forage. All possible actions will be taken to maintain the integrity of the natural area.

VI. FIRE SEASON

A. Refuge Fire Frequency

Seven wildfires have been recorded in the Fire Management Information System during the period 1980 to 1999. Six were human caused and one was the result of lightning. The size of the fires ranged from .2 of an acre to 99 acres. There is not enough statistical data to determine trends. Generalities can be made, however, based on the information available. Wildfires tend to be small and occur infrequently.

B. Normal Fire Season

The normal fire season runs from April to September.

VII. FIRE MANAGEMENT RESPONSIBILITIES

A. Refuge 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. A listing of staff and their qualifications can be found in Appendix E.

1. Refuge Manager

- Responsible for the overall management of the refuge including fire management.
- Insures fire management policies observed
- Fosters effective cooperative relations within the refuge, cooperating fire organizations, and adjoining land owners.
- Insures sufficient collateral duty firefighters meeting Service standards are available for initial attack.
- Supervises the collateral duty fire staff.
- Approves individual prescribed fire plans.

2. Refuge Operations Specialist

- Responsible for planning and coordinating preparedness activities including:
  - The Refuge fire training program.
  - Physical fitness testing and Interagency Fire Qualification System (IFQS) data entry.
  - Coordinating with cooperative agencies on a regional level. Revising cooperative agreements as necessary.
  - Insuring the Step-up Plan is followed.
- Prepares annual Firebase budget request and manages and tracks use of Firebase account.
- Advises Refuge Manager of the status of fire suppression operations.
- Responsible for coordinating prescribed fire activities including:
  - Reviewing proposed annual prescribed fire program to meet resource management objectives.
  - Assisting the Refuge Manager in daily validation that

prescribed fires are under prescription and meet all other Service policy requirements.

- Maintains liaison with Regional Fire Management Coordinator and Cooperators.
- Maintains fire records, reviews completed DI-1202's for accuracy, and annually reviews and updates as necessary the Fire Management Plan.

3. Maintenance Worker

- Maintains engine(s) in a state of readiness.
- Supervises and trains assigned engine crew, as qualified.
- Serves as collateral duty firefighter, generally as Engine Boss or Incident Commander, as qualified.
- Insures crew satisfactorily complete assigned prevention, preparedness, training, and monitoring duties, when appropriate.
- Insures crew satisfactorily completes assigned project work when fire management duties have been assigned.

4. Seasonal and Collateral Duty Firefighters

- Responsible for their own fire records, equipment, and physical conditioning.
- Qualifies annually by completing the appropriate fitness test between January 15-30, or within 2 weeks of EOD date.
- Maintains assigned fire equipment in ready state and using all safety gear assigned.
- Assists the ROS maintain accurate fire records.

5. Wildfire Incident Commander (as assigned)

- The Incident Commander (IC) is responsible for the safe and efficient suppression of the assigned wildfire.
- Fulfills the duties described for the IC in the Fireline Handbook.
- Notifies the Refuge Manager or Dispatcher of all resource needs and situational updates, including the need for extended attack.
- Ensures wildfire behavior is monitored and required data is collected.
- Ensures personnel are qualified for the job they are performing.
- Identifies and protects endangered and threatened species and sensitive areas according to the Fire Management Plan.
- Utilizes minimum impact tactics to the fullest extent possible.
- Ensures fire is staffed or monitored until declared out.
- Ensures that the fire site is fully rehabilitated or that management

is notified that rehabilitation is required.

- Submits completed DI-1202 (wildfire report), Crew time sheets, a listing of any other fire related expenditures or losses to ROS, and completes taskbooks within 3 days of fire being declared out.

6. Prescribed Burn Boss (as assigned)

- Writes or reviews prescribed burn prescriptions for assigned blocks.
- Implements approved prescribed burn plans.
- Assist with the administration, monitoring, and evaluation of prescribed burns.
- Submits completed DI-1202 (wildfire report), Crew time sheets, a listing of any other fire related expenditures or losses to ROS, and completes taskbooks within 3 days of fire being declared out.

B. Cooperator Involvement and Standards

1. Cooperator Involvement (Appendix F)

- Provides assistance in detection and suppression of wildfires.
- Assists, as needed, in the investigation of suspicious fires.
- Assists in training and conducting prescribed burns, per agreement.

2. Cooperator Standards

Along with other land management agencies, the Service has adopted the National Interagency Incident Management System (NIIMS) Wildland and Prescribed Fire Qualifications 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 participation in prescribed fire management activities must meet Service fitness and training standards.

VIII. EQUIPMENT AND STAFFING NEEDS

A. Normal Unit Strength

Engines are the primary initial attack resource on the Refuge because of the

predominance of fine fuels and good vehicle access. Hand crews and portable pumps are not as efficient in range fires, but would be effective in areas of riparian habitat where vehicle access is limited by vegetation, topography, hydrology, or policy. Earth moving equipment and air attack resources are not readily available, but can be ordered when needed.

Currently, the Refuge maintains a fire management fleet consisting of two 200-gallon permanently mounted slip-on units and four pickups. This fleet has excellent response time, but the small tanks limit their utility on large range fires.

Primary equipment is equipment that is essential to firefighting operations and maintained and used exclusively for that purpose. Secondary equipment is equipment that is primary used to support non-fire refuge operations but may be used, when necessary, for fire management operations. The maintenance of primary equipment will be funded out of fire funds. The maintenance of secondary equipment will be charged to the benefitting account.

All firefighters will be issued the required personal protective equipment. All primary engines will be equipped with tools, firing devices, and water handling accessories. The Refuge maintains a 6-person fire cache at the Headquarters. A listing of resources can be found in Appendix G.

B. Personnel

The ability to maintain an adequate response time to fires occurring on the Refuge has been eroding over the years and is of critical importance. Staffing reductions, both seasonal and permanent have impacted the ability to respond to any fire situation. This is especially true during periods of high fire danger, which may occur at any time of the year in Kansas.

All attempts will be made to maintain the following **minimum** fire qualification staffing levels for firefighters within the Refuge:

Table 4: Minimum Fire Qualifications

Position	Fire Funded	Collateral
Incident Commander Type 3 (ICT3)		1
Initial Attack IC (ICT4)		1
Burn Boss Type 3 (RXB3)		2
Engine Boss (ENGB)		2
Engine Operator (ENOP)		2

Firefighter Type 2 (FFT2)	3	2

Note: Personnel can be qualified for more than one position

Additional firefighters (emergency hire/casual firefighters) may be temporarily hired to supplement engine crew, or existing crew seasons may be extended, using severity or emergency preparedness funding when very high or extreme fire conditions warrant.

IX. PREPAREDNESS

A. Staffing

1. General

The Refuge Manager with assistance from the Refuge Operations Specialist is responsible for coordinating Refuge preparedness actions. Specific duties are assigned in the Step-up plan (Appendix H).

2. Personnel

Only employees meeting current Service fitness, training, and experience requirements will be dispatched to fires. Non red-card employees may assist in support capacities, but will not be permitted on the fire line. A listing of fire qualified employees and their qualifications can be found in Appendix E.

B. Readiness Activities

Table 5: Annual Refuge 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											

Update Qualification and Training			x								
Annual Refresher Training			x								
Annual Fitness Testing & Physical Exam			x								
Pre-Season Engine Preparation			x								
Weigh Engines to verify GVW Compliance			x								
Prescribed Fire Plan Preparation			x								

Review and Update Fire Management Plan				x								
Prepare Pre-season Risk Analysis			x									
Weather Station Maintenance and Calibration										x		
Live Fuel Moisture Sampling						x	x	x	x			

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

1. Annual Refresher Training

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

All personnel involved in Fire Management activities are required to

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

2. Physical Fitness

All personnel involved in fire management activities will meet the fitness standards established by the Service and Region. At this point in time, firefighters participating in wildfire suppression must achieve and maintain an **Arduous** rating. Firefighters participating in Prescribed Burns must achieve and maintain a **Moderate** rating. Information found in Appendix H 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 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 training for or taking a physical fitness test. They must read and sign the Par-Q health screening questionnaire, an informed consent form (Appendix H). If an employee cannot answer NO to all the questions in the PAR-Q health screening questionnaire, or is over 40 years of age, unaccustomed to vigorous exercise, and testing to achieve a Moderate or Light rating, the test administrator will recommend a physical examination. As noted below, all individuals over 40 years of age **must** receive an annual physical **prior** to physical testing.

3. Physical Examinations

In keeping with Service Policy, a physical examination is required for all new permanent employees and all seasonal employees assigned to arduous duty as firefighters 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.

C. Impacts of Drought and Other Activities

As indicated previously, periods of drought can greatly impact fire behavior and resistance to suppression. For that reason the Rangeland Fire Danger Index, Palmer Drought Index, and the Keetch-Byram Drought Index will be monitored at a minimum on a weekly basis throughout the year. All are available on the Internet at *http://ndc@fws.gov*. The Refuge fire staff can also contact the Pueblo Interagency Dispatch Center (719-545-1454) during periods of high fire danger to track indices and anticipate opssible 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 engines during periods of extreme drought or high fire danger.

The Refuge is in Rocky Mountain Area. During National and Regional Planning Levels IV and V it is necessary to receive approval from the Rocky Mountain Area Coordination Group to conduct prescribed burns.

D. Step-Up Plan

The Step-up Plan is found in Appendix I.

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. 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 long-range forecasts call 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 threat to firefighter safety is from fast moving, wind-driven wildfires that can quickly over take and trap firefighters. Due to terrain, soil conditions, and the location of the lake, it may be difficult for an engine to out-run a fast moving fire. It is important that firefighters practice LCES **at all times**! Weather forecasts should be requested early-on during initial attack to gain insight into the possibility of shifting winds from thunderstorms, approaching fronts, and other related weather phenomena.

B. Prevention Program

While fifteen percent of the fires occurring on the Refuge are lightning caused and are not preventable, eighty-five percent of the Refuge's wildfires are human caused and thus could possibly have been prevented. All of the human caused fires started as a result of equipment use or carelessness. Human caused fires are generally the most damaging because they can occur outside of the normal fire season when fire behavior can be explosive and there are fewer initial attack resources available to respond.

In general, the local public and many visitors to the refuge are very aware of fire prevention and have an ingrained fear of starting range fires. As for the reminder, the Refuge will endeavor to place fire prevention information and hints on Refuge information kiosk's. The Refuge will also post special warnings/notices, enforce area closures, and increase patrols during periods of very high or extreme fire danger as part of it's Step-up Plan activities. Equipment and/or public use restrictions may also be declared when conditions warrant. Another fire prevention measure is the annual mowing of unpaved refuge road sides and

parking areas to reduce the likelihood of vehicles starting fires.

C. Detection

The Refuge relies on neighbors, visitors, staff, and cooperators to detect and report fires. In addition, the Step-up Plan provides increased patrols if deemed necessary by the Refuge Manager.

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

1. Fires On or Threatening the Refuge

All fires occurring within or adjacent to the Refuge that are observed by Refuge staff will be immediately reported to Headquarters. The person at Headquarters receiving the report will be responsible for initiating the Fire Dispatch Plan and assuming the duties of Fire Dispatcher until relieved (Appendix J).

The Fire Dispatcher will stay on duty until all Refuge resources return, and monitor and record the radio traffic of Refuge firefighters. The fire dispatcher will not be required to stay on duty when the fire occurs in an area outside of Refuge radio coverage, but must notify the IC and Phillips County Dispatcher when he/she leaves, and leave a forwarding phone number.

The Fire Dispatcher will be responsible for coordinating the filling and delivery of any resources orders made by the IC including engines, tools, supplies, and meals. IC will place all resource orders through the dispatcher, and will specify what is needed, and when and where it is needed. The Dispatcher will promptly determine if the resource orders can be filled or procured locally and notify the IC. If a resource order can not be filled locally, the Dispatcher will place the order with the Phillips County Dispatcher, the Zone FMO, or Pueblo Interagency Dispatch Center, as appropriate.

2. Out of Area Assignments

Requests for assistance from cooperators managing fires that are not threatening the Refuge or requests from the Pueblo Dispatch Center for resources to meet Regional or National mobilization needs must be made to and approved by the Refuge Manager. Only qualified and properly equipped resources will be dispatched off of the Refuge. A list of the fire qualified employees available to be dispatched to local, zone, regional, and national incidents will be compiled every Monday morning during the fire season by the Refuge Manager or his designee, and will be forwarded to the Zone FMO. The Zone FMO will be responsible for transmitting availability information to the Pueblo Dispatch Center.

E. Fire Suppression

A qualified Incident Commander (IC) will be dispatched to each fire. If a qualified IC is not available, the highest qualified firefighter will assume command of the fire and perform the duties of the IC until relieved by a qualified individual. The IC is responsible for aspects of the management of the fire, including:

- Providing a size-up of the fire to dispatch as soon as possible.
- Using guidance found in the Fire Management Plan or in the Delegation of Authority, determine the strategy and tactics to be used
- Determine the resources needed for the fire.
- Brief assigned resources on the strategy and tactics to be used, expected fire behavior, historic weather and fire behavior patterns, impacts of drought, live fuel moisture, escape routes and safety zones, and radio frequencies to be used.
- Advising despatch of resource needs on the fire.
- Managing all aspects of the incident until relieved or the fire is suppressed.

All Refuge and Cooperator resources will report to the IC (in person or by radio) prior to deploying on the fire.

The IC will select the appropriate fire suppression strategies and tactics necessary to effectively suppress the fire. Minimum impact tactics will be utilized whenever possible. Dozers, graders, plows, or discs will not be used inside Refuge boundaries without approval of the Refuge Manager.

The IC will notify the Refuge Manager whenever it appears that a fire may escape initial attack efforts, escape Service lands, or when fire complexity will exceed the capabilities of command or operations. The Refuge Manager in conjunction

with the IC, the Phillips County Fire Chief and in consultation with the Zone FMO, will be responsible for coordinating all extended attack actions including:

1. Completion of the WFSA for signature by Refuge Manger (Appendix K).
2. Completion of Delegation of Authority, if needed (Appendix K).

F. Mop-Up Standards and Emergency Stabilization and Rehabilitation

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

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

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

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

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

- **Rehabilitation** is the use of appropriate rehabilitation techniques to improve natural resources as stipulated in approved refuge management plans and the repair or replacement of minor facilities damaged by the fire. Total "rehabilitation" of a burned area is not within the scope of the Emergency Rehabilitation funding. Emergency Renabilitation funding can be used 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 facil,ities 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 refuge land use plans. The refuge manager is responsible for preparing all ESR Plans. In order to be funded, ESR Plans must meet resource management objectives and be approved by the Project Leader and the Regional Director.

XI. PRESCRIBED FIRE PROGRAM

A. Program Overview

Prescribed fire has been identified in the Comprehensive Management Plan as a management tool suitable to meet certain resource management objectives on Kirwin National Wildlife Refuge. The Compatibility Determination and Environmental Assessment covering the CMP for the Refuge was approved by theRegional Director. Specific examples of the use of fires include;

Use of controlled burning based upon accepted fire management standards and practices to manage grasslands favoring native species of flora and fauna, and emphasizing habitat diversity on 3,750 acres of mixed-grass prairie...

Use management tools such as fire to refuge fragmentation and encourage expansion of the current 60-acre prairie dog town to a maximum of 200 acres.

Enhance habitat for endemic species and migratory birds using a variety of tools, including fire.

Service policy permits the use of prescribed fire funds to manage hazard fuels and reduce fuel loadings. Hazard fuel reduction projects should also accomplish resource management projects whenever possible. Unfortunately, extensive fuel reduction is not always compatible with other Refuge objectives because of its effect on habitat and wildlife populations. Therefore, the Refuge will take a two pronged approach to fuel management:

1. Use mechanical means and/or prescribed fire to maintain desired

fuel loadings in areas adjacent to private property, Service improvements, and sensitive resources.

2. Strategic fuel breaks will be maintained throughout the Refuge to assist in suppression and prescribed burn operations, and prevent the spread of fires into sensitive areas or across administrative boundaries.

B. Prescribed Fire Objectives

1. Provide a fire protection buffer around the headquarters and staff housing compound

2. Restore the natural fire regime (5-10 year return interval) to grasslands

3. Restore and perpetuate native wildlife species, maintain a diversity of plant communities, and enhance and maintain vigor of perennial grasses and forbes. Treat 800 acres annually.

4. Reduce the encroachment of tree and shrub species and non-native cool season grasses into the grasslands. Treat 800 acres annually.

5. Reduce the risk of catastrophic wildfire by reducing fuel loading. Treat 400 acres annually.

C. Limits

The following limitations have been identified:

Wildlife disturbance should be held at a minimum during critical times of the year to allow for nesting, feeding and resting.

The mature cottonwoods and other trees suitable for roosting and nesting by threatened and endangered species in the riparian area should be protected from the effects of fire.

Prescribed burns should not be conducted when the Keetch-Byram Drought Index is 600 or higher

Prescribed fires will be conducted in accordance with all service policies and the prescribed fire burn plan once approved by the Refuge Manager.

The use of mechanical equipment must be approved by Refuge

Manager

D. Burn Season

The primary prescribed fire season is mid-March to late September.

E. Complexity

Most burns which will be conducted will be of low complexity as determined by the Region 6 Fire Rating Guide (Appendix L). Under certain conditions, the complexity may be Moderate. It is not anticipated that any burns conducted at the Refuge will exceed that level.

F. Planning

As part of the annual Firebase budgeting process, individual prescribed burns to be conducted in the up-coming fiscal year will be identified by the Refuge Manager and submitted to the Regional Fire Manager Coordinator for approval. Once approved, the funds may be used to implement the prescribed burn plan.

Prescribed fire burn plans are required for all prescribed burns, and will generally be written by a Burn Boss. Once written, the burn plan will be submitted to the ROS for review and the Refuge Manager for approval. Plans written by the Refuge Manager will be submitted to the Zone FMO for review and concurrence and returned to the Refuge Manager for approval. Plans, once approved are valid for three years. All plans must be reviewed by the Burn Boss before implementing the burn.

The approved burn plans will include a general contingency plan for all prescribed burns. More specific information regarding contingency planning may be included for a particular prescribed burn if the need exists. The following are the general contingency plan elements included in prescribed burn plans:

G If the prescribed fire escapes and is declared a wildland fire, the Burn Boss will request additional resources from Headquarters. At this time, the Burn Boss will determine if this is an escaped fire and if County Rural assistance is needed. If so, the Dispatcher will contact Phillips County Dispatch and request their resources. The Burn Boss will remain the IC until replaced by a more qualified person. The Burn Boss will determine if the ignitors should continue to ignite as part of the suppression tactics or quit and assist with other aspects of the wildland fire suppression activities. The Burn Boss will need to notify all Refuge personnel committed to the fire to switch their mobile radios to channels 2 & 3 (depending on which radio they have) so communications with Rural engines can

occur.

- If the fire suppression activities are not effective, each member of the burn crew needs to return to the place designated by the Burn Boss in the pre-burn briefing. The Burn Boss will meet with the burn crew there and provide further instructions.

- If a residence or structure is located between the wildland fire and secondary containment line or is directly threatened by the fire, that property will be priority second only to firefighter and public safety.

In the event of a wildland fire on or directly threatening Service owned lands being caused by an escaped prescribed burn being conducted on privately owned lands by the landowner or land renter, Refuge personnel will act accordingly. Refuge personnel will become part of the suppression team when requested by the Phillips County Dispatcher or a Refuge employee notices the wildland fire on or directly threatening Service lands, in which case the Phillips County Dispatcher will be notified of Refuge resources sent for suppression assistance.

G. Preparation and Implementation

Preparation of the burn unit will be specified in the prescribed fire burn plan and implemented in accordance with the plan. The Refuge Manager will assign the personnel needed to complete the preparation work, or the preparation work may be contracted and the contractor paid utilizing funds authorized by Firebase for the project.

H. Monitoring and Evaluation

Monitoring activities will be in accordance with the Region-6 Monitoring Plan (Appendix M).

XII. ADDITIONAL OPERATIONAL ELEMENTS

A. Public Safety

Firefighter and public safety will always take precedence over property or resource protection during any fire management activity. Firefighter safety is covered in Section X. This section will deal with public safety.

The greatest threat to public safety from Refuge wildfires are entrapment by

extremely fast moving fire fronts or fingers. Of particular concern are sportsmen and other visitors that may be present in the area of a fire, and neighbors who initiate their own suppression actions without proper training, equipment, or communication. Refuge staff will attempt to keep the fire scene clear of people except for qualified firefighters responding to the emergency.

Another concern is smoke from a Refuge wildfire, particularly smoke that drifts into a roadway causing reduced visibility. The fire dispatcher will notify the Phillips County Sheriffs office whenever the IC believes that smoke may be causing a safety hazard. The Sheriffs Office can assess the situation and take action as needed.

Another concern is for fires that might escape from the Refuge and threaten neighbors on private property. The following steps will be taken to minimize this threat:

The development of a professional and skilled fire management organization capable of safely suppressing wildfires and conducting prescribed fires.

The development and implementation of fire prevention programs.

The development and implementation of a hazard fuel management program.

Improving interagency coordination and cooperation including keeping local officials briefed on the potential for escape.

These programs are in their infancy, and will improve as the Refuge becomes more proficient, and is able to fine tune strategies and tactics.

B. Public Information and Education

Informing and educating the public is an important part of firefighting, fire prevention, and the Service mission. An informed and educated public is critical to gaining support for firefighting, fire prevention, and prescribed fire programs. There are several different aspects of this task.

1. Wildfire Suppression

The Incident Commander is in charge of the dispersal of fire information to the press and/or public on wildland fires. The IC may request assistance with these tasks if needed, but there has

been little need to do this in the past.

2. Prescribed Fire

Areas that have been burned will present an opportunity for the public to actually see the effects of fires, and offer staff members an excellent opportunity to explain the purpose of the burns to the public. These programs should demonstrate the refuge's capability to safely conduct prescribed fire operations, and increase the public's tolerance of the aesthetic effects.

3. Fire Prevention

The Refuge fire prevention plan is contained in Section X. B.

C. Records and Reports

The Refuge will use SACS to assign their own fire numbers and establish fire accounts. The web address is: http://fire.nifc.nps.gov/webterm/doidec.asp

The Refuge will use the same system to enter individual fire reports within 10 days of the prescribed burn being completed or a wildfire being declared out.

Individual Fire Fighter Time Reports or Crew time reports documenting hours worked and hazard and premium pay authorized will be submitted to the Refuge Administrative Assistant for input into the payroll system.

A list of all expenditures and requisitions for lost, damaged, or destroyed items resulting from wildfire suppression actions will be submitted to the Refuge Administrative Assistant within 5 working days of the fire.

Individual Fire Reports (DI-1202) that are open will be finalized and closed out no later than November 1st of each calendar year, unless the DI-1202 was issued for a prescribed fire project that is to be carried over to the following year. In that case, the Zone FMO will be provided with a list of fire number(s) to be carried over.

Completion Reports and/or other information required by Firebase will be submitted in time to meet Regionally established deadlines.

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 and Refuge's mission. Minor changes can be made and included in the plan. Revisions that result from changes in policy or resource planning are to be forwarded to the Regional Fire Management Coordinator for review and approval.

Fire management operations should undergo periodic review. The following are guidelines to be followed when conducting program reviews.

1. Wildfire

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

Significant injury or accident or fatality
Significant property or resource damage
Significant safety concerns are raised
An extended attack is necessary

2. Prescribed Fire

Prescribed fires will be critiqued by the Burn Boss and the results documented in the prescribed burn plan or on the DI-1202. The Regional Fire Management Coordinator and/or Zone Fire Management Officer will conduct a formal review in the event of:

Significant injury or accident or fatality
A prescribed fire is declared a wildfire
Significant safety concerns are raised
Significant smoke problems are encountered

XIII. CULTURAL RESOURCES AND SECTION 107 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.

Approximately fifteen percent of the Refuge has been inventoried for cultural resources. In May 1947, prior to construction of the Kirwin Dam, an archeological and

paleontological resource survey was conducted by the Smithsonian Institution. Nine sites have been identified and recorded on the Refuge. One is a historic site, Camp Kirwin, a U.S. Government encampment established circa 1865 for the protection of government surveyors working in the area. Registered fossil quarries are located on the Refuge. Scattered Native American campsites and artifacts occur (Osborn et.al. 1979). Many of these resources are in areas closed to recreational use.

Most of the sites are surface manifestations (Rhoda Lewis, personal conversation). Although several of the sites are inundated during periods of high water, they are susceptible to damage from fire activities and increased vandalism during periods of low water. The high incidence of human skeletal materials and the sensitivity associated with these remains must be taken into consideration when developing a prescribed burn plans or suppressing a wild fire. With so little of the Refuge inventoried for cultural resources there is a high probability that other sites exist.

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 on North Dakota prairies 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 Kansas 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 Refuge Manager on a fire by fire basis, and the use these resources will be considered in the approval process for any planned management actions. When the use of heavy equipment is authorized, its use will be monitored.

! The location of sites discovered as the result of fire management activities will be reported by the ROS 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

Visibility and clean air are primary natural resource values. The protection of these resources must be given full consideration in fire management planning and operations. In addition, smoke management can have serious health and safety effects which must be considered during the planning and approval process.

The management of smoke will be incorporated into the planning of prescribed fires, and to the extent possible, in the suppression of wildfires. Sensitive areas will be identified and precautions will be taken to safeguard visitors and local neighbors.

Federal smoke management regulations and guidelines will be followed when planning

and conducting prescribed fire on the Refuge. There is no State Implement Plan (SIP) for smoke management in the State of Kansas.

The State of Kansas does have minimal smoke management guidelines and regulations that pertain mainly to agricultural burning and the prevention of smoke lingering on roadways and in other sensitive areas. Night-time ignitions, burning on days when the cloud cover is >.7 and/or when wind speeds are <5 or >15 mph are prohibited. No prescribed burning permits are required, however the public is required by the Kansas Department of Health and Environment to complete a brief outline and submit it to the local Sheriff's office prior to ignition so the Sheriff Dispatcher can track prescribed burning activities for the RVFDs. The Refuge will inform the Phillips County Dispatcher in advance of all planned prescribed fire activities and will mitigate all smoke and other emissions in order to meet State guidelines (Appendix N).

XV. FIRE RESEARCH NEEDS

The effects of fire upon the Refuge's plants and animal populations need to be better understood. Through applied research and careful application of fire, data collected can provide managers with a better understanding of the natural ecological effects of fire, and the information needed to refine prescriptions to meet resource objectives.

Fire behavior data will be collected on all fires occurring on the Refuge. Monitoring, addressed earlier, will comply with accepted scientific methods. This data, along with information gathered through research studies, will be used to improve the effectiveness of the fire management program.

The following Fire Research is needed at the Kirwin National Wildlife Refuge:

- Comprehensive assessment of the Refuge's hazard fuels, and the identification and prioritization of hazard fuel units.

- Assessment of hazard fuel management options, and their effects upon Refuge resource objectives.

- Assessment of long and short term fire effects in the Kansas prairie with recommendations for using prescribed fire in conjunction with other management tools to meet resource objectives.

XVI. CONSULTATION AND COORDINATION

This plan is subject to review by Regional Office staff and members of the National Fire staff at NIFC. In addition the plan should be circulated to the local fire departments for review and comment.

The following individuals were consulted during the development of this plan:

Carl Douhan, Prescribed Fire Specialist, Region 6, USFWS
Roger Erb, National Fire Coordinator, USFWS, NIFC
Jim Kelton, Zone Fire Management Officer, Region 6, USFWS
Bill Leenhouts, USFWS, NIFC
Rhoda Lewis, Regional Archeologist, Region 6, USFWS
Rich Sterry, Fire Management Officer, Flint Hills National Wildlife Refuge
Phil Street, Regional Fire Management Coordinator, Region 6, USFWS

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APPENDIX A: WILDLIFE LISTS

APPENDIX B: RARE, THREATENED, AND ENDANGERED SPECIES LISTS

Federally listed threatened and endangered species which may occur in Phillips County, Kansas:

Common Name	Scientific Name	Comments
Peregrine falcon	Falco peregrinus	Migrant
Bald eagle	Haliaeetus leucocephalus	Migrant & winter resident
Eskimo curlew	Numenius borealis	Spring migrant
Interior least tern	Sterna antillarum	Migrant, nesting
Piping plover	Charadrius melodus	Migrant, nesting
Whooping crane	Grus americanus	Migrant
American burying beetle	Nicrophorus americanus	Riparian & grassland areas

Federally listed category I and II candidate species found in Phillips County, Kansas:

Common Name	Scientific Name	Comments
Ferruginous hawk	Buteo regalis	Migrant
Loggerhead shrike	Lanius ludovicianus	
Black tern	Childonias niger	
Long billed curlew	Numenius americanus	

APPENDIX C: CAPITAL IMPROVEMENTS

APPENDIX D: FIRE OCCURRENCE

APPENDIX E: QUALIFICATIONS

STAFF FIREFIGHTERS: (Line Qualified - Fitness)

Firefighter	Qualifications		Home Phone Number
	Wildland Fire	**RX Fire**	
William Schaff	ICT4, CRWB, FFT1, ENGB, HESM	RXB2, RXI2	785-543-6673
Erich Gilbert	FFT2	RXB3,FFT2	785-543-6673
Steve Knowles	FFT2, ENGB	FFT2, ENGB	785-543-6673

Chris Flores-Schaff	FFT1, ENOP, ENGB Trainee	FFT1, ENOP,	785-543-6673
Deon Steinle	ENOP, FFT2	ENOP, FFT2	785-543-6673
Robin Balaban	FFT2	FFT2	785-543-6673

APPENDIX F: AGREEMENTS

APPENDIX G: NORMAL UNIT STRENGTH

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)	1998	100	1	12k	1	18k
Slip-on Unit(s)	1991,1995	100	2			
Water Tender(s)						
Portable Pump(s) Standard Flot-a-pump	1998	100	1		1	

Power saw(s)	1998	100	1			
Mower(s)	1996	100	2			
Tractor(s)						
ATV(s)						
Grader(s)						
Plow Unit/Disk	1997		1			

Other (List) 1500 gal ag-tank			1			

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.
4WD Tractor with Disk	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
Road Grader	
Chevy Cheyenne 3500 4WD	
Dodge Ram 4WD	
2 ATV	

Table 2: Supplies and PPE

Item	Quantity	
	Need	Have
Hose, lightweight, lined 1.5" x 100'	9	2
Hose, lightweight, lined 1" x 100'	9	
1" NH gated wye	2	
1.5" NH gated wye	2	
1.5" nozzle	2	
1" Forester nozzle	4	
Hydrant wrench, spanner	2	
Hose clamp	2	
flapper	3	5
Pulaski w/sheath	3	3
Shovel w/sheath	3	6
rake	2	
Combi tool	3	0
Drip Torch	2	3
Fusees	1 Case	

Safety Can: 3 Gallon	2	
Foam	15 gallons	
Backpack Pump	4	7
Canteen, large	2	
Belt Weather Kit	2	
Hard Hat	8	8
Goggles	8	
Headlamps	8	
Fire Shelter w/Liner	8	2
Line Pack w/harness	7	
Water Bottle	24	
Ear Plugs	12 pks	
Leather Gloves, Assorted sizes	18 pr	
Sleeping Bags	7	
Pearsonal Gear Pak (Red Bag)	7	
Personal First Aid Kit	8	
Nomex Shirts Small Medium Large X-Large	Enter Desired Number should have 14 pr (Men & Women)	
Nomex Pants - Men's 28x30 32x30 32x34 34x30 34x32 34x34 36x30 36x32 36x34 38x34 40x34		
Nomex Pants - Women's Size 10 Size 12 Size 14 Size 16		

APPENDIX H: FITNESS TESTING

APPENDIX I: STEP-UP PLAN

The Refuge Manager with the assistance of the Zone and Quivira FMOs will monitor current and predicted fire weather reports, and take appropriate actions as listed in the step-up plan. The Staffing Classes will be based on the cumulative effects of drought as indicated by the Keetch Byram Drought Index which is available on the web at: *http://www.boi.noaa.gov/fwxweb/fwoutlook.htm* and the National Weather Service's Rangeland Fire Index for North Central Kansas which is available on the web at the following address: *www.ksu.edu/weather/rfd.html*

STAFFING CLASS	RANGELAND FIRE DANGER INDEX
SC-1	Low
SC-2	Moderate
SC-3	High
SC-4	Very High
SC-5	Extreme

Table 1: KIRWIN NWR FIRE STEP-UP PLAN

PREPAREDNESS ACTIONS	STAFFING CLASS				
	1	2	3	4	5
FIRE STAFF					
* Dress in nomex and boots, carry PPE while on duty, and maintain radio contact with headquarters	X	X	X	X	X
* Maintain a maximum response time (with assigned engine at duty station) of:	1 hour	30 min	10 min	3 min	3 min
* Remain with assigned engine at station or on patrol				X	X
* Work weeks and/or tours of duty may be extended				X	X
REFUGE STAFF FIREFIGHTERS					
* Carry PPE with them while on duty		X	X	X	X
* May be assigned to an engine at a station or patrol				X	X
* Work weeks and/or tours of duty may be extended				X	X
FIRE EQUIPMENT					
* Type 6 engines in ready status	1	1	2	2	2
FIRE PREVENTION ACTIVITIES					

* Post fire danger signs at high public use areas			X	X	X
* Restrict vehicles to paved/gravel parking areas or within boats ramps and boat trailer parking, and close select trails and public use areas				X	X
MISCELLANEOUS EMERGENCY PREPAREDNESS ACTIONS					
* Increase one staffing class if lightning activity is probable	X	X	X	X	X
* Ground patrol detection after thunderstorm (at discretion of RM)				X	X
* Preposition FWS and Interagency resources				X	X
* Notify RFMC and open emergency presuppression acct.				X	X
Step-up plan does not apply when refuge resources are assigned to fires					

Notes:

1. Ready Status engines are unstaffed, but filled (except in winter) and ready to respond.

2. Resources assigned to fires outside the Refuge may impact some staffing actions - Refuge Manager should use common sense in determining whether or not to fill behind dispatched resources.

3. The Refuge Manager with concurrence of the Zone FMO and Regional Fire Management Coordinator may authorize the activation of a emergency presuppression account to cover overtime for SC-4 and SC-5 step-up actions that can not be met with regularly scheduled employees. Collateral duty firefighters may be assigned emergency presuppression duties if need. It may be impossible for the Refuge to meet some staffing actions once Refuge resources have been dispatched to a fire. In those cases, it will be up to the Refuge Manager with Zone FMO concurrence, to determine if outside assistance should be ordered.

ATTACHMENT 1: PREATTACK PLAN

Preattack planning data continues to be compiled by the Refuge Manager and staff. Once finished, the refuge will have a preattack plan including:

1. Response map

- roads, fences, and gates
- fire stations/caches
- airports and helispots
- water sources (type and flow)
- mutual aid zones/fire cooperator districts

2. Hazard/Risk map

- high potential fire occurrence zones
- potential values at risk zones (high, medium,low)
- hazard potential zones (high, medium, low)

3. Natural and Cultural Resources map

- sensitive zones
- non-sensitive zones
- restricted vehicle access areas

4. Suppression Strategies and Tactics

5. Structure assessments

6. Closure/Evacuation procedures

ATTACHMENT 2 : INCIDENT COMMANDER PROCEDURES

1. Receive report of fire information from dispatcher.

2. Make initial resource order based on current and expected resistance to suppression.

    a. Use two person engine crews **except** during extreme fire conditions or a canyon fire.
    b. Use primary engine first, then secondary engine.
    c. Utilize engines in tandem, if practical.
    d. If refilling tanks looks likely, request support person to handle task.

3. Travel to fire. Utilize radio to brief and deploy responding resources. Brief resources thoroughly on safety concerns.

    a. Caution crews to drive safely and take it easy on the equipment.
    b. Approach fire from the rear or rear flanks. Do not approach fire from head. Beware of wind shifts, and look for escape routes and safety zones
    c. Instruct crew to stop and lock hubs as soon they leave the pavement.

4. Upon arrival, size up the fire and deploy resources as needed.

    a. Fight fire from the black whenever possible. If you must fight from the green, identify safety zones and escape routes and notify fire personnel.
    b. Deploy resources in tandem whenever practical.
    c. Relieve any ranchers/volunteers who are on the fire.
    d. Maintain radio contact with all resources on the fire and request periodic progress checks.
    e. Keep notes on deployments and events.

5. Relay size-up and initial weather observations to dispatcher.

    a. Terrain and fuel type
    b. Fire behavior and rate of spread
    c. Current fire acreage
    d. Projected fire acreage and time of control
    e. Values at risk
    f. Current Weather Observations (belt weather kit)
        * temperature
        * dew point
        * wind speed and direction
        * cloud cover

X comments

6. Insure planning, finance, and logistical support are provided for all resources assigned to the fire. Do not overlook providing drinking water, beverages, meals, and sleeping arrangements as necessary.

7. Order additional resources, or release responding resources, as appropriate.

   a. Order whatever is needed to suppress the fire - let the dispatcher worry about filling the order, but do not count on resources arriving on time.
   b. Order food and/or drinks several hours prior to when they will be needed - take care of your firefighters.
   c. Release rural fire department forces ASAP.
   d. Keep seasonal firefighters on fire until mop-up is complete.

8. Order overhead resources (team or individuals) if any of the following conditions look probable (consult RFMC, Zone FMO, or another FMO for advice on what to order):

   a. Containment is not expected until the next day or later
   b. There is serious risk to life and/or structures
   c. Multiple fires are occurring and the IC(s) can not gain control of the situation and/or feel uncomfortable in performing their duties

9. Inform the Refuge Manager that the fire is not expected to be contained until after 10 am the following day so that a Wildland Fire Situation Analysis can be completed.

10. Effectively mop-up the fire and provide for patrols until the fire is declared out.

11. Have crew informally critique the fire and see if preparations or operations could be improved.

12. Complete taskbooks for crew members.

13. Insure all equipment is ready for the next fire before releasing crews. Report any repairs needed or missing equipment to the Refuge Manager.

14. Insure all paperwork including fire reports, time reports, and resource orders are properly completed and routed to the Zone FMO.

APPENDIX J: FIRE DISPATCH PLAN

A. Upon Report of Smoke or Fire:

1. Maintain log of all radio and telephone communication (Attachment 1).

2. Record the following information.

   a. Name of Person Reporting Fire:
   b. Callback number:
   c. Location of smoke or fire:
   d. Access to fire:
   e. Color of smoke (White, Black, Grey):
   f. Size of fire (Small, Medium, Large):
   g. Type of vegetation (Grass, Brush, Timber, Slash):
   h. Fire behavior (Smouldering, Creeping, Running):
   I. Improvements threatened (Type, Location):
   j. Anyone on the fire (Civilian, Fire Department):

3. Check location on map to determine land ownership/protection status.

B. If Fire Is On or Threatening Refuge

1. Select and notify an Incident Commander. If a qualified IC is not available, contact the highest qualified firefighter available.
2. Obtain and fill IC's resource order for initial attack resources. A listing of resources is contained in Attachment 2.

Table 1: Filling Resource Orders

Filling Resource Orders
1. Determine from the IC: a. The type of resources are needed. b. How many of each type of resource are needed. c. When and where should the resources are to report. 2. Begin locating and ordering the resources from the closest sources: a. Local cooperators b. Local vendors and/or contractors c. Neighboring refuges d. Pueblo Interagency Dispatch Center 3. When notified that an order has been filled and that resources have been dispatched: a. Record info - source, order number, ETA, etc. b. Notify IC of ETA c. Track resources to make sure they arrive. If they do not arrive when expected notify the source dispatch office. 4. Receive and fill additional resource orders as they are made by the IC.

3. Notify Phillips County Dispatch of fire location and the Refuge's response. Unless assistance has been requested by IC, inform them that the Refuge is not presently in need of additional assistance, but will request their assistance if the situation changes.

4. Notify Refuge Manager.

5. Notify KKAN radio of situation (785-543-2151). Inform them that:

A fire has been reported on the Refuge and appropriate fire suppression resources have been dispatched
That additional help is not needed at this time
The fire area has been temporarily closed to public access for safety purposes and to facilitate transportation of fire engines and crews.
Request that they broadcast the information.

6. If fire danger is high, request spot weather forecast for the next 24 hours from National Weather Service - Hastings, NE (402-232-1493). If at all possible provide them with the following information: Current temperature, relative humidity, wind direction, wind speed, barometric pressure, days since precipitation and amount received, and lightning activity.

7. Remain on duty until relieved or released by the Incident Commander.

C. If fire is In the Vicinity But Not on or Threatening Refuge

1. Notify Phillips County Dispatch, offer any assistance if needed.

2. Notify Refuge Manager or acting Refuge Manager.

D. Requests for Assistance to Cooperators (local or interagency)

1. Take resource order information:

a. Nature of incident
b. Location and access to fire
c. Type and quantity of resources needed
d. When and where they are to report
e. Radio frequency
f. IC/Officer in Charge

2.. Inform cooperator that you will check what is available and call back within 1 hour.

3. Notify Refuge Manager and Zone FMO and get approval for dispatch.

4. Dispatch resources requested and approved by Refuge Manager and/or Zone FMO. Additional resources can be obtained from nearby refuges if needed and available (see regional dispatch plan in back of Fire Management Handbook).

5. Notify cooperator or Dispatch Center and inform them of the type and number of resources dispatched and their estimated time of arrival.

6. Coordinate the filling of additional resource orders from the Cooperator.

7. Remain on duty until relieved or released.

E. Releasing Resources

1. Contact the sending unit and determine if they are to be sent home or reassigned.
2. Make necessary travel arrangements including food and lodging.
3. Notify home unit of ETA.
4. Review and sign off on Fire Time Reports.

Attachment 1: Communications Log

TIME	TX	RX	TRANSMISSION

Attachment 2: Radio Frequencies

Attachment 3: Dispatcher Resource List

DISPATCHER RESOURCE LIST		
RESPONSE TIME	RESOURCE	AGENCY/LOCATION
Less than 0.5 hour	2 - Type 6X Engines	Refuge
	1 - Grass Rigs 1 - Structure Trucks 1 - Tanker	Kirwin RVFD (911)
0.5 - 1.5 hours	1 - Tractor and Disc 1 - Grader	Refuge
	4 - Type 6X Engines 1 - Tender 1500 gal	Phillipsburg
	1- Structure Truck	Phillipsburg
	misc grass rigs	local VRFPDs, ranchers (911)
1.5 - 2.5 hours	1 - Type 7X Engine	Rainwater WMD (308-236-5015
2.5 - 3.5 hours	2 - Type 7X Engines 1 - Type 4X Engine	Quivira NWR (316-486-2393)
3.5 - 4.5 hours	2 - Type 6X Engines	Crescent Lake NWR(308-762-4893/4339)
*** Availability and response time varies with time of year and fire occurrence - chart generally reflects optimal conditions.**		

Attachment 4: Fire Directory

KIRWIN NATIONAL WILDLIFE REFUGE
FIRE RESOURCE DIRECTORY - January 31, 2007

FIRE REPORTING OR ASSISTANCE REQUEST:

1. William Schaff, Project Leader 785-543-6673 (w) 785-543-3088 (h)
2. Erich Gilbert, ROS 785-543-6673 (w) 785-543-2677 (h)
3. Steve Knowles, Maintenance Worker 785-543-6673 (w) 785-543-6767 (h)
4. Diane Stockman, Refuge Assistant 785-543-6673 (w) 785-543-6736 (h)

STAFF FIREFIGHTERS: (only employees which can be used on the fire line)

William Schaff	ICT4, CRWB, FFT1, ENGB	785-543-6673
Erich Gilbert	FFT2,	785-543-6673
Steve Knowles	FFT2, ENGB	785-543-6673
Chris Flores-Schaff	FFT1, ENGB Trainee	785-543-6673
Deon Steinle	FFT2	785-543-6673
Robin Balaban	FFT2	785-543-6673

SUPPORT STAFF: (For support off of the fire line only)

Diane Stockman	785-543-6673	CreditCard

ADDITIONAL RESOURCES: (call and place a resource order)

Phillips County, Chief	785-543-6805	911
Pueblo Dispatch, Jim Fletcher, Disp.	719-545-1454	
National Weather Service	402-462-2416	
Phil Street, RFMC	303-236-8145	303-933-6851
Jim Kelton, Zone FMO	402-376-3789	
Brian McManus-North Dakota Dispatch	701-768-2551	
William Waln, Quivira NWR	316-486-2393	316-664-5445
Rich Sterry, Flint Hills NWR	316-392-5553	
Bill Behrends, Crescent Lake NWR	308-762-4893	308-762-4339
Crescent Lake Bunkhouse	308-762-6334	
Gene Mack, Rainwater WMD	308-236-5015	

COOPERATORS:

Phillips County Dispatch	911
Quivira NWR	
Bill Waln, FMO	316-486-2393(w) 316-664-5445(h)
Rainwater Basin WMD	
Gene Mack, RM	308-236-5051
Weather Service	
Hastings Fire Weather	402-426-2416
Regional Fire Management	
Phil Street, RFMC	303-236-8145/933-6851
Jim Kelton, Prescribed Fire Splst	303-236-8145
Mike Granger, Zone FMO	406-538-8706/5286
Lou Ballard, Zone FMO	
Vacant, Zone FMO	402-376-3789
National Fire Management Coordinator	
Roger Erb	208-387-5596/853-0529

Refuge Neighbors:

January 1997

Deer Creek Township	**Residences**	
Section 20, T4S, R17W	Esther McComb, Glade, KS	543-2605
	Cleo McComb, Glade, KS	543-5750
	Eddie Thomas, Glade, KS	543-6207
Section 21, T4S, R17W	Larry Chestnut, Glade, KS	543-2569 543-2100 (Cafe)
Section 21, T4S, R17W	**Landowners Only**	
	Esther McComb	
	Brent Still, Phillipsburg, KS	543-2734
Section 29, T4S, R17W	Esther McComb	543-2605
Section 27, T4S, R17W	Hunting Club (Dr. from Hastings, NE)	

Section 26, T4S, R17W	Oren Yowell, Phillipsburg, KS	543-5576
	Lottie McCormack (Delbert)	543-6798
Section 25, T4S, R17W	**Residences**	
	Delbert McCormack, Kirwin	543-6798
	Landowners Only	
Section 25, T4S, R17W	Lottie McCormack (Delbert)	543-6798
	Vern McDermed, Phillipsburg, KS	543-5436
	Wm. Kendrick (Bill Jones)	543-6758
Section 32, T4S, R17W	Esther McComb, Glade	543-2605
	Doyle Rahjes, Agra, KS	638-2818
Bow Creek Township	**Landowners Only**	
Section 3, T5S, R17W	Doris Stowell, Phillipsburg	543-2622 (Home) 543-2511 (Work)
Section 2, T5S, R17W	Doris Stowell	
	George & Joan Morris	
	Kerry Zillinger - renter	543-2566
Section 1, T5S, R17W	Wyrill Farming, Kirwin	543-6565
Section 7, T5S, R17W	Wyrill Farming	543-6565
Section 12, T5S, R17W	Wyrill Farming	543-6565
	Hoffman Estate	
	Jimmy DeBey, Kirwin	425-6959
	Steve Knowles, Kirwin	543-6767
Section 13, T5S, R17W	Hyle Huginin, Kirwin	543-6766 (Home) 543-5830 (Work)
	Leland McDowell (Nebr)	
	Bruce Stockman - renter	543-6666
Section 24, T5S, R17W	Evelyn Darrah, Phillipsburg	543-5434
	Kenny Stockman - renter	543-6736
	FW Hachmeister, Natoma	885-4630
	Residences	
Section 23, T5S, R17W	Forrest L. Elliott	543-6724
	Vernon Lawyer	543-6747
	Phil Speake	543-6718

	Dan Johnson	543-5783
	Landowners Only	
Section 26, T5S, R17W	Kenneth Stockman	543-6736
	Floyd Wyley	543-6729
	Edward DeBey	543-6735
Section 25, T5S, R17W	Jane Jameson	
	Darrell Bretton - renter	476-3299
	Brooka Keller, Ellis	726-4411
	Dolores Knowles - renter	543-6749
Section 24, T5S, R17W	Floyd Wyley	543-6729
	Jane Jameson, Colorado	
	Darrell Bretton - renter	476-3299
	Cleo McComb, Glade	543-5750
Valley Township	**Residence**	
Section 19, T5S, R16W	Ed Linkous	543-6169
	Landowners Only	
	Jane Jameson, Denver	
	Darrell Bretton - renter	476-3299
	Marcia Blackbill	
	Bob Capps - renter	543-6786
Section 16, T5S, R16W	Marcia Blackbill	
	Bob Capps - renter	543-6786
Section 17, T5S, R16W	Maxine Blecha, Woodston	994-6530
	Bruce Stockman - renter	543-6666
Section 8, T5S, R16W	Myrtle Still	
	Robert Still - renter	543-6740
	Dane G. Hansen Scout Camp	543-6688
Section 9, T5S, R16W	Bob & Donna Mosier, Greensburg	
Section 4, T5S, R16W	Pat Johnson - renter, Canton, KS	
Section 3, T5S, R16W	Wyrill Farming, Kirwin	543-6565

Kirwin Township	**Landowners Only**	
Section 34, T4S, R16W	Wyrill Farming, Kirwin	543-6565
Section 28, T4S, R16W	Wyrill Farming, Kirwin	543-6565
Section 30, T4S, R17W	Jack & Ivalee Bennett, Stockton	425-7272
	Devaun Adams (Bruce Stockman)	543-6666
	Wyrill Farming	543-6565

Local Services

Aircraft - Phillipsburg Airport 913-543-2676

Drinks, Snacks, and Groceries

Kirwin -Hillbilly Inn		785-543-5993
Agra- Peoples Store Grocery		785-638-2875
Phillipsburg-	Boogaarts Market	785-543-5412
	Love's Country Store	785-543-5813
	Quality Corner	785-543-6414
	Tom's Korner	785-543-2801

Meals - Take Out and Restaurants

Kirwin- L&E Cafe		785-543-6797
Glade- Triple C		785-543-2100
Agra-Agra Inn		785-638-2232
Phillipsburg-	Chicken Inn	913-543-6339
	Chubby Pickle	913-543-6474
	Colonial Rest.	913-543-8954
	Oriental-Am. Rest.	913-543-2707
	Pizza Hut	913-543-2139

Lodging- Phillipsburg

Mark V Motel	913-543-5223
Cottonwood Inn	913-543-2125

Fuel Delivery

Agra Coop.	913-695-2216
Prairie Hills Producers	913-543-6138

Tire Service and Mechanics

Pooch's Texaco	913-543-8988

Phillipsburg Coop	913-543-2114
Matteson Motor, Dodge	913-543-2423
Leonard Ford	913-543-2147

Hardware

Coast to Coast	913-543-5017
True Value	913-543-6314

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)	

A. Objectives (Must be specific and measurable)

1. *Safety*

   - Public

   - Firefighter

2. *Economic*

3. *Environmental*

4. *Social*

5. *Other*

B. Constraints

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			
B. Narrative			

C. Resources needed Handcrews Engines Dozers Airtankers Helicopters			
D. Final Size			
E. Est. Contain/ Control Date			
F. Costs			

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**
Safety Firefighter Aviation Public			
Sum of Safety Values			

Economic Forage Improvements Recreation Timber Water Wilderness Wildlife Other (specify)			
Sum of Economic Values			
Environmental Air Visual Fuels T & E Species Other (specify)			

Sum of Environmental Values			
Social Employment Public Concern Cultural Other (Specify)			
Sum of Social Values			
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

Date	Time	By	PREPAREDNESS LEVEL	INCIDENT PRIORITY	RESOURCE AVAILABILITY	WEATHER FORECAST	FIRE BEHAVIOR PROJECTIONS	WFSA VALID

If WFSA is no longer valid, a new WFSA will be completed!

VIII. Objectives	Final Review

The elements of the selected alternative were met on: _____ _____
Date Time

By:_____
(Agency Administrator(s)

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

A. FIRE BEHAVIOR: Observed or Predicted	**Yes**	**No**
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**_____

ATTACHMENT 1 - DELEGATION OF AUTHORITY

Kirwin National Wildlife Refuge
Kirwin, Kansas

As of (time) , (Date) , I have delegated authority to manage the (Fire Incident Name) , (Fire Number) , Kirwin National Wildlife Refuge, to Incident Commander (Name) and his/her Incident Management Team.

As Incident Commander, you are accountable to me for the overall management of this incident including it's control and return to local forces. I expect you to adhere to relevant and applicable laws, policies, and professional standards. While the suppression of the fire is your primary task, you are expected to do so in a manner that provides for the safety and well being of involved personnel. Consideration for the needs of local residents and communities is essential for successful management of the incident.

I am assigning (name) as the line officer representative to act as liaison and provide any help you need. (S)he is authorized to speak for me in the event a decision is needed.

My specific considerations for management of this fire are:

1. Ensure the safety of firefighters, visitors, and neighbors.

2. Protect private and refuge property to the extent possible.

3. Minimize damage to environmental resources

4. Key resource considerations are: protecting rare, threatened, and endangered species; preserving as much wildlife habitat as possible; avoiding wildlife entrapment situations; and limiting degradation of the Refuge's aesthetic values.

5. Restrictions for suppression actions are no earthmoving equipment (dozers, discs, plows, graders) without approval of the Refuge Manager.

6. Manage the fire cost-effectively for the values at risk.

7. Provide training opportunities for U. S. Fish and Wildlife personnel is requested to strengthen our organizational capabilities.

(signed)
William Schaff Date
Project Leader

APPENDIX L: FIRE 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.

APPENDIX N: KANSAS SMOKE MANAGEMENT GUIDELINES