APPENDICES

Appendix A: NEPA Documents
Appendix B: Mowing Plan
Appendix C: Threatened and Endangered Species
Appendix D: Capital Improvements
Appendix E: Selected Fire Effects
Appendix F: District FMO Responsibilities
Appendix G: Staff and Qualifications
Appendix H: Cooperators
Appendix I: Cooperative Agreements
Appendix J: Fitness
Appendix K: Employee Contact List
Appendix L: Normal Unit Strength
Appendix M: Fire Base
Appendix N: Maintenance Plan
Appendix O: Step-up Plan
Appendix P: Crew Standard Operations Guide
Appendix Q: Dispatch Plan
Appendix R: Pre-Attack Plan
Appendix S: Wildland Fire Situation Analysis
Appendix T: Delegation of Authority
Appendix U: Prescribed Fire Complexity
Appendix V: Monitoring Guidelines

TABLES

FIGURES

1.0 INTRODUCTION

1.1 Overview of Complex

The goals of the U.S. Fish and Wildlife Service (Service) in managing refuges are:

Goal 1: To preserve, restore, and enhance in their natural ecosystems all species of animals and plants that are endangered or threatened with becoming endangered;
Goal 2: To perpetuate the migratory bird resource;
Goal 3: To preserve a natural diversity and abundance of fauna and flora on refuge lands; and
Goal 4: To provide an understanding and appreciation of fish and wildlife ecology and man's role in his environment and provide visitors with high quality, safe, wholesome, and enjoyable recreation experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

Fire can be used to meet these goals.

Service policy requires that all refuges with burnable vegetation must have an approved fire management plan. This plan fulfills that requirement and provides the guidance necessary for managing fire to achieve the resource management objectives of the Ft. Niobrara/Valentine National Wildlife Refuge Complex (Complex).

The Complex consists of the Ft. Niobrara National Wildlife Refuge (NWR), the Valentine NWR, the John W. and Louise Seier NWR, the Holt Creek Wildlife Management Area, which is in the process of changing ownership with the state, and the Yellowthroat Wildlife Management Area (Figure 1). Since Holt Creek will not be administered by the Service in the near future its description is omitted as a satellite property. The Complex is administered from the headquarters located at the Ft. Niobrara NWR Visitor Center, five miles east of Valentine, Nebraska.

Table 1: Management Units - Ft. Niobrara/Valentine National Wildlife Refuge Complex

Management Unit	Acres
Fort Niobrara NWR	19,131
Valentine NWR	71,272
Seier NWR	2,400
Yellowthroat WMA	420
Mead, Wagner, Yellowthroat Conservation Easements	989

1.2 Overview of Resource Management Planning Documents

The documents providing guidance for the management of the Refuge Complex are the Fort Niobrara and Valentine Comprehensive Conservation Plans (CCP's). The CCP's were prepared to meet Congressional mandates of the National Wildlife Refuge System Improvement Act of 1997 and will guide management of the wildlife and habitat within the Complex over the next 10 to 15 years. The CCP's provide clear goals and objectives for management of Refuge Complex habitats, wildlife, threatened and endangered species, cultural and paleontological resources, other compatible public uses, and partnerships, along with implementation strategies, and recommended staffing and funding for these areas (Fort Niobrara CCP 1999, Valentine CCP 1999).

With the completion of the CCP process, a series of step-down plans such as a Habitat Management Plan will need to be written. Once this is done, this Fire Management Plan may need to be revised based on the new management direction. The FMP will be further evaluated once the Wilderness Management Plan (WMP) is approved at Fort Niobrara NWR to ensure it is consistent with the WMP objectives. The review will evaluate prescribed fire and fire suppression activities within the wilderness area. Until these plans are completed, this plan will provide the guidance for fire management common to any of the resource management objectives that are outlined in the CCP.

Figure 1 - Vicinity Map - Ft. Niobrara/Valentine NWRC

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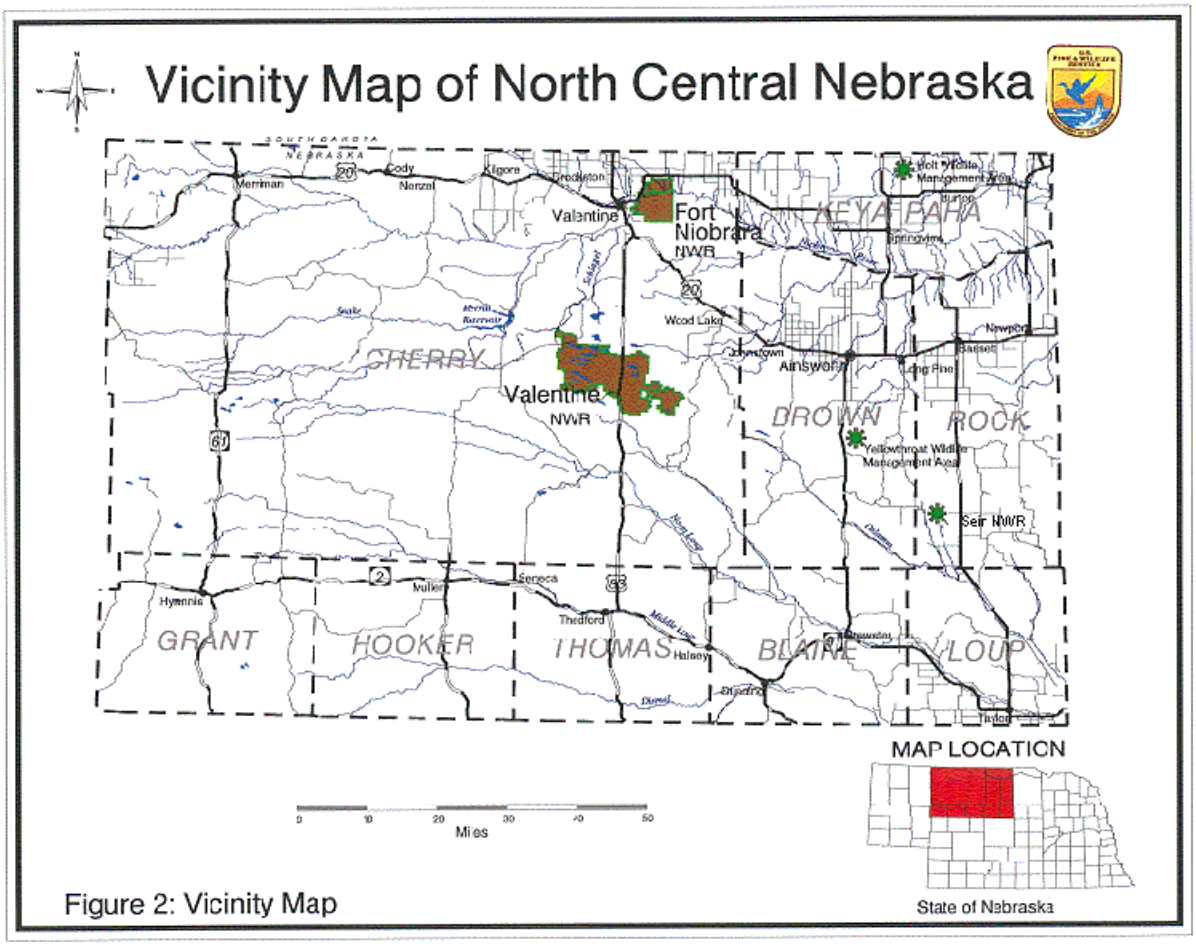

Figure 2: Vicinity Map

2.0 POLICY COMPLIANCE

2.1 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. 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.

2.2 NEPA Compliance

This plan meets the requirements established by the National Environmental Protection Act (NEPA). The assessment of the environmental consequences of all alternatives, and the selected alternative (Modified Historical) was completed as part of the Comprehensive Conservation Plan development process for Ft. Niobrara, and a Finding of No Significant Impact (FONSI) was signed by the Regional Director (Appendix A). The entire planning process was completed with full public participation. The same process was followed for Valentine NWR and a FONSI was signed by the Regional Director (Appendix A). 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 A.

Land use and habitat management options have not been addressed for the Seier National Wildlife Refuge through a process that includes public input as required by NEPA, therefore, only fire suppression will be done until land use plans that address the use of prescribed fire are completed.

2.3 Authorities Citation

Authority and guidance for implementing this plan are found in:

- Protection Act of September 20, 1922, 42 Stat. 857;16 U.S.C. 594. 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.

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

- Reciprocal Fire Protection Act of May 27, 1955, 69 Stat.66.67;42 U.S.C. 1856, 1856 a and b. 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.

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

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

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

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

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

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

- National Wildlife Refuge System Improvement Act of 1997

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

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

- U.S. Fish and Wildlife Service Fire Management Handbook (June 1, 2001)

2.4 Other Regulatory Guidelines

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

- Departmental Manual Part 519 (519DM)

- Code of Federal Regulations (36 CFR 800)
- The Wilderness Act of 1964
- National Historic Preservation Act of 1966
- The Endangered Species Act of 1973, as amended
- The Archaeology and Historical Preservation Act of 1974, as amended
- The Archaeological Resources Protection Act of 1979
- The Provisions of the Clean Air Act, as amended 1990

3.0 ENABLING LEGISLATION AND PURPOSE OF REFUGE (MISSION STATEMENT)

3.1 Fort Niobrara National Wildlife Refuge

Fort Niobrara National Wildlife Refuge was established by Executive Order 1461 on January 11, 1912 as a “preserve and breeding ground for native birds”. Following issuance of an Executive Order dated November 14, 1912 setting aside additional lands at the “Niobrara Reservation”, the Refuge’s purpose was expanded to include preservation of bison and elk herds representative of those that once roamed the Great Plains. An unusual and unique assemblage of major plant communities converge along the Niobrara River on Fort Niobrara NWR thereby providing habitat for a rich diversity of wildlife generally unchanged from historic times. Special legislated designations on the Refuge include the Fort Niobrara Wilderness Area, Ponderosa Pine Research Natural Area, and National Scenic River. Approximately 120,000 people visit the refuge annually for wildlife/wildlands observation, photography, interpretation, education and fishing. Floating the Niobrara River by canoe, kayak or float tube is a popular recreational activity and enables several priority wildlife-dependent public uses to take place.

3.2 Valentine National Wildlife Refuge

Valentine National Wildlife Refuge was established August 13, 1935 by Executive Order 7142 "as a refuge and breeding ground for migratory birds and other wildlife." In 1976 the refuge was designated as a Registered National Natural (Grassland) Landmark. The refuge also contains one wilderness study area and two research natural areas. Valentine National Wildlife Refuge is managed primarily to preserve, restore, and enhance native grasslands for migratory birds and other indigenous wildlife with emphasis on waterfowl, prairie grouse, and other grassland dependent birds. The refuge also provides outstanding recreational opportunities with an annual visitation of approximately 20,000 - 40,000.

3.3 Seier National Wildlife Refuge

On July 26th, 1990, John W. and Louse Seier Living Trust was prepared and included in the Last Will and Testament of John W. Seier by John R. McDonald. Provisions of this Trust and Will indicate that upon his death, the property shall be bequeathed to his sister, Louise. John W. Seier died in December of 1997. Louise Seier, through the Personal Representative of the Trust, Jim Eiler, indicated to the Service, by letter dated April 27, 1998, that she wishes to fulfill the original purposes of the Trust and donate the property to the Service with a life-use reservation. On the 26th day of October 1999, John W. and Louse Seier Property was officially listed in Rock County, Nebraska as a National Wildlife Refuge.

The basic provisions are that the Service would receive title to the property upon formal acceptance and commitment to manage the land for wildlife purpose as the John W. and Louise Seier National Wildlife Refuge. Further provisions include the Service commitment to erect an appropriate memorial on the property recognizing the donation. The final provision of the Trust and Will are that all personal property and investments are to be converted to cash and donated to the Service for use in managing the donated land upon Louise's death. The primary objective will be to preserve, restore and enhance the ecological diversity and abundance of migratory and resident wildlife. Management of this refuge in this manner will provide the opportunity for wildlife observation, wildlife photography, and hunting of wildlife. Environmental education and interpretation will be developed for the visiting public to learn about the valuable refuge resources and the National Wildlife Refuge System.

4.0 LAND MANAGEMENT GOALS AND OBJECTIVES

The following goals and objectives were identified in the CCP that was prepared for the individual refuge.

4.1 Ft. Niobrara National Wildlife Refuge

4.1.1 Purpose of Refuge

Fort Niobrara NWR is to be managed as a preserve and breeding ground for native birds and for the preservation of bison and elk herds representative of those that once roamed the Great Plains.

4.1.2 Resource Management Goals and Objectives

Habitat Management

Goal: Preserve, restore, and enhance the unique diversity of upland and riparian plant communities and associated water resources representative of the physiographic regions described as Sandhills Prairie, Mixed Prairie, Rocky Mountain Coniferous Forest, Eastern Deciduous Forest, and Northern Boreal Forest within the Northern Great Plains to ensure their rarity, richness, and representativeness is sustainable into the future.

< **Grassland Objective**: Maintain the approximate 14,264 acres of Sandhill Prairie and Mixed Prairie vegetation communities in early through late successional stages to meet nesting, brooding, feeding, and/or protective cover requirements of various grassland dependent birds, fenced animals and other wildlife. Species composition on a minimum of 90 percent of the grasslands will be middle-to-late successional stage and consist of 75-85 percent grasses, 5-10 percent grass-like plants, 5-10 percent forbs, and 5 percent shrubs (dominant species as described by Kaul and Rolfsmeier 1993, Schneider *et al.* 1996, USDA Soil Conservation Service 1983). Vegetation structure will exist in a range of heights and densities with complete visual obstruction to an average height of six inches in the fall on a minimum of 50 percent of the grassland acreage (Prose 1985; Prose 1987). A minimum of 50 percent of the grasslands will not have planned burning or grazing during the native bird breeding season (April 15 - July 15).

Reduce vehicle trails on the Refuge. Identify main access trails to be maintained and discontinue use of other trails. Complete minimum trail maintenance required for Refuge vehicle access (i.e., mulch with native prairie hay).

Stabilize and encourage revegetation of blowouts located on or adjacent to boundary fence, main access trails, etc. Allow other blowouts to exist in a natural state if they provide suitable habitat for blowout penstemon.

< **Ponderosa Pine Savanna/Woodland Objective**: Manage the approximate 3,022 acres of Rocky Mountain Coniferous Forest community to provide nesting,

brooding, feeding and/or protective cover requirements of various native birds, fenced animals, and other wildlife. Approximately 85 percent of the acreage will be maintained as savanna and consist of 70 percent grasses, 10 percent grass-like plants, 5 percent forbs, 5 percent shrubs, and 10 percent trees with the remaining acreage managed as a woodland/forest. Species composition to manage for will be based on descriptions by Kaul and Rolfsmeier 1993, Schneider *et al.* 1996, USDA Soil Conservation Service 1983. A minimum of 50 percent of this community type will not have planned grazing or burning during the native bird breeding season (April 15 - July 15).

< **Riparian Eastern Deciduous/Northern Boreal Forest Objective**: Maintain and preserve the approximate 1,296 acres of Eastern Deciduous Forest/Northern Boreal Forest riparian community to provide nesting, brooding, feeding and/or protective cover requirements of various native birds and other wildlife. Species composition to manage for will be based on descriptions by Kaul and Rolfsmeier 1993, and Schneider *et al.* 1996. Habitat diversity will be enhanced by managing for a mix of trees (size and age classes with a minimum of 10 percent mature trees), and well-developed shrub and herbaceous layers. Strips of woodlands (150 acres) in habitat units utilized by fenced animals will be protected to the extent necessary to ensure regeneration. A minimum of 50 percent of this community type will not have planned grazing or burning during the native bird breeding season (April 15 - July 15).

< **Niobrara River and Associated Wetlands Objectives**: Restore and maintain the approximate 375 acres of the Niobrara River and associated wetlands with emphasis on maintaining streambed quality, stream bank stability, water flow, water temperature, and quality. Use existing data on the Niobrara River water flow, quality (sediment, nitrate, pollutants) and water temperature as minimum baseline levels and repeat at five year intervals. Ensure vegetation adjacent to the River and streams are adequate to minimize erosion, dissipate water energy and trap sediments.

< **Exotic and Invading Species Objective**: Prevent additional exotic plant species from becoming established and reduce the occurrence, frequency and stand density of existing invading and exotic vegetation. Target level of combined total of invading and exotic plant species is less than 5 percent of species composition. Invading and exotic plant species to manage include leafy spurge, purple loosestrife, Canada thistle, Kentucky bluegrass, smooth brome, downy brome, sweet clover, reed canary grass, eastern red cedar, Russian olive, and phragmites.

Reduce the presence of nonnative tree species in Refuge plantations by allowing natural degeneration to occur. Future replantings/plantings will include only native tree and shrub species.

Wildlife

Goals: Preserve, restore, and enhance the ecological diversity and abundance of migratory and resident wildlife with emphasis on native birds. Maintain representative breeding herds of nationally significant animals under reasonably

natural conditions.

< **Prairie Grouse Objective**: Maintain a five-year average density of one prairie grouse lek/1.4 sq. mile with an annual target of 100 sharp-tailed grouse and 65 prairie chicken breeding males in the grasslands (approximately 12,271 acres) south and east of the Niobrara River (USFWS, unpublished Refuge data).

< **Native Birds Objective**: Maintain or increase breeding and migration use on Fort Niobrara by Species of Management Concern, U.S. Fish and Wildlife Service, Region 6, including northern harrier, ferruginous hawk, upland sandpiper, long-billed curlew, burrowing owl, short-eared owl, red-headed woodpecker, loggerhead shrike, dickcissel, lark bunting, grasshopper sparrow, chestnut-collared longspur, eastern meadowlark, and other habitat sensitive migratory birds such as western meadowlark, bobolink, clay-colored sparrow, belted kingfisher, willow flycatcher, and yellow-breasted chat. Monitor and document migration use by peregrine falcons as it occurs. Use existing data as minimum baseline levels and implement monitoring procedures that provide an index to overall species richness/diversity and document population trends of selected species over a five year period.

< **Bison and Elk Objective**: Preserve and maintain breeding populations of bison and elk with age and sex composition approximating historic herds. Implement management actions that maintain or increase levels of genetic variability to assure viable, sustainable populations according to accepted standards of conservation biology (Berger 1996, Berger and Cunningham 1994). This objective is intended not as an end in itself but as a means to attain the Refuge's goals and objectives for native avian species while conserving essential populations of these important prairie ungulates.

Incrementally remove some interior fence where feasible and construct 8-11 miles of big game boundary fence.

< **Rocky Mountain Bighorn Sheep Objective**: Reintroduce, if feasible and in accordance with the State's future Bighorn Sheep Management Plan, Rocky Mountain bighorn sheep to the Refuge to restore an indigenous species into its historic range and aid in habitat management goals.

< **Prairie Dog Objective**: Allow the expansion of the existing black-tailed prairie dog town in the Refuge to a manageable size to enhance Refuge biological diversity and attain stated goals and objectives for native and migratory avian species.

< **Other Indigenous Wildlife Objective**: Ensure the diversity and abundance of other indigenous mammals, reptiles, amphibians, fish, and invertebrates continues. Use existing data as minimum baseline levels and monitor periodically to document population trends. (Bogan, 1995)

Threatened and Endangered Species

Goal: Contribute to the preservation and restoration of threatened and endangered flora and fauna that occur or have historically occurred in the area of Fort Niobrara NWR.

In addition to continuing to provide for wintering bald eagle use, the Service will conduct an American burying beetle survey, introduce blowout penstemon into suitable habitat for this species, and continue to provide migration habitat for whooping cranes, plovers, and terns in the braided River channel habitat upstream of Cornell Dam.

< **Blowout Penstemon Objective**: Evaluate the Refuge for blowout penstemon habitat. If suitable habitat exists, establish plants in at least two sites.

< **Bald Eagle Objective**: Maintain a minimum of 10 percent of the woodlands within the Niobrara River corridor in mature or old-growth timber with an open and discontinuous canopy to provide undisturbed roosting habitat for wintering populations of bald eagles. Monitor and document eagle use on the Refuge and mortality in the area.

< **Whooping Crane, Piping Plover, and Least Tern Objective**: Maintain the shallow braided River habitat above Cornell Dam for use by whooping cranes, piping plovers, and least terns during migration. Keep use areas free from human disturbance. Monitor and document migration use by whooping cranes, piping plover, and least terns as it occurs.

< **American Burying Beetle Objective**: Determine if American burying beetles inhabit the Refuge. Implement appropriate management strategies if a population exists.

Interpretation and Recreation

Goal: Provide the public with quality opportunities to learn about and enjoy the ecological diversity, wildlands, wildlife, and history of the Refuge in a largely natural setting and in a manner compatible with the purposes for which the Refuge was established.

< **Interpretation, Wildlife Observation and Photography, and Environmental Education Objectives**: Provide visitors with quality interpretation, environmental education, wildlife observation and photography opportunities.

Ensure a safe, quality river-floating experience on the Wild and Scenic Niobrara River that follows the standards of the National Wild and Scenic Rivers Act, National Wildlife Refuge System and maintains the integrity of the Fort Niobrara

Wilderness Area.

Protect and interpret Refuge cultural and paleontological sites.

< **Fishing Objective**: Provide opportunities for warm water fishing in the Niobrara River and Minnichaduza Creek.

< **Hunting Objective**: Offer ethically sound, limited and strictly controlled hunting opportunities for elk and, if reintroduced, for bighorn sheep to facilitate removal of herd excess.

Ecosystem (Partners)

Goal: Promote partnerships to preserve, restore, and enhance a diverse, healthy, and productive ecosystem of which the Fort Niobrara and Valentine NWR's are part.

< **Ecosystem Objectives/Strategies for the Fort Niobrara/Valentine NWR Complex**: Support the National Scenic River, the National Park Service and other management entities to meet desired future conditions of the Niobrara Scenic River.

Support the Sandhills Management Plan through Partners for Wildlife Program to enhance wildlife habitat on private lands.

Support use of Refuges as research areas for relevant natural resource studies. Conduct applied research on management of threatened and endangered plant and animal populations.

Develop an effective outreach program that results in two wildlife habitat/public use projects completed annually with non-governmental organizations.

Develop greater cooperation with state and local governments that result in completion of at least two projects annually. Projects are to benefit area wildlife resources or enhance public use opportunities such as fish rearing in Refuge ponds.

4.1.3 Designations and Management Considerations

Research Natural Area (200 acres)

Wilderness Area (4,635 acres)

National Scenic River designation (Niobrara River)

National Recreation Trail System (5 mile portion of the Niobrara River)

Seventeen distinct fossil sites

Fort Niobrara nominated to National Registry of Historic Places with the hay shed registered as a National Historic Building

The management considerations will be further addressed in the pre-attack plans, Appendix R.

4.1.4 Management Strategy

Wildlife is managed by maintaining native ecosystems and habitats in a healthy and productive condition. Grazing by bison and elk has been the primary management tool. The practice of burning large areas to benefit grassland and woodland habitats and associated wildlife has not occurred on the Refuge. The potential exists to increase the use of prescribed fire to manage habitats.

4.2 Valentine National Wildlife Refuge

4.2.1 Purpose

Established as a refuge and breeding ground for migratory birds and other wildlife.

4.2.2 Goals and objectives

Habitat Management

Goal: -Preserve, restore, and enhance the ecological diversity of indigenous flora of the physiographic region described as Sandhills Prairie within the Northern Great Plains.

< **Grasslands Habitat (Composition) Objective:** Preserve, restore, and enhance the diverse native floral communities so that greater than 75 percent is composed of climax species (good to excellent range condition). The following are the indicator species and composition of the desired floral community by range site (USDA Range Handbook and Potential Natural Vegetation of Nebraska - Kaul and Rolfsmeier, 1993).

< **Wetland Range:** Eighty percent grasses (bluejoint and northern reedgrass, inland saltgrass, prairie cordgrass and foxtail barley); 15 percent grasslike plants (sedges and rushes); 5 percent forbs (saw-toothed sunflower, marsh hedge-nettle, Indian hemp dogbane, swamp milkweed, arrowhead and smartweeds).

< **Sub-irrigated Range:** Seventy-five to 85 percent grasses (switchgrass, big bluestem, Indian grass, Scribner's panicum, prairie cord grass, inland saltgrass and purple lovegrass); 5-10 percent grasslike plants (sedges and rushes); 5-10 percent forbs (American licorice, blue verbena, purple prairie clover, stiff sunflower, nodding lady's-tresses, western ironweed, milkweeds, goldenrods, closed and downy gentians, blue lobelia, and the threatened western prairie fringed orchid); 5 percent shrubs (leadplant, willow, poison ivy, western snowberry, Arkansas and Wood's wild rose).

< **Sand Range:** Eighty to 95 percent grasses (switchgrass, sand bluestem, little bluestem, big bluestem, Indian grass, prairie sandreed, needle-and-

thread, porcupine grass, sand love grass, Canada wildrye, Scribner's panicum, western wheatgrass, prairie June grass); less than 5 percent grasslike plants (sedges); 10 percent forbs (blue verbena, bush morning glory, cudweed sagewort, blazing star, penstemons (shell-leaf, narrow beardtongue), western ragweed, bracket spiderwort, Rocky Mountain bee plant, evening primrose, prairie coneflower, silky and purple prairie clovers, gilia, ten-petal mentzelia, sunflowers, goldenrods, vetches, scurfpeas, yucca and pricklypear cactus); less than 5 percent shrubs (Arkansas and wild rose, leadplant, green sage, poison ivy, sand cherry, wild plum, chokecherry and western snowberry).

< **Choppy Sands Range:** Eighty-five percent grasses (prairie sandreed, little bluestem, sand bluestem, blowout grass, needle-and-thread, prairie June grass, sand dropseed, sand love grass, spiny muhly, switchgrass, and blue grama); less than 5 percent grasslike plants (thread-leaf sedge); less than 10 percent forbs (bush morning glory, painted milkvetch, bracted spiderwort, western ragweed, cudweed sagewort, sunflowers, scurfpeas, yucca, pricklypear cactus and the endangered blowout penstemon); less than 5 percent shrubs (Arkansas and wild rose, green sage, poison ivy, sand cherry, wild plum, chokecherry and western snowberry).

< **Grassland Cover (Structure) Objectiv**e: Annually provide diverse vegetation composition and structure with greater than 50 percent (30,930 acres) of the total grassland (61,861 acres) remaining in undisturbed cover (i.e., vegetative cover that has not been disturbed by grazing, mowing or fire during the preceding growing season through July 10 of the current year) to meet nesting, brooding, feeding and protective cover requirements of various grassland dependent wildlife species. The following combinations of cover treatment and vegetative structure are recommended for meadow and hill acreage:

Cover Treatment	**Acreage (%)**	**VOR Ave. (Range)***
Meadow (13,106 Acres)		
Disturbed cover	~5,200 (~40%)	~ 3.0" (1-10")
1 Year Rest	~2,600 (~20%)	~10.0" (2-20")
2 Years+ Rest	~5,200 (~40%)	~12.0" (4-24")
Hills (48,755 Acres)		
Disturbed cover	~21,900 (~45%)	<3.0" (1-10")
1 Year Rest	~12,200 (~25%)	=>6.0" (1-16")
2 Years+ Rest	~14,600 (~30%)	=>6.0" (1-18")

* Visual Obstruction Readings averages are residual cover readings taken in the Fall (before the upcoming nesting season).

< **Wetland Habitat Objectives:** Groundwater Resources: Maintain a database on Refuge groundwater resources to ensure long-term protection of Refuge groundwater quantity and quality.

Surface Water Resources: Maintain a database on Refuge surface water resources by documenting wetland elevations for long-term protection of Refuge water supplies.

Maximize production of invertebrate (protein) and plant (carbohydrate) resources on 11,181 wetland acres to provide an appropriate food base for indigenous wildlife (migratory birds, mammals, reptiles, amphibians, fish) and enhance production on 2,650 acres of lakes for sport fishing.

Maximize food production for migratory birds by providing an unexploited food base on the following acreage of wetlands that are not designated for sport fishing:

Wetland Class	**Acreage**
Temporary	735
Seasonal	1,094
Semipermanent	4,636
Lakes	4,716
Total Acreage	11,181

Enhance food production by periodic drawdowns/renovations on the following Lakes designated for sport fishing:

Wetland	**Acreage**
Clear	532
Dewey	494
Duck and Rice	118
Hackberry	528
Pelican	617
Watts	173
West Long	76
Willow (Refuge)	112
Total	2,650

Maintain Dewey Marsh Fen and identify and maintain other fen sites which have unique vegetation and hydrology.

< **Indigenous Trees, Brush, and Planted Tree Habitat Objective:** Enhance the

Sandhill Prairie landscape by reducing invading cedar trees while still maintaining a representative interspersion of indigenous woody vegetation per the following specific objectives.

< **Site specific indigenous woody vegetation recommended targets:** Maintain indigenous woody vegetation of the north facing slopes next to the south shorelines of Clear, Dewey, Hackberry, Pelican, Whitewater, Dad's and South Marsh Lakes.

Maintain indigenous willow tree and brush on the northwest-west ends of Dewey, Hackberry and Pelican Lakes and around Duck Lake.

Maintain indigenous trees in and adjacent to the Headquarters and Sub-headquarters areas.

< **Recommended maximum target level of composition by habitat unit:** Willow occurrence and invasion on meadows and around lakes (less than 10 percent).

Cedar occurrence and invasion on meadows (less than 5 percent) and in the Sandhills (less than 5 percent).

Reduce cottonwood invasion in the northern King Flat area.

Maintain the two relic stands of quaking aspen at the west end of Watts Lake Habitat Unit (H.U. 1A) and the north side of Dewey Marsh (H.U. 3B)

< **Exotic and Invading Species Objective:** Prevent additional exotic plant species from becoming established and reduce the occurrence, frequency and stand density of existing exotic species to less than 5 percent of composition within five years. The invading and exotic species targeted by this objective include, but are not limited to:

Russian olive	Black and honey locust
Siberian elm	Mulberry
Smooth brome	Quack grass
Reed canary grass	Leafy spurge
Canada thistle	Kentucky bluegrass

Wildlife

Goals: Preserve, restore and enhance the ecological diversity and abundance of migratory

birds and other indigenous wildlife with emphasis on waterfowl, prairie grouse, and other grassland dependent birds.

In addition to implementing habitat management actions that improve and maintain the diverse native plant communities, the Service will consider and implement management regimes that meet various native bird requirements. Biological monitoring of native birds and other wildlife will increase to better document population trends and effects of management.

The following wildlife objectives are based upon unpublished Refuge data, and represent average population levels that can normally be expected to occur given the above habitat objectives. Periodic severe weather events, continental changes in migratory bird populations, and other factors can, and do, cause fluctuations in Refuge populations.

< **Migratory Waterfowl Objectives:** Achieve an averageannual breeding pair density of equal to or greater than 4,000 dabbling and 700 diving ducks with a brood/pair ratio expressed as a percent of equal to or greater than 20 percent over a five year period (unpublished Refuge data 1978-91). A brood/pair ratio is the percent of pairs that produce a brood to flight stage.

Maintain an annual breeding population of approximately 100 Canada goose pairs.

Provide approximately 11,000 acres of wetland for spring and fall migrating waterfowl.

Trumpeter swans: Cooperate with Lacreek NWR by reporting all trumpeter swan production and winter activity observed on and adjacent to Valentine NWR. Generally one and periodically two breeding pairs of swans are present on Valentine NWR.

< **Other Migratory Birds Objectives:** Maintain and increase breeding populations of indigenous, neotropical migrants that are water-based including American bittern, white-faced ibis, black tern, marbled godwit, northern harrier and other shorebirds and wading birds that inhabit the Refuge. Establish average densities of appropriate species and an overall species richness/diversity index to document baseline levels and to determine subsequent population trends.

Maintain and increase breeding populations of land-based species of management concern such as upland sandpiper, long-billed curlew, short-eared owl, barn owl, grasshopper sparrow, dickcissel, eastern phoebe, eastern kingbird, loggerhead shrike, and eastern meadowlark (Bogan, 1995). Establish average densities of selected species and an overall species richness/diversity index to document baseline levels and to determine subsequent population trends.

Maintain and increase breeding populations of colonial nesting species (western and eared grebes, Forster’s and black terns, cormorants and black-crowned night herons).

Evaluate reintroduction of breeding populations of sandhill cranes to the Nebraska Sandhills and specifically Valentine NWR.

< **Prairie Grouse Objectives:** Maintain a five-year average density of equal to or greater than one prairie grouse lek per 1.6 sq. mi. (28 total leks including 15 prairie chicken and 13 sharp-tailed grouse) within the area designated as the State Survey Block. The Refuge surveyed each year is one part of a statewide survey of prairie chicken and sharp-tailed grouse. Maintain annually a minimum of 35 prairie chicken leks (2.8 sq. mi. / lek) throughout Valentine NWR. Annually achieve a minimum target sample of 350 prairie grouse wings from the Volunteer Prairie Grouse Hunter Harvest Survey. Achieve a harvest ratio of equal to or greater than 2.5 juveniles per adult. The harvest ratio measures current year nesting success and health of the population by comparing the number of young in the fall population to the number of adults. Ratios greater than or equal to 2.5 indicate a healthy population.

< **Other Indigenous Wildlife Species Objective:** Ensure the diversity and abundance of indigenous mammals, reptiles, amphibians, fish, and invertebrates remain intact. Establish average densities of key indicator species to document baseline levels and to determine subsequent population trends.

Evaluate the suitability of habitat on the Refuge for introduction of the black-tailed prairie dog and, if suitable habitat is present, prepare a step-down management plan for introduction and management of this species.

The Service will maintain the existing furbearer harvest program, which uses trapping as a management tool to achieve Refuge wildlife objectives.

< **Exotic and Invading Species Objectives:** Prevent the establishment of additional introduced species and refrain from carrying out management activities specifically to encourage population expansion of existing introductions (i.e., pheasants).

Reduce carp population densities in Refuge lakes.

< **Sport Fishery Objective:** Maintain sustainable and harvestable populations of sport fish in the nine designated sport fishing lakes.

Threatened, Endangered, and Management Concern Species

Goals: Contribute to the preservation and restoration of endangered and threatened flora and fauna that occur or have historically occurred around Valentine NWR. The Refuge staff will continue to maintain existing habitat and document endangered bird use and will conduct surveys for American burying beetles. The Refuge staff will intensify efforts to reintroduce blowout penstemon and will conduct Refuge wide surveys for it and western prairie fringed orchids. In consultation with the Service's Ecological Services staff, the Refuge staff will conduct applied research efforts to determine management

practices promoting these species. The Service will maintain existing woodland, and promote regeneration of woodland habitat along lake borders that are important as bald eagle roosting sites.

< **Threatened and Endangered Plant Objectives:**

Maintain approximately 72 acres of blowouts, with potential for the endangered blowout penstemon, on the Refuge. In a minimum of five blowouts, establish and maintain populations of 100 penstemon plants per blowout. Currently the Refuge has an estimated 72 acres of blowouts in at least a dozen locations. Three habitat units exist with very small natural populations of penstemon and three additional habitat units with nine blowouts that have had plants transplanted into them. The blowout penstemon recovery plan has an objective of maintaining ten population groups with 300 plants in each group. The Refuge, if successful in increasing its populations to the objective, would satisfy approximately 16 percent of the endangered penstemon recovery goal.

Maintain and manage a meadow habitat with potential for western prairie fringed orchids (2,000 acres) insuring an average annual population of 300 individuals in at least four locations. Currently the Refuge has an estimated population of approximately 300 plants in five known locations. Western prairie fringed orchids have been observed on private land at four other sites adjacent to the Refuge. The Refuge currently manages meadows with orchids so that plants can flower and set seed.

< **Threatened and Endangered Wildlife Species Objectives:** Monitor and document migration use by whooping cranes, piping plover, and least terns. Record habitats used, areas used, and durations of stay. Keep use areas free from human disturbance while individuals are present. Use by these species is so seldom that no habitat management objective or population objectives can be stated. Monitoring, documenting use, and keeping them undisturbed may at some time provide insights into ways to help these populations.

Monitor and document use by American burying beetles.

Maintain large hackberry, cottonwood, and willow trees around Refuge lakes as roost sites for migrating and wintering bald eagles. Monitor and document eagles use of habitat, roost trees, and eagle mortality. Monitoring will help in describing key locations and trees, and in documenting eagle mortality, a problem in past years. Some of these wintering locations could become nesting areas as eagle populations expand.

< **Species of Management Concern Objective:** Maintain self sustaining populations of Blanding's and yellow mud turtles. Develop and implement strategies to reduce mortality from vehicles.

Interpretation and Recreation

Goal: Provide the public with quality opportunities to learn about and enjoy Sandhill Prairie, fish, wildlife, and history of the Refuge in a largely natural setting and in a manner compatible with the purposes for which the Refuge was established.

< **Interpretation, Wildlife Observation and Photography, and Environmental**

Education Objectives: Provide visitors with quality interpretation, environmental education, wildlife observation, and photography opportunities.

The Service will seek funds to construct a visitor contact station along Highway 83 to improve environmental education and interpretation of wildlife, cultural, and historic resources on the Refuge. A site plan that is being developed will include a concept design. The site plan will also contain suggestions for improving and upgrading existing facilities for visitors. Current facilities, wildlife observation, and photography uses will remain open.

< **Fishing Objective:** Provide year-round fishing opportunities for warm water fish in designated lakes in a largely natural setting. Watts Lake has handicap accessibility.

The Service will continue its current sport-fishing program on nine designated fishing lakes. No additional lakes will have sport fish stocked in them.

< **Hunting Objective:**Provide quality hunting opportunities for waterfowl, deer, prairie grouse, pheasants, dove, and coyote on portions of the Refuge.

The current Refuge hunting program will continue with the exception of 160 acres adjacent to the Hackberry Civilian Conservation Corps fire tower which will be closed to hunting. This no-hunting area will be from the west side of the George Wiseman Research Natural Area west to the county road. This Fire Tower, which is adjacent to the Wiseman Natural Area, will be enhanced to support the addition of a self-guided nature trail and interpretive observation deck on the tower.

< **Cultural and Paleontological Resources Objective:** Conduct a cultural resource inventory and provide protection for and interpretation of Refuge cultural and paleontological resources and sites.

The Service will develop a Cultural Resource/Paleontological Management Plan. The Plan will include Refuge-wide cultural resource inventory and paleontological resource inventory strategies. It will also include increased interpretation, protection, and education about the cultural and paleontological resources on the Refuge.

Ecosystem (Partner)

Goal: Promote partnerships to preserve, restore, and enhance a diverse, healthy, and productive ecosystem of which Valentine is part.

< **Ecosystem Objectives/Strategies for Ft. Niobrara-Valentine NWR Complex:** Support the Sandhills Management Plan through Partners for Wildlife Program to enhance wildlife habitat on private lands.

Support use of Refuges as research areas for relevant natural resource studies. Conduct applied research on management of threatened and endangered plant and animal populations.

Develop an effective outreach program that results in two wildlife habitat/public use projects completed annually with nongovernmental organizations.

Develop greater cooperation with state and local governments that result in completion of at least two projects annually. Projects are to benefit wildlife resources or to enhance public use opportunities such as fishing.

Use this Plan to help in marketing Refuge needs through grant writing and networking with other entities.

4.2.3 Designations and Management Considerations

Research Natural Areas (2 areas, 1,381 acres

Wilderness Study Area (15,809 acres)

National Natural Landmark designation (entire refuge)

4.2.4 Management Strategy

Wildlife is managed by maintaining native ecosystems and habitats in a healthy and productive condition. Grazing has been the primary management tool. The practice of burning large units to benefit grassland habitat and wildlife has not occurred on the Refuge. The potential exists to use larger prescribed fires to manage habitats.

5.0 REFUGE FIRE MANAGEMENT GOALS AND OBJECTIVES

5.1 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, and the protection of public and private property, and cultural and natural resource values. Service policy and the Wildland Fire Policy and Program Review direct an agency administrator to use the appropriate management strategy concept when selecting specific actions to implement protection and the use of fire as a management tool. The resulting Appropriate Management Response are specific actions taken in response to a wildland fire to implement protection and the use of fire as a management tool. With an approved Fire Management Plan, the Refuge staff may use wildland fire in accordance with State regulations to achieve resource management objectives (habitat improvement).

5.2 Considerations

The following considerations influenced the development of the Complex's fire management goals and objective and are supported in various sections of this plan.

- Fire is an essential part of the Complex's native biotic communities.
- Providing for the safety of visitors, staff, and the surrounding community from the impacts of wildland fire is the highest priority.
- Uncontrolled wildfire has potential to negatively impact values at risk both on and off the Complex.
- Large fires could adversely affect wildlife populations.
- Potential rapid rates of spread, fire suppression response times, and the lack of fuel breaks pose significant suppression problems and increase the likelihood of escape onto adjacent lands.
- Use of the "minimum tool" concept to minimize environmental damage is important throughout the Complex, especially in the Wilderness Area, Wilderness Study Area, and Natural Areas. In some instances, fire engines are the minimum tool necessary due to factors mentioned above.
- Catastrophic wildfires pose a significant safety risk. The safety risk from lower intensity fires, both wild and prescribed, is much less than that of the occasional catastrophic fire.

5.3 Complex Fire Management Goals

- Protect life, public and private property, and cultural and natural resources from wildfire.

- Use prescribed fire as a tool to establish, maintain and restore desired plant communities, and accomplish other Refuge resource management objectives.

5.4 Complex Fire Management Objectives

- Safely suppress all wildfires using strategies and tactics appropriate to safety considerations and the values at risk, and in accordance with Service policy.
- Prevent human-caused wildfires.
- Minimize the impact and cost of fire suppression.
- Manage the risks associated with fuels.
- Use prescribed fire to the fullest practical extent to restore natural fire processes and maintain vegetative communities in the desired condition.
- Use prescribed fire when it is the most effective and efficient means for achieving management objectives.
- Educate the public regarding the natural role of fire within the Complex's ecosystems.
- Inform the public of the Complex’s commitment to wildfire suppression.
- Support the Sandhills District to the level staffing and Complex workload allow.

6.0 FIRE MANAGEMENT STRATEGIES

6.1 Appropriate Management Response

Local residents have expressed a high degree of concern about wildfire and the potential effects a wildfire can have on their property. These concerns are well documented in incident master file for the *Valentine Wildfire Complex* (Valentine Complex Fire, 2000). The CCP's completed in 1999 state that all wildfires will be suppressed.

It is the intention of the Service to suppress all wildland fires occurring within the Complex using the appropriate management concept. Prescribed fire will be utilized under controlled conditions and defined weather variables to achieve resource management goals and objectives. Resource benefits that may be derived from a wildland fire will not be a consideration when selecting an appropriate management response.

The basic fire management strategy for the Complex will be to use the appropriate management response concept to suppress all wildfires commensurate with values at risk. The appropriate strategy and tactics will be developed based on the local situation, values to be protected, management objectives, external concerns and land use. Strategies employing a range of suppression options may be considered by the Incident Commander. The primary suppression strategy employed will be direct attack. However, there may be occasions when direct attack on high intensity, rapidly spreading wildland fire would jeopardize firefighter safety and not be appropriate. In these cases indirect attack will be employed utilizing natural and human-made features as wildfire control points. Minimum impact suppression techniques (MIST) will be utilized, where appropriate.

The matrix in Table 2 is intended to illustrate some of the possible strategies and tactics available to the Incident Commander(IC). The Fire Management Plan is intended to provide guidance, but it is the responsibility of the IC to select appropriate response.

Table 2: Appropriate Management Response

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

Since local cooperators are usually not familiar with tactics other than direct suppression to minimize acres burned, the Incident Commander, Refuge staff, and others associated with the fire management program must communicate with cooperators so that they fully understand the fire management goals and objectives developed for the Refuge. Incident Commanders will have to maintain open lines of communication with suppression forces in order to prevent damage to refuge resources from suppression efforts.

6.2 Programmatic Strategies

The following programmatic strategies will be employed to collectively assess and select an appropriate management responses.

- Maintain an Initial Attack organization capable of suppressing multiple Class A, B, and C wildfires. Initial Attack equipment and personnel will be distributed to maintain a maximum response time of 1 hour to all Complex fires occurring during the fire season.

- Maintain Cooperative Agreements with local fire agencies to promote cooperative

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.

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

- Prepare and implement a long-term fuel management plan for the entire Complex 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) to increase cost effectiveness.

- Prescribed fire will be used in a manner that will support resource management objectives.

- 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.

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

- Conduct all fire management programs in a manner consistent with applicable laws, policies, and regulations, and on an interagency basis whenever possible

- Support the Wildland Urban Interface initiative (WUI) to the extent possible and practical without compromising other objectives.

6.3 Mechanical and Other Treatments

Due to the extreme fire behavior and resistance to control exhibited by range fires occurring in Sandhills Prairie, some management of fuels to reduce the likelihood of a catastrophic fire from occurring on the Complex is prudent. However, extensive fuel reduction is not compatible with other Complex objectives because of it's effect on habitat and wildlife populations. Therefore, the Complex will take a two pronged approach to fuel management:

- Use mechanical means alone or in conjunction with prescribed fire to maintain recommended safe fuel levels in areas adjacent to buildings and/or sensitive resources like threatened and endangered species. The Fire Management Officer (FMO), with the assistance of the seasonal fire staff, will identify problem areas and corrective actions for the Refuge Manager’s approval. Work will be carried out primarily by seasonal fire staff. The mowing plan included in Appendix B outlines recommended treatments.

Mechanical thinning to reduce fuel loads of Ponderosa pine and eastern red cedar has never been conducted at Fort Niobrara. Areas outside of the wilderness boundaries at Fort Niobrara could be considered for thinning treatments in the future. A fuel inventory would need to be conducted, objectives would have to be determined, and a system for prioritizing needs would have to be established before thinning treatments could begin. The feasibility of implementing mechanical thinning project at other Complex sites would be determined following evaluation of thinning treatments at Fort Niobrara.

6.4 Limits

- All fire management programs will be conducted in a manner consistent with applicable laws, policies, and regulations.

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

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

- Prescribed burning in areas where threatened, endangered, and candidate species exist will not be conducted if the prescribed fire will be detrimental to the species or any adverse impacts cannot be mitigated. Section 7 clearance will be secured, as appropriate.

- All sensitive resources inventoried or discovered must be protected (e.*g.* archaeological, paleontological, historical, cultural). Clearance will be received from the Regional Archeologist before conducting prescribed fire activities. Discovered resources will be reported and protected by the official in charge to the Agency Administrator for proper management.

- Heavy equipment (dozers, discs, plows, and graders) will only be used for fire suppression in life threatening situations with the express approval of the Project Leader or his/her designee.

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

- 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.

6.5 Impacts of Fire Management Activities

Proper management of the Refuges's habitats is essential in order to meet management objectives established for the Complex and to meet Service bio-diversity mandates. Fire was an essential part of the natural Sandhills and Niobrara River Basin ecosystems, and along with grazing, is the primary tool available to resource managers for vegetation and habitat management. Because fire is a natural process, native wildlife evolved with fire and have developed means of tolerating and/or taking advantage of fires. In general, fires result in little direct wildlife mortality and usually benefit native wildlife. However, a large wildfire on the Refuge during drought conditions or late in the growing season could significantly reduce forage availability for wildlife. Potential for escape could increase, overuse of existing forage could occur, and the Refuge may be forced to conduct emergency roundup and liquidation operations to adjust the size of fenced animal herds.

While uncontrolled wildfire has potential for negative impacts on fenced animals, prescribed fire under the correct prescriptions can be used as a tool to improve habitat.

Ranches around the Valentine Refuge are more susceptible to larger range fires due to the remote nature of the area, as was demonstrated during the *Valentine Complex Fire* of 2000. Since the area's economy is dominated by ranching, uncontrolled wildfires can have severe economic consequences to adjacent ranchers. For example, wildfires in the fall may destroy winter pastures. The winter pastures are particularly important to the grazing and calving programs the ranchers utilize and depend on. Loss of this forage and cover directly impacts the economy by forcing ranchers to buy more feed, lease additional pasture, or sell cattle before they are ready for market. Large fires in the area have killed cattle, injured ranchers and firemen, and caused some fatalities. However, an aggressive fire management program designed to reduce the likelihood of a wildfire from escaping Service lands would have the opposite effect, and could gain support for other management programs occurring at the Complex.

Wildland fires occurring within Fort Niobrara during the peak period of visitor use on the Niobrara River could impact several local businesses and other communities in the area. The river activities are often part of travelers' summer vacation plans. A wildfire in the river corridor could divert tourists to other locations outside of north-central Nebraska. Refuge closures could occur due to wildfire danger or occurrence. This would most likely happen in the fall during hunting seasons. The results could impact the local economy by deterring hunters from using the Refuge. Hunters and anglers in 2000 were concerned the Refuge would be shut down during a series of large fires in the area. They were also concerned that access in the area would be restricted following the large fires and that the fires had displaced game species. Displacement of game due to a loss of winter cover and feed could have a impact on game harvested on the Valentine Refuge.

The Removal of vegetative cover with either wildfire or prescribed fire at the wrong times of year could have adverse impacts. For example, burning in the wrong season, allowing too little or too much time between burns, or burning with the wrong prescription may cause undesirable changes in vegetation which could lead to the increased potential for erosion of sandy soils. This can be minimized through the prompt suppression of wildfires and carefully planned prescribed fires that will be used to maximize benefits to the Refuge's resource management program. While the short-term damage from wildfires and prescribed fire to the Complex resources could appear serious, the long-term effects on Complex resources would most likely be negligible or positive.

The environmental and social impacts of the prescribed fire program have been examined as part of the Environmental Assessments completed as part of the Comprehensive Conservation Planning process.

7.0 FIRE HISTORY AND FIRE SEASON

7.1 Historic and Ecological Role of Fire

Fire is a natural component of the Sandhills and Niobrara River Valley environments and one of the forces under which vegetation on the Complex evolved (Harrison 1980, Bogan 1993, Bragg 1994). Historic records describe huge prairie fires started by lightning or man. Fires burned millions of acres because there were few natural fuel breaks and no suppression.

The condition and appearance of the Nebraska Sandhills is different today than it was in the past. Historic records describe the Sandhills as wet and grassy meadows between sparsely vegetated sand dunes when explored in the mid-1800s. The sand dunes became stabilized by vegetation with the advent of managed grazing and fire exclusion in the mid-1800s. Current management objectives emphasize maintenance of improved range conditions rather than the natural condition and historic fire regime of the Sandhills. Today, cattle grazing continues to be the primary use and economic industry of the Sandhills. Society places a high value on suppressing any fires which might threaten vegetation used both for soil stabilization and economic production.

Research throughout the Great Plains indicates historic fire frequencies of 1 to 10 years for tall grass prairies (Kucera 1981, Abrams and Gibson 1990), 5 to 10 years for rolling mixed grass prairies, (Wright and Bailey 1980), 2 to 25 years for ponderosa pine forests, (Wright and Bailey 1980), and 10 to 30 years for other forested Great Plains areas (Wright and Bailey, 1980). Research along the Niobrara River Valley/Sandhills ecotone indicates that fires occurred every 4 to 5 years between 1850 and 1900 (Bragg 1986 and 1994). There is no fire history database for the Refuge Complex to evaluate the presettlement fire intervals on the grasslands, Niobrara River Valley, and Ponderosa pine/prairie ecotone.

Grasslands historically evolved in areas with a fire frequency too high to permit the establishment of tree species, and/or in areas either too dry or too wet for most indigenous tree species. Over eighty years of wildland fire suppression on the Complex has resulted in the conversion of pine and hardwood savanna communities to forest communities, decreased abundance of lower successional stages of vegetation and associated wildlife species, and permitted woody species to invade grasslands.

All vegetation communities, with the possible exception of the more mesic canyon hardwood sites and submergent vegetation sites, have evolved with periodic fire and are fire adapted. Changes in grass and forb composition, with the exception of the invasion of exotic species, is largely undocumented due to a lack of baseline species composition data.

Exclusion of fire in the past has resulted in various changes in vegetation composition and structure - the most visible of which are the pioneering of cedar, Ponderosa pine and brush into prairies and into the understory of savannas and forests, or the filling of wetlands with slowly decomposing decadent vegetation and invading woody growth.

The historic fire regime of frequent low intensity fuel-reducing surface fires has been replaced with a fire regime of infrequent fires leading to increased fuel levels, and a greater probability of high intensity stand replacement fires which pose a greater threat to life, property and resources

because they are difficult to suppress.

7.2 Complex Fire History

Records indicate that the Refuge staff has responded to wildfires in every month of the year (FMIS 2000). Table 3 summarizes response data for fires occurring on or threatening Service lands and fires occurring on Cooperator's lands. Over the past ten years the Complex staff has responded to an average of 13 wildfires per year that burned on average 935 acres.

Table 3: Fire Type by Response - Ten Year Average

Ten Year Period	Type 11 Fires, On FWS Lands & FWS Supression		Type 15 Fires, On Other Lands threatening FWS Lands w/no agreement with FWS Suppression		Type 16 Fires, On Other Lands threatening FWS Lands w/agreement with FWS Suppression		All Types of Fire	
	# Fires	Acres	# Fires	Acres	# Fires	Acres	# Fires	Acres
1981-1990	26	5991.7	6	24.7	61	19,011.9	93	27,543.3
1991-2000	42	23,249.6	11	2,229.8	74	92,858.5	127	118,716.9

Source: FMIS 2001.

The number of wildfires occurring on Service lands during the second 10-year period have increased from 2.6 fires per year to 4.2 fires per year and are significantly larger (FMIS 2000). The increase in number of fires may be attributable to better record keeping.

Almost all fires are started by lightning, which occurs about every month of the year, but is most common during the warmer months, April through September. Lightning is usually accompanied by wind, but may or may not be accompanied by rain. In general, dry lightning fire appear to be more common in drought years. Multiple starts on a single day are common during the warmer months. The Complex has responded to as many as 11 fires during a single day (Table 4).

Table 4: Multiple Fire Start Data

Type 11 FWS Land/FWS Suppression		Type 16 Land/Agreement/FWS Supp.	
Multiple Start Date	Number of Fires	Multiple Start Date	Number of Fires
23-Aug-1995	2	17-May-1996	2
17-Sep-2000	11	12-July-1994	2
29-Sep-1997	2	24-July-2000	2
		01-Aug-1991	2
		16-Aug-2000	2

		20-Aug-1999	2
		24-Aug-1994	2
		25-Aug-1994	3
		08-Sep-2000	3
		17-Sep-2000	4
		13-Nov-1999	2

Source: FMIS 2000, 1991-2000

Most wildfires were suppressed in a matter of hours, while small, but some fires have left Service lands and spread onto private ranches. Suppression is complicated by the lack of natural or man made fuel breaks. The amount of fuel is light, but the fuels dry quickly and burn extremely rapidly, and can grow to an unbroken fire front that covers a long distances. Wind

driven fires in these fuels can burn for 20 miles or more in a single afternoon.

Several large fire events have occurred in the area. The largest event in recent history occurred on September 17, 2000. On that day, a lightning storm produced over 50 fires in Cherry County that consumed over 100,000 acres in 36 hours. Ten known ignitions produced five separate large fires that were managed as the *Valentine Complex*. The five fires ranged in size from 1,276 acres to 22,587 acres and burned 18,424 acres on Valentine Refuge, 31 acres of State lands, and 4,132 acres of private lands. During this event, a broken line of fires extended from the McKelvie National Forest past the southeast boundary of Valentine NWR, a distance of 49 miles (Figure 2). Thirty percent of the Refuge rangeland was burned during this event, causing damage to minor structures, wildlife habitat, winter forage, and 50 miles of fenceline. Damage to grazing forage, feed, windmills, and fencelines occurred on private lands. Estimates indicate that over $320,000 may be spent as a result of this fire once rehabilitation efforts are completed. The Powderhorn Fire on the Forest Service, state and private lands consumed 48,770 acres in the same time period.

Figure 2: Fire Map - 2000 Fire Season

Note: The above figure represents fires managed by Federal cooperators. Some of the fires were on Federal, State and Private lands. Many fires triggered by the lightning storm were not represented on this figure if they were exclusively managed by private cooperators. A total of 50 fires were triggered by this lightning event and burned over 100,000 acres.

Another historic fire event occurred on the Valentine NWR on February 2, 1990, burning 5,400 acres of Refuge lands, 2,120 acres of private land, and 320 acres of State school lands. This fire resulted in damage to improvements both on and off the Refuge as well as an economic loss of grazing forage. One neighboring rancher received burn injuries while fighting this fire. Much larger fires have occurred on local private property with one fire burning 87,000 acres in less than 24 hours. The Thedford Fire, which occurred in 1999, south of the Refuge, burned 74,000 acres in two and a half days with most of the fire's spread occurring in the first burning period.

7.3 Refuge Fire Frequency

The Complex currently averages over four fires a year (Table 3). The majority of these fires occur on the Valentine NWR during the months June through September. (The high fire frequency noted for the month of September is primarily due to a drought and lightning activity experienced during the fire season of 2000). However, a better picture of the size and complexity of the wildland fire program for the Complex can be seen when other fires occurring in the area, including false alarms, are included in the aggregate. For the same period, there were 331 responses. The total acreage burned, including Service and other lands was 282,967. In all, the Complex staff responded on average to over 17 incidents per year. The total acreage burned per year in the area was 14,893 (FMIS 2000).

7.4 Fire Season

The fire season as determined by FMIS, and confirmed by the Valentine Fire District, is April 1 through October 30 (FMIS 2000). **However**, **wildfires can occur at any time**. The largest and most severe fires have occurred late in the summer, in the fall, or late winter-early spring. Wildfires occurring outside the established fire season do not occur with the same frequency, but tend to be more difficult to control. This is primarily due to the presence of cured fuels and higher than average wind speeds. Fires occurring after dry, open winters tend to be the most severe.

8.0 FORT NIOBRARA NATIONAL WILDLIFE REFUGE

8.1 Description of Fort Niobrara NWR

Fort Niobrara National Wildlife Refuge (Fort Niobrara) is 19,131 acres in size and is recognized, along with the surrounding area, by ecologists for its biogeographic significance due to the occurrence of six distinctly different, major vegetation communities within and adjacent to the Niobrara River corridor. The region is the only place in North America where Rocky Mountain Coniferous forest (eastern limit), Northern Boreal forest (southern limit), Eastern Deciduous forest (western limit), Mixed Grass Prairie, Sandhill Prairie, and Tallgrass Prairie meet and intermingle (Kaul and Rolfsmeier 1993). The unusually diverse plant and animal assemblages found in this area are due to unique surface and subsurface geologic formations, water and soil conditions, current and past climates, and differential sun exposure (Churchill et al. 1988). Additional ecological factors that had significant affect on the biological diversity that evolved in this region prior to Euro-American settlement includes wildfire and the use of fire by aboriginal men (Higgins et al.1986, Steuter 1991), and the unrestricted grazing and impacts associated with grazing of bison, elk, pronghorn antelope, and prairie dogs (Knopf 1994, Bragg and Steuter 1996). Though changes in composition and density of native flora and fauna have occurred since settlement, Bogan (1995) reported that Fort Niobrara is one of the few areas where the basic components of the 1850 landscape are still present and viable (Ft. Niobrara CCP1999).

8.1.1 Location

Fort Niobrara is located in north central Nebraska in Cherry County, five miles east of the city of Valentine (Figure 3). The area lies within the Niobrara River Basin near the geographic center of the vast Missouri River Basin and the Great Plains.

Figure 3. Map - Fort Niobrara

Ken, Insert Sean's map here.

8.1.2 Topography and Soils

The Refuge topography is varied and well-defined. The Niobrara River valley extends from east to west across the Refuge and is entrenched 150 to 350 feet below the general upland level. High terraces, or benches, lie at different levels from 175 to 275 feet above the present River channel and from 30 to 250 feet below the general level of the uplands (Layton 1956). Most benches are discontinuous strips 1/4 to 3/4 of a mile wide with level to rolling or hummocky relief. Steep valley sides, or breaks, are on both sides of the River and along lower courses of its major tributaries. Table land north of the River valley is nearly level to gently rolling with several surface areas modified by narrow, steep-sided and shallow drainage ways, by small areas of typical sandhills, numerous hummocks, and low, elongated sandy ridges. Sandhill terrain south of the River is undulating to hilly with dune tops 10 to 100 feet higher than the surrounding area. The range of hills, with alternating pockets or narrow valleys, usually run parallel in an irregular northwest-southeast direction. Generally, the southerly (leeward) sides of the hills are steeper than the northerly (windward) sides. Elevations on the Refuge range from 2,000 feet above sea level to 2,800 feet.

Soil groups and series found on the Refuge are mapped and described in detail in the 1956 Soil Survey of Cherry County (Layton 1956). Dominant soils south of the Niobrara River in the Sandhills portion of the Refuge are Valentine (fine sand, undulating), Valentine - Rosebud (loamy fine sands, undulating) and Dune Sand (stabilized, rolling). Within the Niobrara River valley, Tripp (fine sandy loam) soils are generally found on terraces above streams, Sarpy (loamy fine sand) soils occur on bottom land along the River and streams, and little soil development exists on rough broken land and steep bluffs. Bench land north of the Niobrara River and small areas near River "breaks" consist of mostly Holt (fine sandy loam, gently undulating) and Rosebud (loamy fine sand, gently undulating) soils. The predominantly sand and sandy loam topsoils are extremely well drained. Soils are highly erodible and erosion is a major concern following wildfires and during the planning of prescribed fires.

8.1.3 Water

The major water resources of the Niobrara River Valley are the Niobrara River and the series of streams which feed into it. Fifteen small streams, arising from springs on the Refuge, enter the Niobrara River within the Refuge. The streams are fed both by springs and from canyon runoff.

8.1.4 Climate

A variable continental climate dominates the area. Winters are cold with periodic severe winter storms. Summers are hot with low humidity and high temperatures. Moderate to strong winds, ranging from 5-15 mph or more, are common throughout the year. Winds are generally out of the north, west, or northwest direction in the winter and out of the south, west, or southwest direction in the summer. The prevailing wind direction appears to switch from north to south around May, which is a preferred time for much of the prescribed burning.

Temperatures range from 39 E F to 114E F with July and August being the warmest months (average high temperature 85-87E F) and January and February the coldest months (average low temperature 8-12E F). The mean annual temperature is 46.9 degrees Fahrenheit. The average frost-free period for the area is approximately 150 days.

Annual precipitation averages 18.35 inches. Precipitation is generally in the form of rain, with approximately 65 percent of the annual total occurring during the May to September growing season (NOAA National Climatic Data Center 1996). Precipitation generally 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. The greatest potential for lighting caused ignitions is from April to October. Hail and/or tornados may also be associated with storms. The rain that does fall percolates quickly into the sandy soil, and any remaining soil moisture is quickly evaporated by sun and wind.

The fall, winter, and spring months are generally dry and windy. Winter precipitation is usually in the form of snow with an average annual accumulation of 37 inches.

National Weather Service records show the occurrence of at least one day with fire danger ratings of high to extreme during all months of the year. All months except January demonstrate regularly repeated patterns which produce high fire dangers for five or more consecutive days.

8.1.5 Wildlife

Fort Niobrara is managed for native birds, bison and elk. Maintaining habitats so as to provide forage for bison and elk while meeting the diverse needs of birds and other wildlife is critical to meeting refuge resource objectives. Over 220 species of birds inhabit the refuge seasonally or year-round with an additional 10 species recorded every few years. Refuge grasslands provide important habitat for sharp-tailed grouse, greater prairie chicken, grasshopper sparrow, upland sandpiper, and other species of management concern. Almost half of all bird species on the Refuge have ecological affinities associated with the woodland communities and many are neotropical migrants. A rich diversity of other wildlife also inhabit Fort Niobrara including 48 additional species of mammals and at least 24 species of reptiles and amphibians.

8.1.6 Vegetation

The Niobrara River Valley is considered nationally significant because it is a natural biological crossroads where eastern, western, northern, and southern species meet. The natural diversity of flora and fauna is tremendous. Churchill et al. (1988) recorded 581 species of vascular plants in this area which represents one-third of the total known for Nebraska. Native species equal 519 while 62 are introduced. The vegetation on the Refuge is indicated in Figure 5.

8.1.6.1 Grasslands

Sandhills prairie is found atop sand dunes south and west of the River and is dominated by a mixture of tall-, mid- and short-grasses with their relative abundance differing according to variation in water holding capacity of the sandy soil as influenced by topography. Common grass species include sand and little bluestems, sand lovegrass, prairie sandreed, switchgrass, blue and hairy grama, sand dropseed, sandhill muhly, needle-and-thread, prairie junegrass and western wheatgrass. Shrubs include leadplant, prairie rose, sand cherry, poison ivy, buckbrush, and yucca. Typical forbs are hoary vetchling, purple and silky prairie clovers, sand milkweed,

spiderwort, bush morning glory, prairie coneflower, lemon scurfpea and several penstemon species.

Mixed prairie is located most extensively on the flat tableland above the pine-covered slopes north of the Niobrara River where drier, sandy loam soils support shallow-rooted, drought-tolerant species. This vegetation type also occurs south of the River where appropriate soil moisture characteristics exist. Dominant grass species include little bluestem, blue grama, side oats grama, needle and thread grass, and threadleaf sedge. Silver-leaf scurf pea, prickly-pear cactus, yucca, leadplant, prairie rose, and several other forbs and shrubs are present.

Isolated remnants of **Tallgrass prairie** are found adjacent to the river, however, due to the absence of fire, native shrubs and trees dominate.

Total grassland acreage on the Refuge is approximately 14,264 acres. Included in this total is an estimated 148 acres of restored native prairie.

8.1.6.2 Savannas and Forests

Pine and hardwood savannas historically evolved in fringe areas that could support tree regeneration and growth and were subject to fewer fires than grasslands. Typical areas for savanna development were the Niobrara River valley and well drained riparian areas where moisture and/or slope helped to reduce fire frequency. Deciduous forests historically evolved on steep north facing slopes of the Niobrara River Valley. Fire occurrence on these sites was relatively rare and allowed for the development of a closed canopy and an understory of forbs, brush, and saplings.

Ponderosa Pine Forest/Savanna is generally found on the steep south facing slopes of the Niobrara River Valley. The dry nature of these slopes generally inhibit widespread hardwood encroachment. More mesic sites (i.e. near springs or streams) are often invaded by dense oak brush. The slope of these sites often prevented prairie fires from backing into the Niobrara River Valley, thus reducing fire frequency for these sites. Typical vegetation is an open canopy of mixed aged ponderosa pine with an understory of mid-grasses, forbs, and some shrubs. Fire exclusion has increased the stem density and canopy coverage of pine, and promoted understory invasion by eastern red cedar and other woody species. Total acreage on the Refuge is approximately 3,022 acres.

Riparian Forest/Savanna is generally found in mesic flat sites adjacent to river. Historically, the mesic conditions and the protection provided by water on one or more sides helped to reduce the fire frequency of these sites. Typical vegetation is comprised of an open overstory (generally willow or cottonwood) with an understory of tall grasses and wetland species. Fire exclusion has resulted in increases of woody understory species (dense willow reproduction, cedar) crowding out the grass and wetland species. Total acreage on the Refuge is approximately 32 acres.

Eastern Deciduous Forest covers much of the River floodplain, south wall of the River valley, and canyons of larger tributaries where a permanent water supply is accessible via the shallow floodplain water table or from permanent spring seeps. This woodland type is also found in moist slopes and draws. Bur oak are common with ironwood, American elm, green ash,

basswood, and hackberry present. The understory is varied and comprised of typical mesic, shade-tolerant species. Paper birch, a characteristic species of the **Northern Boreal Forest** community, is restricted and clustered around cold springs in sheltered spring branch canyons, or near spring-fed seeps along the steep canyon walls of the south side of the river valley. Understory consists of boreal-type (cold water marsh or bog habitats) grasses, sedges and mosses. Eastern red cedar has invaded these woodland communities and is dominant in some areas. Total Refuge acreage is approximately 1,296 acres.

8.1.6.3 Tree Plantations

Tree Plantations established in the 1930's by the Civilian Conservation Corps and later by Refuge staff are located mostly in administrative areas and consist of Eastern red cedar, black and honey locusts, American elm, green and white ash, and/or ponderosa pine totaling approximately 59 acres.

8.1.6.4 Exotic Plants and Invasive Species

Exotic and invading vegetation found on or near the Refuge includes leafy spurge, purple loosestrife, Canada thistle, Kentucky bluegrass, smooth brome, downy brome, sweet clover, reed canary grass, phragmites, Eastern red cedar, Russian olive, black and honey locusts.

8.1.7 Endangered Species

There are several threatened and endangered species or candidates for the listing which reside on or use the Refuge at various times of the year including the bald eagle, whooping crane, piping plover, and black-tailed prairie dog. Protection of these species is a primary goal of the Fish and Wildlife Service and the Complex. Complete listing can be found in Appendix C.

8.1.8 Public Use

The high aesthetic value of the Refuge to the local community and visitors from across the state and nation is one of the primary reasons that public use is increasing. The Refuge receives substantial public use. Wildlife observation and photography are popular and occur throughout the year. Visitation is highest during summer months due to the popularity of canoeing and tubing on the Niobrara National Scenic River. Outfitter led float trips down the Niobrara and associated services to tourists has become one of the major factors in the Valentine economy. The grasslands also have high aesthetic value because of their expanse, wildflowers, and wildlife. Visitors are attracted by the opportunity to see elk, bison and prairie dogs. Camping and hunting on the refuge are prohibited.

8.1.9 Values and Improvements on and Adjacent to Station

Lands adjacent to Fort Niobrara are primarily in private ownership and are utilized for ranching. The neighboring ranches have a mix of pasture and hay meadow lands primarily used for livestock production. In addition to the ranching operations, the Refuge is bounded by some private residences and a golf course. Valentine is the nearest community to Fort Niobrara and is

the largest population center in Cherry County, Nebraska.

A listing of all capital improvements and their value can be found in Appendix D. Wildfire damage to improvements on and off the Refuge is a primary concern. While developments can generally be protected from fire damage, dispersed improvements, particularly fences, are likely to be damaged by severe or large fires. The exterior big game fences are especially costly to replace or repair from fire damage or from being cut during the course of fire suppression efforts. PVC windmill casings are also susceptible to fire damage.

A comprehensive inventory of the monetary value of adjacent values has not been conducted. Subdivisions, private residences, and ranch home sites bound the Refuge property on the SW, W, NW, N, NE, and East boundaries. These sites are plotted on fire location maps in the fire cache. All of these sites typically consist of a primary residence and have a number of outbuildings and machinery associated with the site. The ranches may have pasture lands, hay fields, and CRP lands adjacent to the Refuge. Irrigation circles are not common and the crops are generally range hay or alfalfa.

A well-maintained golf course, separated by a highway, bounds Fort Niobrara on the west. The southwest corner of the Refuge is one mile from a new subdivision. No natural fuel barrier exists between the residences and the Refuge. The structures in the subdivision have mowed fuel breaks around them. Several lots are still vacant in the subdivision. Continued growth is anticipated.

8.1.10 Cultural Resources

Significant paleontological sites are found on the Refuge, mostly concentrated near the Niobrara River Valley. Seventeen distinct registered fossil quarries are located on the Refuge. Two fossil beds of the lower Pliocene and upper Miocene epochs provided the non-articulated skeletons and bone fragments of more than 20 extinct mammalian species including three-toed horses, camels, antelopes, rhinoceroses, rodents, and rabbits (Osborn et al. 1979).

Scattered Native American campsites and artifacts occur. These resources are either in areas closed to recreational use or protected by soil coverage. Archaeological remains collected in this area suggest short term occupation by prehistoric and historic aboriginal groups for hunting and gathering. Artifacts date back through several cultures to the Paleo-Indian period of 7,500-11,500 years ago and include scattered flint chips, projectile points, other stone tools, animal bone fragments, charcoal pieces, and pottery pieces. Aboriginal occupation of this region documented in various expeditions of the middle and late 1800's was by the Dakota Sioux, Ponca, and Pawnee (Osborn et al. 1979).

Some Native American sacred sites are present on the refuge which are in use currently. Executive Order 13007 Indian Sacred Sites of 1996 directs Federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

Military history of the area began in the late 1870's with the restriction of Sioux Indian tribes to the Great Sioux reservation in Dakota Territory (now western South Dakota) and establishment of Fort Niobrara Military Reservation. The Fort was established in 1879 to monitor Sioux

activity and control operations of cattle rustlers and horse thieves. "Longhorned" cattle trailed from Texas were distributed to the Sioux, and the Fort served as a market for locally furnished goods and services. Soldiers were dispatched to several skirmishes although no major battles occurred. The Fort was closed in 1906 and retained by the War Department as a remount station until 1911 when a portion was transferred to the Department of Agriculture, Bureau of Biological Survey to be used as a preserve and breeding ground for native birds. A hay shed, constructed in 1897 by the Army, remains on the Refuge and is listed on the National Register of Historic Places (Ft. Niobrara CCP).

EuroAmerican settlement of the Sandhills began in the late 1870's and 1880's and corresponded with the strong cattle market provided by the Military Fort. The railroad (Fremont, Elkhorn, and Missouri Valley) reached Fort Niobrara in 1883 resulting in the development of the town of Valentine. Homesteading was further encouraged by the Fort's ready market for local farm produce and labor. Several saw and flour mills were in operation along the Niobrara River by the mid-1880's. Homesteading and farming grew during the 1880's but were challenged by drought and recession in the 1890's. The 1904 Kinkaid Act encouraged more settlement; however, the Sandhills was nearly the last of the Great Plains to be homesteaded. Population in the area increased and peaked during World War I with elevated commodity prices but steadily declined to current levels (Miller 1990).

Limited cultural resource studies have been conducted by the U.S. Fish and Wildlife Service (Service), National Park Service, and various research institutions to locate and describe and evaluate cultural and paleontological resources (Burgett and Nickel 1999). Less than 1 percent of the Refuge has been inventoried. The remains of old Fort Niobrara, including the north barn, have been determined eligible for Nomination to the National Register of Historic Places. The remainder of the main military complex surrounds the present Refuge headquarters. Virtually all the buildings were sold and removed between 1906 - 1912; however, foundations, roads and minor surface features remain. The 1879 hay barn is the only remaining structure from the original fort still standing on the refuge. Twelve of the 21 Refuge buildings are over 50 years old and need to be evaluated for historic significance. An inventory of cultural resource sites will be kept at the refuge to be used by Refuge staff for land management purposes in accordance with applicable laws and regulations.

8.1.11 Intrinsic Values, Wilderness, Natural Areas

In 1982, five miles of the Niobrara River on the Refuge was designated as a National Canoe Trail, and in 1991, a total of 76 miles of the Niobrara River including the entire stretch of River through the Refuge was designated by Congress as a Scenic River.

The Wild and Scenic Rivers Act of 1968 (16 U.S.C 1271-1287: This Public Law (90-542, as amended) states that: "It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations". This act may have some bearing in the management of fire within the river corridor as both a short-term aesthetic concern and a long-term ecosystem sustainability factor.

Fort Niobrara lies at the heart of an area recognized by ecologists for its biogeographic

significance due to the co-occurrence of several distinctly different, major vegetation communities within and adjacent to the Niobrara River corridor. The river corridor contains the 200 acre Ponderosa Pine Research Natural Area and the majority of the Fort Niobrara Wilderness Area. The Wilderness includes approximately 4,635 acres, with 3810 acres in one single unit; the remaining 825 acres includes portions of four other habitat units and approximately 5 miles of Niobrara River corridor (Figure 4).

Public use of the main portion of the Wilderness Area to the north of the river is primarily by hikers or horseback, largely for wildlife observation. Day use is permitted, with public access by foot, horseback or cross-country ski. The primary public use of the Niobrara River corridor portion of the Wilderness Area are river floaters, who access the area for day use by canoe or tube on the river, or by hikers on the Fort Falls Nature Trail. Virtually all of the Niobrara River used by the public on the Refuge is inside the Wilderness Area, as the Wilderness boundary is only a few hundred yards downstream from the launch point.

Air quality is good due to the absence of significant air pollution sources. The Fort Niobrara Wilderness is a Class 2 Status Area under the Clean Air Act (Ft. Niobrara CCP 1999).

Figure 4: Ft. Niobrara Wilderness

Ken, put Sean' map in here.

Figure 5: Ft. Niobrara Vegetation Map

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8.1.12 Socio-Political-Economic

Fort Niobrara NWR contributes to the local economy primarily by attracting tourists, bird watchers, photographers, and school groups. Ranching has been and continues to be the primary economic factor in the Sandhills. Permittee grazing and haying can occur on Service lands for resource management which benefits the local economy. Society places a high value on suppressing any fires which might threaten vegetation used for soil stabilization, economic production, and aesthetics.

Canoeists, tubers, and kayakers frequently take out or put in their vessels 3 miles down river of the Refuge boundary at the Berry Bridge. Outfitters and tourists utilize the county road that goes through the Refuge to access this point. The availability of the launch site at the Refuge is of vital importance to the community and the down river concessionaires and outfitters. A road or river closure on the Refuge due to a wildfire or prescribed burn at certain times of the year could have a significant impact on the local economy, and would be of concern to the local community, outfitters, concessionaires, Niobrara River Council, National Park Service, the Service, and the public who use the area.

8.2 Fire Management Units - Fort Niobrara

The Refuge has been broken into four fire management units based on predominant fuel types, management restrictions, values at risk and typical suppression strategies. The Units are identified in Figure 6 and Table 5.

Table 5: Fire Management Units - Fort Niobrara

Fire Management Unit	Acres
Upland Grassland Unit	13.334
Niobrara Valley Unit	981
Wilderness & Natural Areas Unit	4,633
Structural Interface Unit	407

8.2.1 Upland Grassland Unit

8.2.1.1 General Description

The terrain is mostly level to gently rolling topography, however choppy sands sites are steep, irregular slopes. The unit includes lands grazed by the bison and elk herds and as habitat for a wide variety of other wildlife. The primary concern would be escape of a wildland fire from this unit onto private property or into the Refuge wildland/structural interface area.

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

Figure 6: Fire Management Units - Fort Niobrara NWR

8.2.1.2 Fire Management Objectives

- Ensure the safety of Service staff and the visiting public.
- Minimize the damage of fire and fire suppression efforts on Refuge resources by using Minimum Impact Suppression Tactics.
- Prevent fires from escaping Refuge boundaries onto adjacent private lands.
- Utilize prescribed fire when it will be useful in achieving Refuge wildlife and habitat objectives. The estimated acres to be treated can be found in Table 10.
- Respond to wildfires in a cost effective manner consistent with the values at risk.

8.2.1.3 Unit Strategies

Primary suppression strategy would be aggressive initial 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 rates of spread. All fires on the Refuge have the potential to escape into adjacent private land and cause damage to crops, pasture or improvements. For that reason all fires must immediately sized up by the responding Refuge fire personnel and a decision made as to whether the responding initial attack team can contain and control the fire. If there is any doubt, then assistance should immediately be requested from local fire departments or interagency resources.

8.2.1.4 Unit Tactics

- Fires will be attacked using engines when possible. Roads, wetlands, and other barriers will be used where possible as primary control lines, anchor points, escape routes and safety zones.
- Burnout operations will be conducted from roads or other barriers when it is safe and effective to do so.
- Burnouts will also be used to strengthen primary control lines when it is safe and effective to do so.
- Approved fire retardant chemicals may be deployed by either air or ground forces when their use will be effective in containment, control or facility protection.

8.2.1.5 Habitat Type, Fuel Loading and Unusual Fire Behavior

Vegetation is predominantly mixed-grass prairie with scattered brush and trees, and is continuous with few natural or man-made fuel breaks. Fires can be moderately intense with extreme rates of spread.

NFFL Fuel Model 1 is the most abundant fuel found on the unit and is largely represented as NFDRS Fuel Model L (perennials), with some classified as NFDRS Fuel Model A (annuals). Fire spread in this fuel type is governed by fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured

grass and

associated material. Very little shrub or timber is present, generally less than one third of the area.

Fuel Model 3 Grass - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and some naturally occurring wetlands. Fuel loading found in the grassy areas of this unit falls within the normal range.

8.2.1.6 Expected Fire Effects

Fire is a natural and essential part of the Refuge's ecosystems. Native wildlife evolved with fire and have developed means of tolerating and/or taking advantage of fires. In general, fires result in little direct wildlife mortality and usually benefit native wildlife. However, a large wildfire on the Refuge during drought conditions or late in the growing season could significantly reduce forage available for bison and elk. Overuse of remaining forage could occur and require the Refuge to conduct emergency roundup and liquidation operations to adjust the size of the fenced animal herds. Also, wildfire could damage fence increasing the potential for bison and elk to escape.

While uncontrolled wildfire has potential for negative impacts on bison and elk, prescribed fire under the correct prescriptions can be used as a tool for fenced animal grazing and improve habitat for other wildlife. The effects of fire on selected species can be found in Appendix E.

8.2.1.7 Limits to Strategy and Tactics

- The use of dozer or plow lines is permitted on Service lands to protect life or improvements such as buildings or bridges, but only with the approval of the Project Leader or his acting.
- Hand line construction which causes soil disturbance is to be avoided if possible.
- Retardant or foam is not to be used within 300 feet of a stream or other water feature.

8.2.2 Niobrara Valley Unit

8.2.2.1 General Description

This unit is a primary water and view shed for the Niobrara National Scenic River. Maintaining water quality and aesthetic quality is a high priority. Topography ranges from level riverbanks to steep slopes. 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 to directly access the area by vehicle. Access by watercraft is also possible. Response time should be not more than 1 hour.

8.2.2.2 Fire Management Objectives

- Ensure the safety of Service staff and the visiting public.
- Minimize the damage of fire and fire suppression efforts on Refuge resources by using Minimum Impact Suppression Tactics.
- Prevent fires from escaping Refuge boundaries onto adjacent private lands.
- Utilize prescribed fire when it will be useful in achieving Refuge wildlife and habitat objectives. The estimated acres to be treated can be found in Table 10.
- Respond to wildfires in a cost effective manner consistent with the values at risk.

8.2.2.3 Unit Strategies

Suppression strategy will be determined by circumstances. Low to moderate intensity fires will be directly attacked by handcrews 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.

8.2.2.4 Unit Tactics

- Fires will be attacked using engines and handcrews when possible. Roads, trails, the river, wetlands, and other barriers will be used where possible as primary control lines, anchor points, escape routes and safety zones.
- Burnout operations will be conducted from roads, trails, or other barriers when it is safe and effective to do so.
- Burnouts will also be used to strengthen primary control lines when it is safe and effective to do so.
- Approved fire retardant chemicals may be deployed by either air or ground forces when their use will be effective in containment, control or facility protection.

8.2.2.5 Habitat Type, Fuel Loading and Unusual Fire Behavior

Vegetation is variable and includes eastern deciduous forest on northern aspects, ponderosa pine forest/savanna on southern aspects, mixed grass and tall grass prairie and hardwood savanna on more level sites.

Most fires in this unit exhibit moderate to high intensity due to past fire suppression which has allowed for the buildup of large amounts of woody fuels and ladder fuels with potential for high intensity surface and crown fires under drought or open winter conditions. During drought conditions and late summer, fires in this unit can exhibit moderate to high intensity fires.

The predominant fuel models that can be used to predict fire behavior include:

- **Fuel Model 2 - Grass** - describes open pine stands with grass and brush understory. Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are

surface fires where the herbaceous material, in addition to litter and dead-down stemwood from the open shrub or timber overstory, contribute to the fire intensity. Rates of spread are moderate with flame lengths less than two feet.

- **Fuel Model 3 Grass** - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and some naturally occurring wetlands.

- **Fuel Model 4 Shrub** - describes areas in which fast spreading fires involve the foliage and live and dead fine woody material. Stands of mature shrubs, 6 feet or more tall, are included. This fuel model occurs in scattered patches of mature stands of willow in the flood plain.

- **Fuel Model 8 Timber** - describes timbered areas with short-needled conifers where slow burning ground fires with low flame length are generally the case. Only under severe weather conditions involving high temperatures, low humidities and high winds do the fuels pose fire hazards.

- **Fuel Model 9 Timber** - describes closed stands of long-needled pine like ponderosa or hardwoods with loosely packed leaves. Fires run through the surface litter faster than model 8 and have longer flame height. Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Concentrations of dead-down woody materials will contribute to possible torching out of trees, spotting and crowning.

- **Fuel Model 10 Timber** - describes areas where fires burn in the surface and ground fuels with greater fire intensity than the other timber litter models. Dead-down fuels include greater quantities of 3-inch or larger limbwood resulting from over-maturity or natural events that create a large load of dead material on the forest floor. Crowning out, spotting and torching of individual trees are more frequent in this fuel situation, leading to potential fire control difficulties.

8.2.2.6 Expected Fire Effects

Fire is a natural and essential part of the Refuge's ecosystems. Native wildlife evolved with fire and have developed means of tolerating and/or taking advantage of fires. In general, fires result in little direct wildlife mortality and usually benefit native wildlife.

While uncontrolled wildfire has potential for negative impacts on fenced animals, prescribed fire under the correct prescriptions can be used as a tool to improve habitat.

Wildland fire shaped the vegetative community as well. The pine savannas are a direct result of fire, while the exclusion of fire in the riparian areas, has helped certain species to survive.

However, almost all of the native species found in this unit are fire adapted in one way or another. The effects of fire on selected species can be found in Appendix E.

8.2.2.7 Limits to Strategy and Tactics

- The use of dozer or plow lines is permitted on Service lands to protect life or improvements such as buildings or bridges, but only with the approval of the Project Leader or his acting.
- Hand line construction which causes soil disturbance is to be avoided.
- Retardant and foam are not to be used within 300 feet of the Niobrara River, a stream or other water feature.
- Federal National Scenic River regulations apply to this unit. These regulations do not restrict fire suppression operations, but encourage the use of minimal impact fire suppression tactics (MIST) whenever possible. The use of minimal impact suppression tactics may hinder fire suppression effectiveness due to the resistance of control from heavier fuels. Following containment MIST tactics should be applied.

8.2.3 Wilderness and Natural Areas Unit

8.2.3.1 General Description

The unit contains the 200 acre Ponderosa Pine Research Natural Area and the Fort Niobrara Wilderness Area. The Wilderness includes approximately 4,635 acres, with 3,810 acres in one single unit; the remaining 825 acres includes portions of four other habitat units and approximately 5 miles of Niobrara River corridor. The majority of the unit serves as a winter pasture for the bison herd. The remainder of the area included in other habitat management units are grazed by elk.

The unusually diverse plant and animal assemblages found in this area are due to unique surface and subsurface geologic formations, water and soil conditions, current and past climates, and sun exposure. Additional ecological factors that had significant affect on the biological diversity that evolved in this region prior to Euro-American settlement includes wildfire and the use of fire by aboriginal man, and the unrestricted grazing and impacts associated with grazing by bison, elk, pronghorn antelope, and prairie dogs.

Previously existing fire trails and rustic bridges are utilized for access by horseback, and limited access by motorized equipment is permitted when absolutely necessary during emergency situations, for prescribed fire or wildfire suppression, or for reasons related to safety.

8.2.3.2 Fire Management Objectives

- Ensure the safety of Service staff and the visiting public.
- Minimize the damage of fire and fire suppression efforts on Refuge resources by using Minimum Impact Suppression Tactics.
- Prevent fires from escaping Refuge boundaries onto adjacent private lands.
- Utilize prescribed fire when it will be useful in achieving Refuge wildlife and habitat objectives and preserve Wilderness and Research Area values.
- Respond to wildfires in a cost effective manner consistent with the values at risk.

8.2.3.3 Unit Strategies

Suppression strategy will be determined by circumstances. Low to moderate intensity fires will be directly attacked by handcrews 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.

Prescribed fire strategies will include late evening or early morning blacklining prior to the ignition of units and the use of extended hoselays, handcrews, and rotary winged aircraft to reduce impacts on the landscape. A prescribed fire conducted in the Wilderness Area (2001) demonstrated that limited vehicle use is absolutely essential to conduct prescribed fires in the Ponderosa pine grasslands.

8.2.3.4 Unit Tactics

- Fires will be attacked using engines and handcrews when possible. Roads, trails, the river, wetlands, and other barriers will be used where possible as primary control lines, anchor points, escape routes and safety zones.
- Burnout operations will be conducted from roads, trails, or other barriers when it is safe and effective to do so.
- Burnouts will also be used to strengthen primary control lines when it is safe and effective to do so.
- Approved fire retardant chemicals may be deployed by either air or ground forces when their use will be effective in containment, control or facility protection.

8.2.3.5 Habitat Type, Fuel Loading and Unusual Fire Behavior

Vegetation is variable and includes eastern deciduous forest on northern aspects, ponderosa pine forest/savanna on southern aspects, tall grass and mixed prairie and hardwood savanna on more level sites.

Most fires in this unit exhibit moderate to high intensity. Past fire suppression has allowed for the buildup of large amounts of woody fuels and ladder fuels with potential for high intensity surface and crown fires under drought or conditions found during an open winter. Native prairie on tablelands can have fast rates of spread during the late summer and early fall after vegetation has cured and before bison have grazed the unit.

The predominant fuel models that can be used to predict fire behavior include:

- **Fuel Model 2 - Grass** - describes open pine stands with grass and brush understory. Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead-down stemwood from the open shrub or timber overstory, contribute to the fire intensity. Rates of spread are moderate with flame lengths less than two feet.

- **Fuel Model 3 Grass** - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and some naturally occurring wetlands.

- **Fuel Model 4 Shrub** - describes areas in which fast spreading fires involve the foliage and live and dead fine woody material. Stands of mature shrubs, 6 feet or more tall, are included. This fuel model occurs in scattered patches of mature stands of willow in the flood plain.

- **Fuel Model 8 Timber** - describes timbered areas with short-needled conifers where slow burning ground fires with low flame length are generally the case. Only under severe weather conditions involving high temperatures, low humidities and high winds do the fuels pose fire hazards.

- **Fuel Model 9 Timber** - describes closed stands of long-needled pine like ponderosa or hardwoods with loosely packed leaves. Fires run through the surface litter faster than model 8 and have longer flame height. Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Concentrations of dead-down woody materials will contribute to possible torching out of trees, spotting and crowning.

8.2.3.6 Expected Fire Effects

Fire is a natural and essential part of the Refuge's ecosystems. Native wildlife evolved with fire and have developed means of tolerating and/or taking advantage of fires. In general, fires result in little direct wildlife mortality and usually benefit native wildlife. However, a large wildfire on the Refuge during drought conditions or late in the growing season could significantly reduce forage available for bison and elk. Overuse of remaining forage could occur and require the Refuge to conduct emergency roundup and liquidation operations to adjust the size of the fenced animal herds. Also, wildfire could damage fence increasing the potential for bison and elk to

escape.

Wildland fire shaped the vegetative community as well. The pine savannas are a direct result of fire, while the exclusion of fire in the riparian areas, has helped certain species to survive. Almost all of the native species found in this unit are fire adapted in one way or another. The effects of fire on selected species can be found in Appendix E.

8.2.3.7 Limits to Strategy and Tactics

- Hand line construction which causes soil disturbance is to be avoided.
- Retardant and foam are not to be used within 300 feet of the Niobrara River, a stream or other water feature.
- Regulations resulting from the Federal Wilderness Act apply to this unit. These regulations do not unnecessarily restrict fire suppression operations, but encourage the use of minimal impact fire suppression tactics (MIST) whenever possible.

8.2.4 Structural Interface Unit

8.2.4.1 General Description

The unit contains the Refuge Headquarters, the majority of the historic structures, and is the main access point for visitors using the river or viewing wildlife. In addition, the unit borders private lands and is near privately owned structures.

8.2.4.2 Fire Management Objectives

- Ensure the safety of Service staff and the visiting public.
- Minimize the damage of fire and fire suppression efforts on Refuge improvements and cultural and natural resources by using Minimum Impact Suppression Tactics.
- Prevent fires from escaping Refuge boundaries onto adjacent private lands or from destroying or damaging Refuge improvements.
- Utilize prescribed fire when it will be useful in achieving Refuge wildlife and habitat objectives. The estimated acres to be treated can be found in Table 10.
- Utilize prescribed fire, either alone or in combination with other means, to control fuels.
- Respond to wildfires in a cost effective manner consistent with the values at risk.

8.2.4.3 Unit Strategies

Primary suppression strategy would be aggressive initial 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 rates of spread. All fires on the Refuge have the potential to escape

into adjacent private land and cause damage to crops, pasture or improvements. For that reason all fires must immediately sized up by the responding Refuge fire personnel and a decision made as to whether the responding initial attack team can contain and control the fire. If there is any doubt, then assistance should immediately be requested from local fire departments or interagency resources.

8.2.4.4 Unit Tactics

- Fires will be aggressively attacked using engines when possible. Roads, wetlands, and other barriers will be used where possible as primary control lines, anchor points, escape routes and safety zones.
- Burnout operations will be conducted from roads or other barriers when it is safe and effective to do so.
- Burnouts will also be used to strengthen primary control lines when it is safe and effective to do so.
- Approved fire retardant chemicals may be deployed by either air or ground forces when their use will be effective in containment, control or facility protection.
- Structural firefighting is not the functional responsibility of the Service (241 FW 7.1 and 095 FW 3.8.C.). Structural and vehicle firefighting is the responsibility of State and local fire jurisdictions. Service personnel may assist in structural fire suppression by directing traffic, providing structure protection, etc. Cooperative agreements will not commit Service personnel to structural fire suppression.

8.2.4.5 Habitat Type, Fuel Loading and Unusual Fire Behavior

Vegetation in this unit is mixed, and ranges from pastures lands that were once heavily grazed to riparian areas. The following fuel models may be used to predict expected fire behavior:

- **Fuel Model 1 Grass** - describes areas dominated by short grass, such as saltgrass. Rate of spread of 78 chains/hour with flame lengths of 4 feet are possible under moderate conditions. This fuel model occurs on low river terraces and certain pasture land.

- **Fuel Model 3 Grass** - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail and patches of tall-grass prairie. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and some naturally occurring wetlands.

- **Fuel Model 4 Shrub** - describes areas in which fast spreading fires involve the foliage and live and dead fine woody material. Stands of mature shrubs, 6 feet or more tall, are included. This fuel model occurs in scattered patches of mature stands of willow in the flood plain.

- **Fuel Model 8 Timber** - describes timbered areas of hardwood with compacted leaf litter

where slow burning ground fires with low flame length are generally the case. Only under severe weather conditions involving high temperatures, low humidities and high winds do the fuels pose fire hazards.

- **Fuel Model 9 Timber** - Describes closed stands of hardwoods with loosely packed leaves. Fires run through the surface litter faster than model 8 and have longer flame height. Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Concentrations of dead-down woody materials will contribute to possible torching out of trees, spotting and crowning.

Fuel loading found in the grassy areas of this unit falls within the normal range. The grasses are responding to the lack of grazing on in the pastures and may be replaced by NFFL Fuel Model 3.

8.2.4.6 Expected Fire Effects

The effects are expected to be similar to those identified in previous sections. The effects of fire on selected species can be found in Appendix E.

8.2.4.7 Limits to Strategy and Tactics

- The use of dozer or plow lines is permitted on Service lands to protect life or improvements such as buildings or bridges, but only with the approval of the Project Leader or his/her acting.
- Hand line construction which causes soil disturbance is to be avoided.
- Retardant or foam is not to be used within 300 feet of a stream or other water feature.

9.0 VALENTINE NATIONAL WILDLIFE REFUGE

9.1 Description

Valentine National Wildlife Refuge (Valentine) consists of 71,516 acres (Figure 7). The Refuge, and surrounding area, is recognized by ecologist for its biological significance as the Nebraska Sandhills, one of the largest grass-stabilized sand dune regions in the world (Valentine CCP 1999). This region is characterized by rolling, vegetated sand dunes and interdunal valleys that spread over the landscape, with native grasses predominating as the main vegetative cover. Many shallow lakes and wetlands are interspersed in the lower valleys and the area is relatively unchanged since early settlement of the Sandhills (Valentine CCP 1999).

9.1.1 Location

The Refuge lays in Cherry County in north-central Nebraska, at the "Heart of the Nebraska Sandhills", 20 miles south of the City of Valentine (Figure 1).

9.1.2 Topography and Soils

The predominant types of topsoils are sand and sandy loams. These soils are extremely well drained. Soils on upland sites are highly erodible and erosion is a major concern following wildfires.

9.1.3 Water

The major water resources in the Sandhills and Valentine NWR are subirrigated lakes and wetlands as well as occasional streams. Because of the sandy soil, there is little water runoff, but there are numerous springs from the Ogallala aquifer. Water does not play a major role in soil erosion except in some cases where vegetation cover is removed (i.e. rutted cattle trails on steep sandy range sites); almost all erosion is caused by wind. As mentioned above, the Sandhills are essentially sand dunes stabilized with vegetation. Removal of the vegetation increases the likelihood of wind erosion to the dunes and sand deposition to lands elsewhere. This can have serious negative effects upon the economic production of the lands affected.

9.1.4 Climate

A description of the climate can be found in Section 2.1.4 Climate.

Figure 7: Valentine National Refuge

Ken, please insert Sean's map here.

9.1.5 Wildlife

Valentine National Wildlife Refuge is managed to preserve, restore, and enhance native grasslands for migratory birds and other indigenous wildlife with emphasis on waterfowl, prairie grouse, and other grassland dependent birds.

The Nebraska Sandhills are within the range of 26 to 27 species of amphibians and reptiles (Freeman 1990). Twenty-three species are relatively common on Valentine National Wildlife Refuge, including 7 amphibians, 5 turtles, 4 lizards, and 7 snake species. The turtle fauna on Valentine National Wildlife Refuge is rich in species with abundant populations (Corn et al. 1993) - especially the Blanding's turtle which is on the Federal Category I and II Candidate Species List. Of the seven snake species on Valentine National Wildlife Refuge only the milk snake and prairie rattlesnake do not occur in any significant numbers.

The avifauna of the Nebraska Sandhills is extremely diverse with 270 species making up the Refuge Bird List. There are five endangered species that are migrants or winter residents only; and three species on the Federal Category I and II Candidate Species List. Of the latter three, the ferruginous hawk is a migrant and the black tern and loggerhead shrike are abundant and common breeding species on Valentine National Wildlife Refuge.

The riparian shorelines on Valentine National Wildlife Refuge are primarily native willow which provide habitat for many neotropical migrants (Sedgewick 1993). The high water levels of the past 10-15 years have not encouraged significant use by migrating shorebirds.

The Nebraska Sandhills provide two distinct land types, sandhills and wet meadows, that support an abundant diversity of native mammals. The original native mammalian fauna probably comprised 58 species. Ten carnivores and ungulates were probably extirpated by the turn of the century and the remaining 48 native mammal species have been augmented by 10 additional species that have been introduced or their ranges have been extended (Jones 1964, McDaniel 1967, Freeman 1990, and Bogan and Ramotnik 1993). One native species, the swift fox, is on the Federal Category I and II Candidate Species List as well as the State Endangered Species List. The present range of occurrence of this species is within the region of Valentine National Wildlife Refuge, but, recent documentation of occurrence has not been verified.

Three insect species are on the Federal Category I and II Candidate Species List -- the regal fritillary butterfly, the Belfragi's chlorochroan bug, and the noctuid moth. However, systematic monitoring of the diverse insect life on and adjacent to the Refuge has not been accomplished. During 1983, personnel from the Smithsonian Institute's Museum of Natural History, Washington D.C., collected small moths on the Refuge and reported that a minimum of 25 species had not been previously described.

9.1.6 Vegetation

Valentine consists of approximately 49,111 acres of grassy uplands and undulating sand dunes, 10,272 acres of dense grass stands covering subirrigated meadows, 4,572 acres of marsh, and 7,561 acres of shallow lakes. The flora of the Refuge is primarily composed of native species of

grasses, sedges, forbs (Figure 8). The Refuge is primarily grassland prairie which includes tall-grass prairie, Sandhills Prairie, and Mixed Grass Prairie. The healthy native prairies found on the Refuge are among the best found anywhere in North America.

9.1.6.1Grasslands

Sandhills Prairie is within the wide transitional zone of the Mixed Grass Prairie between Tall Grass Prairie and the Short Grass Plains. Annual precipitation is typical of the semi-arid Mixed Grass Prairie; however, the Nebraska Sandhills is characterized by a predominance of post-climax tall grass species typical of a greater moisture regime (Oosting 1948, Keeler et al. 1980). This mixture and general dominance by Tall Grass Prairie species is locally influenced by topography (i.e., the soil moisture holding capacities and soil moisture penetration in different textures of the sand soil range sites) and the root structures and the photosynthetic strategies of cool and warm season plants (Tolstead 1942, Barnes and Harrison 1984). In general, sub-irrigated sites are dominated by Tall Grass Prairie species, and the well drained sandy uplands are dominated semi-arid Mixed Grass Prairie species. There are four basic range sites within the Sandhills.

- Wetland range sites (4,572 acres) are the low meadow sites dominated by grass species that thrive with a moisture saturated soil profile, i.e., prairie cordgrass, blue-joint reedgrass, sedge species, and non-grass species such as golden rods, saw-toothed sunflower and willows. A federally threatened species, western prairie fringed orchid, is found within the wetland range site. Also included within the wetland range site is Dewey Marsh which contains a rare sandhills fen community (108 acres) growing on a dense layer of flooded peat. Remnant populations of northern plant species such as cottongrass and northern bog violet still exist in the fen. Accumulations of decadent vegetation and continued invasion of woody species can significantly reduce the productivity of these sites.

- Sub-irrigated range sites (10,272 acres) are meadows that are very close to the ground water level. These sites are characteristic of "mesophytic tallgrass" communities (Tolstead 1942, Harrison 1980) and are dominated by Tall Grass Prairie species such as big bluestem, switchgrass, and Indiangrass. Soil moisture in the sub-irrigated range site is adequate to support the deep rooted warm season native grasses even during periods of drought. Sub-irrigated range sites are commonly invaded by exotic species such as Kentucky bluegrass, smooth brome, and redtop, and woody invaders such as eastern red cedar and native willows.

- Sand range sites (36,131 acres) comprise the dry meadows (low sand sites) and the gently undulating sandhills. Native vegetative species common to the sand range sites are cool season grasses: needle-and-thread, porcupine grass, prairie junegrass and western

Figure 8. Valentine NWR Vegetation MapKen compare to Sean's, you may not need a change.

wheatgrass; and warm season grasses typical of the Tall Grass Prairie: prairie sandreed, sand bluestem, sand lovegrass, little bluestem, and switchgrass. Typical non-grass species of the sand range site include stiff sunflower, yucca, leadplant and prairie rose. Exotic smooth brome, Kentucky bluegrass, and eastern red cedar will invade the lower elevations of the sand range sites.

G Choppy sand range sites (12,980 acres) are the characteristic sand dunes for which the Nebraska Sandhills is named. Many vegetational characteristics are common to the sand range sites, but, there is a greater proportion of unvegetated sand soil surface that is subject to wind and water erosion. Typical perennial grasses include: blue gramma, sand bluestem, prairie sandreed, blowout grass, sand lovegrass, little bluestem, spiny muhly; and non-grass species include yucca, prairie rose and sunflowers. The federally endangered species, blowout penstemon, is endemic to the Nebraska Sandhills and its characteristic habitat includes the blowouts and open sand areas of the choppy sand range sites.

Native perennial and annual flowering forbs adorn the various range sites on Valentine National Wildlife Refuge - some of which are only found on native grasslands that have not been degraded by the impact of modern man, i.e. conversion of grassland to farm land, use of herbicides, and chronic overgrazing of livestock (Weaver 1961, Farrar 1990).

9.1.6.2 Trees, Shrubs and Plantations

There are approximately 45 species of native and introduced trees and shrubs in the Sandhills. Native willows are found around wetlands as are occasional cottonwoods; and hackberry, chokecherry and American plum are located on the north slopes usually adjacent to the south sides of lakes. The abundance of woody cover has drastically changed since Valentine National Wildlife Refuge was established. Many shrub and tree species, including non-natives, were planted by the Civil Conservation Corps (CCCs) during the 1930s. Since then, red cedar and Russian olive trees have been expanding and invading grassland and are beginning to jeopardize the floral and faunal integrity of native Sandhills Prairie. The eastern red cedar has continued to expand on sub irrigated sites and upland prairie sites.

9.1.6.3 Exotic Plants and Invasive Species

The primary exotic plants of concern on the Refuge are smooth brome and Kentucky bluegrass. Cheat grass is present in a few areas of recent disturbance. Cheat grass has not historically been a species of concern, but it will need to be monitored. The eastern red cedar is an invasive species of concern that has been spreading rapidly from sub irrigated sites up into the sand range sites. The invasions are prevalent in areas closest to planted red cedar tree breaks. The three species receiving fire use treatments are smooth brome, Kentucky bluegrass, and eastern red cedar.

9.1.7 Endangered Species and Species of Conservation Concern

As indicated in the previous sections, there are a number of rare, threatened and endangered species which reside on or use the Refuge at various times of the year. A more in depth discussion of some key species follows. A complete listing is contained in Appendix C.

The western prairie fringed orchid (Plantanthera praeclara) occurs in moist tall grass prairie meadows, and small numbers have been found in meadows on the Refuge. It's life cycle is not well understood, but it appears to bloom and seed irregularly. Researchers have not been able to germinate seeds in the laboratory, but prescribed fire has been used to produce conditions resulting in the natural germination of western prairie fringed orchid in Nebraska (Bird 1994).

Blowout penstemon (Penstemon haydenii) occurs in the exposed sandy blowouts between dunes, and a few plants have been found over the years on the Refuge. It's numbers have dwindled because the number of blowouts has decreased dramatically over the years due to changing range management practices and the exclusion of fire.

The American burying beetle (Nicrophorus americanus) is a large carrion beetle. A few specimens have been found on Valentine NWR, however there is no estimate of how large or small the population may be, or if they have any type of preferred habitat on the refuge. The effect of prescribed fire upon burying beetle populations is unknown, although it should be noted that these beetles historically maintained populations throughout the grasslands and prairies of the midwest which may indicate some type of survival strategy in relation to wildfires. Theoretically, American burying beetles can escape low to moderate intensity grass fires by either flying or burrowing.

Several threatened or endangered bird species may be found on the Refuges including: Bald Eagle (Haliacetus leucocephalus), interior least tern (Sterna antillarum), piping plover (Charadrius melodus), and whooping crane (Grus americanus). Historically, periodic fires maintained some of these species preferred habitats of open grasslands and marshes.

9.1.8 Public Use

The Refuge receives substantial public use during daylight hours. Valentine NWR receives considerable fall, winter, and spring hunting and fishing use. Wildlife watching and hiking are popular and occur at all times of the year. The high aesthetic value of the Complex to the local community and visitors from across the state and nation is one of the primary reasons that public use is increasing. The grasslands also have high aesthetic value because of their expanse, wildflowers, and wildlife. Aesthetic value was a factor in the designation of Valentine NWR as a National Natural Landmark.

The Nebraska Game and Parks Commission (NEG&PC) manages a wildlife area, known as Willow Lake State Recreation Area, north of the Refuge, which is being traded with the Service for the Holt Creek Wildlife Management Area. The NEG&PC also manages the Rat and Beaver Lake Wildlife Management Area on the south boundary of the Refuge. The area has only one access point and off road use is prohibited.

The school sections of land bordering the Refuge are leased for public school tax revenue. The school sections are fenced rangeland.

The residences within the Refuge are utilized by volunteers, researchers, and the seasonal and permanent staff. The Trapper Cabin is utilized for special field work needs on a limited basis. Camping on the Valentine refuge is prohibited.

9.1.9 Values and Improvements On and Adjacent to the Station

Wildfire damage to improvements on and off the Refuge is a primary concern. While developments can generally be protected from fire damage, dispersed improvements, particularly fences and windmills, are likely to be damaged by severe or large fires. Powerlines running through the Refuge are vulnerable to wildfire and on occasion may be the cause of a wildfire. Hackberry Headquarters and Pony Lake Subheadquarters have the most monetary value on the Refuge. A listing of all capital improvements and value can be found in Appendix D.

A comprehensive inventory of the adjoining ranches has not been conducted. Most ranch operations have multiple residences to house hired hands and the owners. As mentioned, these areas are frequently mowed or cattle trampling has compacted fuel. Feed storage areas around hay fields are vulnerable to wildfire, as are some of the outbuildings. Several ranchers access their operations by utilizing the county road 16B that runs through the northwest end of the Refuge. Other ranch operations are only accessible by Refuge roads. Ignition sources on the ranch operations are likely to be caused by equipment failure, mowing, and feed grinding. Fire departments in the area can access Refuge and private property within thirty to forty five minutes.

9.1.10 Cultural Resources

A comprehensive archaeological survey of the Valentine NWR has not been completed. An inventory was done in the 1970's, but the records were lost. There are no known or recorded cultural resources that might be affected by fire management on Valentine National Wildlife Refuge. In the event that Native American camps or burial sites are found through the course of fire management activities, work will be halted and Regional Archeologist and Nebraska State Historical and Preservation Officer will be contacted.

Several deserted homestead and CCC sites are located on the Refuge, but native prairie revegetation has all but naturalized them. However, the windbreaks planted by homesteaders or the CCC have been classified as historical by the Regional Archaeologist and in 1998 the refuge was directed to research which tree rows were planted by either of these groups and document them before they can be burned. One of these windbreaks burned up in the Pony Fire of 2000.

9.1.11 Intrinsic Values, Wilderness, Research Natural Areas

The Refuge has a 15,809 acre proposed wilderness area located in the southwest part of the Refuge (Figure 7). The area was proposed as a wilderness area in 1973 and the Refuge was

recognized as a Registered National Landmark in 1979.

The proposed wilderness area has two large lakes, Dad's and Mule, and several smaller ones. Dad's Lake, one of the largest natural lakes in the Sandhills, is bordered on the south by a narrow strip of trees and brush and high sandy hills. Vegetation and wildlife is similar to that found in other areas of the Refuge. The area is very scenic with the native grasses, undeveloped lakes, high choppy sand hills, and feeling of isolation and the expanse of the prairie. Man-made structures in the wilderness consist of a few windmills and tanks and electric and barbed wire fences.

There are two research natural areas located on the Refuge. The George Wiseman Natural Area and Natural Area 2 have a combined acreage of 1,381 acres. These areas are closed to public access and not subjected to cattle grazing. No restrictions are in place for the use of fire apparatus in this area.

9.1.12 Socio-political-economic

See section 8.1.12

9.2 Fire Management Units - Valentine National Wildlife Refuge

The Refuge has been broken into general fire management units based on predominant fuel types, management restrictions, values at risk and typical suppression strategies. The Units are identified in Figure 9 and Table 6.

Table 6: Fire Management Units - Valentine National Wildlife Refuge

Fire Management Unit	Acres
Grassland - Wetland Unit	53,316
Wilderness & Natural Areas Units - Valentine	17,190
Structural Interface Units - Valentine NWR	1,010

Note: Lakes and ponds on Valentine NWR are included in wetland acreage figures. Surface water acres are a part of the total acreage.

Figure 9 Fire Management Units - Valentine NWR

Ken, please put Sean's map in here.

9.2.1 Grassland - Wetland Unit

9.2.1.1 General Description

Prior to the advent of grazing and fire suppression, the Sandhills was composed primarily of sparsely vegetation sand dunes and sub-irrigated meadows, with spring and lakes fed by a huge underground aquifer. Dense vegetation was restricted to sub-irrigated meadows and the edges of lakes and other wetlands. Today, the unit is covered by endless expanses of prairie with few natural or man-made breaks. The vegetation is primarily tall-grass prairie species and cattails and other water loving plants at the fringes of lakes and ponds. The terrain is level to gently rolling topography.

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. The primary concern is an escape of a wildland fire from this unit onto private property or into the Refuge wildland/structural interface area. An escape into these areas could pose a serious threat to life and property. A final concern would be the loss of improvements including fences and windmills within the unit.

Access is available to 4-wheel drive vehicles via refuge trails. Vehicle travel off trails is generally possible. Response time should be not more than 1 hour.

9.2.1.2 Fire Management Objectives

- Ensure the safety of Service staff and the visiting public.
- Minimize the damage of fire and fire suppression efforts on Refuge resources by using Minimum Impact Suppression Tactics.
- Prevent fires from escaping Refuge boundaries onto adjacent private lands.
- Utilize prescribed fire when it will be useful in achieving Refuge wildlife and habitat objectives. The estimated acres to be treated can be found in Table 11.
- Respond to wildfires in a cost effective manner consistent with the values at risk.

9.2.1.3 Unit Strategies

Suppression strategy will be determined by circumstances. The primary suppression strategy would be aggressive initial attack with engines whenever possible. Low to moderate intensity fires may be directly attacked by handcrews 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.

All fires on the Refuge have the potential to escape into adjacent private land and cause damage to crops, pasture or improvements. For that reason all fires must immediately sized up by the responding Refuge fire personnel and a decision made as to whether the responding initial attack team can contain and control the fire. If there is any doubt, then assistance should immediately

be requested from local fire departments or interagency resources.

9.2.1.4 Unit Tactics

- Fires will be attacked using engines or handcrews when possible. Roads, wetlands, and other barriers will be used where possible as primary control lines, anchor points, escape routes and safety zones.
- Burnout operations will be conducted from roads or other barriers when it is safe and effective to do so.
- Burnouts will also be used to strengthen primary control lines when it is safe and effective to do so.
- Approved fire retardant chemicals may be deployed by either air or ground forces when their use will be effective in containing or controlling the fire, provided that there is a 300 foot buffer between the retardant or foam line and a water feature.

9.2.1.5 Habitat Type, Fuel Loading and Unusual Fire Behavior

Vegetation composition of the grasslands is predominantly mixed-grass prairie with scattered brush and trees, and is continuous with few natural or man-made fuel breaks. Fires can be moderately intense with extreme rates of spread. Vegetation in the wetland areas includes tall grass prairie and marsh plants and sedges. Most fires in this unit exhibit low to moderate intensity due to moisture levels except in periods of drought. During drought periods fires can exhibit high intensities.

The predominant fuel type that can be use to predict fire behavior is:

NFFL Fuel Model 3 Grass - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail and patches of tall-grass prairie. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions.

Fuel loading found in the grassy areas of this unit falls within the normal range. The grasses are responding to the lack of grazing on the unit and fuel loadings may buildup over time and contribute to more intense fire behavior. This fuel model is particularly affected by wind and fuel moisture. During windy, dry days, the flame lengths can well exceed 12 feet, with rapid rates of spread. Severe drought is indicated by a Palmer Drought Index reading of - 4.0 or less or a Keetch-Byram Drought Index of 300 or greater.

9.2.1.6 Expected Fire Effects

Fire is a natural and essential part of the Refuge's ecosystems. Native wildlife evolved with fire and have developed means of tolerating and/or taking advantage of fires. In general, fires result in little direct wildlife mortality and usually benefit native wildlife and vegetation. The effects of fire on selected species can be found in Appendix E.

9.2.1.7 Limits to Strategy and Tactics

- The use of dozer or plow lines is permitted on Service lands to protect life or improvements such as buildings or bridges, but only with the approval of the Project Leader or his acting.
- Hand line construction which causes soil disturbance is to be avoided.
- Retardant and foam are not to be used within 300 feet of a lake, stream or other water feature.

9.2.2 Wilderness and Natural Areas Unit

9.2.2.1 General Description

The Refuge, recognized as a Registered National Landmark in 1979, has a 15,809 acre proposed wilderness area located in the southwest part of the Refuge (Figure 9).

The proposed wilderness area has two large lakes, Dad's and Mule, and several smaller ones. Dad's Lake, one of the largest natural lakes in the Sandhills, is bordered on the south by a narrow strip of trees and brush and high sandy hills. Vegetation and wildlife is similar to that found in other areas of the Refuge. Man-made structures in the wilderness consist of a few windmills and tanks and electric and barbed wire fences.

There are two research natural areas located on the Refuge. The George Wiseman Natural Area and Natural Area 2 have a combined acreage of 1,381 acres. These areas are closed to public access and not subjected to cattle grazing. No restrictions are in place for the use of fire apparatus in this area.

9.2.2.2 Fire Management Objectives

- Ensure the safety of Service staff and the visiting public.
- Minimize the damage of fire and fire suppression efforts on Refuge resources by using Minimum Impact Suppression Tactics.
- Prevent fires from escaping Refuge boundaries onto adjacent private lands.
- Utilize prescribed fire when it will be useful in achieving Refuge wildlife and habitat objectives. The estimated acres to be treated can be found in Table 11.
- Respond to wildfires in a cost effective manner consistent with the values at risk.

9.2.2.3 Unit Strategies

Suppression strategy will be determined by circumstances. Low to moderate intensity fires will be directly attacked by handcrews 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.

Prescribed fire strategies will include late evening or early morning blacklining prior to the ignition of units and the use of extended hoselays, handcrews, and helicopters to reduce impacts on the landscape.

9.2.2.4 Unit Tactics

- Fires will be attacked using engines and handcrews when possible. Roads, trails, wetlands, and other barriers will be used where possible as primary control lines, anchor points, escape routes and safety zones.
- Burnout operations will be conducted from roads, trails, or other barriers when it is safe and effective to do so.
- Burnouts will also be used to strengthen primary control lines when it is safe and effective to do so.
- Approved fire retardant chemicals may be deployed by either air or ground forces when their use will be effective in containment, control or facility protection.

9.2.2.5 Habitat Type, Fuel Loading and Unusual Fire Behavior

The area is very scenic with the native grasses typical of mid- and tall-grass prairies, and sparsely vegetated high choppy sand hills.

Fuel loading is normal. Most fires in this unit exhibit a wide range of intensities depending on fuel moisture and fuel loading and continuity.

The predominant fuel type that can be used to predict fire behavior include:

- **Fuel Model 3 Grass** - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and some naturally occurring wetlands.

9.2.2.6 Expected Fire Effects

Fire is a natural and essential part of the Refuge's ecosystems. Native wildlife evolved with fire and have developed means of tolerating and/or taking advantage of fires. In general, fires result

in little direct wildlife mortality and usually benefit native wildlife.

Wildland fire shaped the vegetative community as well. The prairie is a direct result of fire. Almost all of the native species found in this unit are fire adapted in one way or another. The effects of fire on selected species can be found in Appendix E.

9.2.2.7 Limits to Strategy and Tactics

- Hand line construction which causes soil disturbance is to be avoided.
- Retardant and foam are not to be used within 300 feet a stream or other water feature.
- Regulations resulting from the Federal Wilderness Act apply to this unit. These regulations do not unnecessarily restrict fire suppression operations, but encourage the use of minimal impact fire suppression tactics (MIST) whenever possible.

9.2.3 Structural Interface Unit

9.2.3.1 General Description

The unit is composed of the Hackberry Headquarters and Pony and Pelican Sub-headquarters areas.

9.2.3.2 Fire Management Objectives

- Ensure the safety of Service staff and the visiting public.
- Minimize the damage of fire and fire suppression efforts on Refuge improvements and cultural and natural resources.
- Prevent fires from escaping the Unit boundaries into adjacent private lands or other Service lands.
- Utilize prescribed fire when it will be useful in achieving Refuge wildlife and habitat objectives. The estimated acres to be treated can be found in Table 11.
- Prevent damage or loss of natural or cultural resources and improvements through the use of Minimum Suppression Impact Tactics.
- Respond to wildfires in a cost effective manner consistent with the values at risk.

9.2.2.3 Unit Strategies

Primary suppression strategy would be aggressive initial 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 rates of spread. All fires in the unit have the potential to escape into other Service lands or adjacent private land and cause damage to pastures or improvements. For that reason all fires must immediately sized up by the responding Refuge fire personnel and a decision made as to whether the responding initial attack team can contain and control the fire. If there is any doubt, then assistance should immediately be requested from local fire departments or interagency resources.

9.2.2.4 Unit Tactics

- Fires will be aggressively attacked using engines when possible. Roads, wetlands, and other barriers will be used where possible as primary control lines, anchor points, escape routes and safety zones.
- Burnout operations will be conducted from roads or other barriers when it is safe and effective to do so.
- Burnouts will also be used to strengthen primary control lines when it is safe and effective to do so.
- Approved fire retardant chemicals may be deployed by either air or ground forces when their use will be effective in containment, control or facility protection.
- Structural firefighting is not the functional responsibility of the Service (241 FW 7.1 and 095 FW 3.8.C.). Structural and vehicle firefighting is the responsibility of State and local fire jurisdictions. Service personnel may assist in structural fire suppression by directing traffic, providing structure protection, etc. Cooperative agreements will not commit Service personnel to structural fire suppression.

9.2.2.5 Habitat Type, Fuel Loading and Unusual Fire Behavior

Vegetation in this unit is mixed. The following fuel models may be used to predict expected fire behavior:

- **Fuel Model 1 Grass** - describes areas dominated by short grass, such as saltgrass. Rate of spread of 78 chains/hour with flame lengths of 4 feet are possible under moderate conditions.

- **Fuel Model 3 Grass** - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail and patches of tall-grass prairie. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and some naturally occurring wetlands.

- **Fuel Model 4 Shrub** - describes areas in which fast spreading fires involve the foliage and live and dead fine woody material. Stands of mature shrubs, 6 feet or more tall, are

included. This fuel model occurs in scattered patches of mature stands of willow.

- **Fuel Model 8 Timber** - describes timbered areas of hardwood with compacted leaf litter where slow burning ground fires with low flame length are generally the case. Only under severe weather conditions involving high temperatures, low humidities and high winds do the fuels pose fire hazards.

- **Fuel Model 9 Timber** - Describes closed stands of hardwoods with loosely packed leaves. Fires run through the surface litter faster than model 8 and have longer flame height. Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Concentrations of dead-down woody materials will contribute to possible torching out of trees, spotting and crowning.

Fuel loading found in the grassy areas of this unit falls within the normal range. Other areas may vary from expected loading.

9.2.2.6 Expected Fire Effects

The effects are expected to be similar to those identified in previous sections. The effects of fire on selected species can be found in Appendix E.

9.2.2.7 Limits to Strategy and Tactics

- The use of dozer or plow lines is permitted on Service lands to protect life or improvements such as buildings or bridges, but only with the approval of the Project Leader or his or her acting.
- Hand line construction which causes soil disturbance is to be avoided.
- Retardant or foam is not to be used within 300 feet of a stream or other water feature.

10.0 SATELLITE PROPERTIES

10.1 Description

Yellowthroat Wildlife Management Area and Seier NWR are also administered and managed by the Complex (Figure 1). The descriptions of these management areas are limited because they are not yet fully surveyed. However, the vegetation classifications and land use descriptions applied to the Valentine NWR are most applicable to these areas. No wildfires have been reported on these lands since their inclusion into the Refuge Complex, and no prescribed burns have been conducted.

10.1.1 Yellowthroat Wildlife Management Area

Yellowthroat Wildlife Management Area is located about 13 miles south of Ainsworth, Nebraska in Brown County. The 900 acre property consists of one simple fee parcel of approximately 480 acres and one adjoining conservation easement parcel of approximately 420 acres. The combined properties were part of a working ranch prior to their inclusion in the Fort Niobrara/ Valentine Complex. The area, although farm land in the past, is now a wetland due to rising water levels in the recent past. Wildlife associated with this Wildlife Management Area are primarily water fowl and other birds, including the Yellowthroat for which the area was named.

10.1.2 John W. and Louise Seier National Wildlife Refuge

The John W. and Louise Seier National Wildlife Refuge, approximately 2,400 acres in size, became a part of the National Wildlife Refuge System in 1999. The Refuge, once a working ranch, is still in the developmental stages as a National Wildlife Refuge, so no official boundary map, archaeological survey, or habitat survey have been completed that can be include in this plan. The sandhills terrain is gently rolling with two major wetland areas influenced by Bloody and Skull Creeks. Wetland areas occupy the bottomland portions and the upland sites are represented by mixed grass and tall grass prairie. The ranch structures are still in place, but there are no facilities for official use at this time. Prescribed fire as a tool to manipulate habitat has not been used on the Refuge.

10.2 Satellite Fire Management Unit

10.2.1 General Description

This 3,681 acre unit is made up of the Yellowthroat Wildlife Management Area and Seier National Wildlife Refuge. The areas are similar to Valentine National Wildlife Refuge, with mixed and tall grass prairie and wetlands.

10.2.2 Fire Management Objectives

- Ensure the safety of Service staff and the visiting public.
- Minimize the damage of fire and fire suppression efforts on Refuge resources by using Minimum Impact Suppression Tactics.
- Prevent fires from escaping Refuge boundaries onto adjacent private lands.
- Utilize prescribed fire in the future when it will be useful in achieving Refuge wildlife and habitat objectives.
- Respond to wildfires in a cost effective manner consistent with the values at risk.

10.2.3 Unit Strategies

Suppression strategy will be determined by circumstances. Low to moderate intensity fires will be directly attacked by handcrews 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. Because of response time and distance considerations, local fire districts will initiate initial attack. Seier NWR is in the Basset Volunteer Fire Department response area. Keya Paha County Rural Fire District provides protection for Yellowthroat NWR and it is within the Brown County Rural Fire District (Appendix H).

10.2.4 Unit Tactics

- Fires will be attacked using engines and handcrews when possible. Roads, trails, wetlands, and other barriers will be used where possible as primary control lines, anchor points, escape routes and safety zones.
- Burnout operations will be conducted from roads, trails, or other barriers when it is safe and effective to do so.
- Burnouts will also be used to strengthen primary control lines when it is safe and effective to do so.
- Approved fire retardant chemicals may be deployed by either air or ground forces when their use will be effective in containment, control or facility protection.

10.2.5 Habitat Type, Fuel Loading and Unusual Fire Behavior

Yellowthroat Wildlife Management Area is primarily a wetland, while Seier National Wildlife Refuge is a combination of wetlands and mixed and tall-grass prairie. The predominant fuel type that can be used to predict fire behavior include:

- **Fuel Model 3 Grass** - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and some naturally occurring wetlands.

10.2.6 Expected Fire Effects

Fire is a natural and essential part of the Refuge's ecosystems. Native wildlife evolved with fire and have developed means of tolerating and/or taking advantage of fires. In general, fires result in little direct wildlife mortality and usually benefit native wildlife.

Wildland fire shaped the vegetative community as well. The prairie is a direct result of fire. Almost all of the native species found in this unit are fire adapted in one way or another. The effects of fire on selected species can be found in Appendix E.

10.2.7 Limits to Strategy and Tactics

- Hand line construction which causes soil disturbance is to be avoided.
- Retardant and foam are not to be used within 300 feet of a lake, stream or other water feature.
- Response times of over one hour by Refuge Complex resources will be mitigated by the establishment of mutual aid agreemeents.

11.0 FIRE MANAGEMENT RESPONSIBILITIES

The Refuge Complex fire program has fully fire funded positions to perform the primary fire management responsibilities as well as those associated with the District. Several collateral staff members funded from other accounts provide support or implement support to the Complex’s fire management program according to their assigned duties and levels of qualification. The information below clarifies responsibilities and duties of persons in various roles to perform the day-to-day duties required to accomplish the Complex’s fire management goals and objectives.

The Complex is part of a the Sandhills District (District) which also includes Lacreek National

Wildlife Refuge and the Crescent Lake/North Platte National Wildlife Refuge Complex. The Complex hosts the District FMO (DFMO) who has oversight and assistance responsibilities for the other Refuges in the District. Each Refuge has a fire management plan as required by policy. The fire management activities of the other refuges may at times impact the annual workload of the Complex and the ability of the fire staff to accomplish program goals. The draft of District Responsibilities developed for Region 6 is included as Appendix F and will be attached when approved. This Attachment is included to indicate the responsibilities and duties of the DFMO. In the absence of the DFMO, the designated acting FMO is not expected to perform the duties and responsibilities of the DFMO. When the document is finalized and approved, it will replace the document in AppendixF.

11.1 Refuge Staff Responsibilities

The fire job responsibilities in the Fireline Handbook (PMS 410-1) and the ones described for the positions below are to be fulfilled. A listing of staff and their qualifications can be found in Appendix G.

11.1.1 Refuge Manager

- Responsible for planning and implementation of an effective and the safest possible fire management program at the Complex.
- Responsible for the overall management of the Complex including fire management.
- Ensures fire management policies are observed.
- Ultimately responsible for all fire management decisions related to both wildfire and prescribed fire in the Refuge.
- Provides the FMO with the amount of support funds to be requested through FireBase.
- Fosters effective cooperative relations within the Complex, cooperating fire organizations, and adjoining land owners.
- Within budgetary and staffing restraints, ensures sufficient collateral duty firefighters meeting Service standards are available for initial attack.
- Requests additional assistance if needed to manage severity or emergency presuppression activities.
- Approves individual prescribed burn plans.
- Coordinates duties of the DFMO.
- Implements closures or restrictions as necessary for public safety related to fire danger or occurrence.
- Ensures that a Delegation of Authority and Wildland Fire Situation Analysis (WFSA) are prepared for incoming fire suppression overhead teams.

11.1.2 Deputy Refuge Manager

- Serves as designee to Refuge Manager. All decision making responsibility is delegated to the Deputy Refuge Manager in the absence of the Project Leader.

- Serves as collateral duty firefighter, as qualified.
- Acts as Agency Representative on extended attack wildfires.
- Coordinates assistance of collateral duty firefighters in fire management activities.
- Coordinates with FMO to receive assistance from FireBase funded firefighters.

11.1.3 Refuge Operations Specialist Valentine NWR

- Serves as acting Refuge Manager designee. All decision making responsibility is delegated to the Refuge Operations Specialist in the absence of the Refuge Manager and Deputy Refuge Manager.
- Reviews biologists recommendations to manage units with prescribed fire.
- Coordinates with FMO to receive assistance from FireBase funded firefighters.
- Ensures biologist coordinates and integrates prescribed fire treatment plans with grazing plans.
- Utilizes law enforcement authority as necessary to investigate wildfires or control public use as approved by Project Leader.
- Assists FMO or IC in selecting rehabilitation and restoration measures for wildfires.
- Serves as collateral duty firefighter, as qualified.

11.1.4 Biologists

- Responsible for selection of prescribed fire units and determining objectives for prescribed fires.
- Provides three to five year plan for treatment of prescribed fire units and adjusts annual prescribed fire priorities.
- Receives approval for treatment of selected units from Refuge Manager.
- Coordinates with FMO to implement prescribed fire plans.
- Provides input for monitoring first order fire effects to FMO.
- Responsible for monitoring of second order fire effects.
- Assists FMO or IC in selecting rehabilitation and restoration measures for wildfires.
- Serves as collateral duty firefighter, as qualified.

11.1.5 Administrative Officer

- Serves as Dispatcher, as assigned.
- Completes all necessary administrative documents associated with fire management activities.
- Coordinates personnel management for fire management program under direction of Project Leader.
- Assist FMO with budget tracking through the fiscal year.
- Procures necessary items for fire management program with warrant authority.

- Serves as finance and procurement officer during wildfires.
- Serves as collateral duty firefighter, as qualified.

11.1.6 Office Automation Assistant

- Serves as Dispatcher, as assigned.
- Provides information approved by Project Leader to public during wildfire and prescribed fire operations.
- Provides initial logistical support on extended attack fires.

11.1.7 Biological Technicians

- Serve as collateral duty firefighter, as qualified.
- Assists Biologists evaluate second order fire effects.

11.1.8 Fire Management Officer

Since the fire program duties span both refuges in the Complex, the FMO is supervised by the Deputy Project Leader.

- Manages the Complex fire program. Emphasis is on day-to-day supervision of the program and accomplishment of Complex's fire management needs.
- Supervises the Complex's fire staff.
- Plans, coordinates, and directs operational and logistical aspects of preparedness activities including:
  - Prepares annual FireBase budget as requested by the Project Leader.
  - Manages Complex fire training and firefighter development program.
  - Fire weather station operation and data entry.
  - National Fire Danger Rating System (NFDRS) and WIMS use.
  - Coordinates with cooperative agencies.
  - Revises cooperative agreements as necessary.
  - Annually reviews and updates the Fire Management Plan.
  - Physical fitness testing and Interagency Incident Qualification System (IQS) data entry.
  - Fire cache and equipment inventory accountability.
  - Tracks fire weather and fire behavior indices and ensures that adequate resources are available to meet suppression needs.
  - Ensures the Step-up Plan is followed (Appendix R)
  - Informs Complex staff of fire situation and potential.

- Responsible for coordinating and directing all suppression activities including:
  - Dispatching resources from or to Complex.
  - Fire Command.
  - Insuring that fire management policies are observed.
  - Advising Project Leader of the status of fire suppression operations.
  - Preparing or overseeing preparation of the WFSA.
  - Ensuring that both a briefing statement and Delegation of Authority are prepared for the incoming Incident Management Team (IMT).
  - Reviewing IMT actions to ensure safety of suppression actions, adequate. logistical support, demobilization, and initiation of rehabilitation measures.

- Responsible for managing prescribed fire activities including:
  - Coordinating with Refuge staff to propose annual prescribed fire program to meet management objectives.
  - Preparing individual prescribed fire plans.
  - Serving as qualified or designating Prescribed Burn Boss.
  - Coordinating dispatching of support resources.
  - Providing daily validation that prescribed fires are under prescription and meet all other Service policy requirements.

- Assists Complex Biologists with fire research and fire effects monitoring.
- Prepares a Complex fire prevention plan, and coordinates fire prevention activities with other employees.
- Assists in the operation of the fire public relations program.
  - Responsible, with the Public Use staff, for planning programs to educate the public regarding the role of fire in the Complex and for fire prevention.
  - Prepares and presents slide programs, video presentations, and displays about the Fire Management Program.

- Maintains liaison with other Regional Fire Management staff and Cooperators.
- Maintains fire records and reviews completed DI-1202's for accuracy.
- Administers the suppression evaluation process on wildfires.
- Serves as the District FMO

11.1.9 Fire Program Technician

- Serves as acting FMO in the absence of the FMO.
- Supervises Valentine NWR fire crew.
- Responsible for implementation of first order fire effects monitoring.
- Coordinates first order fire effects monitoring with long term biological monitoring.

- Maintains FTS weather station.
- Maintains fire cache at Valentine NWR and performs Fire Cache Manager duties in the absence of the seasonal Cache Manager.
- Assists with administrative aspects of fire management program.
- Serves as Complex representative with cooperators.
- Serves as Initial Attack Incident Commander Type 4 (ICT4), if qualified.

11.1.10 Seasonal Fire Cache Manager

- Maintains NUS inventory under direction of FMO.
- Completes fire replacement orders of damaged, expended, or worn out fire equipment.
- Maintains MSDS files for fire program.
- Maintains file system of updated safety alerts relevant to fire equipment inventory.
- Ensures proper storage of equipment and accounts for security of main fire cache.
- Ensures radio and communication equipment is repaired.
- Maintains equipment and fire engine files for maintenance history purposes.
- Coordinates with Model 52 program to maintain engines.
- Issues fire equipment and tracks location of issued property.
- Ensures fire cache is fully stocked with all forms necessary to manage a Type III incident.
- Updates daily fire danger ratings.
- Completes DI-1202 forms and updates Complex qualifications in FMIS.
- Coordinates weekly fire activities under direction of FMO.
- Supervises Fort Niobrara fire crew daily tasks.
- Completes duties and responsibilities listed for seasonal firefighters.

11.1.11 Engine Bosses

- Maintain assigned engine(s) in a state of readiness.
- Supervises and trains assigned engine crew.
- Completes Single Resource Boss administrative duties on fire assignments.
- Serves as needed on fires, generally as Engine Boss or Incident Commander, as qualified.
- Ensures crew satisfactorily complete assigned prevention, preparedness, maintenance, training, and monitoring duties.
- Assists FMO and fire program technician in maintaining accurate fire records and completing administrative work.

11.1.12 Seasonal and Collateral Duty Firefighters

- Responsible for their own fire records, equipment, and physical conditioning.
- Qualifying annually on the physical fitness test within 2 weeks of EOD date for seasonals. Permanent collateral staff qualifies annually by April 1st.
- Maintaining assigned fire equipment in ready state.
- Use issued personal protective equipment and all safety gear assigned and follows safe work practices.(Appendix P)
- Assists the fire management staff in maintaining accurate fire records, and data gathering of first order fire effects.
- FireBase funded firefighters must be available for 14 to 21 day assignments off Complex.

11.1.13 Wildfire Incident Commander (as assigned)

- The Incident Commander (IC) will be responsible for the safe and efficient suppression of the assigned wildfire.
- Fulfill the duties described for the IC in the Fireline Handbook (PMS-410-1).
- Notify the FMO of all resource needs and situation updates, including the need for an extended attack.
- Ensures all personnel are briefed on Lookouts, Communications, Escape Routes, and Safety Zones along with the current weather, weather forecasted, and fire behavior. Posts lookouts.
- Identify and protect endangered and threatened species and sensitive areas according to the Fire Management Plan.
- Utilize minimum impact tactics.
- Ensure fire is staffed or monitored until declared out.
- Ensure that the fire site is fully rehabilitated or that the management of rehabilitation is undertaken by the FMO.
- Submit completed DI-1202 wildfire report, Crew time sheets, and a listing of any other fire related expenditures or losses to FMO within 3 days of fire being declared out.

11.1.14 Prescribed Burn Boss (as assigned)

- Write or review prescribed burn prescriptions for assigned units.
- Implements approved prescribed burn plans.
- Assist with the administration, monitoring, and evaluation of prescribed burns.
- Requests spot weather forecast updates as needed.
- Ensures on site conditions are within prescription and that all required resources are capable of performing assigned duties.
- Verifies the availability of backup contingency resources.
- Ensures pre-burn briefing is conducted and leads post fire critique.
- Determines when the fire is out and when equipment and personnel may be demobilized.
- Submits completed DI-1202 (fire report), Crew time reports, a listing of any fire related

expenditures or losses to the FMO, and completes taskbooks within three days of the fire being declared out.

11.1.15 Ignition Specialist (RX Firing Boss)

- Maintains control of all ignition sources.
- Ensures the deployment of all ignition sources according to the prescribed fire plan to meet objectives.
- Supervises assigned personnel and ensures their safety.
- Maintains immediate and clear communication with the Burn Boss and holding crews.

11.2 Fire Cooperators

11.2.1 Cooperator involvement

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

Federal cooperators include the approximately 500,000 acre Rosebud Indian Reservation located 5 miles north of the Ft. Niobrara and the125,000 acre McKelvie unit of the Nebraska National Forest located 10 miles west of Valentine NWR. The National Park Service will also assist Federal Cooperators and mutual aid associations adjacent to Service lands. The Park Service ranger station in Valentine, NE jointly administers the Niobrara National Scenic River while the headquarters office is in O'Neil, NE, 90 miles east.

The refuge relies on a number of volunteer fire department cooperators for a coordinated response to wildfires. By state statute, each volunteer fire protection district in Nebraska is an autonomous entity. The State of Nebraska has no fire suppression responsibilities on private lands; their responsibilities for fire suppression are restricted to State-owned lands. The State does not have the authority to enter into agreements on behalf of the fire districts, consequently there is no single statewide agreement between the State and the federal agencies that provides for cooperative fire assistance fire on State, private, and federal lands. Fire agreements must be entered into with each department individually or sometimes with multiple departments that have grouped into "Mutual Aid Associations".

Fully State-funded firefighters generally have structural and wildland fire responsibilities but have limited fire suppression capabilities. Some personnel who have completed NWCG certified training may be available to assist on a limited basis and they may have some type 7 engines that

could be used.

The most important participation by the State of Nebraska in wildfire cooperation is through the issuance of disaster declarations, which allow State funding to be used by local fire districts to pay for suppression actions in the event of a large fire. The Refuge will work with local entities to develop emergency procedures in the form of "Local Emergency Plans" for joint response to large wildfires.

The duties and responsibilities of Federal, State, and mutual aid cooperators are listed below. A list of Cooperators can be found in Appendix H.

11.2.2 Cooperator Duties

- Provide assistance in detection and suppression of wildfires.
- Assist, as needed, in the investigation of suspicious fires.
- Assist with training.
- Resources will report to the IC (in person or radio) and receive their duty assignment.
- Follow procedures as outlined in their agreements.

11.3 Wildland Fire Agreements

The following is a summary of the agreements specific to the Ft. Niobrara/Valentine NWR Complex. All agreements will be valid for a period not to exceed five years. They will reviewed annually and renewed, modified, or discontinued as necessary. The complete agreements are found in Appendix I.

11.3.1 Cherry County Mutual Aid Association Agreement

An agreement between the rural fire districts bordering on the north and west of the Complex, including South Dakota, that authorizes the agencies to assist other districts in fire suppression when requested. Participation by the Service and the U.S. Forest Service is limited to wildfire suppression. No reimbursement is made for the first 96 hours of assistance. After 96 hours, the receiving party shall reimburse the assisting party for all costs. A new agreement will be completed in 2001/02.

11.3.2 Sandhills Mutual Aid Association Agreement

An agreement between the fire districts bordering on the south of the Complex that authorizes the agencies to assist other districts in fire suppression when requested. Participation by the Service and the U.S. Forest Service is limited to wildfire suppression. No reimbursement is made for the first 24 hours of assistance. After 24 hours, the receiving party shall reimburse the assisting party for all costs. A signed and dated copy of the agreement is not on file. A new

agreement will be completed in 2001/02.

11.3.3 Keya Paha, Brown, Rock, and Cherry County Mutual Aid Association Agreement

Agreement options are being considered at present with the association. This agreement will be between the fire districts east of Cherry County bordering the Seier Refuge and Yellowthroat WMA that authorizes the agencies to assist other districts in fire suppression when requested. Participation by the Service, U.S. National Park Service and the U.S. Forest Service is limited to wildfire suppression. Three options are considered for the agreement. The first option is to maintain an agreement similar to the ones found in Appendix I. The first option has no reimbursements made for the first 24 hours of assistance. After 24 hours, the receiving party shall reimburse the assisting party for all costs. The second option is to utilize a new agreement format being developed by the USFS that authorizes payment of fire suppression services after four hours of response time to each others district (lands) and provides an operation plan that utilizes NWCG qualified persons to retain reimbursement. The third option would be to have a cooperative agreement in place to reimburse fire departments an annual fee for suppression of fires on Federal Lands with qualified NWCG personnel. Resolution of the agreement options will occur in 2001/02. The final agreement will be placed in Appendix I.

11.3.4 Statewide Agreement

A statewide agreement for cooperation on fires between the Federal agencies and the State of Nebraska agencies is in the development process. When the Agreement is approved it will be included in Appendix I.

11.3.5 MOU Between TNC and USFWS

The 54,470 acre Niobrara Nature Preserve operated by The Nature Conservancy is located 1 mile east of Ft. Niobrara. While there is no authority to use The Nature Conservancy personnel or equipment as cooperators for wildfire suppression since they are a non-governmental organization with no statutory responsibility for fire suppression, agreements for prescribed fire, training, and other forms of fire management cooperation will be pursued.

A Memorandum of Understanding between The Nature Conservancy Nebraska Field Office and the U.S. Fish and Wildlife Service properties in Nebraska has been developed to allow each organization to use firefighters and equipment from the other to assist with prescribed burn planning, operations, and monitoring. Cross billing will not occur.

11.3.6 South Dakota Interagency Fire Council

The South Dakota Interagency Fire Council is a collection of members in the response area of the Custer Interagency Dispatch Center. Members are of various federal, state, municipal and rural fire departments are represented. The FWS is a member to this organization and participates at annual or semiannual meetings. Resources from this organization would be

accessed through normal dispatch procedures. The last agreement with the council was signed in 1997.

11.3.7 Annual Operating Plan

The Annual Operating Plan with the U.S. Forest Service provides for automatic dispatch of firefighters to support fire suppression on Service lands or the McKelvie N.F. and Nebraska N.F. The areas are approximately 10 to 120 miles distant from the Complex.

12.0 PREPAREDNESS

12.1 Overview

Wildfires on the Complex are generally Type IV fires that range in size from .1 to 99 acres. However, as demonstrated during 2000, wildfires occurring during times of highest seasonal fire danger or during drought years can range from100 to over 20,000 acres in size (FMIS, 2001). While Extended Attack (Type III) fires are infrequent on the Complex, they occur with enough regularity that it is necessary to plan and prepare for them. The Complex has adequate personnel and equipment to manage three Type IV fires, but Type III fires often exceed the capabilities of the Complex.

12.2 Current Staff Available to meet Position Needs

Currently, the Complex FireBase-funded staff consists of:

- A Fire Management Officer (FMO) who is responsible for the management and supervision of the Complex's fire management program. The FMO also serves as a District FMO (DFMO). A listing of duties performed by the DFMO can be found in Appendix F and will be attached when approved.

- A Fire Program Technician-Crew Supervisor stationed at the Valentine NWR who is responsible for supervising the Valentine fire crew and implementing fire management activities at the Complex.

- A seasonal Fire Cache Manager/Engine Foreman stationed at the Ft. Niobrara who is responsible for the day-to-day supervision of the Ft. Niobrara fire crew and implementing fire management activities at the Complex.

- Up to five 1039-hour Seasonal Range Technician/Firefighters, depending on budget and availability, duty stationed at both Ft. Niobrara and Valentine NWRs.

This staffing level allows the Complex to field during the summer months, two 3-person FireBase-funded engine crews staffed with an Engine Boss, Engine Operator, and Firefighter (Appendix G).

The prescribed fire program at the Complex and the Sandhills District continues to grow. The wildfire workload and prescribed fire workload currently warrant an increase in the existing staff qualification and numbers. Due to funding, FTE limits and regional priorities, it may not be possible to fully staff the program with FireBase funded employees. Until adequate staffing is funded and present, alternate means of managing personnel shortages at the Complex and District need to be pursued in order to schedule and staff prescribed burns and meet requirements of the Step-up Plan. For example, in addition to FireBase-funded personnel, the Complex needs

to maintain a base of collateral duty firefighters as a critical part of its fire management workforce.

Additional firefighters (emergency hire/casual firefighters) may be hired temporarily to supplement engine crew, or existing crew term of employment may be extended, using severity or emergency presuppression funding when very high or extreme fire conditions warrant or when fire funded personnel are away from the Complex on fire assignments, and during the off season. A list of available emergency hire firefighters will be kept in the Dispatch Plan. Additional emergency hire firefighters may be available through the fire management program at the Rosebud Reservation.

The ability to maintain an adequate response time to fires occurring on Valentine National Wildlife Refuge has been eroding over the years. Staffing constraints, limited seasonal housing, and an aging workforce prevent maintaining more than one permanent collateral duty firefighter and one engine crew (during the fire season) at Valentine NWR. Valentine NWR accounts for nearly 80% of refuge property and fire occurrence. This situation, and the increasing interagency involvement of the engine crew, often makes it necessary to relying on the utilization of emergency presuppression funding to preposition employees stationed at Ft. Niobrara at Valentine National Wildlife Refuge to ensure adequate staffing.

The staffing request attachment reflects the overall staffing needs the Sandhills District generates in the Service Firebase funding system (Appendix M). A list of firefighters and their levels of qualification are found in Appendix G.

12.2.1 Personnel and Level of Qualifications

The table below identifies the minimum number of personnel needed to manage the wildfire and prescribed fire workload of the Complex. Every effort will be made to maintain the **minimum** fire qualification levels. Additional staff will be resource ordered to meet immediate needs.

Table 7: Desirable Qualification Level - Suppression

Position	Fire Funded	Collateral Duty	Total
IC - Extended Attack (ICT3)	2		2
IC - Initial Attack (ICT4)	4	1	5
IC - Smoke Chaser (ICT5)	6	2	8
Division Supervisor (DIVS)	2		2
Task Force Leader (TFLD)	2		2
Strike Team Leader Engines (STEN)	3		2
Engine Boss (ENGB)	6	1	7
Single Resource Boss - Crew (CRWB)	2		2
Firefighter Type 1 (FFT1)	8	2	10
FWS Engine Operator	4	4	8
Helicopter Crewmember	2		2
FWS Engine Operator (ENOP)	4	4	8
Firefighter Type 2 (FFT2) - Arduous	12	4	16
*Firefighter Type 2 (FFT2) - Moderate Fitness		1	1
Incident Dispatcher (INDI)	1	1	2
Following Positions Are Required to Manage an Extended Attack Operation			
Procurement Specialist (PROC)		1	1
Personnel Time Recorder (PTRC)	1	1	2
Equipment Time Recorder (ETRC)	1	1	2
Ground Support Unit Leader (GSUL)		1	1
Facility Unit Leader (FACL)		1	1
Agency Representative (AREP)		2	2
Base Camp Manager	1	1	2
Public Information Officer (PIO)	1	1	2

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

*Firefighter Type 2 (FFT2) - Moderate Fitness may only be assigned to Complex fires and may not be dispatched to fires not threatening the Complex. There are also other restrictions on the use of employees with fitness wavers, as explained in Appendix J.

The qualifications above anticipate future growth in the fire program. The additional positions identified would provide the additional staff required to support multiple Type IV fires and provide an incoming Incident Management Team a cadre of persons to make the transition to a

Type III incident much more manageable.

Table 8: Desirable Qualification Level - Prescribed Fire

Position	Fire Funded	Collateral Duty	Total
Prescribed Fire Manager Type Two (RXM2)	1	0	1
Prescribed Fire Burn Boss Type One (RXB1)	1	0	1
Prescribed Fire Burn Boss Type Two (RXB2)	2	1	3
Prescribed Fire Burn Boss Type III (RXB3)	2	2	4
Firing Boss (FIRB)	4	2	6
Following Positions Are Required to Meet Future Operational Needs			
Fire Effects Monitor (FEMO)	4	2	6
Aerial Dispenser Operator (ADOP)	1	0	1

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

The prescribed fire positions identified account for future growth in the prescribed fire program. The positions the staff are unable to fill will be resource ordered. The number of fire funded burn bosses and firing bosses identified would also support the Sandhills District prescribed fire program.

12.2.2 Employee Contact List

The employee fire directory is the initial contact list utilized to activate personnel for wildfires or preparedness situations (Appendix K). The weekend availability roster is posted on weekends or holidays for fire suppression needs (Appendix K).

12.3 Normal Unit Strength

12.3.1 Overview

Service policy specifies that each station must develop a Normal Unit Strength (NUS) list of supplies and equipment and have the list approved by the Regional Fire Management Coordinator (Appendix L).

12.3.2 Equipment

Engines are the primary initial attack resource on the Complex because of the predominance of areas with fine fuels and good vehicle access. Earth moving equipment and other resources are not readily available, but can be resource ordered when needed.

Currently, the Complex maintains three 200 gallon (Type 6) permanently mounted slip-on units, three 200 gallon (Type 6) slip-on units on 1 ton pickups, twelve 3/4 ton pickups, and four 125 gallon (type 7) slip-on units. The type 5 engine on station is broken down and needs to be replaced. This fleet has excellent response time. The small tanks limit their time in the field on large range fires. Based on current and projected staffing and mission, the composition of the entire fleet will be reconfigured and upgraded in accordance with the NUS list, as funding becomes available. Annual equipment needs will be identified in the Firebase equipment submittal requests.

All primary engines are equipped with a full compliment of radios, tools, and water handling accessories. GPS units, cell phones, and satellite phones are also utilized for fire activities. The Complex maintains one chainsaw kit and a Mark III pump kit at Ft. Niobrara and a floating pump kit at Pony Lake sub-headquarters. A disc was also purchased for fire operations, but will generally not be used because of response time and resource damage. A complete listing of equipment can be found in Appendix L.

Primary equipment is that equipment which is essential to firefighting operations and maintained and used for that purpose exclusively. Secondary equipment is equipment purchased with Complex funds, but which primary uses are to support non-fire Complex operations. All maintenance of primary equipment will be funded out of fire funds. The maintenance of secondary equipment will be charged to the benefitting account. Repair of secondary equipment damaged on wildfires or prescribed fires will be charged to the appropriate fire account.

12.3.3 Supplies

The primary cache of fire equipment and supplies is located in secure storage at the Ft. Niobrara NWR fire station. Smaller caches of gear necessary for resupply and emergency needs are located at the Pony Lake sub-headquarters and Hackberry Headquarters at Valentine NWR. The main Fire Cache provides storage for most of the fire supplies and equipment for the Complex.

The primary purpose of the Complex Fire Cache system is to support fire management operations and ensure that adequate gear is available to furnish required Personal Protective Equipment (PPE) to all Complex firefighters. Current staffing levels dictate that fire gear must be available to support a minimum of twenty firefighters.

The secondary purpose of the cache is to support the Zone by maintaining adequate inventory to supply another 10 people, bringing the NUS to a 30 - Person Cache. Fully stocked, the cache can outfit other firefighters for local fires in the event of an emergency and to fill immediate needs of other Refuge fire programs in the Kansas/Nebraska/ South Dakota/Colorado area. The additional resources will also be utilized on an interim basis to outfit casual hires that are trained to participate in Refuge prescribed and wildland firefighting operations.

Because the Black Hills National Forest Cache Van, four hours away, is not readily available during the peak fire season, the fire program must strive to maintain the Cache at the fully authorized level. A higher stocking level than that indicated by the NUS process may be justified as demonstrated by the Valentine Complex Fire, and the primary cache stocked to handle Extended Attack incidents in the Sandhills or Niobrara River Breaks. If approved, the stocking level of certain items (rations, batteries, hose, hard line, drafting lines, nozzles and foam) should be increased to support incoming strike teams of engines or handcrews. Extra engine pumps, pumpheads, trash pumps, floating pumps and portable tanks should be stocked in the cache as well. An extended attack analysis will be completed to identify equipment needs and submitted as an addendum to the NUS list (Appendix L).

Guidance for NUS procurement, maintenance, and replacement will be in accordance with criteria established in Chapter 3.1.4 of the Fire Management Handbook. A complete listing of Supplies can be found in Appendix L.

12.4 Annual Readiness Activities

Table 9: 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									x		x
Winterize Fire Management Equipment										x		
Inventory Fire Engine and Cache					x					x		
Hire prescribed fire/summer seasonals		x	x									
Update Budget Status for fire program			x			x			x			
Submit Firebase and WUI project requests, updates	x	x	x	x	x	x	x	x	x	x	x	x
Complete Training Analysis/Complex & District			x							x		
Annual Refresher Training/Complex & District			x	x	x							
Annual Fitness Testing/Complex , District, AD-hires			x	x	x	x						
Pre-season Risk Analysis/Complex & District			x	x								
Complex and District Readiness Review short form						x						
Red Cards issued to Complex & District personnel					x	x						
Pre-Season Engine Preparation			x									
Weigh Engines to verify GVW Compliance				x						x		
Prescribed Fire Plan Preparation/Complex & District	x	x	x				x	x		x	x	x
Prescribed Fire Unit Preparation/Complex & District			x	x	x				x	x		
Fire Use Implementation & Post Burn Narratives			x	x	x				x	x	x	
Review and Update Fire Management Plan						x						
Update Preattack Plan, WFSA, Dispatch Plan			x					x				
Update Complex and District Quals and Fire Reports					x	x	x	x	x	x		x
Weather Station Maintenance & Calibration			x							x		
Live Fuel Moisture Sampling, 1,10, 100 & 1,000hr			x	x	x	x	x	x	x			
Monitoring Plots, photos for fire use activities			x	x	x	x	x	x				
Update Spot Weather Forecast needs with National Weather Service for fire use			x									

Although many activities may take more than one month to complete, those activities that can should be completed prior to the end of the month that is indicated. Some activities are scheduled to utilize the summer fire crew.

12.4.1 Annual Fire Refresher Training and Safety 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 Project Leader 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. The Service has adopted the training and fitness standards established in PMS 310-1, and all firefighters must meet these and other standards established by the Service to participate in fire management activities. PMS 310-1 also recognized the ability of cooperating agencies at the local level to jointly define certification and qualification standards for wildland fire suppression. Under that authority, mutual aid resources responding to wildfires must meet the standards established for their department. Personnel involved in prescribed fire activities must meet the standards established by the Service. Employees not meeting these requirements may assist in support capacities, but will not be permitted on the fireline.

All personnel involved in Fire Management activities are required to participate in 8 hours of fire refresher training annually in order to maintain currency for that calendar year. Refresher training will concentrate on local conditions and factors, the Standard Fire Orders, LCES, 18 Situations, and Common Denominators. NWCG courses Standards for Survival, Lessons Learned, Look Up, Look Down, Look Around, and others meet the firefighter safety requirement; but, efforts will be made to vary the training and use all or portions of other NWCG courses to cover the required topics. Fire shelter use and training under adverse conditions, if possible, **must** be included as part of the annual refresher. An airboat generating up to 40 mph winds can be used to simulate shelter deployment under adverse conditions. All firefighters on the Complex are also given training on static fire shelter deployment and rapid mobile shelter deployment. In addition to training aids, NFES 1568 - Using Your Fire Shelter and NFES 1570 - Your Fire Shelter, 2001 Edition, can be used. Participation in the annual refresher sessions will be documented and kept on file.

All firefighters will be provided with the training required to meet Service job qualification standards for the jobs they will be expected to perform. When required training courses are not available through Interagency training, the FMO may conduct that training on the Complex if he/she meets the instructor requirements.

In addition to formal training, there will be a training day held weekly during the fire season for all FireBase-funded staff and any other employees who are able to attend. Training day activities will concentrate on drills designed to increase the efficiency of fire crews (Appendix P). Short training sessions on various topics may also be given. The Complex has monthly safety meetings which all staff attend. At these meetings, fire videos are often shown to review specific subjects and enhance the staff's awareness of fire issues. Short fire critiques are also reviewed with the staff at these meetings.

12.4.2 Physical Fitness

All personnel involved in fire management activities will meet the fitness standards established by the Service and Region 6. 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

J 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 taking a physical fitness test. They must read and sign the Par-Q health screening questionnaire, an informed consent form (Appendix J). 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 in the following section, all individuals over 40 years of age must receive an annual physical prior to physical testing.

Several interagency studies and publications show fitness training is a valuable component to improve employee performance, reduce fatigue and prevent injuries. Currently, physical fitness training is not part of the fire crew's assigned daily or weekly routine. Physical fitness and conditioning is the responsibility of the individual and is performed during off-duty hours. The Fire Management Officer is currently having a fitness program drafted for the Project Leader's review. If approved, a physical fitness training program will be instituted in accordance with the plan. Exercises will be targeted to produce endurance, strength, and agility.

Due to the topography and typical fire suppression methods in the Nebraska Sandhills, the Complex has been granted a limited waiver of fitness requirements for firefighting positions to be used on fires on or threatening the Complex (Appendix J). Although the management goal is for all firefighters to be able to meet the arduous fitness requirements, personnel meeting the moderate rating will still be able to function safely and effectively in these conditions.

12.4.3 Physical Examinations

In keeping with Service policy, a physical examination is required for all new permanent employees and all seasonal employees assigned to arduous duty as fire fighters prior to reporting to 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 positions are required to have an annual physical examination before taking the test. Permanent employees must take a physical every three years to maintain fitness currency. The Fire Management Handbook provides information in Chapter 1.5.1 concerning fitness standards, testing procedures, and the forms needed to complete the physical.

12.4.4 Equipment Maintenance Considerations

12.4.4.1 Fire Ready Engines

The complex keeps five Type 6/7 engines ready for immediate dispatch on a year round basis. On the Valentine NWR two fire engines are kept in heated bays, one at Pony Lake Sub-Headquarters and the other at Hackberry Headquarters. The three remaining engines are kept in the heated bays of the Fort Niobrara Fire Cache. During the off season, the Complex can only staff four engines for initial attack. The fifth engine is kept on line as a back up engine. The remainder of the fleet is kept in a winterized state in cold storage bays. The stored engines and slip-on units only need to be flushed and filled with water. Slip-on units in cold storage will need to have batteries placed back on them to start the pumps. The batteries are kept in approved containers in heated storage to prevent frost damage.

The Sandhills environment constantly challenges the limits of a fire engine. All engines meet GVWR requirements and are 10% downloaded for safety reasons. Due to the conditions found in the Sandhills, at least one spare engine must be line-ready to replace an engine that is down for repairs. A primary type 6 and 7 engine can also be replaced by a slip-on unit.

12.4.4.2 Pumps

The silty environment in local water sources is extremely rough on centrifugal pumps. The fine sand frequently erodes pump seals and creates premature wear on pumper parts and plumbing hardware. The fire program keeps two centrifugal pump heads in stock for quick replacement. Additional draft pumps may need to be procured by the refuge to protect pumps on engines.

12.4.4.3 Other Equipment Maintenance and Preparation

All emergency equipment must be fully operational from February through November. The fire crew is usually starts in May and laid off at the end of October. The FMO and Fire Program Technician maintain the equipment during the off-season. Prior to the departure of the fire crew for the season, all motorized equipment is operated and treated with fuel stabilizer or the fuel tanks are emptied.

Currently, the maintenance history of each primary engine is kept on file. Each engine is weighed annually with one copy of the weight ticket kept in the office and another copy on the engine. All fire equipment is inspected following a response and damages or repairs are made within three days. The fire staff is developing a Severe Service Maintenance Plan that will later be included as a step-down plan from the Fire Management Plan (Appendix N). The plan will have a comprehensive list of service items to perform on all primary fire equipment based on mileage, hours of service, and time of year the equipment is operated. This plan will also incorporate engine checklists, inventories, and marshalling sheets to ensure the highest standards of equipment maintenance.

Storage facilities are rodent proofed to the extent possible and bunkhouse quarters are winterized in the fall.

12.4.5 Updating Qualifications

The management of fire qualifications is accomplished through the Fire Management

Information System. Access to this system is password restricted. The FMO or delegated person at the Complex also maintains the qualifications database for the Sandhills District as the other Refuges in the District do not have access to the system. Experience and training entries are to be entered into the database three days after the completion of an incident or training course.

12.4.6 Weather Monitoring

12.4.6.1 General

A variety of sources must be used to monitor weather conditions at the Complex. Due to the separation of the refuges in the Complex and the spotty nature of precipitation in the Sandhills, it is necessary to monitor internet sites and check weather station data at several locations. Monitoring precipitation and lightning strike data is important to preposition resources and perform follow up patrols for potential hold over fires.

12.4.6.2 Weather Stations

A Forest Technology Systems (FTS) automated weather station is located near the Pony Lake Sub-headquarters at Valentine NWR. The station was formerly located on the southwestern corner of the Valentine NWR. The Dads Lake Fire burned the station over and damaged it. The station is currently in a centralized location that allows year round access and can be protected from wildfires. The solar-powered station currently has sensors to collect temperature, relative humidity, wind speed, direction, precipitation, and fuel stick temperature. The station software enables the current conditions to be obtained as well as hourly summaries of maximum gusts, precipitation, high and low temps. and Relative humidity. 1-hour, 10-hour 100-hour, and 1000-hour fuel moistures are calculated from the sensor inputs. Access to the station is by cellular telephone and requires a computer with FTS software loaded. This station will be the primary source of information for the Complex' fire program.

An AFOS site is located immediately south of the town at the Valentine airport - Miller Field. Current conditions are continuously updated for pilots and may be accessible by phone, 402-376-1673. A recording gives the current time, wind speed (in Knots), direction, barometric pressure, and temperature and dew point in Celsius. This information is sometimes useful for an immediate report on local conditions that is accessible by phone. The Miller Field site can also be accessed at: http:/weather.noaa.gov/weather/current/KVTN.html

and http://www.weather.com/weather/local/69201.

The Valentine FTS weather station has been catalogued in the Weather Information Management System (WIMS) as a station to be used to calculate National Fire Danger Rating System indices. The complex has purchased the FTS NFDRS software, which is a more user-friendly program than WIMS. This program may be used for internal purposes, however, it is not the official NFDRS version, and indices calculated by this package are not accessible by other users. The Complex fire management staff will ensure that Valentine NWR weather data are archived into WIMS and that NFDRS indices are being calculated for use in the Wildland Fire Assessment System.

The Complex anticipates putting the station under a maintenance program with the RAWS depot

maintenance program in Boise, ID. The program will contract BLM services to maintain the station on an annual basis and the "full ride agreement" will be funded by the national FWS fire program. Requests to receive the service required to maintain the station need to be made annually to the Boise, FWS Equipment Specialist. Due to the scarcity of weather stations reporting in the Great Plains, it is important that data for the station be kept updated so that it may be used in fire danger calculations. NFDRS indices generated by the station will be used as the basis for the station's Step-up plans.

Other RAWS stations: Nearby stations operated by other agencies may be of some use in determining regional trends in weather and fire danger, passage of weather fronts, etc. The stations accessible through WIMS include:

Table 10:Weather Stations

Station	Number	Owner
Bessey District	252402	Nebraska National Forest (Halsey)
King's Canyon	250203	Nebraska National Forest (Chadron)
Crescent Lake NWR	252101	Fish and Wildlife Service
Agate Fossil Beds	250105	National Park Service
Scottsbluff Natl. Monument	251905	National Park Service
White River	393505	Rosebud - Bureau of Indian Affairs

Mini RAWS stations are available for fire use activities or wildland fires. The Mini RAWS stations would need to be ordered for special fire use activities, such as Type I prescribed fires or in the event large wildland fire occurs on Refuge lands. The Mini RAWS should be ordered if the FTS weather station can not be repaired during severe fire conditions. For severity or wildfire situations a technical specialist should be resource ordered to set the station up and perform Fire Meteorologist duties or Fire Behavior Analyst Duties.

12.4.6.3 Weather Forecasts and other Information Sources

The National Weather Service (NWS) office responsible for the Valentine area is located in North Platte, Nebraska, and generates all the weather products used by the Complex, including general weather forecasts and spot weather forecasts. This office does not have a fire weather forecaster on staff, therefore, this office does not routinely issue fire weather forecasts including Red Flag watches and warnings, Fire Weather watches, predicted Lightning Activity Levels, and standard spot weather forecasts. However, spot weather forecasts are issued by the office on request for wildfire emergencies. A procedure was set up in 1998 to standardize the weather information needed in a spot weather forecasts throughout Kansas and Nebraska so that any meteorologist could address the specific information needed by the Complex to make fire management decisions. The Fire Management Officer should coordinate with the Office Manager to verify procedures and time frames for obtaining spot weather forecasts prior to entering the prescribed burn season. The North Platte office is part of the NWS Central Region. The Fire Weather Forecast Coordinator for this region is located in their regional office in Kansas City, MO.

Fire personnel may monitor NOAA weather radio information via the highband mobile radios in some (but not all) fire vehicles and with handheld radios. This information should not serve as the primary source of weather information for fire management purposes.

The NWS's Omaha office issues a Rangeland fire weather forecast, based on the Rangeland Fire Index when temperature, relative humidity, and wind factors create high to extreme fire danger conditions. Fire personnel should monitor these forecasts to assist in determining planning levels and preparedness. These forecasts may be of limited use in determining when to conduct prescribed burns since the same conditions that result in very high fire danger may be the same combinations that are desired in the prescription window to accomplish burn objectives. Access at link, http://www.crh.noaa.gov/lbf.

The Rapid City Fire Weather forecast is monitored to confirm the approach of severe weather that may create dangerous fire conditions. The forecast is monitored to track conditions at Lacreek NWR. Access at http://www.boi.noaa.gov/FIREWX/FSDFWFWRAP.html.

Valentine NWR - Hackberry headquarters weather data is also available. Personnel at the Hackberry headquarters have been collecting weather data for the NWS for many years, primarily temperature, precipitation, and evaporation.

Belt weather kits provide the opportunity to make observations at the site that will be the basis for many burn decisions made by a burn boss or incident commander. Fuel moisture calculations from reference tables in the field will generally be the basis to determine if a prescribed burn is within prescription.

No smoke management forecasts are necessary in the area, however, transport wind speed, direction, and smoke mixing height is one of the items requested in the spot weather forecast to assist with go/no go decisions. The Haines index issued by the NWS as part of the spot weather forecasts may have a positive correlation to ventilation of smoke, that is, the higher the Haines index, the better the smoke rises. Haines Index ratings of 4 or over on a scale of 1 to 6 are of concern.

Internet sites, in addition to those indicated above provide additional useful information.

- Doppler radar loops are obtainable through internet sites. The sites are useful to watch incoming precipitation in the county. Drier areas on the Doppler sites are monitored for lightning strike ignition or hold over potential. Access at http://weather.unisys.com/radar/rad_cp.html.

- Weather conditions locally can be accessed through several internet sites. Daily forecast can be obtained, but generally provide little wind and humidity information. Link at http://www.underground.com.

- Lightning Detection data is not currently available to the Complex except through

commercial internet sites. The difficulty of obtaining lightning strike web sites has increased. Sites providing that information continuing to switch to a paid subscriber service only. These sites frequently change or are canceled. Tracking and accessing this information is time consuming and difficult. The lightning information that does exist does not approximate time or location of strikes. The information on the sites may not be accurate enough to indicate that lightning is not taking place, however, if lightning strikes are indicated on the map it is probably a certainty that at least some cells are producing lightning. Access at http://www.weather.com/golf/maps/mwlightning2.html.

12.5 Impacts of Regional and National Preparedness Levels on Station 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://www.boi.noaa.gov/fwxweb/fwoutlook.htm. The Refuge fire staff can also contact the Custer Interagency Dispatch Center (605-673-9300) during periods of high fire danger to track indices and anticipate possible fire activity. Preparedness actions have been identified in the Step-Up Plan to respond to unusual conditions associated with drought and other factors (See following section).

The Rangeland Fire Index is calculated daily during the fire season by the National Weather Service (NWS) in Omaha, NE. Greenness factors of fuels are calculated by an Advanced Very High Resolution Radiometer (AVHRR) onboard NOAA weather satellites. Satellite calculated greenness factors are combined with forecasted windspeed and relative humidities. The data is accurate enough to calculate greenness factors and fire danger ratings on a county by county basis. The Range Land Fire Index is available at the site mentioned in Section 8.2.4 Weather Monitoring.

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

The Refuge is in the Rocky Mountain Area. During National and Regional Preparedness Levels IV and V, it is necessary to receive approval from the Regional Fire Management Officer and the concurrence of the Rocky Mountain Area Coordination Group to conduct prescribed burns during PL IV and the National Coordination Group during PL V.

12.6 Step-Up Plan

The Complex has procured a Remote Automated Weather Station and will be using it as a National Fire Danger Rating System station once Weather Information Management System (WIMS) compatible software is installed. This system will allow the complex to track daily fire danger indices and take appropriate action according to the Step-Up Plan (Appendix O). The staffing class breakpoints were determined using a FIREFAMILY analysis of 4 year fire weather data from Halsey, NE, and are comparable to breakpoints calculated by other area agencies.

Breakpoints may be modified as the Complex develops it's own historic weather database.

The Burning Index (BI) was chosen as the primary fire danger indicator because it reflects the intensity and rate of spread of wildfires based primarily on wind speed and fuel moisture.

The FMO will monitor current and predicted fire weather reports, and take appropriate actions as listed in the Step-up Plan. Outside of the fire season, severity funding will be requested when severe drought is indicated by drought indices or 1000 hour fuel moisture and the previous growing season was excellent.

12.7 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 increases the fire danger beyond what is normal. Severity funding is requested to prepare for abnormally extreme fire potential caused by an unusual climate or weather event 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 may be requested if a severe drought is indicated by a Palmer Drought Index reading of -3.0 or less and a long-range forecast calling for below average precipitation and/or above average temperatures has been issued, or a Keetch-Byram Drought Index of 300 or greater. The Palmer Drought indices will be the one of the primary factors monitored along with observed fire potential and occurrence of wildfires in the area. Drought Indices can be located at: http://www.boi.noaa.gov/fwxweb/fwoutlook.htm.

13.0 WILDFIRE SUPPRESSION PROGRAM

13.1 Special Safety Concerns and Firefighter Safety

Firefighter safety is the top priority of the fire management program. Safety of Service employees and cooperators involved in fire management activities is of primary concern. The Crew Standard Operating Procedures Guide reflects this commitment to safety (Appendix P). Only trained and qualified employees will be assigned to fire management duties. All fire management personnel will be issued appropriate personal protective equipment and will be trained in its proper use. No Service employee, contractor or cooperator will be purposely exposed to life threatening conditions or situations except when necessary to save the life of another person.

The lack of natural barriers (roads, rivers or lakes) which leads to the lack of suitable anchor points in an area of continuous fine fuel, coupled with explosive fire behavior, is an immediate concern for fire fighters. The primary threat to firefighter safety is from fast moving, wind-driven wildfires that can quickly and over take or trap firefighters. Due to terrain, soil conditions, and the location of various wetlands and water courses, it may be difficult for an engine to out-run a fast moving fire or reach a safety zone quickly. **It is important that firefighter practice LCES at all times**! Spot 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 weather related phenomena.

Communications is a problem of major concern on the Complex. Any fire situation has the potential to encounter communication problems. This is critical because it is difficult to implement ICS and LCES without proper communications. The problems and concerns are summarized as follow:

- The Forest Service has a high band frequency repeater in a remote site that has limited range. Local fire departments only use low band radios. The Complex fire program has an outdated low band radio system that only utilizes one repeater.
- The use of multiple communication devices leaves dispatchers out of the communication loops.
- The county does not utilize an emergency dispatcher to assist with fire suppression. Each fire department dispatches for itself and consequently resources do not always arrive on time or at the right location.
- All Service fire engines have cell phones, but cell phone coverage is limited in the county. The fire program has one satellite phone to mitigate some communication gaps.
- The possibility to use radios from the National Cache is limited and the radios, if received, have a limited range.
- Nebraska does not yet have a designated Federal Air Attack Frequency. When an emergency occurs that requires interagency aircraft, the Incident Commander has to request an air to ground frequency from Custer dispatch center for communication. Without this channel and a repeater to talk to an incoming aircraft, the incident commander has to remain in one location to coordinate with incoming aircraft. The fire management staff are currently working with the dispatch center to address this problem.

The lack of an adequate communication system can be overcome. Options to consider include (in the following order of preference):

$ Installing a new interagency communication system

$ Preposition a radio kit during the peak fire season

$ Order a repeater kit and specialist to install a radio network during a large wildfire incident.

$ Issue interagency resources radios with the Complex frequently.

$ Establish unified command with local cooperators.

$ Issue interagency resources radios with the Complex frequently.

There are limits and restrictions with each option. The best course of action is to work locally to formalize the ICS process and develop agreements designed to improve communications.

The Goals and Objectives of the Complex Safety will be incorporated into all aspects of fire management. The Fire Management Plan will provide direction to accomplish safety objectives listed below during wildfire suppression actions and prescribed fire activities.

$ Provide safe working conditions for employees.

$ Provide safe environments for the visiting public.

$ Protect and ensure safety of government equipment.

$ Define equipment available and:

identify responsibilities.

identify sources of resources.

provide documentation.

promote a healthy safety attitude.

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

13.2 Prevention Program

Twenty seven percent of the Complex's fires are human caused and thus could have been prevented. All of the human caused fires are attributable to equipment use. Human caused fires are generally the most damaging because they can occur outside of the fire season when fire behavior can be explosive, fewer initial attack resources are available, and fire effects can be severe.

Camping on the refuge is prohibited and open fires are not permitted. One designated picnic area exists adjacent to the Niobrara River which is open during summer months only. Charcoal

grills are used by visitors and occasional careless festivities may provide a source of ignition. The grasses immediately around the picnic tables and parking areas are mowed, however, higher concentrations of natural fuels around the picnic area may readily ignite.

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 a reminder to the others, the Complex will place fire prevention information and hints on Complex bulletin boards. The Complex will also post special warnings and notices, institute area closures, and increase patrols during periods of very high or extreme fire danger as part of it's step-up preparations. Equipment and/or public use restrictions may also be instituted, when needed. Refuge law enforcement officers will continue to include fire prevention messages in contacts with hunters, fishermen, and others.

The Complex has identified the need to post two fire danger rating signs at Ft. Niobrara and four fire danger rating signs at the Valentine NWR. These signs would indicate the fire danger adjective class, and would be updated by the fire crew from spring to fall. The actual location of these signs has yet to be determined, but they will be located on county roads and state highways passing through FWS property. Refuge personnel will work closely with local cooperator fire departments and State agencies in all prevention programs and activities.

Another fire prevention measure is the annual fall mowing of unpaved refuge roads and parking areas to prevent vehicle use from starting fires. This is a labor intensive project requiring approximately 4 person weeks of labor by heavy equipment operators. The Seier Refuge requires three mowing treatments annually to protect the structures from wild fire. The maintenance of the fuel breaks at Seier Refuge requires several person hours (see Appendix B).

13.3 Detection

There is a high degree of fire awareness in the Nebraska Sandhills. Neighbors, visitors, staff, and cooperators are the principal means of detecting and reporting fires. Although the area is sparsely populated, smoke from wildfires is usually easily seen from a distance and the population is spread out enough that someone will usually see and report a fire fairly quickly. There are times, however, when detection by local residents may not occur until a fire has become large enough to put off significant smoke or glow. Fire reports are often vague or inaccurate in terms of location and size. Generally, no legal description is given to better define the location. Judging distances and locations of a fire when the smoke is drifting over sand dunes compounds the problem. Inaccurate reports at night can send resources down access routes that turn out to be dead ends because of lakes, marshes, canyons, streams, or terrain.

In order to undertake a quicker response to new starts, especially when fire danger is high, the Step-up Plan provides increased patrols as well as the use of aircraft if deemed necessary by the FMO. Detection activities undertaken as a result of the Step-up Plan will be charged either to a fire that is discovered as the result of the patrol or to an Emergency Presuppression account.

Two fire lookout towers still stand on the Valentine NWR, but are not currently used for fire detection. The Hackberry Lake Tower has a newly constructed observation platform built around its foundation. The platform serves as an occasional lookout point; however, detection activities undertaken by refuge staff will generally consist of engine crews patrolling routes to look for smoke. The patrols concentrate on areas not easily seen by the public or in areas where

the greatest fire potential exists. Good vantage points, such as high points and those with views into canyons shielded from view, roads that take in a large part of the refuge, and access routes to those locations, will be noted in the Pre-attack plan. The FMO will make assignments based on the situation.

Aircraft patrols may sometimes be necessary. One OAS certified aircraft is currently available in the Valentine area. Other carded aircraft may be obtained through the Custer Interagency Dispatch Center, however response time is likely to be long unless conditions requiring an aircraft are anticipated and an aircraft is pre-positioned nearby. Procedures for using aircraft for detection and aerial observation flights are located in the Dispatch Plan (Appendix Q). The OAS web site posts local vendor updates with contract rates, which is updated annually. Care must be taken to ensure that aircraft and pilot is carded for the activity, radio communications procedures are understood, and that everyone understands how the mission is to be flown.

Local rural fire departments may be assisted by private citizens who own aircraft. These aircraft are able to transmit on the Nebraska fire frequency, so their transmissions may be monitored by Service fire crews. Uncertified aircraft will not be requested by the Service, nor can the Service offer to cost share these aircraft with local cooperators.

There may be occasions when unqualified service 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

13.4 Initial Reporting and Dispatching

All fires occurring within or adjacent to the Complex and observed by Service personnel will be immediately reported to Headquarters or the FMO. The person receiving the report at headquarters will be responsible for initiating the Fire Dispatch Plan (Appendix Q) and assuming the duties of Fire Dispatcher. Refuge staff receiving reports of fires from local neighbors must be prepared to gather additional information if necessary and report the fire to the proper channel. Procedures for doing this are listed in the Dispatch Plan (Appendix Q).

Requests for assistance from cooperators on fires not threatening the Complex must be made to and approved by the FMO. The FMO will not obligate firefighters for over one burning period without the preapproval of the Refuge Manager. A list of fire qualified employees available for dispatch to local, zone, regional, and national incidents will be compiled every Monday morning during the fire season and approved by the Refuge Manager. The District FMO will be responsible for transmitting availability of Sandhills District information to the Regional Office and Custer Interagency Dispatch every Wednesday during the prescribed fire and wildfire season. Only qualified and properly equipped resources will be dispatched.

For local fires, the Fire Dispatcher will monitor and record the radio and phone traffic of Complex firefighters. They will stay on duty until all Complex resources return or until released by the Incident Commander or Chief of Party. The Fire Dispatcher is not required to stay on duty when the fire occurs outside of Complex radio coverage, but must notify the IC, Cherry

County Dispatcher and/or Valentine Fire Department Dispatcher when he/she leaves, and leave a phone number where he/she can be reached. A relief dispatcher may be ordered if needed.

The Fire Dispatcher will be responsible for coordinating the filling and ensuring delivery of any resources requested by an Incident Commanders (IC). An IC will place all resource orders through the dispatcher, specifying what is needed, and when and where it is to be delivered. 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 Custer Interagency Dispatch Center. The FMO will generally be able to assist in ordering resources from outside the local area.

Three trained dispatchers are required to manage extended and initial attack situations. The FMO, IC or Project Leader should Resource Order Dispatchers during extended attack situations to return the Refuge staff to assigned duties or support other logistical functions. A Resource Orders should be completed as part of the preattack planning efforts to facilitate the resource ordering process. Courses such as D-110, Dispatch Recorder, and D-310, Support Dispatcher, should be completed by Refuge staff filling the incident dispatcher role.

13.5 Pre-attack Planning

Pre-attack Plans are currently being prepared by the Refuge. Once finished, copies of the Pre-attack Plans will be placed at each sub-headquarters and the Complex headquarters and included in the FMP as Appendix R. Final Pre-attack Plans will include:

$ Response map(s) that include roads, fences, and gates, fire stations/caches, airports, helispots, water sources (type and flow), and mutual aid zones/fire cooperator districts.

$ Hazard/Risk map(s) that include high potential fire occurrence zones , potential values at risk zones (high, medium, low), and hazard potential zones (high, medium, low).

$ Natural and Cultural Resources map(s) that indicate sensitive and non-sensitive zones and restricted vehicle access areas. Knowing where sensitive features are located on the Complex will be the responsibility of the Project Leader, Refuge Managers, Biologists and FMO.

$ Structure risk assessments.

$ Closure/Evacuation procedures.

$ MIST guidelines

Service policy requires the Refuge to utilize the ICS system and firefighters meeting NWCG and Service qualifications for fires occurring on Refuge property. All suppression efforts will be directed towards safeguarding life and property while protecting the Refuge's resources and other values at risk from harm.

All fires occurring on the Complex and staffed with Service employees will be supervised by a qualified Incident Commander (IC). The FMO will serve as or appoint a qualified IC for each fire occurring on the Complex. If a qualified IC is not available, one will be ordered through the Custer Interagency Dispatch Center. Until the IC arrives, the highest qualified firefighter will assume the duties of the IC until relieved by a qualified IC or the fire is suppressed. The IC will be responsible for:

- Providing a size-up of the fire to the Dispatcher 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 the Dispatcher of resource needs on the fire.
- Managing all aspects of the incident until relieved or the fire is suppressed

In the event the highest qualified firefighter is not Incident Commander qualified, the firefighter will only be expected to perform within the scope of his or her training and level of qualification, which may not include all of the above duties.

13.6 Fire Suppression

13.6.1 Overview

The IC is also responsible for the safety, deployment, and supervision of assigned engines and crews. Each engine will be staffed with an Engine Boss (ENGB) who will serve as the Single Resource Boss of the engine and crew, or an Engine Operator (ENOP) who will be in charge of the engine but will be under the direction of an Engine Boss. The person in charge of the engine will be responsible for receiving assignments from the IC, selecting the appropriate tactics, and supervising the crew in the completion of the assignment(s).

The IC will receive general suppression strategy from the Fire Management Plan, but appropriate tactics used to suppress the fire will be up to the IC to implement. Minimum impact suppression tactics should be used whenever possible.

Upon arriving at the scene, all resources, including mutual aid resources, will report to the IC (either in person or by radio) prior to deploying to the fire. Mutual aid forces will be first priority for release from the fire. Procedures outlined in the dispatch section and elsewhere in this plan will be used to acquire Service and Interagency fire personnel and resources.

13.6.2 Initial Attack Strategies and Tactics

All fires are to be suppressed on Complex lands. The IC, FMO and line officer have the responsibility to choose the appropriate suppression strategy. As indicated earlier, resource benefits will not be a factor when determining the appropriate management response. The strategies and tactics will vary depending upon the location of the fire, the predicted weather, the time of ignition, and the threat to life, property or resources and may be modified to respond to changing conditions. Direct attack with light engines or handcrews will be the most frequent method employed. Minimum impact Suppression Techniques will be used where appropriate.

13.6.3 Minimum Impact Suppression Tactics

See Preattack Plan (Appendix R).

13.6.4 Limits to Suppression Activities

The Complex has a number of archaeological sites, one wilderness area, a proposed wilderness area, and three research natural areas. Field monitoring sites, research plots, developments and improvements need to be protected. An inventory of these sites needs to be collected and placed on a map system kept under restricted access for an IC to access with the Project Leader.

Other limits were discussed previously in the Fire Management Unit Sections.

13.7 Escaped fires/Extended Attack (WFSA)

The IC will notify the Dispatcher or FMO whenever it appears that a fire will escape initial attack efforts, escape Service lands, or when fire complexity will exceed the capabilities of command or operations. The FMO will be responsible for coordinating all extended attack actions including:

- $ Completion of WFSA for Refuge Manger (Appendix S).
- $ Assigning or ordering of appropriate suppression resources.
- $ Completion of Delegation of Authority (Appendix T), if needed.

13.8 Mop up Standards and Emergency Stabilization and Rehabilitation

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

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

- All trash will be removed.
- Firelines will be refilled and waterbars added if needed.
- Hazardous trees and snags cut and the stumps cut flush.
- Disked firelines should be compacted as soon as possible to preserve the living root stock of natives grasses.
- Overturned sod resulting from plowing must be rolled back with a grader or by hand and compacted to preserve native grass root stock.
- Repair damaged barbed and electrical fences and gates.
- Repair of damaged access roads.
- Identify above measures in the Incident Action Plan.

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

- **Rehabilitation** is the use of appropriate rehabilitation techniques to improve natural resources as stipulated in approved refuge management plans and the repair or replacement of minor facilities damaged by the fire. Total "rehabilitation" of a burned area is not within the scope of the Emergency Rehabilitation funding. Emergency Rehabilitation funding can be 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 facilities are repaired or replaced through supplemental appropriations of other funding. Rehabilitation measures that can be particularly important include reseeding of native plants, soil stabilization, repair of interior fences and boundary fences and windmills. Stabilization of cultural resources affected by wildfire also needs to be addressed. All measures need to be addressed in the ESR Plan.

- 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. The refuge manager and Regional Director will approve all ESR Plans as meeting resource management objectives.

14.0 PRESCRIBED FIRE PROGRAM

14.1 Program Overview

As previously indicated wildland fire, either lightning ignited or aboriginal, played a major role in the Complex's ecosystems prior to European settlement and the advent of fire suppression. With few exceptions, fire is no longer a natural process within the Great Plains and Sandhills ecosystem and landscape, and its absence may be a limiting factor for some native species. The Great Plains were shaped primarily by the natural forces of climate (particularly drought), herbivory, and fire. These three forces varied widely at any given time, and tended toward extremes. As a result, various species developed strategies for using these periodic disturbances to their advantage. This produced an environment rich in natural diversity. The natural diversity is especially evident in the area of the Niobrara River Valley where the geographic location and unique mixture of many different types of habitats and plant communities is considered nationally important.

Native wildlife evolved with fire in the Northern Great Plains ecosystem and may rely on fire adapted plant communities for habitat and life requirements. Wildlife composition and density are largely determined by the composition and structure of vegetation and its suitability as wildlife habitat. Monitoring on Valentine NWR has established that habitat which has not been disturbed for 2 to 7 years appears to be preferred by many native upland nesting birds (especially prairie grouse and ducks) species (McDaniel pers. com. 1994). Management ignited prescribed fire now offers a powerful tool for managing refuge resources. The Complex plans to use prescribed fire as a tool in two management areas: resource management and fuels reduction.

Resource management prescribed burning will be used to restore, create, and/or maintain a diversity of plant communities in order to restore and perpetuate native plant and wildlife species. The primary use of fire management fires to date has been to control smooth brome, Kentucky blue grass, and Eastern red cedar encroachment at the Valentine NWR. Most of the burns at Valentine NWR have been located on the fringes of meadows, lakes, or hay meadows. The bottomland habitat is important for nesting and winter cover. Fire has targeted cool season grasses in these areas to restore composition of native warm season grasses. Similar smaller scale burns have been conducted at Ft. Niobrara. Fire has been used on a trial basis at Ft. Niobrara to restore croplands and Texas Longhorn holding pastures. (These holding pastures will be converted back to native prairie and fire will play a role in this process.) Limited use of prescribed fire has been applied along the north slopes of the Niobrara River to reduce understory density of brush, thin ponderosa pine stands, and to provide hardwood reproduction sites. Only one prescribed fire to restore bluestem prairie in the wilderness area at Ft. Niobrara has been conducted.

The Refuge may use fuel reduction prescribed burns within or near Complex development zones, sensitive resources, and boundary area to reduce the risk from wildfire damage.

14.2 Resource Management Objectives

Prescribed fire will be used to restore, create, and/or maintain a diversity of plant communities for the purpose of restoring and perpetuating native species. Objectives of resource management prescribed fires are:

- Preservation of native prairie vegetation.
- Reduction/control of exotic vegetation (Kentucky bluegrass, smooth brome, cheat grass).
- Reduce of woody vegetation invading native prairie and marsh (cedar, willow, sumac, snowberry, ponderosa pine).
- Reduce abundance of eastern red cedar in woodland communities above the natural regime.
- Periodically reduce dense cattail growth in shallow wetlands.
- Preserve and stimulate reproduction of savannah species (ponderosa pine, burr oak).
- Maintain/rejuvenate quality nesting cover for waterfowl and native birds.
- Maintain/rejuvenate quality forage for native herbivores.
- Preserve and stimulate reproduction of endangered, threatened, or sensitive species (western prairie fringed orchid, blowout penstemon).

The Complex land base is approximately 100,000 acres and the two CCPs call for several thousand acres (up to 9,000 acres) to be burned on a rotational basis (CCP1999). Most prescribed fires will occur on wetland, sub-irrigated meadow, or sands range sites. Burning portions of choppy range sites with management ignited fires may be necessary to provide adequate containment of prescribed fires. Prior to the introduction of prescribed fire into the choppy range sites on a large scale, test fires to evaluate erosion concerns must be conducted. Forest and savanna areas will also be treated using prescribed fire. Burning frequency will vary from 3 to 15 years dependent upon management objectives, historic fire frequency, and funding.

The following two tables outline the overall quantitative treatment objectives.

Table 11: Estimated Acres to be Treated with Prescribed Fire - Fort Niobrara NWR

FT. NIOBRARA NWR					
HABITAT TYPE / RANGE SITE	**APPROX. ACREAGE**	**FIRE RETURN INTERVAL**		**ANNUAL AVERAGE BURN TARGET**	
		MIN	MAX	MIN	MAX
Marsh & Wetland	80	3	7	0	10
Subirrigated Meadow	55	3	7	0	10
Sand/Sandy	14,043	5	10	50	580
Choppy Sand	166	0	0	0	0
Savanna	3022	5	15	30	300
Deciduous Forest	1355	10	20	20	100
Unclassified or Non-Burnable	410	0	0	0	0
Total	19,131			100	1,000

Note: No habitat listing is available for the satellite properties or Seier Refuge due to unavailable vegetative surveys.

Table 12: Estimated Acres to be Treated with Prescribed Fire -Valentine NWR

VALENTINE NWR					
HABITAT TYPE / RANGE SITE	**APPROX. ACREAGE**	**FIRE RETURN INTERVAL**		**ANNUAL AVERAGE BURN TARGET**	
		MIN	MAX	MIN	MAX
Marsh & Wetland	4,816	3	7	100	800
Subirrigated Meadow	10,272	3	7	500	4,000
Sand	36,131	5	10	400	3,200

Choppy Sand	12,980	0	0	0	0
Unclassified or Non-Burnable	7,073	0	0	0	0
Total	71,272			1,000	8,000

14.3 Fuel reduction

The Complex may use fuel reduction techniques (mechanical, prescribed fire, or the combination of the two) within or near Complex development zones, sensitive natural resources, and boundary areas to reduce the risk from wildfire damage. Burning frequency will be determined by fuel loading and resource management considerations.

14.4 Wildland Fire Use For Resource Benefits.

The benefits of wildland fire will not be a factor to consider when selecting the appropriate management response. The potential impacts on Service and private lands along with safety concerns, the lack of natural barriers, continuous fuels, and high rates of spread in the area are the primary reasons for this decision. All fires will be suppressed as quickly and safely as possible.

14.5 Prescribed Fire Season

Prescribed burns can be conducted at any time of the year, depending upon the objectives to be achieved. Most burning will take place from March through October. The majority of the burns for prairie management and control of exotics will occur March through early June. Woodland management for control of eastern red cedar and pine encroachment may occur in March, April, September, and October. Prescribed burning may be limited during late spring and early summer due to waterfowl nesting and other biological considerations.

Multiple prescribed fires may be initiated at the same time within the Complex. A qualified Prescribed Fire Manager II will coordinate multiple burns. The maximum number of simultaneous burns will depend upon the cumulative impacts of smoke on sensitive targets and the availability of the prescribed equipment and personnel. The need for multiple burns will increase when the prescribed burn “window” is limited during a burning season.

14.6 Potential Impacts

Safety of all persons affected by fire is the highest priority of the Complex. Prescribed fire is a planned event, so preplanning for the safety of all firefighters, cooperators, neighbors and visitors is completed in the prescribed fire plan. Several topics are worthy of notation below:

Smoke Management: There are state highways, county roads, communities, residences, and public use to evaluate as being smoke sensitive in the vicinity of the Complex. The town of Valentine has a hospital, schools, nursing homes, and is the main area of commerce in the county. To avoid impacting these areas, each prescribed fire plan will use the smoke-sensitive area screening process outlined in Wade and Lunsford, 1988 (Wade, D.D. and J.D. Lunsford. 1988). In addition to the smoke screening, the prescribed fire plan specifically indicates the placement and type of signs to be used during prescribed fires to protect motorists. The impact of smoke on roads is recognized as one of the most hazardous situations to motorists and firefighters.

Socio-Political/Economic: The net effect of prescribed fire activity would have a positive impact on the local economy. Persons detailed in for prescribed fires would require food, lodging, and pay for supplies and services.

Prescribed fire is not an accepted practice utilized by ranchers to benefit rangeland in the Nebraska Sandhills. The risk of conducting prescribed fires and the lack of a perceived need for the practice limits its utilization for economic benefit. The negative impacts of wildfire on the ranch economy and personnel has promoted a total fire suppression campaign in the area. Prescribed fire rather than grazing may affect refuge grazing permittees.

The use of prescribed fire to achieve wildlife and cover goals has been demonstrated on the Valentine NWR. Similar results are expected for the Yellowthroat WMA, and may someday be obtained on the Seier Refuge to enhance wildlife production. The local economy benefits from having Service lands well stocked with game that can be hunted.

Prescribed fire application for resource objectives on Service lands can sometimes be beneficial by reducing fuel loads that lead to higher intensity fires. Less fuel in an area aids suppression efforts and can reduce suppression costs.

Escaped Prescribed Fires (Wildfires): An escaped prescribed fire that rages out of control on Service lands and moves onto private lands would adversely impact relations with the local community. An escaped fire could alter Complex management goals and the grazing management on neighboring ranches. Tort claims, bad press, and local public meetings could have a major impact on the management of the whole Complex. The local acceptance of prescribed burning would be set back and other local and state projects may come under scrutiny. Strict adherence to the prescribed fire plan is the primary mitigating factor to prevent this from happening.

Public Use: Persons who were concerned about prescribed fire killing trees in the river corridor expressed their concerns during the development of the Fort Niobrara CCP (1999). Some

respondents considered burned trees an eyesore. While a prescribed burn may kill a few small trees, a wildfire in the same stand would probably destroy it entirely. Because the effects are often short-lived, scheduling of prescribed burns may reduce or eliminate the perception that burned trees are an eyesore.

Most of the prescribed fires conducted on the Complex occur before the heavy visitor use season. In May, when public use begins to gain momentum, prescribed burns can be scheduled to avoid peak visitor use times such as holidays and weekends. Refuge visitors may be able to observe prescribed burn being conducted while Refuge personnel explain the process and purpose. Those same visitors may return later to see first hand the benefits of a sound prescribed fire program.

14.7 Limits

No permits are required from the state air quality office. The fire chief of the protection district the fire is being conducted in must be notified where the prescribed fire is going to occur and that a burn plan is in place to proceed.

The environmental factors which limit prescribed burning are primarily related to wind erosion. The Sandhills soils are highly susceptible to erosion following disturbance.

Other limits include:

- The County Sheriff's Office, landowners adjacent to the Complex lands, the local radio station and fire departments, and the Custer Interagency Dispatch Center will always be notified by the Burn Boss prior to ignition. The required notifications will be included in each burn plan.

- Prescribed fire activities may be limited during nesting season.

- Drought can have an effect on fire severity and control. It is important to track one or more of the drought indicators. A Palmer index below -3.0, severe drought, should be of concern to the Burn Boss and Project Leader. Prescribed burns should not be initiated if the Keetch-Byram Fire Danger Index is 500 or higher or the Palmer Drought Index is -4.0 or lower.

- The use of heavy equipment and other ground disturbing devices will be approved by the Project Leader or his designee.

- A prescribed fire can not proceed if contingency resources are not available or are responding to another emergency.

- Refuge habitat goals and objectives especially for undisturbed cover and structure may

limit the use at prescribed fire.

- Prescribed burning may be limited in the wilderness area due to threats to wilderness values.

- Limitations may be imposed in the Research Natural Areas.

14.8 Complexity

Complexity is dependent upon fuels/vegetation, objectives, burn boundaries, size, and other factors. Although prescribed fires on the Complex are generally of low or moderate complexity as determined by the Service's Region 6 Complexity Analysis (Appendix U), the majority are rated as Type II (Moderate) burns due to the potential of escape, fine flashy fuels, lack of natural barriers, access, and remote location.

An aviation component for aerial ignition on the Complex will raise the complexity of burns from moderate to high, Type I. Large fires exceeding 1,000 acres on the Valentine NWR and burns conducted in the Wilderness area at the Fort Niobrara would most likely be Type I fires as well. Before large scale burns are conducted, procedures must be put into place to address the aerial ignition and monitoring components of the burn.

14.9 Planning

14.9.1 Overview

Refuge Biologists are responsible for identifying units or areas in need of treatment, and for developing treatment objectives for those units or areas based on Refuge resource management goals and objectives. Prescribed fire is just one of a combination of tools (fire, thinning, grazing, haying, rest, water level manipulation, biological control, chemical) that can be used to achieve the desired conditions.

The Refuge Manager will select the type of treatment based upon input from the biologist, FMO, range conservationist, or Regional Fire Ecologist. Once prescribed fire has been selected as the tool of choice, the FMO is responsible for determining if prescribed fire can be utilized to meet the treatment objectives.

The Complex fire program currently manages the burning program goals on a year-to-year basis, however, in order to have a successful prescribed burn program, Refuge personnel must improve their ability to plan 3-5 years out. Not only does the FireBase funding system require fire managers to plan two years ahead to schedule treatment applications on management units, but projects involving large bocks of land may need to be implemented over a three to five year period. The planning cycle and the funding cycle may not work in harmony with the implementation schedule due to natural events such as weather and wildfires. The fire program needs to be flexible to adapt to changes in rangeland condition which are primarily controlled by

weather and stocking rates of bison and cattle.

The Refuge may assist private landowners with prescribed burning to improve the value of their land as wildlife habitat. A Wildlife Extension Agreement with a written provision for the use of prescribed fire must be approved prior to implementing burns on private lands. Such assistance is subject to guidance provided within the Fire Management Handbook, private lands program policies, Region 6 Fire Management Guidelines, and funding and staffing constraints.

14.9.2 Burn Plan Development

Planning for fire use generally occurs in the winter months. When prescribed fire is selected as the preferred treatment, alone or in combination with other treatments, the FMO will assign a qualified individual who, with the assistance of the Biologist, will develop a burn prescription and plan that will accomplish the desired objectives. At the earliest possible time, but no less than 60 days prior to the expected burn date, the prescribed fire plan for a burn should be completed and presented to the Project Leader. Burn plans will be prepared according to the Region 6 format and will address all elements specified in the Service's Fire Management Handbook. In addition to meeting habitat objectives prescribed fires will be planned to reduce impacts, minimize the risk of escape, and provide an adequate contingency plan for managing any escapes. BEHAVE runs are used to develop prescriptions and can be used to provide guidance for adequate containment lines, but most of the planning details must come from data collected in the field.

14.9.2.1Contingency Planning

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

The contingency plan will identify:

- The individual(s) who has the authority to activate the contingency plan.
- Clearly defined conditions ("trigger points") that indicate the contingency plan should be activated.
- A listing of those to be notified or contacted
- Who assumes the duties of the Incident Commander and what are the roles of others.
- The location of values at risk and other resources requiring protection.
- The preferred strategies and tactics.
- The location of containment lines or natural fuel breaks outside the burn unit.
- The location of water refill points, staged equipment, etc

G Contingency forces (Type, number, location).

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

14.9.3 Burn Plan Review and Approval Process

Burn plans will be reviewed in accordance with Service and Regional policy. The Review Process can be long and involved. So planning for the lengthy review process is key to a successful burn program. It may be necessary for the FMO to detail qualified Burn Bosses in to complete the preparation or implementation of management ignited prescribed fires. Detailer expenses will be charged to the benefitting prescribed fire account.

Region 6 guidelines require prescribed fire plans be submitted to the Regional Archeologist for review. Prescribed Burn Plans must contain a description of the area being treated and list the methods to be used to contain, execute, and rehabilitate a burn unit.

All Complex burn plans will be reviewed by the biologists before being approved by the Project Leader. The FMO will review all plans written by others. Plans written by the FMO must be reviewed by the Zone FMO. All Type II burns require Zone FMO review and all type I burn plans require Regional review and concurrence.

When the plans are returned after the review, the Project Leader will make changes to the plan as necessary based upon the review's comments before approving the plan. Once approved, burn plans are valid for a period of three years. This allows land managers the flexibility to conduct the burn over a three year period. Modifications in the plans may occur, and will be approved by the Complex project leader, as necessary. If modifications raise the complexity of a prescribed fire plan, the plan will be resubmitted to the Zone FMO for review and concurrence.

The FMO is also responsible for the review and approval of Type III plans within the District, and reviews District Type II plans before forwarding them to the Zone FMO for concurrence. District support responsibilities and the archaeological review process will require comprehensive scheduling and prioritization by line officers from all Refuges in the District and the FMO.

14.10 Preparation and Implementation

Implementation of a prescribed burn will be in accordance with the Prescribed Fire Plan for that unit. All elements that must be completed before a burn can be initiated will be included in the burn plan and will be adhered to. The FMO and fire management crew are responsible for prescribed fire preparations including equipment maintenance, fuel break mowing, and black-lining. The Deputy Project Leader will be responsible for assisting with public relations and education regarding the use of fire as a management tool.

Advanced planning may be necessary to bring in outside resources to complete a prescribed burn. Service personnel available to accomplish the prescribed fire projects on the Complex are limited, and other Refuges in the District may be conducting burns in the same window. Some

local hires may help with the staffing shortage, however they are usually only available on weekends.

14.11 Monitoring and Evaluation

As a minimum, fire behavior and first-order fire effects monitoring guidance is contained in and will be conducted for all burns (Appendix V).

Past vegetative monitoring and evaluation of prescribed fires has been limited. Pre-burn evaluation has been limited to photo points, vegetative height measurements (VOR transects), and/or qualitative evaluation of fuel conditions and green-up conditions. Burn day evaluations have documented weather and fire behavior and objective related measurements such as dead fuel reduction or woody growth scorch. Post-burn evaluation has included photo point, VOR vegetative height measurements, and/or qualitative estimates of native species response and effectiveness in achieving objectives.

The second order fire effects are currently evaluated by the Complex Biologists when scheduling permits. Second order fire effects may be the only means by which burn objectives can truly be documented. Without an examination of second order fire effects in the Sandhills, prescriptions may be limited. Current funding guidance provides for monitoring first and second order fire effects provided certain conditions are met. The Refuge will work at developing a fire effects monitoring program according to Regional and National guidance and submit a request for funding to the regional office.

15.0 ADDITIONAL OPERATIONAL ELEMENTS

15.1 Public Safety

Firefighter and public safety will always take precedence over public and private property and cultural and natural resource protection during any fire management activity. Firefighter safety was covered previously. This section will address public safety.

Fire fronts in grass fuel models move rapidly and are dangerous. Entrapment by public users is a possibility as burn units grow larger and burn plans should address checking units to make sure they are clear before proceeding with ignition. Another possible threat is neighbors who initiate their own suppression actions without proper training, equipment, or communication. The Refuge staff will attempt to keep the fire scene clear of people except for Service firefighters and cooperating volunteer fire departments.

Smoke from a Refuge fire could impair visibility on roads and become a hazard. During wildfires, the local law enforcement agency having jurisdiction is responsible for managing traffic hazards from smoke. Smoke from prescribed fires is addressed in the prescribed burn plan and its management and mitigation are the responsibility of the burn boss. Actions to reduce the hazards associated with smoke include: use of road guards and pilot car, signing, altering ignition techniques and sequence, halting ignition, suppressing the fire, and use of local law enforcement as traffic control.

Wildfires which might escape Service lands and spread to inhabited private property are also a concern. The IC is responsible for contacting the local law enforcement agency having jurisdiction so that they can warn and/or evacuate the public from potentially dangerous situations. Additionally, the Refuge will use prescribed fire and other management techniques to manage fuels in high risk areas.

15.2 Public Information and Education

Informing the public is an important aspect of fire suppression, fire prevention, prescribed fire, and the Service mission. Information and education are critical to gaining public support for the Refuge's fire management programs. There are several different aspects to this task.

15.2.1 Wildfire Suppression

During wildfire suppression, the IC is in charge of dispersal of information to the press and or public. The IC may delegate this responsibility if needed.

15.2.2 Prescribed Fire

An informed public is a vital component of the prescribed fire program. During and immediately after, the Burn Boss will be responsible for this aspect of the program. This aspect of the operation may be delegated, as appropriate.

Areas that have been burned will present opportunities for the public to actually see the effects of fires, and offer staff members an opportunity to explain the purpose of the burns to the public. The following will be used to promote the prescribed fire program to the public:

- Talks in local schools
- Attendance at local volunteer fire department meetings
- Including the prescribed fire message in Refuge interpretive publications and
- Personal contacts with bystanders during prescribed burns
- Follow prescriptions in burn plans to prevent escapes
- Developing a quantitative fire effects monitoring program and sharing the results with the public.

Plans have been implemented in conjunction with the Rocky Mountain Elk Foundation to provide public education opportunities by creating interpretive exhibits in areas where prescribed burns are conducted. Promoting prescribed fire may encourage the private utilization of the practice and promote an understanding of the role of fire in land management. The continued application of successful prescribed fires demonstrates an effective range management tool.

15.3 Reports

Following the suppression of a wildfire or the completion of a prescribed burn, the IC or Burn Boss will:

- Complete a DI-1202 Fire Report.
- Include a list of all expenses and/or items lost or expended on the incident and list personnel assignments on the DI-1202.
- Complete a Crew Time Reports for all personnel assigned to the wildfire or prescribed fire.
- Submit the documents to the Refuge FMO within 3 days of the fire being declared out.

The FMO will enter the DI-1202 into the FMIS database within 10 days after the fire is declared out.

15.4 Fire Critique and Review

15.4.1 Wildfire Review

Wildfires will be critiqued by the IC and the results documented in the DI-1202. The Regional Fire Management Coordinator and/or Zone FMO will conduct formal critiques in the event of:

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

15.4.2 Prescribed Burn Review

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

- Significant injury, accident, or fatality.
- An escaped prescribed fire occurs.
- Significant safety concerns are raised.
- Smoke management problems occur.

15.5 Annual Fire Management Plan Review

The Fire Management Plan will be reviewed annually to ensure the fire program advances and evolves with the Service's and the Refuge's mission.

16.0 AIR QUALITY AND SMOKE MANAGEMENT GUIDELINES

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

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

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

17.0 CULTURAL RESOURCES

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.

All prescribed fire plans must be submitted for review by the regional archaeologist to ensure damage to archaeological resources does not occur. Following the review process from the archaeologist, the FMO can modify preparation measures if needed. The review process is intended to ensure that damage to sites does not occur. The FMO will access archaeological data files prior to submitting the plan to minimize the need for preparation modifications.

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

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

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

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

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

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

- The Nebraska 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 mechanized 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 Refuge Manager to the Regional Archeologist.

- Rehabilitation plans will address cultural resources and will be reviewed by the Regional

Archeologist.

18.0 RESEARCH NEEDS

Fire behavior data will be collected on all fires occurring at the Refuge. Long-term monitoring will comply with accepted scientific methods and will be funded from sources other than Fire. These data, along with information gathered through research studies, will be used to improve the effectiveness of the fire management program. The Refuge will continue to encourage fire related research on Service lands where research operations will not conflict with resource management objectives. Research will be conducted on an interagency basis whenever possible.

19.0 CONSULTATION AND COORDINATION

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

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21.0 GLOSSARY OF TERMS

Agency Administrator: The appropriate level manager having organizational responsibility for management of an administrative unit. May include Director, State Director, District Manager or Field Manager (BLM); Director, Regional Director, Complex Manager or Project Leader (FWS); Director, Regional Director, Park Superintendent, or Unit Manager (NPS), or Director, Office of Trust Responsibility, Area Director, or Superintendent (BIA).

Appropriate Management Action: Specific actions taken to implement a management strategy.

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

Appropriate Management Strategy: A plan or direction selected by an agency administrator which guide wildland fire management actions intended to meet protection and fire use objectives.

Appropriate Suppression Response: Selecting and implementing a prudent suppression option to avoid unacceptable impacts and provide for cost-effective action.

Emergency Fire Rehabilitation/Burned Area Emergency Rehabilitation (EFR/BAER): Emergency actions taken during or after wildland fire to stabilize and prevent unacceptable resource degradation or to minimize threats to life or property resulting from the fire. The scope of EFR/BAER projects are unplanned and unpredictable requiring funding on short notice.

Extended attack: A fire on which initial attack forces are reinforced by additional forces.

Fire Suppression Activity Damage: The damage to lands, resources and facilities directly attributable to the fire suppression effort or activities, including: dozer lines, camps and staging areas, facilities (fences, buildings, bridges, etc.), handlines, and roads.

Fire effects: Any consequences to the vegetation or the environment resulting from fire, whether neutral, detrimental, or beneficial.

Fire management: All activities related to the prudent management of people and equipment to prevent or suppress wildland fire and to use fire under prescribed conditions to achieve land and resource management objectives.

Fire Management Plan: A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fuels: Materials that are burned in a fire; primarily grass, surface litter, duff, logs, stumps, brush, foliage, and live trees.

Fuel loadings: Amount of burnable fuel on a site, usually given as tons/acre.

Hazard fuels: Those vegetative fuels which, when ignited, threaten public safety, structures and facilities, cultural resources, natural resources, natural processes, or to permit the spread of wildland fires across administrative boundaries except as authorized by agreement.

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

Maintenance burn: A fire set by agency personnel to remove debris; i.e., leaves from drainage ditches or cuttings from tree pruning. Such a fire does not have a resource management objective.

NFDRS Fuel Model: One of 20 mathematical models used by the National Fire Danger Rating System to predict fire danger. The models were developed by the US Forest Service and are general in nature rather than site specific.

NFFL Fuel Model: One of 13 mathematical models used to predict fire behavior within the conditions of their validity. The models were developed by US Forest Service personnel at the Northern Forest Fire Laboratory, Missoula, Montana.

Preparedness: Actions taken seasonally in preparation to suppress wildland fires, consisting of hiring and training personnel, making ready vehicles, equipment, and facilities, acquiring supplies, and updating agreements and contracts.

Prevention: Activities directed at reducing the number or the intensity of fires that occur, primarily by reducing the risk of human-caused fires.

Rehabilitation: (1) Actions to limit the adverse effects of suppression on soils, watershed, or other values, or (2) actions to mitigate adverse effects of a wildland fire on the vegetation-soil complex, watershed, and other damages.

Staffing Class: Step up plans are designed to direct incremental preparedness actions in response to increasing fire danger. Those actions are delineated by “staffing classes”. Each step up plan contains five staffing classes that describe escalations in preparedness activities and staffing. These are approved, predetermined responses to increased fire danger for a burning period, which is defined as that period of the day when fire burns most actively in a given fuel type (Fire Management Handbook 6/11/01). The staffing classes correlate to five fire danger ratings that the public can visualize as low, moderate, high, very high, and extreme. For example, a staffing class of 1 would correlate to a low fire danger rating and a staffing class of 5

would correlate to an extreme fire danger rating.

Suppression: A management action intended to protect identified values from a fire, extinguish a fire, or alter a fire's direction of spread.

Type 5, 6 and 7 engines: Engine type denotes a standard the National Wildfire Coordinating Group (NWCG) has established to define categories of fire engines. Engines within a NWCG established category will have a minimum standard of equipment and personnel on board to attain classification. For example, a type 5 engine would have a pump capacity of 50 gpm and have a tank capacity of only 200 gallons, 300 ft. of 1.5 inch hose, 300 ft. of 1.0 inch hose, and two persons on board. The type 7 engine would have a pump capacity of 20 gpm, tank capacity of 125 gallons, 200 ft. of 1.5 inch hose, 200 ft. of 1.0 inch hose and have two persons on board (NWCG Fireline Handbook, 01/98).

Wildfire: An unwanted wildland fire.

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

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

Wildland/urban interface fire: A wildland fire that threatens or involves structures.