

FIRE MANAGEMENT PLAN

BOWDOIN NATIONAL WILDLIFE REFUGE COMPLEX

and

BOWDOIN WETLAND MANAGEMENT DISTRICT

Malta, Montana

September 24, 2001

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Table of Contents

INTRODUCTION

.1	General	1
1.2	Description of Complex	1
1.2.1	Management Units	1
1.2.1.1	Bowdoin National Wildlife Refuge	1
1.2.1.2	Hewitt Lake National Wildlife Refuge	2
1.2.1.3	Black Coulee National Wildlife Refuge	2
1.2.1.4	Creedman Coulee National Wildlife Refuge	2
1.2.1.5	Lake Thibadeau National Wildlife Refuge	2
1.2.1.6	Bowdoin Wetland Management District	2
1.2.2	Topography	10
1.2.3	Slope	10
1.2.4	Soils	10
1.2.5	Water	10
1.2.6	Vegetation	10
1.2.7	Wildlife	11
1.2.8	Threatened and Endangered Species & Species of Conservation Concern	11
1.2.9	Land Use	11
1.2.10	Values and Improvements On and Adjacent to Station	12
1.2.11	Cultural Values	12
1.2.12	Intrinsic Values, Socio-Political-Economic	13
1.3	Historical/Ecological Role of Fire	13
1.4	Complex Fire History	14

POLICY COMPLIANCE - GOALS AND OBJECTIVES

2.1	Compliance With Service Policy	14
2.2	NEPA Compliance	14
2.3	Authorities Citation	15
2.4	Other Regulatory Guidelines	15
2.5	Enabling Legislation and Purpose of Refuge (Mission Statement)	16
2.6	Overview of Planning Documents	17
2.7	Land Management Goals and Objectives	17
2.7.1	Land Management Goals	17
2.7.2	Land Management Objectives	17

COMPLEX FIRE MANAGEMENT OBJECTIVES

3.1	Introduction	19
3.2	General Fire Management Objectives	19
3.3	Specific Objectives	19

FIRE MANAGEMENT STRATEGIES

4.1	General	20
4.2	Limits	21
4.3	Impacts on Neighboring Lands	21

FIRE MANAGEMENT RESPONSIBILITIES

5.1	Complex Staff Responsibilities	21
5.1.1	Project Leader	22
5.1.2	Biologist	22
5.1.3	Maintenance Worker	22
5.1.4	Refuge Operations Specialist	22
5.1.5	Administrative Officer	23
5.1.6	Biological Technician	23
5.1.7	Seasonal and Collateral Duty Firefighters	23
5.1.8	Wildfire Incident Commander	23
5.2	Cooperator Involvement	24

FIRE SEASON

6.1	Fire Frequency	24
6.2	Fire Season	25

EQUIPMENT AND STAFFING REQUIREMENTS

7.1	Normal Unit Strength	25
7.1.1	Equipment and Supplies	25
7.1.2	Personnel and Level of Qualifications	25

PREPAREDNESS

8.1	Current Staff Available to Meet Position Needs	26
8.2	Pre-season Readiness Activities	26
8.2.1	Annual Refresher Training	26
8.2.2	Physical Fitness	27
8.2.3	Physical Examinations	27
8.3	Impacts of Regional and National Preparedness Levels on Station Activities	27
8.4	Step-up Plan	28
8.5	Severity and Emergency Presuppression Funding	28

WILDFIRE PROGRAM

9.1	Firefighter Safety Concerns and Firefighter Safety	29
9.2	Prevention Program	30
9.3	Detection	30
9.4	Initial Reporting and Dispatching	31
9.5	Fire Suppression	31
9.5.1	Initial Attack Strategies and Tactics	31
9.5.2	Minimum Impact Suppression Tactics	32
9.5.3	Limits to Suppression Activities	33
9.6	Escaped Fires - Extended Attack	33
9.7	Mop up Standards and Emergency Stabilization and Rehabilitation	34

PRESCRIBED FIRE PROGRAM

10.1	Program Overview	35
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FIRE MANAGEMENT UNITS

11.1	General	35
11.2	West Unit	35
11.2.1	Fire Management Objectives	36
11.2.2	Unit Strategies	38
11.2.3	Unit Tactics	39
11.2.4	Limits to Strategies and Tactics	39
11.2.5	Habitat Types	40
11.2.6	Fuels	40
11.2.7	Fuel Loading and Unusual Fire Behavior	41
11.2.8	Expected Fire Effects	41
11.3	Big Island Unit	42
11.3.1	Fire Management Objectives	42
11.3.2	Unit Strategies	42
11.3.3	Unit Tactics	42
11.3.4	Limits to Strategies and Tactics	43

11.3.5	Habitat Types	43
11.3.6	Fuels	43
11.3.7	Fuel Loading and Unusual Fire Behavior	44
11.3.8	Expected Fire Effects	44
11.4	East Unit	44
11.4.1	Fire Management Objectives	44
11.4.2	Unit Strategies	44
11.4.3	Unit Tactics	45
11.4.4	Limits to Strategies and Tactics	45
11.4.5	Habitat Types	45
11.4.6	Fuels	45
11.4.7	Fuel Loading and Unusual Fire Behavior	46
11.4.8	Expected Fire Effects	46
11.5	Outlying Unit	47
11.5.1	Fire Management Objectives	47
11.5.2	Unit Strategies	47
11.5.3	Unit Tactics	47
11.5.4	Limits to Strategies and Tactics	47
11.5.5	Habitat Types	48
11.5.6	Fuels	48
11.5.7	Fuel Loading and Unusual Fire Behavior	49
11.5.8	Expected Fire Effects	49

ADDITIONAL OPERATIONAL ELEMENTS

12.1	Public Safety	49
12.2	Public Information and Education	50
12.3	Annual Fire Plan Review	51
12.4	Reporting Requirements	51
12.5	Wildfire Review	51

AIR QUALITY AND SMOKE MANAGEMENT GUIDELINES	51
---	----

CULTURAL RESOURCES	52
--------------------	----

RESEARCH NEEDS	54
----------------	----

CONSULTATION AND COORDINATION	54
-------------------------------	----

REFERENCES	55
------------	----

APPENDICES

APPENDIX A: NEPA COMPLIANCE	
APPENDIX B: THREATENED AND ENDANGERED SPECIES	
APPENDIX C: BOWDOIN NWR COMPLEX FIRE HISTORY	
APPENDIX D: MISSION STATEMENTS	
APPENDIX E: QUALIFICATIONS	
APPENDIX F: FIRE AGREEMENTS AND COOPERATOR CONTACTS	
APPENDIX G: NORMAL UNIT STRENGTH	
APPENDIX H: FITNESS TESTING	
APPENDIX I: STEP-UP PLAN	
APPENDIX J: DISPATCH PLAN	
APPENDIX K: WFSA AND DELEGATION OF AUTHORITY	
APPENDIX L: FIRE EFFECTS	

FIGURES

Figure 1: Bodowin National Wildlife Refuge	4
Figure 2: Hewitt Lake National Wildlife Refuge	5
Figure 3: Black Coulee National Wildlife Refuge	6
Figure 4: Creedman Coulee and Lake Thibadesu National Wildlife Refuges	7
Figure 5: Drydahl and Webb Waterfowl Production Areas	8
Figure 6: Korsbeck Waterfowl Production Area	9
Figure 7: West, Big Island and East Fire Management Units	37

Tables

Table 1: Management Units	1
Table 2: Appropriate Management Response	20
Table 3: Minimum Staffing Needs - Bowdoin NWR Complex	25
Table 4: Annual Complex Fire Management Activities	26
Table 5: Fire Management Units	35
Table 6: NFFL Fuel Models - West FMU	40
Table 7: Expected Fire Behavior	41
Table 8: NFFL Fuel Models - Big Island FMU	43
Table 9: NFFL Fuel Models - East FMU	46
Table 10: NFFL Fuel Models - Outlying FMU	48

1.0 INTRODUCTION

1.1 General

One of the primary objectives of the U.S. Fish and Wildlife Service (Service) in managing natural areas is the maintenance of ecosystems and their dynamic processes to ensure as nearly as possible a functional natural environment. As one of these processes, fire can constitute one of the greatest influences on an ecosystem.

U.S. Fish and Wildlife Service policy requires that an approved Fire Management Plan must be in place for all of Service lands with burnable vegetation. This plan meets that requirement and is a detailed program of actions to implement fire management policies and procedures at Bowdoin National Wildlife Refuge Complex (Complex), the four other refuges within the Complex, and Bowdoin Wetland Management District .

1.2 Description of the Complex

Bowdoin National Wildlife Refuge Complex is composed of six units. Bowdoin National Wildlife Refuge, Hewitt Lake National Wildlife Refuge and two Waterfowl Production Areas (WPA's) are located in the Big Bend of the Milk River, an Area of Critical Environmental Concern for the Bureau of Land Management due to the tremendous amounts of prehistoric cultural features related to Native American use of the concentrations of bison which grazed the area on a regular basis.

Table 1: Management Units

Management Unit	Acres
Bowdoin National Wildlife Refuge	15,551
Hewitt Lake National Wildlife Refuge	1,680
Black Coulee National Wildlife Refuge	1,494
Creedman Coulee National Wildlife Refuge	2,728
Lake Tibadeau National Wildlife Refuge	4,040
Bowdoin Wetland Management District	5,631

1.2.1 Management Units

1.2.1.1 Bowdoin National Wildlife Refuge

Bowdoin National Wildlife Refuge (NWR) is located about seven miles east of Malta in the Milk River Valley of north central Montana (Figure 1). The Refuge lies at about 2,200 feet elevation and encompasses approximately 15,551 acres that include Lake Bowdoin (5,495 acres) and Dry Lake Pond (1,171 acres).

1.2.1.2 Hewitt Lake National Wildlife Refuge

Hewitt Lake National Wildlife Refuge is located about 32 miles south of the Canadian border in the short-grass prairie region of north central Montana, 13 miles northwest of Saco, Phillips County, Montana (Figure 2). With the acquisition in 1991 of 320 acres with Migratory Bird Stamp Funds, the total acreage of the Refuge is 1,680 acres. The Refuge consists primarily of 459 acres of salt marshes and 1,221 acres of native grasslands. Two perpetual easements for flowage and Refuge management purposes apply to 480 acres within the Refuge. A revokable permit, issued by the Montana State Board of Land Commissioners, covers the use of 160 acres. The permit authorizes flooding and management for the conservation of water, migratory waterfowl, and other wildlife.

1.2.1.3 Black Coulee National Wildlife Refuge

Black Coulee National Wildlife Refuge is located near the Canadian border, 10 miles south of Turner, Blaine County, Montana (Figure 3). The area, which consists of the 639 acre Refuge and WPA fee lands totaling 185 acres, consists of shallow fresh marshes (173 acres), cropland (489 acres), and native grasslands (832 acres). Three perpetual easements for flowage and Refuge management purposes apply to 670 acres.

1.2.1.4 Creedman Coulee National Wildlife Refuge

Creedman Coulee National Wildlife Refuge is located 27 miles north of Havre, Hill County, Montana, and is about 2 miles south of the Canadian border (Figure 4). The area consists of shallow fresh marshes (308 acres), native grasslands (1,550 acres), and 870 acres of croplands. Eight perpetual easements for flowage and wildlife conservation purposes apply to 2,648 of the 2,728 acre Refuge. The Service only holds fee title to 80 acres.

1.2.1.5 Lake Thibadeau National Wildlife Refuge

Lake Thibadeau National Wildlife Refuge is located in the short-grass prairie region, about 15 miles northeast of Havre, Montana and 16 miles south of the Canadian border (Figure 4). The Refuge consists of 600 acres of seasonally flooded basins or flats, 35 acres of shallow fresh marshes, 480 acres of native grasslands, and 2,925 acres of croplands. Thirteen perpetual easements for flowage and Refuge management purposes apply to all but 80 acres of the Refuge which was Public Domain land.

1.2.1.6 Bowdoin Wetland Management District

Bowdoin Wetland Management District is scattered throughout Valley, Phillips, Blaine and eastern Hill counties (Figures 1-6). The district includes nine Waterfowl Production Areas (WPA's) and over 100 wetland easements. The WPA's include Drydahl (1,327 acres), Holm (2,255 acres) (Figure 5), McNeil Slough (1,200 acres), Beaver Creek (1,525 acres), Hewitt Lake NWR/WPA (WPA is 320 Acres), Black Coulee NWR/WPA (WPA is 185 acres), Korsbeck (1,038 acres) (Figure 6), Pearce (535 acres), and Webb (476 acres).

Figure 1: Bowdoin National Wildlife Refuge

Figure 2: Hewitt Lake National Wildlife Refuge

Figure 3: Black Coulee National Wildlife Refuge

Figure 4: Creedman Coulee and Lake Tibadeau National Wildlife Refuges

Figure 5: Drydahl and Web WPAs

Figure 6: Korsbeck WPA

1.2.2 Topography

The landscape at Bowdoin and associated refuges is a direct result of glacial action. The area was glaciated about 15,000 years ago, but does not have the preponderance of potholes found in true glaciated prairie. Geologists speculate that Lake Bowdoin was an oxbow of the Missouri River prior to the glacial period.

1.2.3 Slope

The area around the Refuge is considered to be relatively flat, with mostly gently rolling terrain features. The Beaver Creek floodplain is several miles wide and has very little slope. Generally, slope is not a factor when determining fire behavior.

1.2.4 Soils

Eleven soil types are present on the refuge. The predominant soils are clays and clay-loams. The most common clay-loam associations are Phillips-Elloam, Phillips-Kevin, Arvada-Bone, Scobey-Phillips and Kevin-Sunburst. Soils in the vicinity are typically saline/sodic type clays.

1.2.5 Water

Water features in the area include the Milk River and associated tributaries, including Beaver Creek, fresh and saline marshes, seasonally flooded wetlands, lakes, and saline flats.

1.2.6 Climate

The climate in northern Montana is cool and semi-arid, with cold and dry winters, and warm summers. Temperatures at Bowdoin NWR range from an average of 12 degrees Fahrenheit in January to 72 degrees in July. Summer temperatures may reach 100 degrees, while winter temperatures often plummet to -30 degrees, or even as low as -50 degrees. Average annual precipitation is 12.56 inches, with over half occurring from April through July. The frost free season averages 128 days. Most summer storms come from the direction of the prevailing winds (west-northwest) and travel through the area in an easterly direction. Prevailing winds are NW in winter and SW to NW during the remainder of the year.

1.2.6 Vegetation

Habitat types on Bowdoin NWR are 7,680 acres of native grasslands (arid mixed-grass prairie), 500 acres of shelter belts and shrub areas, 300 acres of inland saline flats, 200 acres of Dense Nesting Cover (DNC), 170 acres of introduced grasslands, 86 acres of administrative sites and 6,615 acres of wetlands. Vegetation is typical of native short grass prairie, consisting mostly of western wheat grass (*Pascopyrum smithii*), needle and thread (*Hesperostipa comata*), June grass (*Koeleria macrantha*), blue grama (*Bouteloua gracilis*), and green needle grass (*Stipa viridula*), mixed with silver sage (*Artemisia cana*), Nuttall saltbush (*Atriplex nutallii*), and winterfat (*Eurotia lanata*). Moist saline areas contain a combination of saltgrass (*Distichlis stricta*), alkali sacaton (*Sporobolus airoides*), and greasewood (*Sarcobatus vermiculatus*). Areas of

freshwater seep contain Russian olive (*Elaeagnus angustifolia*) and cottonwood (*Populus angustifolia*), but such areas are quite limited. Marsh vegetation ranges from cattail (*Typha latifolia*) and hardstem bulrush (*Scirpus acutus*) in freshwater areas to pure sands of alkali bulrush (*Scirpus paludosus*) in saline areas.

1.2.7 Wildlife

Vast herds of Bison (*Bison bison*) ranged throughout north central Montana before the homesteading period. Bowdoin's uplands may have been grazed more heavily than other areas because of the presence of a reliable source of fresh water in Lake Bowdoin.

The Complex attracts migrating waterfowl by the thousands while providing nesting cover for breeding ducks and geese. Although managed primarily for waterfowl, the Complex is known for its colonies of nesting birds. Franklin's gulls (*Larus pipixican*), black-crowned night-herons (*Nycticorax nycticorax*), eared grebes (*Podiceps nigricollis*) and white faced ibises (*Plegadis chihi*) nest in bulrush marshes of Lake Bowdoin, while American white pelicans (*Pececanus erythrorhynchos*), double-crested cormorants, Caspian terns (*Sterna caspia*), great blue herons (*Ardea herodias*) and California (*Larus californicus*) and ring-billed gulls (*Larus delawaronsis*) occupy several large islands. The area is equally important for a variety of resident and migrant wildlife including raptors, white-tailed deer (*Odocoileus virginianus*), pronghorn antelope (*Antilocapra americana*), coyotes (*Canis latrans*) and grassland nesting songbirds. The Spragues's pipit (*Anthus spragueii*), Bairds's sparrow (*Ammodramus bairdii*) and Chestnut-collared longspur (*Charadrius ornatus*) are typical upland nesting birds.

1.2.8 Threatened and Endangered Species and Species of Conservation Concern

Federal and State listed species receiving special management consideration include the Bald eagle (*Haliaeetus leucocephalus*), which is being considered for delisting, and the Peregrine falcon (*Falco peregrinus*), Piping plover (*Charadrius melodus*) and several other species, including the mountain plover (*Charadriou montanus*) (Prellwitz, 1993) and the black-tailed prairie dog (*Cynomys ludovicianus*). A listing of the 81 threatened and endangered species whose native range included the area or have been documented are listed in Appendix B.

1.2.9 Land use

Bowdoin's history for upland habitats is primarily related to prehistoric grazing by bison and historic grazing by domestic animals (primarily sheep). The area was extensively grazed by domestic livestock prior to establishment of the Refuge. Large herds of cattle and sheep were fed and watered at Bowdoin prior to shipping to market. Grazing by domestic livestock went through several periods of use and non-use during the early years of Refuge management. The first Refuge Manger immediately closed Bowdoin to grazing in 1938. The Refuge was reopened to grazing in the early 1940's. Records indicate that during the 1950's and early 1960's grazing was often permitted throughout the year, except from April 1 to July 15. Grazing was gradually phased out again between 1973 and 1977.

1.2.10 Values and Improvements On and Adjacent to Station

The Bowdoin Complex is located in a rural setting in a sparsely-populated portion of northern Montana. None of the Complex lands are close to population centers, and farms and ranches are quite large and widely-spaced. Many of the land units are in remote areas with few, if any neighbors. The largest concentration of farms and ranches is adjacent to the western and southern boundaries of Bowdoin Refuge. Cultivated croplands with blocks of irrigated hayland comprised of mixtures of tame grasses and legumes provide abundant fuels in dry years, but often are difficult to burn during wet years with abundant growth. Native prairie on the north side and dryland small grain fields on the east side are more prone to fire. The Burlington Northern Sante Fe railroad crosses the Refuge and provides a fire ignition source as well as potential fuels on the right-of-way, but much of the line is in or near wet areas while on the Refuge.

Black Coulee, Creedman Coulee and Lake Tibadeau NWRs contain large areas of dryland small grain fields on easement acres which can be a fire hazard of a short period prior to harvest when crops are curing in the hot part of summer. The only farm buildings at risk are to the west of Lake Thibadeau NWR. But, with the prevailing winds out of the west, the buildings are in little danger from a wildland fire originating on the Refuge. Hewitt Lake NWR is in a remote area with heavily-grazed native prairie on three sides and the McNeil Slough WPA and the Milk River on the northeast side. Other natural fire barriers include Nelson Reservoir (a Bureau of Reclamation irrigation project) and some small grain croplands.

Most WPAs are surrounded by native prairie which receives moderate to heavy livestock grazing. Lightning-caused fires are often of short duration and easily controlled. McNeil Slough WPA along the Milk River and Beaver Creek WPA along Beaver Creek are located in riparian areas where heavy fuels are more abundant. Beaver Creek WPA is also crossed by the railroad after the railroad leaves Bowdoin Refuge.

All units in the Complex are protected by Fire Fighting Agreements with the Bureau of Land Management and various fire fighting Districts of Phillips, Blaine and Hill Counties. Small engines from the various districts frequently are stored at neighboring farms and ranches in remote areas.

1.2.11 Cultural Resources

The entire region is an Area of Critical Environmental Concern for the Bureau of Land Management due to the tremendous amounts of prehistoric cultural features related to Native American use of the concentrations of bison which grazed the area on a regular basis.

The Big Bend of the Milk River includes Bowdoin and Hewitt Lake NWR, and McNeil Slough, Pearce, and Beaver Creek WPSs. Concentrations of prehistoric stone circles are found both on and adjacent to Service lands, with a concentration of over 300 stone circles located just west of McNeil Slough. Several sites on McNeil Slough, Hewitt Land, and Bowdoin are recorded with records maintained at the University of Montana. The Display Pond water control structures, built in 1936, are the only historic cultural features nominated to the National Register of Historic Places.

Much of Black Coulee, Creedman Coulee and Lake Thibadeau NWRs are cultivated and prehistoric features destroyed. Many of the WPAs were farmed while in private ownership and the prehistoric features damaged or eliminated.

Prehistoric stone circles, cairns, drive lines, and medicine wheels generally are not damaged by fire, but surface evidence (pieces of bison bone) of bison kill sites and meat processing areas could be eliminated by fire. The biggest risk to stone circles comes fire-suppression equipment.

1.2.12 Intrinsic Values, Socio-Political-Economic

Prescribed fire has not been looked on favorably in the West. As the Complex utilizes prescribed fire, additional efforts will be undertaken to dispel beliefs that all residual fuel (feed) burned in prescribed fires could have been better utilized by cattle. As public sentiment slowly changes and ecosystem management becomes a reality, the Complex may increase its utilization of prescribed fire.

1.3 Historical and Ecological Role of Fire

Fire is a historical and critical process which has been instrumental in the shaping and maintaining of grasslands in the Northern Great Plains. Climatic conditions and vegetation on the Complex are the primary factors contributing to the occurrence of wildfires. Low annual precipitation, high summer temperatures and moderate to strong winds provide "ideal" wildfire conditions. The grassland and associated shrub/grassland uplands produce ample amounts of flashy fuels in most years. One factor contributing to wildfire is the occurrence of intense lightning storms during the summer months, June to September. These storms can cover a wide area in a single day and may or may not produce precipitation, making lightning-caused fires likely. On the other hand, many of these lightning strikes do not produce fires or are self-extinguishing when precipitation happens to occur with them. It is speculated that natural fires were probably rare in the vicinity of Bowdoin Lake due to the lack of vegetation in areas heavily grazed by bison.

Fire suppression activities over the years have to some extent ignored the fact that fire is a natural component of the environment. Consequently, these activities have had negative effects. Generally, species of vegetation that derive some benefit during their life cycle from fire have suffered while those species that are not fire tolerant have benefitted. Another effect of past fire suppression activities has been the accumulation of fuels. These accumulated fuels, when burned, tend to produce very hot fires which can damage vegetative species that normally would not be affected. They also make the possibility of larger, potentially disastrous fires much more likely.

The most obvious ecological and beneficial impact of fire is the maintenance of the prairie ecosystem. The natural role of fire has a positive affect on the nutrient cycle by releasing nutrients from old vegetation growth back to the soil.

1.4 Complex Fire History

One factor contributing to wildfire is the occurrence of intense lightning storms during the summer months, June to September. These storms can cover a wide area in a single day and may

or may not produce precipitation, making lightning-caused fires likely. The other cause of most wildfires is human induced. The Complex is surrounded by private land that is either farmed cropland or grazed prairie. Human activities associated with farming, ranching such as equipment malfunctions during harvest or carelessness with cigarettes may ignite fires. The Burlington Northern Railroad runs through the southern portion of the Refuge. Equipment malfunctions from the railroad may also cause fires. The Complex's fire history can be found in Appendix C.

2.0 POLICY COMPLIANCE - GOALS AND OBJECTIVES

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. Prescribed burning will not be initiated until an Environmental Assessment or other appropriate NEPA document is completed that fully addresses the use of wildland fire to achieve resource management objects, and the Fire Management Plan is rewritten to reflect the resulting changes. Until that time, all wildland fire will be suppressed in accordance with Service policy.

2.2 NEPA Compliance

This plan meets the requirements established by the National Environmental Protection Act (NEPA). Wildfire suppression is categorically excluded, as outlined in 516 DM2 Appendix 1. Copies of this plan will be circulated to cooperators and other interested parties.

2.3___Authorities Citation

Authority and guidance for implementing this plan are found in:

- G Protection Act of September 20, 1922, 42 Stat. 857;16 U.S.C. 594.
- G Economy Act of June 30, 1932, 47 Stat. 417; 31 U.S.C. 315.
- G Reciprocal Fire Protection Act of May 27, 1955, 69 Stat.66.67;42 U.S.C. 1856, 1856 a and b.
- G National Wildlife Refuge System Administrative Act of 1966, as amended, 16 U.S.C. 668 dd-668 ee.
- G Disaster Relief Act of May 22, 1974, 88Stat. 143; 42 U.S.C. 5121.
- G Federal Fire Prevention and Control Act of October 29, 1974, 88 Stat. 1535; 15 U.S.C. 2201.
- G 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.
- G Supplemental Appropriation Act of September 10, 1982, 96 Stat.837.
- G Wildfire Assistance Act of 1989, Pub. L. 100-428, as amended by Pub. L. 101-11, April,1989.
- G Department of Interior Departmental Manual, Part 620 DM-1, Wildland Fire Management (April 10, 1998).

2.4 Other Regulatory Guidelines

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

- G Departmental Manual Part 519 (519DM)
- G Code of Federal Regulations (36CFR 800)

- G The Archaeological Resources Protection Act of 1979
- G The Archaeology and Historical Preservation Act of 1974, as amended
- G National Historic Preservation Act of 1966
- G The Endangered Species Act of 1973, as amended
- G The Provisions of the Clean Air Act, as amended 1990

2.5 Enabling Legislation and Purpose of the Complex (Mission Statement)

The Bowdoin National Wildlife Refuge was established by an act of Congress (Executive Order No. 7295) in 1936 “ as a refuge and breeding ground for migratory birds and other wildlife; and (2) that such part of said lands as the Secretary of Agriculture may deem proper be reserved for use as a shooting area to be operated under a cooperative agreement with the Montana State Game Commission ... under such regulations as may from time to time be adopted by the Secretary of Agriculture... The reservation of these lands as a migratory-waterfowl refuge is subject to the use ... for irrigation and other incidental purposes...” A copy of the Mission Statement can be found in Appendix C.

The Bowdoin Wetland Management District was established by authority of the Migratory Bird Hunting and Conservation Stamp Act and the Migratory Bird Conservation Act “...as Waterfowl Productions Areas” subject to “...all of the provisions of such Act...except the inviolate sanctuary provisions...” (16 U.S.C. ss 718(c) Migratory Bird Hunting and Conservation Stamp Act), and “... for any other management purpose, for migratory birds.” (16 U.S.C. ss 715d.). A copy of the Mission Statement can be found in Appendix C.

Black Coulee National Wildlife Refuge was established by Executive Order 7801, dated January 28, 1938, “... as a refuge and breeding ground for migratory birds and other wildlife.” A copy of the Mission Statement can be found in Appendix C.

Creedman Coulee National Wildlife Refuge was established by Executive Order 8924, dated October 25, 1941, “...as a refuge and breeding ground for migratory birds and other wildlife.” A copy of the Mission Statement can be found in Appendix C.

Hewitt Lake National Wildlife Refuge was established through the following authorities:

“...as a refuge and breeding ground for migratory birds and other wildlife:...nothing herein shall affect the disposition of the oil and gas deposits therein...” Executive Order 7833, dated March 7, 1938.

“...purposes of a land-conservation and land-utilization program...” 7 U.S.C. ss1011 (Bankhead-Jones Farm Tenant Act).

“...for use and administration under applicable laws as refuges for migratory birds and other wildlife...” Secretarial Order 2843, dated November 17, 1959.

A copy of the Mission Statement can be found in Appendix C.

Lake Thibadeau National Wildlife Refuge was established under Executive Order 7713, dated September 23, 1937, “...as a refuge and breeding ground for migratory birds and other wildlife...” A copy of the Mission Statement can be found in Appendix C.

2.6 Overview of Planning Documents

No approved Master Plan or Comprehensive Conservation Plan currently exists (2001). A Comprehensive Conservation Plan is scheduled for completion within the next few years.

2.7 Land Management Goals and Objectives

2.7.1 Land Management Goals

Land management goals as outlined for all six areas are very similar.

GOAL 1: ENDANGERED SPECIES: Protect and monitor federally listed endangered and threatened species, and preserve, enhance, and restore the natural habitats upon which they depend.

GOAL 2: CULTURAL RESOURCES: Protect and maintain state and nationally designated historic, cultural, and natural areas and objects unique to the northern Great Plains.

GOAL 3: MIGRATORY BIRDS: Provide natural production and migration habitats for waterfowl and other migratory birds indigenous to the area.

GOAL 4: OTHER WILDLIFE: Provide natural, life requirements for indigenous, resident wildlife species and ensure that populations are in harmony with available habitats.

2.7.2 Land Management Objectives

Objectives identified in the Mission Statements for the six areas include:

GOAL 1: ENDANGERED SPECIES

1. Participate in activities of the Montana Piping Plover Recovery Committee and

assist with annual plover surveys.

GOAL 2: CULTURAL RESOURCES

1. Identify, preserve, and protect all cultural resource values in accordance with public law.

GOAL 3: MIGRATORY BIRDS

1. Enhance and maintain natural migratory bird habitat, emphasizing waterfowl nesting and brood rearing.
2. Maintain annual duck nesting success at 30-60 percent, determined by the Mayfield method.
3. Provide optimum, natural, migration habitat for waterfowl and other migratory birds.

GOAL 4: OTHER WILDLIFE

1. Maintain a pronghorn population of 75-100 animals (Bowdoin NWR).
2. Monitor populations of resident wildlife species and maintain proper species/habitat balance.
3. Monitor Sharp-tailed grouse and Ring-necked pheasant populations and habitats and maintain proper species/habitat and balance.

GOAL 5: INTERPRETATION AND RECREATION

1. Manage waterfowl and upland bird hunting programs to ensure that participants have an opportunity to enjoy a quality outdoor experience in a natural setting.

3.0. COMPLEX FIRE MANAGEMENT OBJECTIVES

3.1 Introduction

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

The primary goal is to provide for firefighter and public safety, property, and natural resource values. Service policy and the Wildland Fire Policy and Program Review direct an agency administrator to use the appropriate management strategy response concept when selecting specific actions to implement protection and fire use objectives. The resulting Appropriate Management Response are specific actions taken in response to a wildland fire to implement protection and fire use objectives. With an approved Fire Management Plan which addresses this action, the Complex staff may use wildland fire in accordance with local and State ordinances and laws to achieve resource management objectives (habitat improvement).

3.2 General Fire Management Objectives:

1. Protect life, property, and other resources from unwanted fire.

1. Develop and implement a process to ensure the collection, analysis, and application of high quality fire management information needed for sound management decisions.

3.3 Specific Objectives:

1. Protect from fire important scientific, cultural, historic, and scenic resources, recreational areas, and key visitor and administrative facilities on Service lands and private and other public properties and improvements.

2. Provide an opportunity for public education and interpretation explaining of how prescribed fire could be used to manage wildlife habitat.

3. To minimize human caused wildfires and to take appropriate legal action when trespass violations occur.

4.0 FIRE MANAGEMENT STRATEGIES

4.1 General

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. 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.

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.	<ol style="list-style-type: none"> 1. Holding at natural and man-made barriers. 2. Burning out. 3. Observe and patrol.
<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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.
<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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.

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

4.2 Limits

- G Smoke management issues will be carefully considered when developing a management response.
- G All fires occurring on the Complex will be staffed or monitored until declared out.
- G Heavy equipment (dozers, discs, plows, and graders) will not be used for fire suppression except in life threatening situations without the express approval of the Project Leader or his/her designee.
- G Aerial Retardants and foams will not be used within 300 feet of any waterway as described in the Guidelines for Aerial Delivery of Retardant or Foam near Waterways.

4.3 Impacts on Neighboring Lands

Due to the limited number of wildfires and the decision to not conduct prescribed burns at this time, the fire management program is expected to pose little threat to Refuge neighbors. Every effort will be made to keep fires that occur on Service lands from spreading to privately owned lands outside the various Service managed areas.

In late summer, small grain crops to the east of Bowdoin Refuge are most at risk of fire spreading out of the Refuge. Fires leaving the west and south sides of Bowdoin are most likely to damage neighboring farm buildings and houses. County fire fighting forces, however, are most likely to engage a spreading fire in those directions before Refuge firecrews could arrive.

Roads, ditches, canals, and cattle feedlots all may serve as barriers to protect occupied homes and other farm outbuildings. The Dodson South Canal can be an effective fire break on the north side of Bowdoin. Irrigation canals and spreader dikes, on the other hand, could hamper movement by fire crews unfamiliar with the area. The Burlington Northern Sante Fe Railway tracks, both an ignition source and a barrier to fire spread, often are a barrier to equipment movement. The Railway occasionally provides hand crews to assist with fire control.

5.0 FIRE MANAGEMENT RESPONSIBILITIES

5.1 ___ Complex Staff Responsibilities

All fire management duties on the Complex are collateral duties. The Project Leader is responsible for planning and implementation of an effective and safest possible fire management program at the Complex. The Project Leader is also ultimately responsible for all fire management decisions related to wildland fire. 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 E.

5.1.1 Project Leader

- G Responsible for the overall management of the Complex including fire management.
- G Insures fire management policies observed
- G Fosters effective cooperative relations within the Complex, cooperating fire organizations, and adjoining land owners.
- G Within budgetary restraints, insures sufficient collateral duty firefighters meeting Service standards are available for initial attack.
- G Serves as collateral duty firefighter, as qualified.

5.1.2 Biologist

- G Responsible for planning and coordinating preparedness activities including:
 - # The Complex fire training program.
 - # Physical fitness testing and Interagency Fire Qualification System data entry.
 - # Coordinating with cooperative agencies on a regional level. Revising cooperative agreements as necessary.
 - # Insuring the Step-up Plan is followed.
 - # Prepares annual FireBase budget request and manages and tracks use of FireBase account.
- G Maintains liaison with Regional Fire Management Coordinator and Cooperators.
- G Maintains fire records, reviews completed DI-1202's for accuracy and submits them to the Zone FMO, and annually reviews and updates as necessary the Fire Management Plan.
- G Serves as collateral duty firefighter, as qualified.

5.1.3 Maintenance Worker

- G Maintains engine(s) in a state of readiness.
- G Supervises and trains assigned engine crew, as qualified.
- G Serves as collateral duty firefighter, as qualified.

5.1.4 Refuge Operations Specialist

- G Supervises and trains assigned engine crew, as qualified.
- G Serves as collateral duty firefighter, as qualified.

5.1.5 Administrative Officer

- G Serves as Dispatcher
- G Completes all necessary administrative documents associated with fire management activities

5.1.6 Biological Technician

- G Serves as collateral duty firefighter, as qualified

5.1.7 Seasonal and Collateral Duty Firefighters

- G Responsible for their own fire records, equipment, and physical conditioning.
- G Qualifies annually by completing the appropriate fitness test between March 15-30, or within 2 weeks of EOD date.
- G Maintains assigned fire equipment in ready state and using all safety gear assigned.
- G Assists the Biologist maintain accurate fire records.
- G Serves as collateral duty firefighter, as qualified

5.1.8 Wildfire Incident Commander (as assigned)

- G The Incident Commander (IC) is responsible for the safe and efficient suppression of the assigned wildfire.
- G Fulfills the duties described for the IC in the Fireline Handbook

- G Notifies the Project Leader or Dispatcher of all resource needs and situational updates, including the need for extended attack.

- G Ensures wildfire behavior is monitored and required data is collected and that fire personnel are informed of forecasted and expected weather and fire behavior, radio frequencies, escape routes, and safety zones, and posts lookouts

- G Ensures personnel are qualified for the job they are performing.

- G Identifies and protects endangered and threatened species and sensitive areas according to the Fire Management Plan.

- G Utilizes minimum impact tactics to the fullest extent possible.

- G Ensures fire is staffed or monitored until declared out

- G Ensures that the fire site is stabilized and notifies management if rehabilitation is required.
- G Submits completed DI-1202 (wildfire report), Crew time sheets, a listing of any other fire related expenditures or losses to the Project Leader, and completes taskbooks within 3 days of fire being declared out.

5.2 Cooperator Involvement

The Complex is surrounded by large amounts of private and certain State and federal lands. The appropriate governmental agency and local fire department have responsibilities for suppression on lands within their jurisdiction. Coordination is essential prior to and during the fire season to ensure adequate cooperation and fire protection.

A Memorandum of Understanding exists for wildfire suppression with the BLM, Phillips County Volunteer Rural Fire Company and Blaine County Volunteer Rural Fire Department (Appendix F).

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

6.0 FIRE SEASON

6.1 Fire Frequency

A review of fire records indicates six human caused fires on the Complex during the last ten years. The majority of these fires were caused by railroad operations. This occurrence has become even less common with improved maintenance of railroad rights-of-way. No fire prevention analysis has been completed because of the insignificant number of human caused ignitions.

6.2__Refuge Fire Season

The fire season, as determined by fire occurrence analysis, begins April 15 and runs through October 15.

7.0 EQUIPMENT AND STAFFING REQUIREMENTS

7.1 Normal Unit Strength

7.1.1 Equipment and Supplies

See Appendix G

7.1.2__Personnel and Level of Qualifications

Depending on funding and availability, the Complex will employ a minimum of six employees who are red carded firefighters. Minimum staffing needs are found in Table 3.

Table 3: Minimum Staffing Needs - Bowdoin NWR Complex

POSITION	Need
Incident Commander (ICT4)	1
Incident Commander (ICT5)	1
Engine Boss (ENGB)	2
Engine Operator (ENOP)	2
Firefighter Type 1 (FFT1)	1
Firefighter Type 2 (FFT2)	3

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

Only red carded employees will be dispatched to fires. Non red-card employees may assist in support capacities, but will not be permitted on the fireline. Additional firefighters (emergency hire/casual firefighters) may be temporarily hired to supplement engine crews using severity or emergency presuppression funding when very high or extreme fire conditions warrant. Current fire qualified staff are listed in Appendix E.

8.0 PREPAREDNESS

8.1 Current Staff Available to Meet Position Needs

See Section 7.1.2

8.2 Pre-season Readiness Activities

Table 4: Annual Complex Fire Management Activities

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Update Interagency Fire Agreements/AOP's	x											
Winterize Fire Management Equipment										x		
Inventory Fire Engine and Cache		x										
Complete Training Analysis	x											

Annual Refresher Training			x															
Annual Fitness Testing			x															
Pre-Season Engine Preparation			x															
Weigh Engines to verify GVW Compliance			x															
Review and Update Fire Management Plan				x														
Prepare Pre-season Risk Analysis			x															

8.2.3 Physical Examinations

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

8.3 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 bases throughout the year. All are available on the Internet at <http://www.boi.noaa.gov/fwweb/fwoutlook.htm>. The Complex fire staff can also contact the Lewiston Dispatch Center (406) 538-8200) during periods of high fire danger to track indices and anticipate possible fire activity. Preparedness actions have been identified in the Step-Up Plan to respond to unusual conditions associated with drought and other factors (See following section).

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

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

8.4 ___Step-Up Plan

The Step-up plan will be a guide for preparedness activities on the Complex and the use of emergency preparedness funding. The plan uses the National Fire Danger Rating Systems (NFDRS) Burning Index (BI) to determine fire danger from weather indices gathered from remote weather stations. Currently there are no weather stations operating on or directly adjacent to the Complex. Observations will be monitored from weather stations in north eastern Montana and adjacent to Charles M. Russell (CMR) National Wildlife Refuge, approximately 40 miles south of Bowdoin NWR.

The Project Leader will coordinate with the Zone FMO on current and expected conditions and actions. All preparedness activities will be in accordance with the Complex Step-up Plan (Appendix I).

8.5 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 will be requested if a severe drought is indicated by a Palmer Drought Index reading of -4.0 or less or a Keetch-Byram Drought Index of 600 or greater and a long-range forecast calling for below average precipitation and/or above average temperatures. Drought Indices can be located at: <http://www.boi.noaa.gov/fwxweb/fwoutlook.htm>

9.0 WILDFIRE PROGRAM

9.1 Special Safety Concerns and Firefighter Safety

Safety of Service employees and cooperators involved in fire management activities is of primary concern. 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 primary threat to firefighter safety is from fast moving, wind-driven wildfires that can quickly overtake and 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. It is important that firefighters 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.

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.

G Provide safe working conditions for employees.

G Provide safe environments for the visiting public.

G Protect and insure safety of government equipment.

G Define equipment available and:

identify responsibilities.

identify sources of resources.

provide documentation.

promote a healthy safety attitude.

Smoke from wildfires is a recognized health concern for firefighters. Incident commanders must plan to minimize exposure to heavy smoke by incorporating the recommendations outlined in the publication Health Hazards of Smoke (Sharkey 1997).

9.2 Prevention Program

The fire prevention plan will be reviewed annually. If human caused ignitions are occurring in new areas or increasing in identified priority areas, the prevention strategy may need to be changed. As new recreational sites are developed or use and values change, the plan must be reviewed to determine if new actions are required. The decisions made will be documented in that year's prevention plan.

The objectives of the wildland fire prevention program are:

- G To reduce the threat of human caused fires through visitor and employee education.
- G To integrate the prevention message into interpretive programs conducted or sponsored by the Complex.

General Actions Include:

- G All staff members will be familiar with this plan and be able to explain it to other interested parties.
- G Fire prevention will be discussed at appropriate safety meetings, prior to fire season and during periods of high fire danger.
- G Articles concerning fire prevention will be written by the Complex staff for local release.
- G Smoking, open fires and access to Complex lands may be restricted by the Project Leader during periods of high or extreme fire danger. Notices will be posted at appropriate entrances, trails and through local radio and news releases.
- G The Project Leader will coordinate with other State and Federal Land Management Agencies in periods of extreme fire danger and communicate with Burlington Northern Railroad to ensure proper maintenance of railroad right away, ie. hazard fuel reduction.

9.3 Detection

Due to flat terrain, smoke from a fire is generally easily detected on all parts of the Complex within a very short period after ignition. Complex personnel, as well as local neighbors are able to easily observe fires while involved in their daily duties. Fires at night are usually spotted by Complex neighbors, or are reported by Burlington Northern train crews that travel through the Complex at any hour of the day or night. Fires throughout the Bowdoin WMD are generally reported by adjacent landowners to the Phillips County Sheriff's Office, which in turn notifies the Project Leader.

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

9.4 Initial Reporting and Dispatching

All fires occurring within or adjacent to the Complex will be immediately reported to the headquarters or the Project Leader. Dispatching duties will be directed by the Project Leader.

Requests for assistance from cooperators on wildland fires not threatening the Complex must be made to and approved by the Project Leader or designee. Only qualified and properly equipped resources will be dispatched for any fire assignments. A Dispatch / Reporting form can be found in Appendix J.

9.5 Fire Suppression

9.5.1 Initial Attack Strategies and Tactics

Service policy requires the Complex to utilize the ICS system and firefighters meeting NWCG and Service qualifications for fires occurring on Complex property. All suppression efforts will be directed towards safeguarding life and property while protecting the Complex'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 Project Leader will serve as or appoint a qualified Incident Commander (IC) for each fire. If a qualified IC is not available, one will be ordered through the Zone FMO or the Lewiston 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:

- G Providing a size-up of the fire to dispatch as soon as possible.

- G Using guidance found in the Fire Management Plan or in the Delegation of Authority, determine the strategy and tactics to be used.

- G Determine the resources needed for the fire.

- G 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.

- G Advising the dispatcher of resource needs on the fire.
- G Managing all aspects of the incident until relieved or the fire is suppressed

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.

Should a local fire company arrive prior to Service personnel, they will take charge and follow their departments procedures for fire control. Once a Service employee arrives the local fire company will step down and become support for, and follows direction from, Service personnel, providing they are qualified to perform as an Incident Commander.

9.5.2 Minimum Impact Suppression Tactics

Fire management activities within the Complex will be carried out in a manner that minimizes impacts to the Complex's natural and cultural resources, while maintaining the safety of firefighters, the public, and other personnel. Minimum Impact Suppression Tactics (MIST) to be used when suppressing fires on Service lands include:

- G The approval of the Project Leader or representative is needed for use of plows or similar mechanized equipment, unless human life or private or public property are threatened.
- G Minimum use of chemical retardant.
- G Use of natural or existing manmade barriers whenever possible.
- G Cold-trail the fire edge when practical.
- G Branches and other debris from line construction will be scattered in accordance with guidelines contained in the Fireline Handbook (PMS 410-1).
- G Use mop-up kits and other low pressure nozzle settings to prevent erosion.
- G Minimize the falling of trees. Snags near the filelines will be removed only if they present a hazard to firefighters or constitute a threat to the fireline integrity. Lower branches on living trees will be pruned to remove ladder fuels as opposed to falling the tree.

9.5.3 Limits to Suppression Activities

- G Smoke management issues will be carefully considered when developing a management response.
- G All fires occurring on the Complex will be staffed or monitored until declared out.
- G Heavy equipment (dozers, discs, plows, and graders) will not be used for fire suppression except in life threatening situations without the express approval of the Project Leader or his/her designee.
- G 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.

9.6 Escaped Fires/Extended Attack

The IC will notify the Project Leader, will in turn will notify the Zone FMO, whenever it appears a fire will escape initial attack efforts, escape Service lands, or when fire complexity will exceed the capabilities of command or operational forces. A Wildland Fire Situation Analysis (WFSA) will be prepared to govern suppression actions for all fires when it is determined that initial attack efforts will be unsuccessful. The Zone FMO will provide assistance, as available, with the implementation of the extended attack operations including:

- G Assisting the Project Leader complete the WFSA (Wildland Fire Situation Analysis) (Appendix K).
- G Assisting the Project Leader complete the Delegation of Authority (Appendix K), if needed.
- G Ordering of appropriate resources through the Dispatch Center.

9.7 __Mop up Standards and Emergency Stabilization and Rehabilitation

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

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

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

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

- G **Emergency stabilization** is the use of appropriate emergency stabilization techniques in order to protect public safety and stabilize and prevent further degradation of cultural and natural resources in the perimeter of the burned area and downstream impact areas from erosion and invasion of undesirable species. The Incident Commander may initiate Emergency Stabilization actions before the fire is demobilized, as delegated by the Agency Administrator, but emergency stabilization activities may be completed after the fire is declared out.
- G **Rehabilitation** is the use of appropriate rehabilitation techniques to improve natural resources as stipulated in approved Complex management plans and the repair or replacement of minor facilities damaged by the fire. Total "rehabilitation" of a burned area is not within the scope of the Emergency Rehabilitation funding. Emergency Rehabilitation funding can be use to begin the rehabilitation process if other funding is committed to continue the rehabilitation throughout the life of the project (beyond the initial 3 years of Emergency Rehabilitation funding). Major facilities are repaired or replaced through supplemental appropriations of other funding.
- G Because of the emergency nature of the fire event, the emergency stabilization section of the **Emergency Stabilization and Rehabilitation Plan (ESR Plan)** must be developed

expeditiously and is frequently developed by a local unit or designated burned area ESR team. The rehabilitation section of the ESR Plan is not considered an emergency, and is developed as other Complex land use plans. The Project Leader is responsible for preparing all ESR Plans. In order to be funded, ESR Plans must meet resource management objectives and be approved by the Project Leader and the Regional Director.

10.0 PRESCRIBED FIRE PROGRAM

10.1 Program Overview

In past years, the Complex used prescribed fire as a tool in two management areas - resource management and hazardous fuel reduction. Prescribed fire as a management option will be increasingly important in grassland habitat type to restore, create, and/or maintain a diversity of plant communities in order to restore and perpetuate native plant and wildlife species, as well as retarding or eliminating exotic and undesirable species. This section will be developed when the Fire Management Plan is revised. Until that time, prescribed burns will not be conducted on Complex lands.

11.0 FIRE MANAGEMENT UNITS

11.1 General

Bowdoin National Wildlife Refuge is divided into three separate fire management units: West, Big Island, and East. The remainder of the Complex will be designated as a fourth Fire Management Unit. The Units will be the same for both prescribed and wildland fire suppression operations.

Table 5: Fire Management Units

Fire Management Unit	Acres
West Unit	3,520
Big Island Unit	1,920
East Unit	7,476
Outlying Unit	9,865

11.2 West Unit

The West unit is bordered almost entirely on its east side by Lake Bowdoin. It includes all of the administrative areas, parts of the Auto Tour Route and the Burlington Northern Railroad runs through the south end of it (Figure 7). The northeast boundary of the West unit is located where County Road 2 and Erickson's horse pasture (private) meet, and runs south to Lake Bowdoin. Westward from this point the boundary stair steps south where it again meets County Road 2, just west of the Refuge headquarters. From the headquarters area the boundary goes south to

where it crosses the Burlington Northern Rail line (west railroad crossing). From this crossing the boundary stair-steps southeast to Goose Island Pond, the southern most point on the Refuge. From the southeast corner of Goose Island Pond, the boundary travels northeast to the east railroad crossing area. (T 30 N, R 31 E, NE corner of Section 11). From the east crossing, the boundary travels west following the railroad to where it meets the southwest corner of Lake Bowdoin.

11.2.1 Fire Management Objectives

- G Ensure the safety of Service staff and the visiting public.
- G Suppress wildfires in a cost effective manner consistent with the values at risk.
- G Minimize the damage of fire and fire suppression efforts on Refuge resources by using Minimum Impact Suppression Tactics.
- G Prevent fires from escaping Refuge boundaries onto adjacent private lands.

Figure 7: Fire Management Units

11.2.2 Unit Strategies

Wildfires will be managed, when appropriate using a strategy that confines or contains the fire to a specific area to be determined by the Incident Commander in consultation with the Project Leader. In some areas of the Unit where private and state lands are highly intermingled, a wildfire may have to be aggressively suppressed.

Roads, wetlands, and other natural and man-made fire breaks that provide excellent barriers to fire spread are scattered throughout the Complex. The majority of the fuels in the unit are grasses. Indirect suppression tactics are often most effective in these fuels. The fires are usually allowed to burn to a natural barrier or road. Burnout operations are frequently conducted using roads or other barriers to contain a fire.

With good access by road to most of the Complex, many fires can be effectively suppressed using direct attack strategies and tactics. Direct suppression tactics will be used when a fire threatens private property or public safety, or when fire would be detrimental to current wildlife management strategies, provided doing so will not compromise firefighter safety and current and forecast fire weather are favorable.

As indicated, all wildfire fires that pose or may pose a threat to public safety, Complex facilities or private lands will be attacked aggressively. All fires on the Complex 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 Complex 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.

The following strategies give the Line Officer flexibility in managing other than those wildfires that pose an immediate threat to public safety or Complex improvements:

- G Fires north of the railroad and south of the boat ramp in this unit will have different options dependent primarily on wind direction and the potential threat to visitors and Complex facilities. Fires occurring north of the railroad with a west/southwest wind component, that are not immediately a threat to facilities or public safety may be allowed to burn toward Lake Bowdoin. Actions will be taken to prevent fire spread toward the railroad(south), towards the west Refuge boundary and refuge facilities. Fires in this area that have winds or predicted winds other than west/southwest will receive full suppression efforts. These efforts may include direct attack or indirect attack utilizing existing roads, natural barriers and other man-made features for wildfire containment. Low impact suppression will be given high priority when fire intensity and spread is minimal. The same natural or man-made features may be used during large, fast moving fires.

- G Fires north of the boat ramp up to the fire management unit boundary at Erickson's pasture will also have different options dependent primarily on wind direction and the potential threat to refuge visitors. All fires occurring west of the Auto Tour Route will receive full suppression efforts to prevent fire from escaping the refuge and onto private

lands. Fires occurring north of the boat ramp and east of Auto Tour Route, with the influence and prediction of west / northwest winds may be allowed to burn towards Lake Bowdoin. Actions will taken to prevent these fires from escaping the refuge to the west. Fires in this area that have winds or predicted winds other than west/northwest, or prove to or are predicted to impact County Road 2 will receive full suppression efforts. These efforts may include direct attack or indirect attack utilizing existing roads, natural barriers and other man-made features for wildfire containment. Low impact suppression will be given high priority when fire intensity and spread is minimal. The same natural or man-made features may be used during large, fast moving fires.

- G Fires south of the railroad in this unit shall receive full suppression efforts. The threat of fires escaping the refuge or impacting railroad operations and visitor safety dictate aggressive suppression efforts.

11.2.3 Unit Tactics

- G Fires will be attacked using engines when possible.
- G Existing roads, wetlands, and other natural and manmade barriers will be utilized as primary control lines, anchor points, escape routes and safety zones.
- G When necessary to halt the spread of a wildfire, backfires may be set using existing roads and natural barriers as control lines.
- G Burnout operations will be used to stabilize and strengthen primary control lines.
- G If the use of mechanical equipment is approved by the Project Leader or his designee, control lines will be constructed with the minimum disturbance possible.
- G 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 or to protect facilities and other improvements.
- G All constructed firelines will be rehabilitated prior to the demobilization of a fire.

11.2.4 Limits to Strategy and Tactics

- G The use of dozer or plow lines will not be permitted on Service lands except to protect life or improvements such as buildings or bridges, and only with the approval of the Project Leader or his/her acting.
- G Retardant use will be restricted along streams, ponds and lakes, unless otherwise approved by the Project Leader or his/her acting, and is not to be used within 300 feet of a stream or other water feature.
- G Hand line construction which causes soil disturbance is to be avoided.

11.2.5 Habitat Types

The Unit is primarily native grasslands and wetlands, interspersed with shelterbelts and shrubs, limited Dense Nesting Cover (DNC), and introduced grasses. Common grassland species include western wheat grass (*Pascopyrum smithii*), needle and thread grass (*Hesperostipa comata*), June grass (*Koeleria macrantha*), blue grama (*Bouteloua gracilis*), silver sage (*Artemisia cana*), and winter fat. Russian olive (*Elaeagnus angustifolia*) and cottonwoods (*Populus* spp. *angustifolia*) are present and in some cases the Russian olive is invading grasslands. Cattails (*Typha latifolia*) and hard bulrush (*Scirpus acutus*) are common in wetland areas.

11.2.6 Fuels

Fuel Models present in this unit are NFFL Fuel Model 1, Fuel Model 2 and Fuel Model 3.

Table 6: NFFL Fuel Models - West FMU

NFFL Fuel Model	Percent
Fuel Model 1	25
Fuel Model 2	45
Fuel Model 3	30

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.

NFFL Fuel Model 2 is characterized by fire spread 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. Open shrub lands that cover one-third to two-thirds of the area, including clumps of fuels that generate higher intensities and may produce firebrands.

NFFL Fuel Model 3 is characterized as the most intense of the grass fuels and display high rates of spread under influence of wind. Wind may drive fire into the upper heights averaging about 3- feet, but considerable variation may occur. Approximately one-third or more of the stand is considered dead or cured and maintains the fire.

Table 7: Expected Fire Behavior

Condition	Fuel Model	Flame Length <i>feet</i>	Rate of Spread <i>Chains/hr</i>	Characteristics
Normal	1	4.0	78	Fires are at the upper limit of control by direct attack.
Extreme	1	8.0	311	Under windy conditions when fuel moistures and humidity are low, rapid rates of spread can be expected.
Normal	2	3.0	35	May include clumps of fuels that generate higher intensities and may produce firebrands. Fire intensities can lead to short-range spotting and torching of individual trees that can make control difficult.
Extreme	2	16.0	240	Fires exceed the upper limit of control by direct attack. Torching and long-range spotting are very likely.
Normal	3	12	104	Fires in this fuel are the most intense of the grass group and are influence by the wind.
Extreme	3	38	950	Under the influence of wind the wind will drive the fire into the upper heights of the grass and across standing water.

Source: Aids to Determining Fuel Models for Estimating Fire Behavior (Anderson 1982), and BEHAVE (Andrews 1986)

11.2.7 Fuel Loading and Unusual Fire Behavior

Fuel loading found in the grassy areas of this unit falls within the normal range. Fuel loadings in the open shrub lands including clumps of fuels that can generate higher intensities and may produce firebrands. Periods of drought can further affect fire behavior as demonstrated in Table 7. Burning Indices greater than 35 dictate an Adjective Staffing Class of Very High, while a BI of 40 or higher initiates a Staffing Class of Extreme.

Certain grasses, shrubs and trees can be severely impacted when soils are effected by drought. As a general guide, a severe drought is indicated by a Palmer Drought Index reading of -4.0 or lower or a Keetch-Byram Drought Index of 600 or greater.

11.2.8 Expected Fire Effects

Wildland fire have been a natural component in the mixed grass prairie ecosystems for thousands of years. Soils and water quality are seldom affected. Any temporary loss of wildlife or wildlife habitats have been more than offset by fire's beneficial effects. A listing of selected species and their relationship to wildland fire has been developed in anticipation of a future plan revision can be found in Appendix L.

Impacts to Air Quality are discussed in Section 13.0.

11.3 Big Island Unit

The Big Island FMU is completely surrounded by lake Bowdoin on its west, north and east boundaries. It is bordered on its south by the Burlington Northern Railroad (Figure 7).

11.3.1 Unit Fire Management Objectives:

- G Ensure the safety of Service staff and the visiting public.
- G Minimize the damage of fire and fire suppression efforts on refuge resources by using Minimum Impact Suppression Tactics.
- G Prevent fires from escaping refuge boundaries onto adjacent private lands.
- G Respond to wildfires in a cost effective manner consistent with the values at risk.

11.3.2 Unit Strategies

The majority of the fuels are grasses. Roads, fire breaks, and wetlands are scattered throughout the Complex that provide excellent barriers to fire spread. Indirect suppression tactics are most effective in these situations. The fires are usually allowed to burn to a natural barrier or road. Backfires are frequently set from Service roads or control points to contain a fire.

Direct suppression tactics will be used when a fire threatens private property, public safety or when fire would be detrimental to current wildlife management strategies and the fire activity allows for safety of firefighters. With good road access to most of the Complex many fires can be controlled by direct attacks, taking into consideration variable climatic conditions.

Fires within this unit have little threat of escaping the refuge boundary. Fires occurring with winds other than those with north components or forecasted as such may be allowed to burn towards Lake Bowdoin. Actions shall be taken to prevent fires from spreading south across the Auto Tour Route. Big Island also has inland roads that may, at the discretion of the Project Leader or designee, be used as control lines to limit the spread of fire to the north. Currently there is ongoing wildlife research within this unit. Efforts shall be taken to minimize the disturbance of these areas (Figure 7).

11.3.3 Unit Tactics

- G Utilize existing roads, wetlands, and other natural barriers as primary control lines, anchor points, escape routes and safety zones.
- G When possible, conduct burnout operations using existing roads and natural barriers to halt the spread of wildfires.
- G Burn fuels to stabilize and strengthen primary control lines.

G All constructed fireline will be rehabilitated prior to the demobilization of a fire.

11.3.4 Limits to Strategies and Tactics

G The use of dozer or plow lines will not be permitted on Service lands except to protect life or improvements such as buildings or bridges, and only with the approval of the Project Leader or his/her acting.

G Hand line construction which causes soil disturbance is to be avoided.

G Retardant use will be restricted, unless approved by the Project Leader, and is not to be used within 300 feet of a stream or other water feature.

11.3.5 Habitat Types

Mixed grasslands is the predominate habitat type.

11.3.6 Fuels

Fuel Models present in this unit are NFFL Fuel Model 1 and Fuel Model 3.

Table 8: NFFL Fuel Models - Big Island FMU

NFFL Fuel Model	Percent
Fuel Model 1	70
Fuel Model 3	30

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.

NFFL Fuel Model 3 is characterized as the most intense of the grass fuels and display high rates of spread under influence of wind. Wind may drive fire into the upper heights averaging about 3 feet, but considerable variation may occur. Approximately one-third or more of the stand is considered dead or cured and maintains the fire.

11.3.7 Fuel Loading and Unusual Fire Behavior

Wildfire behavior is variable but generally predictable. The topography of the Complex is composed mostly of gently rolling hills to flat prairie. Fuel loading found in the grassy areas of this unit falls within the normal range. Periods of drought can further affect fire behavior as demonstrated in Table 7. Burning Indices greater than 35 dictate an Adjective Staffing Class of Very High, while a BI of 40 or higher initiates a Staffing Class of Extreme.

Certain grasses, shrubs and trees can be severely impacted when soils are affected by drought. As a general guide, a severe drought is indicated by a Palmer Drought Index reading of - 4.0 or lower or a Keetch-Byram Drought Index of 600 or greater.

11.3.8 Expected Fire Effects

Wildland fire have been a natural component in the mixed grass prairie ecosystems for thousands of years. Soils and water quality are seldom affected. Any temporary loss of wildlife or wildlife habitats have been more than offset by fire's beneficial effects. A listing of selected species and their relationship to wildland fire can be found in Appendix L.

Impacts to Air Quality are discussed in Section 13.0.

11.4 East Fire Management Unit

The East FMU comprises the rest of Bowdoin National Wildlife Refuge as well the Pearce WPA Tract. Lake Bowdoin serves as the west boundary (Figure 7). The north boundary starts at the Southwest corner of Erickson's horse pasture, stair-stepping east across County Road 2 and surrounding the Pearce Tract. From the Pearce Tract it stair steps south to the Dry Lake Road/Railroad intersection. It then travels west crossing the railroad several times where it meets the eastern most boundary of the West Unit.

11.4.1 Unit Fire Management Objectives:

- G Ensure the safety of Service staff and the visiting public.
- G Minimize the damage of fire and fire suppression efforts on refuge resources by using Minimum Impact Suppression Tactics.
- G Prevent fires from escaping refuge boundaries onto adjacent private lands.
- G Respond to wildfires in a cost effective manner consistent with the values at risk.

11.4.2 Unit Strategies:

All fires that pose or may pose a threat to public safety, refuge facilities or private lands will be aggressively attacked.

Fires in this unit with an east wind component and predicted the same, and are not an imminent threat to private lands or public safety, may be allowed to burn towards Lake Bowdoin. Efforts shall be taken on such fires to ensure fires do not escape the refuge. Fires with winds other than east shall receive direct suppression actions utilizing the many roads and wetland areas as barriers to spread whenever possible.

Local, Regional and National fire conditions as they relate to resource availability should any fire escape initial attack must be considered for an Appropriate Management Response.

11.4.3 Unit Tactics

- G Utilize existing roads, wetlands, and other natural barriers as primary control lines, anchor points, escape routes and safety zones.
- G When possible, conduct burnout operations using existing roads and natural barriers to halt the spread of wildfires.
- G Burn fuels to stabilize and strengthen primary control lines.
- G All constructed fireline will be rehabilitated prior to the demobilization of a fire.

11.4.4 Limits to Strategies and Tactics

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

11.4.5 Habitat Types

The predominate habitat is mixed grasslands.

11.4.6 Fuels

Fuel Models present in this unit are NFFL Fuel Model 1, Fuel Model 2 and Fuel Model 3.

Table 9: NFFL Fuel Models - East FMU

NFFL Fuel Model	Percent
Fuel Model 1	70
Fuel Model 2	10
Fuel Model 3	20

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.

NFFL Fuel Model 2 is characterized by fire spread 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. Open shrub lands that cover one-third to two-thirds of the area, including clumps of fuels that generate higher intensities and may produce firebrands.

NFFL Fuel Model 3 is characterized as the most intense of the grass fuels and display high rates of spread under influence of wind. Wind may drive fire into the upper heights averaging about 3 feet, but considerable variation may occur. Approximately one-third or more of the stand is considered dead or cured and maintains the fire.

11.4.7 Fuel Loading and Unusual Fire Behavior

Fuel loading found in the grassy areas of this unit falls within the normal range. Fuel loadings in the open shrub lands including clumps of fuels that can generate higher intensities and may produce firebrands. Periods of drought can further affect fire behavior as demonstrated in

Table 7. Burning Indices greater than 35 dictate an Adjective Staffing Class of Very High, while a BI of 40 or higher initiates a Staffing Class of Extreme.

Certain grasses, shrubs and trees can be severely impacted when soils are effected by drought. As a general guide, a severe drought is indicated by a Palmer Drought Index reading of -4.0 or lower or a Keetch-Byram Drought Index of 600 or greater.

11.4.8 Expected Fire Effects

Wildland fire have been a natural component in the mixed grass prairie ecosystems for thousands of years. Soils and water quality are seldom affected. Any temporary loss of wildlife or wildlife habitats have been more than offset by fire's beneficial effects. A listing of selected species and their relationship to wildland fire can be found in Appendix L.

Impacts to Air Quality are discussed in Section 13.0.

11.5 Outlying Unit

The Fire Manage Unit is composed of Bowdoin Wetland Management District which is scattered throughout Valley, Phillips, Blaine and eastern Hill counties (Figures 1-6) and four satellite Wildlife Refuges. The district includes nine Waterfowl Production Areas (WPA's) and over 100 wetland easements.

11.5.1 Fire Management Objectives

- G Ensure the safety of Service staff and the visiting public.
- G Minimize the damage of fire and fire suppression efforts on refuge resources by using Minimum Impact Suppression Tactics.
- G Prevent fires from escaping refuge boundaries onto adjacent private lands.
- G Respond to wildfires in a cost effective manner consistent with the values at risk.

11.5.2 Unit Strategies

The majority of fires occurring on this unit will be suppressed by local fire departments. The primary concern is for wildfires that may escape Service boundaries and burn on to private land.

11.5.3 Unit Tactics

- G The primary means used will be direct attack using engines.
- G Utilize existing roads, wetlands, and other natural barriers as primary control lines, anchor points, escape routes and safety zones.
- G When possible, conduct burnout operations using existing roads and natural barriers to halt the spread of wildfires.
- G Burn fuels to stabilize and strengthen primary control lines.
- G If mechanical treatment is approved by the Project Leader, construct control lines along existing roads, if possible.

11.5.4 Limits to Strategies and Tactics

- G The use of dozer or plow lines will not be permitted on Service lands except to protect life or improvements such as buildings or bridges, and only with the approval of the Project Leader or his/her acting.
- G Hand line construction which causes soil disturbance is to be avoided.
- G Retardant use will be restricted, unless approved by the Project Leader, and is not to be

used within 300 feet of a stream or other water feature.

11.5.5 Habitat Types

Other than the 3,200 acres of cropland, the Unit consists primarily of shallow fresh marshes, salt marshes, seasonally flooded basins or flats, and native grasslands.

11.5.6 Fuels

Fuel Models present in this unit are NFFL Fuel Model 1, Fuel Model 2 and Fuel Model 3.

Table 10: NFFL Fuel Models - Outlying FMU

NFFL Fuel Model	Percent
Fuel Model 1	85
Fuel Model 2	5
Fuel Model 3	10

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.

NFFL Fuel Model 2 is characterized by fire spread 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. Open shrub lands that cover one-third to two-thirds of the area, including clumps of fuels that generate higher intensities and may produce firebrands.

NFFL Fuel Model 3 is characterized as the most intense of the grass fuels and display high rates of spread under influence of wind. Wind may drive fire into the upper heights averaging about 3 feet, but considerable variation may occur. Approximately one-third or more of the stand is considered dead or cured and maintains the fire.

11.5.7 Fuel Loading and Unusual Fire Behavior

Fuel loading found in the grassy areas of this unit falls within the normal range. Fuel loadings in the open shrub lands including clumps of fuels that can generate higher intensities and may produce firebrands. Periods of drought can further affect fire behavior as demonstrated in

Table 7. Burning Indices greater than 35 dictate an Adjective Staffing Class of Very High, while a BI of 40 or higher initiates a Staffing Class of Extreme.

Certain grasses, shrubs and trees can be severely impacted when soils are effected by drought. As a general guide, a severe drought is indicated by a Palmer Drought Index reading of -4.0 or lower or a Keetch-Byram Drought Index of 600 or greater.

11.5.8 Expected Fire Effects

Wildland fire have been a natural component in the mixed grass prairie ecosystems for thousands of years. Soils and water quality are seldom affected. Any temporary loss of wildlife or wildlife habitats have been more than offset by fire's beneficial effects. A listing of selected species and their relationship to wildland fire can be found in Appendix L.

Impacts to Air Quality are discussed in Section 13.0.

12.0 ADDITIONAL OPERATIONAL ELEMENTS

12.1 Public Safety

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

Fire fronts in grass fuel models move rapidly and are dangerous. The greatest threat to public safety from Complex wildfires are entrapment by extremely fast moving fire fronts or fingers. Of particular concern are sportsmen and visitors which may be present in the area of the fire, and neighbors who initiate their own suppression actions without proper training, equipment, or communication. Complex staff will attempt to keep the fire scene clear of people except for Service and cooperator firefighters.

Smoke from a Refuge fire could impair visibility on roads and become a hazard. During wildfires, the IC 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. The Refuge will notify appropriate sheriff department whenever the IC or Burn Boss believes smoke may be causing a safety hazard. The Sheriffs Office can assess the situation and take action as needed.

Wildfires which might escape Service lands and spread to inhabited private property are also a concern. The IC is responsible for warning and evacuating the public from potentially dangerous situations. Additionally, the Refuge will use prescribed fire and other management techniques to manage hazard fuels in high risk areas.

12.2 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 Complex's fire management programs. There are several different aspects to this task.

Vehicle accidents are a major concern when people are attempting to respond to wildfires. Service personnel will continue to inform visitors and permittees of these dangers through the prevention program.

12.2.1 Wildfire Suppression

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

12.2.2 Prescribed Fire

Informing the public is a vital component of the prescribed fire program. At such time as the Refuge implements a prescribed fire program, the Project Leader will be responsible for this aspect of the public information program. This aspect of the operation may be delegated, as appropriate.

The following will be used to promote a future prescribed fire program to the public:

- G Talks in local schools.
- G Attendance at local volunteer fire department meetings.
- G Developing a quantitative fire effects monitoring program and sharing the results with the public.

12.3 Annual Fire Plan Review

All permanent staff will meet in November to review prevention, presuppression, suppression, and prescribed fire operations during the prior fire season, and develop future strategies for improving these operations and to ensure the fire program advances and evolves with the Service's and the Complex's mission. At that time, the Fire Management Plan will be reviewed to insure that it accurately reflects the fire management program. The plan will also be reviewed

following completion of the CCP process and the development of any new habitat management plans.

12.4 Reporting Requirements

Following the suppression of a wildfire the IC will:

- G Complete a DI-1202 Fire Report.
- G Include a list of all expenses and/or items lost or expended on the incident and list personnel assignments on the DI-1202.
- G Complete a Crew Time Reports for all personnel assigned to the wildfire or prescribed fire.
- G Submit the documents to the Project Leader within 3 days of the fire being declared out. The Project Leader will send all data to the Zone FMO to be entered into the FMIS database within 10 days after the fire is declared out.

12.5 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:

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

13.0 AIR QUALITY AND SMOKE MANAGEMENT GUIDELINES

Smoke management is a major concern in Montana. Montana requires an open burning permit be obtained for all prescribed fires conducted by the Service. The burning permit is applied for each fall for the forthcoming burning season and will remain on file at Complex headquarters. The Zone FMO is a member of the Montana Airshed Group and accumulates all pertinent information for Montana refuges for submission to the State Air Quality Bureau. The Complex is located in Airshed 9, the Missouri River portion of Montana. Smoke site and equipment preparation will be conducted by field personnel prior to each prescribed burn. Local authorities (county commissioners, sheriffs departments), permittees and news media will be notified of pending prescribed burns prior to and on the day of burning by Service staff.

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 Complex'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. Prescribed burn bosses and wildfire incident commanders must plan to minimize exposure to heavy smoke to 1 hour or less, at which time the employee should be rotated to a smoke free area (USDA Forest Service, Missoula Technology and Development Center). The use of respirators is not recommended.

14.0 CULTURAL RESOURCES

Fire Management activities at the Complex 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.

Cultural Resource inventories have been completed for specific habitat or construction projects on Bowdoin NWR, and for a proposed land exchange on Hewitt Lake NWR and McNeil Slough WPA. (The land exchange was never completed because the private landowner declined the offer.) Any other cultural information was obtained incidental to other work and does not include complete site information or formal inventory reports. No cultural overview has been completed for the Refuge Complex as part of the CCP planning process.

Prehistoric cultural sites on Bowdoin NWR are primarily small groups of stone circles, cairns, or areas of lithic scatter along shorelines. All material is rock and would be unaffected by fire, but could be damaged fire suppression equipment. Many of these sites are being mapped with GPS equipment and maps would be available to fire suppression personnel. Three water control structures on the Bowdoin Headquarters Display Pond were built in 1936 and are the oldest facilities on the Refuge. These historic structures have been nominated to the National Register of Historic Places and should be protected, but most of the material remaining is concrete and should be unaffected by fire. Any remaining wood flash boards are probably not from the original construction, but are replacement boards installed many years after the original construction

Several prehistoric sites and one historic site were found on McNeil Slough WPA during cultural inventories performed for a proposed land exchange. Prehistoric sites include groups of stone circles, drive lines, areas of lithic scatter, and at least one kill site or meat processing site. The stone features are not expected to be impacted by fire, but the only surface features for the kill

site are pieces of bison bone which could be damaged or destroyed by fire. Most of the site, including any scrapers, projectile points, and other tools are below the surface and should not be impacted by fire. The historic site includes several foundations and excavated basements, but surface debris is minimal. Some of the surface debris could be damaged by fire, but the site was determined not to be significant. Fire suppression personnel should be informed of the locations of these sites in order to prevent damage from fire suppression equipment

Other known cultural features include several stone circles on Pearce WPA, homestead sites on Dyrdaahl and Korsbeck WPAs, small areas of lithic scatter and scattered homestead debris on Holm WPA, and old irrigation canals on Pearce and Beaver Creek WPAs. Complete inventories have not been conducted, but stone circles are being mapped on Pearce WPA.

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 Complex'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 wildland fire 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:

- G 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.

- G 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.

- G The Montana 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 Complex will follow any programmatic archeological/cultural resources management plan that may be implemented in the future.
- G 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.
- G 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.
- G 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.
- G The use of mechanized equipment within the Complex must be approved by the Project Leader on a fire by fire basis, and the use these resources will be considered in the approval process for any planned management actions. When the use of heavy equipment is authorized, its use will be monitored.
- G The location of sites discovered as the result of fire management activities will be reported by the Project Leader to the Regional Archeologist.
- G Rehabilitation plans will address cultural resources and will be reviewed by the Regional Archeologist.

15.0 RESEARCH NEEDS

Fire behavior data will be collected on all fires occurring at the Complex. 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 Complex 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.

16.0 CONSULTATION AND COORDINATION

All fire management program activities will be implemented in cooperation and coordination with the State of Montana Department of Health and Environment, and rural fire protection

districts. Other agencies and organizations will be consulted as needed.

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

Dr. John Cornely, Chief Migratory Birds, USFWS - Mountain Prairie Region

Carl Douhan, Wildland Fire Planner, Contractor

Mike Granger, Fire Management Officer, USFWS - Charles M. Russell NWR

Rhoda Lewis, Regional Archeologist, USFWS - Mountain Prairie Region

Steve Nurse, Assistant FMO, USFWS - Charles M. Russell NWR

Bob Rabarchik, Zone Fire Management Officer - Montana/Wyoming/Utah

Copies of this Fire Management Plan have been sent to the following parties for comment:

Phillips County Volunteer Rural Fire Company

Blaine County Fire Department - Chinook and Harlem Districts

Hill County Fire Department - Saint Joe Fire District

Bureau of Land Management - Malta Field Office

Bureau of Land Management - Lewistown Field Office

17.0 REFERENCES

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APPENDIX A: NEPA COMPLIANCE

RESERVED

APPENDIX B: THREATENED AND ENDANGERED SPECIES

Table 1: Listing of Federal Threatened and Endangered Species and Species of Conservation Concern

Specie	Status
Bald eagle	Threatened
Peregrine Falcon	Species of Conservation Concern
Piping Plover	Threatened
Mountain Plover	Proposed
Black-tailed Prairie-dog	Candidate - Warranted but precluded

Note: The Bald eagle is currently listed as Threatened (Cornely, pers. com., 2001). At such time as the Director delists this species it will be included on the listing of Species of Conservation Concern for up to five years.

Table 2: Listing of State Threatened and Endangered Species and Species of Conservation Concern

See Attached List

APPENDIX C: BOWDOIN NWR COMPLEX FIRE HISTORY 1987-2000

APPENDIX D: MISSION STATEMENTS

APPENDIX E: QUALIFICATIONS

Table 1: Current Fire Management Team and Qualifications

Name	Employment Status	Qualified Jobs
Steven Hopkins	Permanent	FFT2
Kathy Erickson	Permanent	FFT2
Paula Gouse	Permanent	FFT2
Valerie Kopcsó	Permanent	FFT2
Brian Gouse	Seasonal	FFT2

Craig Miller	Permanent	FFT2

APPENDIX F: FIRE AGREEMENTS

APPENDIX G: NORMAL UNIT STRENGTH

Complex Fire Equipment:

The following equipment is located at the Bowdoin NWR Headquarters

1 - 1 ton flatbed truck (2wd) with 250 gallon slip-on pump unit

1 - 1 ton flatbed truck (4wd) with 250 gallon slip-on pump unit

1 - ATV (4wd) with 10 gallon spray unit

1 - single axle ATV trailer

1 - D-7 Dozer

1 - Motor grader

8 - shovels

7 - Mcleods

7 - Pulaskis

20- Fire Swatters

Radios

APPENDIX H: FITNESS TESTING

Job-Related Work Capacity-Tests for Wildland Firefighters

Background Studies of wildland firefighting clearly show the link between fitness and work performance. Fit workers can do more work with less fatigue, and still have a reserve to meet unforeseen emergencies. They perform better in a hot environment, and recover faster from adverse firefighting conditions like long shifts and reduced rest. In short, fitness is the most important factor in work capacity.

Since 1975 Federal Agencies have used a 5-minute step test and an alternative 1.5 mile run test to screen candidates for wildland firefighting. In 1994 the Missoula Technology & Development Center (MTDC) began a review of work capacity testing alternatives. MTDC conducted a comprehensive job task analysis and extensive laboratory and field studies of candidate tests. The result is a family of job-related field tests.

Work Category	Test	Distance	Pack	Time
Arduous	Pack Test	3 Miles	45 lbs	45 min
Moderate	Field Test	2 Miles	35 lbs	30 min
Light	Walk Test	1 Mile	none	16 min

Pack Test The test consists of a 3 mile hike with a 45 pound pack (fire-suppression water bag) over level terrain. A time of 45 minutes, the passing score for the test, approximates a step test score of 45 (ml/kg.min), the established standard for wildland firefighters. The test is a valid, job-related test of the capacity for arduous work, defined as: "Duties involve field work requiring physical performance calling for above average endurance and superior conditioning. These duties may include an occasional demand for extraordinarily strenuous activities in emergencies under adverse environmental conditions and over extended periods of time. Requirements include running, walking, climbing, jumping, twisting, bending, and lifting more than 50 pounds; the pace of work typically is set by the emergency condition." The energy cost of the test is similar to that demanded on the job. The Pack Test is correlated to measures of aerobic and muscular fitness, as well as performance in field tasks such as working with hand tools, or carrying loads over rough terrain. The duration of the test insures the capacity to perform prolonged arduous work under adverse conditions, with a reserve to meet emergencies.

Field Test A 2 mile hike with a 25 pound pack in 30 minutes, approximates a step test (max V02) score of 40. A job-related test of work capacity designed for those with moderately strenuous duties: "Duties involve field work requiring complete control of all physical faculties and may include considerable walking over irregular ground, standing for long periods of time, lifting 25 to 50 pounds, climbing, bending, stooping, squatting, twisting, and reaching. Occasional demands may be required for moderately strenuous activities in emergencies over long periods of time. Individuals usually set their own work pace.

Walk Test This one mile walk test approximates a step test score of 35 is a test to determine the ability to carry out light duties: "Duties mainly involve office type work with occasional field activity characterized by light physical exertion requiring basic good health- Activities may include climbing stairs, standing, operating a vehicle, and long hours of work, as well as some bending, stooping, or light lifting. Individuals almost always can govern the extent and pace of their physical activity."

Instructions

The Pack Test is a 3 mile hike with a 45 lb pack over level terrain. Field studies show that performance on the pack test is significantly related to performance of firefighting tasks, including line construction with hand tools. Studies conducted at the University of Montana Human Performance Laboratory indicate that the energy cost of the test is similar to the cost of firefighting tasks. A score of 45 minutes on the Pack test approximates a Step Test Score of 45 (ml/kg-min). Because of its length, the Pack Test is an excellent indicator of sustained work capacity. Scores on a flat course are highly related to performance on a hilly course. And performance on the Pack Test is significantly related to vascular fitness, including measures of upper and lower body strength. The Pack Test is: job-related, safe, inexpensive, and easy to administer. It is a valid, reliable, and objective measure of work capacity that does not adversely impact workers on the basis of gender, ethnicity, age, height, or weight. **(These instructions apply to the Field and Walk Tests).**

The course

Course must be essentially level and have a firm, relatively smooth walking surface. Course length (3 miles) must be accurate: double-check measurements. Use a measuring wheel or a calibrated bicycle computer. Vehicle odometers are not sufficiently accurate.

Loop or out-and-back courses are preferable. Avoid one-way courses where unfavorable conditions (wind, grade) are not offset. A moderate grade (2-3%) is acceptable if the course starts and finishes at the same place. Have lap counters available for multi-loop courses. Use course monitors when needed.

Candidates must be informed of the course layout (use a map or sketch of the course). Use distance markers (e.g., at 1 or 1.5 miles) to aid candidates. Use hazard and traffic markers as needed.

Equipment

Packs: The 5 gallon backpack pump water bag (NSN8465-01-321-1678, cost \$35.23) used in test development is recommended: The number required will depend on the number of candidates to be tested simultaneously. If other packs are used the test administrator must insure the correct weight (45 lbs).

Pack liners: (NSN8465-01-321-1679, cost \$6.51): Have at least one extra liner for each pack.

Canteens:(NSN8465-00-102-6381, cost \$0.43): Use up to 2 in pack pocket to obtain proper weight (45 +/- 2 lbs).

Safety Vests/Route Markers: As needed.

Distance Markers: Use mile and mid-point markers so candidates can maintain proper pace.

Stop watches: Utilize 2 watches to provide back-up timing.

Vehicle: Bicycle or other vehicle to monitor candidates on the course.

Radios: As needed for monitoring and safety.

Scale: An accurate hanging style spring scale is recommended for weighing packs.

Forms: PAR-Q health screening questionnaire and an informed consent form (attached).

Data collection form (should include: site, date, conditions, test administrator, and columns for name, gender, age, height, weight, Pack Test and other scores - step test, 1.5 mile run, etc.).

Test Administration

One person can administer the test when:

The administrator is a trained First Responder (American Red Cross) or equivalent.

The timer can monitor the course.

The safety/med evacuation plan can be executed.

Five or fewer people are being tested at one time.

Candidate safety and compliance with test requirements can be assured.

For larger groups or when course monitoring is difficult, a 2 to 3 person team should be used.

Testing Tips

Fill packs the night before to check for leaks (use plumber's Teflon tape to stop leaks in threaded fitting).

Weigh bags before test. Check weight after the test if necessary. Note: Bags are used without trombone pumps.

Group or staggered starts can be used. Many candidates will benefit from the support provided by a group start.

Environment: Administer the test in moderate environmental conditions; do not test new recruits when the temperature is high or when the temperature and humidity combine to create high heat stress conditions (see heat stress chart); if necessary, test early in the day to avoid high temperature/humidity combinations; avoid high winds that may affect performance.

Hydration: If the weather is hot, encourage candidates to drink fluids prior to the test, and provide fluid replacement mid way in the course. Candidates may carry a water bottle.

Altitude: Use this chart to adjust for test administered at elevations above 4,000 ft.

Table I: Altitude Corrections for Work Capacity Tests*

Altitude	Pack Test	Field Test	Walk Test
8-9,000 ft	90 sec	60 sec	30 sec

7-8,000 ft	75	50	25
6-7,000	60	40	20
5-6,000	45	30	15
4-5,000	30	10	10

* Add correction to required test time (e.g., Pack Test at 6-7,000 ft, add 60 seconds to test standard (45 min) for altitude adjusted standard of 46 n-dn.

The altitude adjustment assumes that the candidate has had an opportunity to acclimate to the altitude of the test site. If a candidate doesn't meet the required standard, even with the adjustment, he or she should be encouraged to train at the altitude and retake the test.

Instructions for Candidates

In advance of test: Distribute confidential PAR Q physical activity readiness questionnaire so candidates can decide if they should seek medical advice before taking the test. Have candidates read and sign an informed consent form.

Clothing: Candidates may select the clothing worn during the test. "T" Shirts and shorts are acceptable. Footwear that provides ankle height support, such as hiking boots or ankle height sport shoes, is required for the Pack and Field tests, and recommended for the walk test.

Safety: Brief candidates on the test, the course, safety considerations, and accommodations. Tell candidates to terminate the test if they experience major physical problems or discomfort, or feel the need to terminate for any reason.

Pace: Demonstrate to candidates how they should hike (power walk) the course as fast as possible without jogging. The heel of one foot must make contact before the opposite toe leaves the ground. jogging or running will invalidate the test and require a retest.

Accommodations: Candidates may use gloves or other padding to make the pack more comfortable. A candidate-provided walking staff may be used during the test.

Hydration: If weather is hot, tell candidates to drink plenty of fluids prior to the test. Candidates may elect to carry a water bottle, but the extra weight will not be counted as part of the pack weight.

Essentials of Good Testing

*An accurately measured flat course with good surface.

* Proper weight packs. Use the specified water bags and verify pack weight with a calibrated scale. If alternative packs are used encourage candidates to adjust them properly.

* Duplicate and accurate timing. Give candidates split times along the course (e.g., at one mile or the mid point - 1.5 mile for Pack Test).

* Candidates should be rested and well informed about the course and the need to maintain a fast pace.

* Favorable environmental conditions. Avoid adverse conditions.

* Complete the PAR Q physical activity readiness questionnaire and sign an informed consent form.

Safety

A locally developed safety/med evacuation plan must be prepared for the course.

Test administrator(s) must be familiar with the safety plan.

A trained and qualified American Red Cross First Responder (or equivalent) who knows the symptoms of physical distress and appropriate first aid procedures must be on site during the test.

Avoid use of roads and intersections ' where traffic is a problem ' or concern. When using roads, use traffic control devices and traffic controllers in hi-visibility vests as needed.

Require candidates to read and sign the PAR Q health screening questionnaire and an informed consent form.

Check to see that candidates are wearing proper (above ankle) footwear.

Encourage candidates to stretch and warm up prior the test.

Do not test tired or injured individuals, or test during conditions that could compromise health or safety.

Monitor candidates to identify those having difficulties and encourage them to terminate the test if necessary.

Encourage fluid intake and replacement and provide fluids in route when . heat stress conditions (temperature /humidity) exist.

At the mid-point, terminate those who are substantially behind the required pace (22.5 minutes for 1.5 miles and/or are having difficulty maintaining the pace. Candidates cannot jog or run to make up time.

Encourage a cool down with an easy walk after the test. Monitor the recovery of candidates who appear exhausted or distressed.

Recommend several weeks of training before retaking the test.

Training for the Pack Test

Begin at least 4 to 6 weeks before you report for duty. Train by hiking or power walking, using the ankle height footwear you will use in the test.

- \$ Hike a 3 mile flat course without a pack. When you can cover the course in less than 45 minutes;
- \$ Add a pack with about 25 pounds to your training hikes;
- \$ Increase the pack weight until you can hike 3 miles in 45 minutes with a 45 pound pack. Also:
 - \$ hike hills (w pack) to build leg strength and endurance
 - \$ jog the flat course (w/o pack) to build aerobic fitness
 - \$ hike/jog over distance for stamina
 - \$ engage in cross-training (mountain biking, weight lifting).

Finally, do job-specific tasks and training to become work hardened for the coming season. Wear work boots on extended hikes. Work with hand tools to prepare trunk and upper body muscles for prolonged work. Work hardening insures that the hands, feet, muscles, tendons and ligaments used on the job are tough and ready to go.

Informed Consent

Work Capacity Tests

2/97

Pack Test intended for those involved in arduous duties (defined as requiring a max V02 of 45, lifting more than 50 pounds and occasional demand for extraordinarily strenuous activities). The 3 mile test with a 45 pound pack in 45 minutes is strenuous, but no more so than the duties of wildland firefighting.

Field Test intended for those with moderately strenuous duties (requires a max V02 of 40, lifting 25 to 50 pounds, and occasional demand for moderately strenuous activity). The 2 mile test with a 25 pound pack in 30 minutes is fairly strenuous, but no more so than field duties.

Walk Test intended for those whose duties involves light work with occasional field activity (required max V02 of 35). The -1 mile walk in 16 minutes is moderately strenuous, but no more so than the duties assigned.

Risks: There is a slight risk of injury (blisters, sore legs, sprained ankle) for those who have not practiced the test. If you have been inactive and have not practiced or trained for the test, you should engage in several weeks of specific *training before* you take the test. Be certain to warm up and stretch before taking the test, and to cool down after the test. The risk of more serious consequences (e.g., respiratory or heart problems) is diminished by completing the PAR Q physical activity readiness questionnaire.

If you cannot answer NO to all the questions in the PAR Q health screening questionnaire, or if you are over 40 years of age and unaccustomed to vigorous exercise, you should contact your physician, by phone or in person, before you take the test. Your physician may want to see PAR Q and information about the test or job demands.

1. I have read the information on this form and understand the purpose, instructions, and risks of the job-related work capacity test.
2. I have read, understood, and truthfully answered the PAR Q physical activity readiness questionnaire.

3. I believe I have the ability to complete the test and carry out the assigned duties of the position (e.g., wildland firefighter).

4. I assume responsibility and release the US Government from liability for injuries sustained in testing that result from any physical or mental disorders.* * Reference EEOC #915.002,5/19/94

Test (circle) Pack Field Walk

Signature _____ Date

Print Name

Witness

**QUESTIONS AND ANSWERS
"PACK TEST"**

1. **why are we** changing from the Step Test and 1 1/2 mile run?

ANSWER: The Step Test has been used since **1975 by Federal land management** agencies. New Laws (Americans With Disabilities Act), field experience and research on long-term work capacity caused us to reevaluate the current tests. In 1990 the Service-Wide Civil Rights Action Group requested the Forest Service Fire and Aviation Management staff to evaluate the Step Test. They believed that it discriminated against people who should be able to participate in fire activities. The Missoula Technology and Development Center (NMC) was assigned the work of assessing the technical and legal aspects of the Step Test and 1 1/2 mile run. The appropriateness of the physical fitness standard for fire suppression positions was evaluated by the National Wildfire Coordination Group (NWCG). The conclusions were:

The Step Test and 1 1/2 mile run do not meet Federal requirements of testing employee fitness (Federal Uniform Standards for Employee Selection Procedures).

The Step Test and 1 1/2 mile run are not performance related and are therefore not appropriate tests.

Many of the fire position physical fitness standards were not required in order for incumbents to perform the duties of the positions. The fitness requirement were eliminated for many positions and were revised for others in the 1993 revision of the Wildland Fire Qualification Subsystem used by NWCG. (See Summary of ICS Physical Fitness Requirements attached to this document.)

The post-exercise heart rate count used in the step test is difficult to perform accurately thus giving incorrect fitness assessments for some employees.

2. What is the objective of fitness testing/ the "Pack Test"?

ANSWER: Fitness testing was introduced to the process of selecting wildland fire personnel to help reduce the number of heart attacks and other physical fitness related illnesses and injuries experienced by

firefighters. Specifically, fitness testing is to determine if a person has the minimum levels of aerobic and muscular fitness to perform the tasks associated with their assigned fire suppression positions safely and effectively.

3. Did line management participate in the decision to utilize the "Pack Test"?

ANSWER: The direction for Fire and Aviation Management to review the Step Test in response to the Service-wide Civil Rights Group came from Dale Robertson, Chief of the Forest Service at that time. The action plan for the review was accepted by the Chief. A 5100 memorandum dated May 29, 1996 signed by John Chambers acting for the Director of Fire and Aviation Management went to all Regional Foresters and Area Director requesting review and comments. The letter explained that the "Pack Test" was proposed to replace the existing tests and giving the history and rationale leading to the "Pack Test".

4. Why was the "Pack Test" chosen?

ANSWER: The enclosed materials contain the details but the general reasons are:

The existing tests were not appropriate in terms of what they were established to evaluate or with respect to legal requirements and the "Pack Test" was developed to meet those criteria.

The "Pack Test" development followed the Federal Uniform Guidelines for Employee Selection producers beginning with a Job Task Analysis for Wildland Firefighting.

The "Pack Test has "energy costs" similar to tasks performed on the fireline. It is significantly correlated to laboratory measures of aerobic and muscular fitness and to performance on field tasks.

Statistical analyses of the data from field tests run on 333 firefighters show no "adverse impact" for gender, ethnicity, age, height or weight based on the Equal Employment Opportunity Commission (EEOC) standard.

5. Are all state and contractor personnel required to take the "Pack-Test"?

ANSWER: The Forest Service requires all contractors' personnel to meet the fitness standard used by the Forest Service. After January 1, 1998, contractors personnel employed by the Forest Service will have to pass the "Pack Test" if required by the position filled. All agencies have the flexibility to establish the appropriate physical fitness test(s) for their personnel under the ICS 310-1, Wildland Fire Qualification Subsystem Guide.

By agreement, all NWCG members (includes the states) accept each others' personnel based on the certification used by the respective members.

6. Was there a control group for the "Pack Test"? What was its makeup? What statistical information is available?

ANSWER: Yes, the attached information prepared by Dr. Sharkey describes the design of the project and details the steps involved.

7. Is the "Pack Test" gender neutral?

ANSWER: Yes, Dr. Sharkey's information describes the testing, the analyses of the data obtained and the conclusions relative to "adverse impact" defined by EEOC.

8. Is the "Pack Test" equally effective in testing the fitness of a 200-pound firefighter and a 120-pound firefighter (45 pound pack requirement for Arduous)?

ANSWER: Yes, Dr. Sharkey's information shows no "adverse impact" based on firefighter weight.

9. Were fire medical records reviewed to ensure that the "Pack Test" is the correct test to prevent injuries/illnesses resulting from inadequate fitness levels?

ANSWER: The goal of work task related testing is to subject employees to testing that represents tasks they would routinely perform on the job. The task analysis identified those kinds of tasks. The development of the two alternative tests that were analyzed was based on the tasks identified. The "Pack Test" is not and was not intended to replace an intensive physical examination which could evaluate the myriad of physical and medical parameters and conditions to "ensure" accident/illness prevention. It is a screening that can be done by the agencies at a reasonable cost which will identify employees who do not have the muscular and aerobic fitness required to safely and effectively perform the tasks required of them fighting fire.

10. Was a medic physician advisor consulted during the development of the "Pack Test"?

ANSWER: Yes, Dr. Sharkey's educational and experience background is enclosed. Fitness, human performance and testing have long medical related histories. Dr. Sharkey, as a professional Human Performance/Exercise Physiologist has incorporated the pertinent background and technology in the development of the "Pack Test". The "Pack Test" has been formally presented to the Occupational Physiology and medicine section of the American College of Sports Medicine in 1994-95 and 96.

11. How/why was the 45 pounds determined to be the weight for the Pack Test?

ANSWER: Early in the project to evaluate the Step Test and 1 1/2 mile run, fire program managers in the federal agencies were polled to determine the critical tasks required of firefighters. Responses showed a high need for firefighters to be able to carry heavy packs such as hose bags, pumps and 5 gallon waterbags. The 5 gallon waterbag was chosen because it fit the identified task and it is commonly available.

12. Were Demographics of the fire organization (red carded employees) reviewed in the development of the "Pack Test"?

The Wildland Fire fighter Job Task Analysis included input from all Federal agencies from all geographic areas of the United States. The field testing done to evaluate the Pack Test included statistically valid numbers representing gender, ethnicity, age, height and weight.

13. Has the test protocol been reviewed by medical doctors? With what

results?

ANSWER: All phases of test development have been reported at the Occupational Medicine and Physiology Research section of the American College of Sports- Medicine for peer review and feedback- We have consulted with researchers at the U.S. Army Environmental Medicine Laboratory in Natick, and with physicians and physiologists in Canada, Australia and New Zealand. The "Pack Test" has received favorable comments and has caused some to reevaluate their approaches.

14. Define and explain the energy expenditure formula of the Pack Test.

ANSWER: The pack weight and required pace (4 MPH) were determined in laboratory studies to approximate the average energy cost of fireline duties, 22.5 ml of oxygen per kilogram of body weight. The previous fitness standard (45 ml) was based on that energy cost. Correlation analysis of treadmill oxygen intake (max V02), step test and the 1 1/2 mile run score of 45 ml/kg/minute. That indicates that the "Pack Test" does not "raise the barn. it does show that an individual has the capacity to sustain the energy cost of firefighting duties - at least for 45 minutes.

15. Administering the "Pack Test" to 1200 to 1300 firefighters is a huge investment in time. Additionally there is a concise period of time (window) in which they can be done. Are there recommendations on how this can best be accomplished?

ANSWER: Using the "Pack Test" does require an investment of time and energy but the benefits of screening employees who do not have the aerobic or muscular fitness to safely perform firefighting duties outweigh the drawbacks. our commitment is to perform our work safely and the screening is a small price to pay. Firefighters have been outspoken about the inadequacy of the current fitness testing (TriData Phase I report of the Wildland Firefighter Safety Awareness Study) and the need to have more realistic testing. Anecdotal reports have repeatedly charged that emergency hire firefighters often are not fit enough to walk the fireline to their work assignment or to work effectively through the operational period. Anecdotal reports from medical units have reported that many firefighters they saw were not physically fit enough to perform the work required. A screening that deals with those three areas of concern would be very beneficial to prospective firefighters and the agency.

Fire Program managers will have to work out testing schedules. **compared** to the Step Test the "Pack Test" takes longer **per test it but lends itself** to testing several/many employees at a time. The requirement for physical fitness testing to be done prior to issuing a fire qualification (red card) has not changed so there is no impact on date of completion. A significant benefit to the "Pack Test" is that employees can practice the test and know that they are capable of passing the test prior to coming in for official testing. This should reduce the need for and impact of repeat testing.

16. Is the use of a treadmill acceptable for retesting?

ANSWER: The "Pack Test" was designed and validated on a flat track. No work has been done to validate the tests on a treadmill (it would require at least a 1% grade to adjust for lack of wind resistance, terrain variation etc. Holding the rail for balance would invalidate the test given on the treadmill and it is likely most would need to hold the rail. There is no

reason to increase the cost of testing while increasing the risk of inaccurate results.

17. Is it possible to use other packs (not the bladder bag)?

ANSWER: Yes, the test requires that the pack meet the weight specified for the respective test. Good testing will require that pack weights are verified prior to and immediately following testing.

18. The test is to be conducted in temperatures below 80 degrees. In some geographic locations the temperature exceeds 80 degrees during June when employees would need to be tested. What options are available?

ANSWER: The latest publication draft by Dr. Sharkey does not contain the temperature reference. It does include a heat stress and a recommendation about testing during high heat stress conditions.

19. Are there recommendations on how to manage the logistics of administering the "Pack Test"?

ANSWER: Dr. Sharkey makes recommendations on how to conduct the tests in the interest of test validity and safety. We expect to get additional suggestions after the tests have been used for training and practice.

20. There were several questions pertaining to the liability clause and the PAR-Q form. Dr. Sharkey has suggested the use of the forms to encourage and aid employees to assess their personal health and fitness states prior to taking the test. The Forest Service will determine if and how forms such as those 2 are to be used and will include the instructions in the implementation instructions.

21. What is the **reason for omitting blood pressure reading immediately prior to taking the "Pack Test"**?

ANSWER: Use of blood pressure (or similar types of information like heart rate used in the Step Test) violates the EEOC's interpretation of the Americans with Disabilities Act (ADA). Blood pressure was not a parameter in the test or previous testing and has no direct correlation with the ability of employees to safely and effectively perform the tasks of their positions.

22. Were fire medical records reviewed; was a fire medic advisor consulted?

ANSWER: In 1994-95, interviews were conducted with crew members, safety officers and crew "bosses". KMC and the SHWT continually review medical records, injury reports and other information related to employee injuries and illnesses. We requested advice from physicians, physiologist, field workers and others during the development and field evaluation of the test. The NWCG SHWT was also consulted and asked for comments during the development process.

23. Were demographics of the fire organization reviewed?

ANSWER: Yes, all studies included female subjects and in the field study, we attempted to "mirror" the composition of the work force in terms of gender, ethnicity, age, height and weight of firefighters. This consideration is mandated by the Federal Uniform Guidelines for Employee Selection procedures.

24. Has the "Pack Test" protocol been reviewed by medical doctors?

ANSWER: Yes, see response above: American College of Sports Medicine, U.S. Army, etc. None has questioned the test. U.S. Army has conducted studies in which they trained female recruits to hike at 4.4 mph with 75 pounds.

25. Liability; what does the EEOC have to do with it?

ANSWER: The language for the suggested waiver comes from an EEOC publication that discusses the ADA. The ADA precludes asking questions re: a candidate's health or disability in a pre-employment test. The EEOC suggests this waiver subject to managements, approval.

26. Why use the PAR Q form?

ANSWER: It is a validated questionnaire that has been shown to substantially reduce risk in exercise tests and training. Developers require that it be used as is. We do not intend to see the responses on the PAR Q, only to confirm that the candidate read and understood what it says. The form considers the major risks - other questions were discarded during the development of the form.

27. Can the Pack Test be used to meet the fitness requirements for Law Enforcement?

ANSWER: Yes, the Law Enforcement Coordinators for western regions of the FWS agreed to also use the Pack Test as a means to test fitness for LE personnel. Those passing the Pack Test will receive a Level 5 Fitness Rating.

28. Let's say that I start out with a 45 pound pack to do the pack test. I pass the 2 mile mark in under 30 minutes, but it takes me over 45 minutes to finish the 3 mile course. Can I receive a Moderate rating?

ANSWER: Yes. This would more than demonstrate your ability to perform at a Moderate level.

PAR Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

YES	NO
_____	1.Has your doctor ever said that you have a heart condition <u>and</u> that you should only do physical activity recommended by a doctor?
_____	2.Do you feel pain in your chest when you do physical activity
_____	3.In the past month, have you had chest pain when you were not doing physical activity?
_____	4.Do you lose your balance because of dizziness or do you ever lose consciousness?
_____	5.Do you have a bone or joint problem that could be made worse by change in your physical activity?
_____	6.Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
_____	7.Do you know of <u>any other reason</u> why you should not do physical activity?

IF YOU ANSWERED YES TO ONE OR MORE QUESTIONS

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered yes.

You may be able to do any activity you want - as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.

Find out which community programs are safe and helpful for you.

<p>IF YOU ANSWERED NO TO ALL QUESTIONS</p>	<p>DELAY BECOMING MUCH MORE ACTIVE:</p> <p>if you are not feeling well because of a temporary illness such as a cold or fever - wait until you feel better; or</p> <p>if you are or may be pregnant - talk to your doctor before you start becoming more active.</p>
<p>If you answered NO honestly to <u>all</u> PAR-Q questions, you can be reasonably sure that you can:</p> <p>Start becoming more physically active - begin slowly and build up gradually. This is the safest and surest way to go.</p> <p>take part in a fitness appraisal - this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively.</p>	<p>PLEASE NOTE: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.</p>

Informed Use of the PAR-Q The Canadian Society for Exercise Physiology, Health Canada and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction.

Name: _____ Signature: _____
Date: _____

Signature of Parent: _____
or Guardian (for participants under the age of majority)

Witness:

c Canadian Society for Exercise Physiology - *Societe canadienne de
physiologie de l'exercice*
Supported by: Health Canada - *Sante Canada*

APPENDIX I: STEP-UP PLAN

Staffing Class	Fire Danger Rating	Burning Index	Actions
I and II	Low - Moderate	20-29	<p>Engines staged at each field station.</p> <p>All firefighters carry Personal Protective Equipment while on duty.</p> <p>Staff maintains radio contact.</p> <p>All fire equipment used for project work will be brought in at the end of each day and maintained in a fire ready condition.</p>
III	High	30-34	<p>All Staffing Class II actions plus:</p> <p>Staff will be prepared to respond to wildfires and remain with primary engine at all times.</p> <p>Fire staff shall be briefed by the Project Leader as to suppression options available.</p> <p>Step up to staffing class IV if lightning activity is predicted.</p>
IV	Very High	35-40	<p>All Staffing Class III plus:</p> <p>Zone FMO opens emergency presuppression account and notifies RFMC.</p> <p>Staff may be assigned engines to perform field work or do detection patrol.</p> <p>Staff may work weekends and/or tours of duty may be revised or extended at discretion of Project Leader.</p> <p>Post notices.</p>
V	Extreme	40+	<p>All Staffing Class III plus:</p> <p>Engines staffed and response ready.</p> <p>Cancel Annual Leave for key fire personnel.</p> <p>Extend tours of duty to include extended coverage after 1700 hrs and on weekends.</p> <p>Increase detection patrols.</p> <p>Consider prohibition on campfires.</p>

APPENDIX J: DISPATCH PLAN

Key Fire Management Contacts

Table 1: Fish and Wildlife Service

Contact	Business Phone	Home Phone
Carmen Luna	(406) 654-2863	(406) 654-1145
Dwain M. Prellwitz	(406) 654- 2863	(406) 654-2565
Steven Hopkins	(406) 654- 2863	
Mike Hedrick, CMR Refuge Manager	(406) 538-8706 ext.221	(406) 538-7724
Phil Street Region-6 Regional Fire Mgt. Coordinator	(303) 236-8145 ext.676	(303) 933-6851

Jim Kelton Region-6 Regional Fire Mgt. Specialist	(303) 236-8145 ext.618	(720) 887-0468
Bob Rebarchik Zone Fire Management Officer	(406) 329-4749	(406) 626-4654
Angie Braun Region 6 Regional Fire Program Assistant	(303) 236-8145 ext. 617	(303) 936-6184

Table 2: Cooperator Contacts

Contact	Work Number
Bureau of Land Management, Malta After hours contact Police Department	(406) 654-1240 (406) 654-1211
Bureau of Land Management, Lewistown Fire Dispatch District Office	(406) 538-8200 (406) 538-7461
Phillips County Sheriff	(406) 654-2350
Phillips County Volunteer Rural Fire Department	(406) 654-2350
Blaine County Volunteer Rural Fire Department	(406) 357-3260

Hill County Volunteer Rural Fire Department	(406) 265-6511
Valley County Volunteer Rural Fire Department	(406) 228-2418
Burlington Northern Railroad (Burlington Northern will only respond to fires originating on or threatening railroad property.)	(406) 654-1622

Table 3: Emergency Contacts

Contact	Telephone Number
Ambulance Phillips County Ambulance Service	(406) 654-2350
Air Ambulance Russaero Flying Service Mendel Flying Service	(406) 654-1143 (406) 654-1021
Phillips County Health Clinic	(406) 654-1800
Phillips County Hospital	(406) 654-1100

APPENDIX K: WFSA AND DELEGATION OF AUTHORITY

WILDLAND FIRE SITUATION ANALYSIS

Incident Name:

Jurisdiction:

Date and Time Completed:

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

Section I, WFSA Information Page

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

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

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

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

Section II. Objectives and Constraints

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

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

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

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

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

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

II.**Objectives and Constraints**

To be Completed by the Agency Administrator(s)

A. Objectives (Must be specific and measurable)*1. Safety*

- Public

- Firefighter

*2. Economic**3. Environmental**4. Social**5. Other***B. Constraints**

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

Section III. Alternatives

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

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

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

<p>G. Risk Assessment</p> <ul style="list-style-type: none"> - Probability of success - Consequence of failure 	<hr/> <hr/>	<hr/> <hr/>	<hr/> <hr/>
<p>H. Complexity</p>			
<p>I. Attach maps for each alternative</p>			

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

Section IV. Evaluation of Alternatives

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

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

IV. Evaluation of Alternatives			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
A. Evaluation Process	A	B	C
<i>Safety</i> Firefighter Aviation Public			

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

<i>Sum of Environmental Values</i>			
<i>Social</i> Employment Public Concern Cultural Other (Specify)			
<i>Sum of Social Values</i>			
<i>Other</i>			

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

Section V. Analysis Summary

- A. **Compliance with Objectives:** Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.

- B. **Pertinent Data:** Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.

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

Section IV. Decision

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

V. Analysis Summary			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
Alternatives	A	B	C
A. Compliance with Objectives Safety Economic Environmental Social Other			

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

Section VII. Daily Review

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

Section VIII. Final Review

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

VIII. Daily Review								
To be completed by the Agency Administrator(s) or Designate								
Selected to be reviewed daily to determine if still valid until containment or control								
			P	I	R	W	F	W
			R	N	E	E	I	F
			E	C	S	A	R	A
			P	I	O	T	H	B
			A	D	A	T	E	A
			R	E	V	H	H	V
			R	N	A	E	A	I
			E	E	V	F	V	D
			S	P	A	F	A	
			S	R	V	O	V	
			L	I	A	R	I	
			L	O	V	E	O	
			E	R	I	C	A	
			L	I	L	A	S	
			V	T	A	T	P	
			L	I	B		R	
			L	T	I		O	
			L	I	L		N	
			L	Y	L		S	
			L		L			
Date	Time	By						

If WFSAs are no longer valid, a new WFSAs will be completed!

VIII. Objectives

Final Review

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

By: _____
(Agency Administrator(s))

A GUIDE FOR ASSESSING FIRE COMPLEXITY

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

Use of the Guide:

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

GLOSSARY OF TERMS

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

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

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

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

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

Disputed fire policy - Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Pre-existing controversies - These may or may not be fire management related. Any controversy

drawing public attention to an area may present unusual problems to the fire overhead and local management.

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

FIRE COMPLEXITY ANALYSIS

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

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

Signature _____

Date _____ Time _____

DELEGATION OF AUTHORITY

Bowdoin National Wildlife Refuge Complex
Malta, Montana

As of (Time) and (date), I have delegated authority to manage the (Fire/Incident Name and Fire Number), Bowdoin National Wildlife Refuge Complex, to Incident Commander (Name) and his incident management team.

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

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

My specific considerations for management of this fire are:

1. Ensure the safety of firefighters, visitors, and public.
2. Protect private and refuge property to the extent possible
3. Minimize damage to environmental resources.
4. Key resource considerations are: protecting rare, threatened, and endangered species: preserving as much wildlife habitat as possible; avoiding wildlife entrapment situations; protecting cultural resources; and limiting degradation of the Complex's aesthetic values
5. Restrictions for suppression actions are no earthmoving equipment (dozers, discs, plows, graders) without approval of the Project Leader or his/her designated representative.
6. Manage the fire cost-effectively for the values at risk.
7. Provide training opportunities for Service personnel when ever possible in order to strengthen our organizational capabilities.

Signed: _____ Date:

Project Leader

APPENDIX L: FIRE EFFECTS

Table 1: Fire Effects - Selected Vegetation

Common Name	Scientific Name	Effect
Western wheatgrass	<i>Pascopyrum smithii</i>	<p>Western wheatgrass is generally unharmed by fire. Rhizomes may be damaged but are generally not killed by fire.</p> <p>Western wheatgrass cover usually increases or changes little after fire. On sagebrush (<i>Artemisia</i> spp.)-grass ranges western wheatgrass often revegetates rapidly after fire</p> <p>In eastern Montana, western wheatgrass production was unaffected by spring or fall burns. In some instances, vegetative spread of western wheatgrass is enhanced by fire.</p>

<p>Needle and Thread grass</p>	<p><i>Hesperostipa comata</i></p>	<p>Needle-and-thread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needle-and-thread grass in sagebrush ecosystems is classified as slightly damaged by fire, and in Intermountain rangelands, as severely damaged</p> <p>Some studies indicate that needle-and-thread grass becomes more resistant to burning from spring through summer as tissues dry out and root storage of carbohydrates increases. However, this finding contradicts Wright, who claimed mortality of needle-and-thread following burning peaks in July and August and declines slightly in September.</p>
<p>June grass</p>	<p><i>Koeleria macrantha</i></p>	<p>Prairie Junegrass is usually top-killed or killed by fire. Fast-moving, low-intensity fires will consume above ground vegetation without damaging the plant's crown. In general, late-spring burns are more damaging to prairie Junegrass than early-spring, late-summer, fall, or winter burns.</p> <p>Prairie Junegrass's response to fire is related to season of burn, fire intensity, and postfire water availability. Several studies evaluating the effect of fire on following season vigor report positive correlations. Time required to acquire the approximate preburn frequency or coverage, is rapid, averaging 2 to 5 years.</p>

Blue grama	<i>Bouteloua gracilis</i>	<p>Blue grama is generally dormant during early spring and in the hottest, driest part of summer. It is also dormant in cold winter months. When warm-season grasses such as blue grama are burned while dormant, living plant parts are often unaffected. Fire generally top-kills blue grama. Rhizomes are usually unharmed. This species is generally less damaged when burned during the spring than when burned during the summer or fall. Reestablishment occurs through rhizomes, which may be unaffected or even stimulated by fire, and by germination of wind-dispersed, water-dispersed, or animal-dispersed seed.</p> <p>During the spring when soils are moist, heat penetration into the soil is slight, and damage to underground parts is minimal. Blue grama is usually unharmed by fires in years with above normal winter and spring precipitation. It can be severely damaged by fires that occur during drought years.</p>
Silver sage	<i>Artemisia cana</i>	<p>Fire effects on mountain silver sagebrush is not well documented. Burning causes complete top-kill of plants regardless of the degree to which aerial plant parts are consumed (fire intensity). Studies on the morphologically similar plains silver sagebrush indicate that the extent to which plants survive burning is directly related to fire intensity and severity. Totally consumed plants sustain higher mortalities than those less thoroughly burned. This trend is further accentuated by season of burning; more plants survive spring burns than fall burns.</p>

Russian olive	<i>Elaeagnus angustifolia</i>	Russian-olive sprouts from the root crown following fire. Its off-site seeds are an important source in colonizing burned areas.
Narrowleaf Cottonwood	<i>Populus angustifolia</i>	Fire will partially or completely kill narrowleaf cottonwood depending upon severity. Mature narrowleaf cottonwood possesses thick-furrowed bark; however, the bark does not always provide adequate insulation, leaving trunks vulnerable to heat-induced xylem cavitation and scarring. Even low-severity fires may wound trees, resulting in either complete or partially killed crowns. Due to limited root systems, narrowleaf cottonwood seedlings and saplings on well-drained alluvial bars are very susceptible to severe fires.
Common cattail	<i>Typha latifolia</i>	The effects of fire on common cattail vary with water depth and soil moisture. On flooded sites and on sites with exposed but saturated soils, fire consumes most or all of the aboveground biomass, but underground rhizomes remain undamaged and plants survive.

Hard bulrush	<i>Scirpus acutus</i>	Hardstem bulrush sprouts from rhizomes following fire and probably sprouts from the root crown as well. It establishes from buried seed or seed dispersed onto burned sites. Fire increases protein content in sprouting hardstem bulrush.
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Table 2: Fire Effects - Selected Wildlife Species

Common Name	Scientific Name	Effect
Pronghorn antelope	<i>Antilocapra americana</i>	Ungulates are rarely killed in fires. Pronghorn's capacity for rapid flight probably enables them to escape most fires easily. Researchers have recommended prescribed burning to improve pronghorn habitat. As a primarily forb-eating species with strong requirements for open cover, pronghorn are favorably influenced by the increase in herbaceous species and reduction of shrubs after fire.

Coyote	<i>Canis latrans</i>	Fire may improve the foraging habitat and prey base of coyotes. Periodic fire helps to maintain habitat for many prey species of coyote. Fires that create a mosaic of burned and unburned areas are probably the most beneficial to many coyote prey species. Several studies indicate that many small mammal populations increase rapidly subsequent to burning in response to increased food availability.
Whitetailed deer	<i>Odocoileus virginianus</i>	Fast-moving fires can confuse, trap, and kill deer. The effects of fire on whitetail habitat have been well documented. Much of the literature reports in detail on the foraging behavior of whitetails following fire. In general, whitetails are seen foraging more frequently on burned sites than adjacent unburned sites. Patchy burns that create a mosaic of browse and cover are usually beneficial to whitetail populations.

Peregrine falcon	<i>Falco peregrinus</i>	Other than smoke disturbance, no other direct fire effects on peregrine falcon have been noted.. Studies conducted on chaparral burning concluded that abundant food was available to raptors immediately following fire because of the vulnerability of prey species due to a cover reduction. Frequent burning creates a mosaic of habitats and maintains abundant prey for Peregrine falcons. Because Peregrine falcons require open areas for hunting, fires that create these open areas would probably be beneficial, provided burning led to an increase of prey species.
Bald eagle	<i>Haliaeetus leucocephalus</i>	Bald eagles have continued nesting during wildfire and returned to the nest the following year. Fires create snags, which are important perching and nesting sites for bald eagles.

Northern pintail	<i>Anas acuta</i>	Pintail prefer dense nesting cover. Depending on the time of year, fire can destroy nests and kill molting young. Fire does increase food sources.
Western bluebird	<i>Sialia mexicana</i>	Postfire successional communities are usually attractive to western bluebirds, especially in the first few years following the fire.