

FIRE MANAGEMENT PLAN
BROWNS PARK
NATIONAL WILDLIFE REFUGE

Maybell, Colorado

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Executive Summary

In 1998, a fire management plan was prepared by Zone Fire Management Officer Lou Ballard and approved by the Regional Director for the Mountain-Prairie Region. Subsequently, in 2000, a joint fire management plan entitled Little Snake Field Office and Brown's Park National Wildlife Refuge Fire Management Plan (Little Snake Plan) and associated Environmental Assessment were completed. This plan called for the use of wildland fire to achieve resource management objectives in a portion of the Refuge south of the Green River. In March of 2001, a project was initiated by the Regional Fire Management Coordinator to insure all fire management plans in the Region were in compliance with the Federal Wildland Fire Management Policy (January 2001) and Service and Departmental policy changes. The decision was made to rewrite the Browns Park Fire Management Plan to include all the changes in policy since the plan was approved and to incorporate the strategy changes included in the Little Snake Plan.

This plan conforms with all policy guidelines established by the Federal Wildland Fire Management Policy and Program Review (December 1995), The Wildland and Prescribed Fire Management Policy (August 1998), Review and Update of the 1995 Federal Wildland Fire Management Policy (January 2001), and the U.S. Fish and Wildlife Service Fire Management Handbook (December 2000). It calls for the use of the appropriate management response concept to manage all wildland fires burning on Refuge lands, the use of mechanical and chemical fuel treatments, and the use of prescribed fire to achieve resource management objectives. The major change between this plan and the 1998 plan is the Refuge Manager may consider the benefits fire will have on the resource in a specific area, Fire Management Unit D, when selecting the appropriate management response. State of Colorado, federal, Service and Departmental policy and guidelines outlined in this plan will provide direction to the Refuge Manager as he/she implements the fire management program.

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	COMPLIANCE WITH POLICY	2
III.	DESCRIPTION OF REFUGE	
A.	Location	3
B.	Topography and Soils	3
C.	Climate	7
D.	Vegetation	7
E.	Noxious Weeds and Other Problem Species	9
F.	Threatened, Endangered, and Special Concern Species	12
G.	Birds, Mammals, Fish, Reptiles, Amphibians, and Invertebrates	12
H.	Cultural Resources	12
I.	Improvements	13
J.	Wilderness	13
IV.	FIRE ECOLOGY	
A.	Introduction	13
B.	Wetland Marsh	14
C.	Pinyon-Juniper	14
D.	Northern Desert Shrub	14
E.	Grassland	14
F.	Riparian	14
V.	FIRE EFFECTS	
A.	Introduction	15
B.	Noxious Weeds	15
C.	Species of Special Concern	15
D.	Non-Biological Resources	16
VI.	FIRE BEHAVIOR	
A.	Introduction	17
B.	Fuel Models and Estimated Fire Behavior	17
VII.	FIRE MANAGEMENT OBJECTIVES	
A.	Introduction	19
B.	Refuge Management Goals and Objectives	21

VIII.	FIRE MANAGEMENT STRATEGIES	
A.	Overview	22
B.	Strategy and Tactics	22
C.	Rationale	24
D.	Constraints on Fire Management Strategies	25
E.	Effects if Fire Management Activities	26
IX.	FIRE MANAGEMENT RESPONSIBILITIES	
A.	Refuge Staff	27
B.	Cooperators	29
X.	FIRE FREQUENCY AND SEASON	
A.	Fire Frequency	30
B.	Fire Season	30
XI.	EQUIPMENT AND STAFFING NEEDS	
A.	Normal Unit Strength (NUS)	30
B.	Equipment	30
C.	Personnel	30
XII.	PREPAREDNESS	
A.	Training and Fitness	31
B.	Preseason Readiness Activities	33
C.	Effects if Drought and Other Impacts on Station Activities	33
D.	Severity and Emergency Presuppression Funding	34
E.	Step-up Plan	35
XIII.	WILDFIRE PROGRAM	
A.	Fire Fighter Safety	36
B.	Prevention	36
C.	Fire Detection	37
D.	Dispatch Procedures	37
E.	Pre-attack Planning	37
F.	Fire Suppression	37
G.	Wildland Fire Situation Analysis (WFSA)	37
H.	Mop-up Standards and Emergency Stabilization and Rehabilitation	38
XIV.	PRESCRIBED FIRE PROGRAM	
A.	Program Overview	39

B.	Resource Management Objectives	40
C.	Hazardous Fuel Reduction	41
D.	Wildland Fire Use for Resource Benefits	41
E.	Limits	46
F.	Complexity	47
G.	Potential Impacts	47
H.	Planning	47
I.	Preparation and Implementation	49
J.	Monitoring and Evaluation	50
XV.	FIRE MANAGEMENT UNITS	
A.	Introduction	53
B.	FMU A	53
C.	FMU B	53
D.	FMU C	53
E.	FMU D	53
XVI.	COMMON ELEMENTS	
A.	Public Safety	56
B.	Public Information and Education	56
C.	Records and Reports	56
D.	Fire Critiques and Annual Review	57
E.	Air Quality and Smoke Management	58
F.	Fire Research and Monitoring Needs	59
G.	Cultural Resources	59
XVII	CONSULTATION	61
XVIII	REFERENCES	62
LIST OF TABLES		
1.	Vegetation Types	7
2.	Live Fuel Moisture as Burning Indicator	17
3.	Appropriate Management Response	23
4.	Fire Management Staffing	31
5.	Annual Refuge Fire Management Activities	33
6.	Step-up Plan	35
7.	Burn Targets by Vegetation Types	41
LIST OF FIGURES		
1.	Vicinity Map - Browns Park National Wildlife Refuge	4

2.	Browns Park and Adjacent Lands	5
3.	Soils	6
4.	Wetland Vegetation	8
5.	Upland Vegetation	10
6.	Riparian Vegetation	11
7.	Fire Management Flow Chart	20
8.	Relative Risk Rating Chart	44
9.	Fire Management Units	55

APPENDICES

A.	CCP AND NEPA COMPLIANCE
B.	REFUGE SPECIES LIST
C.	FIRE EFFECTS INFORMATION SYSTEM SPECIES LIST & FIRE EFFECTS
D.	WILDLAND & PRESCRIBED FIRE MGT. POLICY - IMPLEMENTATION GUIDE
E.	LITTLE SNAKE OFFICE AND BROWNS PARK NWR FIRE MANAGEMENT PLAN
F.	COOPERATIVE AGREEMENTS
G.	FIRE HISTORY
H.	NORMAL UNIT STRENGTH
I.	LISTING OF FIREFIGHTERS
J.	INTERAGENCY TRAINING FORM
K.	FITNESS TESTING
L.	PRE-ATTACK PLANS
M.	WILDLAND FIRE SITUATION ANALYSIS AND DELEGATION OF AUTHORITY
N.	WILDLAND FIRE USE FOR RESOURCE BENEFIT
O.	PRESCRIBED FIRE COMPLEXITY
P.	MONITORING
Q.	LIVE FUEL MOISTURE SAMPLING
R.	SMOKE MANAGEMENT MEMORANDUM OF UNDERSTANDING

I. INTRODUCTION

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

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

This plan meets the requirements of the National Environmental Protection Act (NEPA). An environmental assessment was completed for the Little Snake Field Office and Brown's Park National Wildlife Refuge Fire Management Plan March 2000). The public was also involved in 1999 through preparation of a Comprehensive Conservation Plan for the Refuge, and a Finding of No Significant Impact (FONSI) was signed by the Regional Director in September of that year (Appendix A). This Fire Management Plan tiers off a land management plan that address the use of fire as a management tool and has been through the NEPA process, therefore an EA will not be completed for this plan. In addition, regulations published in the Federal Register (62 FR 2375) January 16, 1997 categorically excludes prescribed fire when used for habitat improvement purposes and conducted in accordance with local and State ordinances and laws. Wildfire suppression actions and prescribed fire are both categorically excluded, as outlined in 516 DM 2 Appendix 1.

U.S. Fish and Wildlife Service Departmental Manual 621 DM 1 requires all refuges with burnable vegetation to complete a fire management plan. This plan provides fire management guidelines for the Refuge.

The statutes cited herein authorize and provide the means for fire management activities on lands under the jurisdiction of the Department of the Interior, or lands adjacent thereto.

1. Protection Act of 1922 (42 Stat. 857; 16 USC 594)
2. Economy Act of 1932 (47 Stat. 417; 31 USC 1535)

3. Taylor Grazing Act of 1934 (48 Stat. 1269; 43 USC 315)
1. Reciprocal Fire Protection Act of 1955 (69 Stat. 66; 42 USC 1856a)
5. National Wildlife Refuge System Administration Act of 1966 as amended (80 Stat. 927; 16 USC 668dd-668ee)
6. Federal Fire Prevention and Control Act of 1974 (88 Stat. 1535; 15 USC 2201)
7. Wildfire Suppression Assistance Act of 1989 (PL 100-428 as amended by PL 101-11)
8. Disaster Relief Act of May 22, 1974. (88 Stat. 1431 42 U.S.C. 5121)
9. 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 USC 6301-6308)
10. Department of Interior Manual Part 620 DM-1, Wildland Fire Management (April 10, 2000).
11. United States Fish and Wildlife Service Wildland Fire Management Handbook (December 2, 2000).
12. United States Fish and Wildlife Service Refuge Manual, Chapter 6 RM 7, Fire Management (September 6, 1991)

II. COMPLIANCE WITH FISH AND WILDLIFE SERVICE POLICY

The enabling legislation for the Refuge included the Migratory Bird Conservation Act (16 USC 715d) and the Refuge Recreation Act (16 USC 460k-1). The legal purposes (mission) of the Refuge include:

“... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds,” and

“... suitable for-(1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species...”

The Refuge was established for three primary reasons: highly productive **wetlands** along the Green River, valuable **riparian habitat**, and critical **winter habitat** for mule deer, pronghorn antelope, elk and other wildlife. Besides its value to wildlife, the Refuge also provides significant values for people. The Refuge provides a unique combination of: wildlife, solitude, scenery, and western history that is unmatched in the Refuge System. Such values make the Refuge a national treasure. These values, need to be protected from a wildfire that could harm them.

Fire will be used as a tool to improve wildlife habitat on the refuge. Improving habitat is one of the seven goals of the Comprehensive Conservation Plan (CCP). This plan will clearly guide the use of wildland fire on the Refuge, and facilitate the accomplishment of objectives relevant to the use of fire as a land management tool.

III. DESCRIPTION OF REFUGE

A. Introduction

The Refuge is located in extreme Northwest Colorado, 53 miles northwest of Maybell, Colorado and 50 miles northeast of Vernal, Utah (Figure 1). The Refuge boundary encompasses approximately 13,455 acres within the small valley known as Browns Park. The Green River enters the Refuge at the Utah state line, bisects the Refuge and leaves the Refuge at the boundary of Dinosaur National Monument. Of the 13,455 acres within the refuge boundary, 13,276 acres contain flammable fuels. The remaining acreage is open water or rock outcrops. The majority of the surrounding land is managed by the Bureau of Land Management (BLM). A 200 acre private inholding exists in the southeastern portion of the refuge. Land ownership patterns adjacent to the Refuge is illustrated in Figure 2.

B. Topography & Soils

The Refuge area is generally flat to rolling, however the Browns Park area includes steep rocky slopes and rugged terrain. Elevations range from 5500-8500 feet above mean sea level. The influence of topography on weather is evident in Browns Park. Winters are unusually mild for mountainous country.

Soils are highly diverse throughout the Refuge ranging from clay loam to course sand. Soil complexes on the Refuge are indicated on Figure 3.

Figure 1: Vicinity Map

Figure 2: Land Ownership

Figure 3: Soils

C. Climate

Browns Park lies within both the Colorado Plateau and the Middle Rocky Mountain physiographic provinces. The climate is a semi-arid continental regime characterized by low relative humidity, abundant sunshine, high evaporation rates and low precipitation. Prevailing clear skies with strong daytime insolation and rapid nighttime cooling result in wide daily temperature fluctuations. Within Browns Park itself temperature extremes are moderated because of the buffering effect of the Green River. The area experiences a high frequency of inversion and fog in the winter months resulting from nighttime cold air draining from surrounding higher elevations. Over the past ten years precipitation varied from 4 to 12 inches per year. Annual precipitation averages 9.5 inches, most of which occurs in the spring.

The growing season averages about 115 days. The first hard frost typically occurs in mid-September. Temperatures during the growing season range from 40 to 95 degrees Fahrenheit. Upper air flow generally originates from the west or southwest and moves to the east and northeast. Prevailing surface winds are from the west to northwest. Average wind velocities are less than seven miles per hour. Winds are most active in April.

D. Vegetation

Vegetation types on the Refuge are classified as: wetland marsh, pinyon-juniper, northern desert shrub, grassland and riparian.

Table 1: Vegetation Types

Vegetation Types	Acreage
Wetland Marsh	1,245
Pinyon-Juniper	1,083
Northern Desert Shrub	7,930
Grassland	1,906
Riparian	1,112
Not Classified	182

Wetland Marsh: Approximately 1,245 acres of wetland marsh habitat exists on the Refuge. This includes both deepwater and shallow marshes. Hardstem bulrush (*Scirpus acutus*) and cattail (*Typha latifolia*) are the dominant plant species. This vegetative type exists in seven active marsh units along the length of the Refuge adjacent to the Green River (Figure 4).

Figure 4: Wetland Vegetation

Pinyon-Juniper: Approximately 1,083 acres of pinyon-juniper vegetation exists on the Refuge. The dominant plant species in this vegetative type are pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Pinyon-juniper is found in homogeneous stands along the southern border and in scattered clumps throughout the refuge (Figure 5)

Northern Desert Shrub: Approximately 7,930 acres of northern desert shrub exists on the Refuge. Dominant plant species in this type are basin big sagebrush (*Artemisia tridentata ssp. tridentata*), greasewood (*Sarcobatus vermiculatus*), rabbitbrush (*Chrysothamnus spp.*), four-winged saltbush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*), and winterfat (*Krascheninnikovia lanata*). This vegetation type covers much of the upland area of the refuge (Figure 5).

Grassland: Approximately 1,906 acres of grassland vegetation exists on the Refuge. Dominant plant species in this type include alkali sacaton (*Sporobolus airoides*), inland saltgrass (*Distichlis spicata*) and Great Basin wildrye (*Elymus cinereus*). Grasslands are found primarily along Beaver Creek, the Green River and Ryegrass draw (Figure 5).

Riparian: This vegetation type includes the narrow ribbon of trees along the creeks and river on the Refuge. Approximately 1,112 acres of riparian forest habitat exists on the Refuge. The dominant plant species are Fremont cottonwood (*Populus fremontii*), water birch (*Betula occidentalis*), and sandbar willow (*Salix exigua*). This type exists along Beaver Creek, Vermillion Creek and the Green River (Figure 6).

E. Noxious Weeds and Other Problem Species

Several non-native species are acting as invasives on the Refuge. Cheat grass (*Bromus tectorum*), perennial pepperweed (*Lepidium latifolium*), salt cedar (*Tamarix ramosissima*), Russian knapweed (*Centaurea repens*) and leafy spurge (*Euphorbia esula*) are the non-natives of most concern. Perennial pepperweed is the most widespread and difficult to control. These plants have the potential to displace native species.

Figure 5: Upland Vegetation

Figure 6: Riparian Vegetation

F. Threatened, Endangered and Special Concern Species

The Refuge provides important habitat for twenty-two special concern wildlife species, however only eight have important habitat on the refuge: Bald eagle (*Haliaeetus leucocephalus*); Peregrine falcon (*Falco peregrinus*); White faced ibis (*Plegadis chihi*), American bittern (*Botaurus lentiginosus*), Northern harrier (*Circus cyaneus*), Loggerhead shrike (*Lanius ludvicianus*) and Brewer's sparrow (*Spizella breweri*). The Northern harrier, Loggerhead shrike and Brewer's sparrow are the most abundant of the special status species.

The federally endangered Colorado squawfish inhabits the Green River. The peregrine falcon and bald eagle are frequently observed using the Refuge. Bald eagles frequent the Refuge's riparian areas during the winter. The only federally listed special concern plant found along the Green River, but not on the Refuge is the Ute ladies-tresses orchid (*Spiranthes diluvialis*). Gibben's beardtongue (*Penstemon gibbensii*) is a candidate for federal listing as an endangered or threatened species. The Gibben's beardtongue occurs on steep white shale slopes above Hog Lake on the Refuge.

G. Birds, Mammals, Fish, Reptiles, Amphibians and Invertebrates

There are 221 species of birds, 69 species of mammals, 11 species of reptiles and 4 species of amphibians that have been identified on the Refuge. Appendix B contains a species list which includes abundance and residency status of each species. Invertebrates have not been inventoried or studied on the Refuge.

H. Cultural Resources

The Browns Park area is rich in cultural resources. The earliest visible cultural sites belong to the Fremont Indian culture that occupied Browns Park from approximately 300 A.D. Granaries, or storage buildings that held corn, remain today. This same culture left petroglyphs—rock carvings of peoples and animals on rock slabs on and near the Refuge. Sometime after the Fremont peoples disappeared, a portion of the Shoshone or Snake tribe arrived, and began spending winters in the relatively mild climate of Browns Park. Tepee rings and other less dramatic evidence remain on the Refuge. During the Shoshone occupation, Euro-American trappers and traders entered the valley. Three of these traders built a fort they christened Fort Davy Crockett. None of Fort Davy Crockett remains above ground. Sometime after the fur trade dissolved, cattle ranchers entered the valley and began grazing the surrounding area. Not long after, outlaws including notables such as Butch Cassidy and the Wild Bunch, set up in the valley because it offered shelter from the law and for their rustled cattle. Four abandoned homesites also exist on the Refuge. These have not been listed as historic sites and are not considered high value for additional protection.

Three National Historic Sites exist on the Refuge. The Lodore School was

erected in 1911 and is no longer in use as a school. The former school is still maintained and used as needed by the Browns Park community. The Two Bar Ranch is a late 19th century ranch that was winter headquarters for Ora Haley, a powerful rancher at the time. Fort Davy Crockett is the third National Historic Site on the Refuge.

I. Improvements

There are two areas of improvements on the Refuge. The headquarters complex consists of Refuge headquarters, employee residences and refuge maintenance buildings. The estimated value of this complex in 1998 was \$1,048,500. The second area of improvements on refuge is the sub-headquarters. This complex consists mainly of employee housing. The estimated value of the sub-headquarters complex was \$440,000. Total value of improvements on the Refuge was \$1,484,500. Other improvements include seven pump stations, two campgrounds, an informational kiosk, numerous signs, a waterfowl blind for the disabled, and a fishing pier for the disabled.

J. Wilderness

There is no congressionally mandated wilderness within the Refuge. Two Wilderness Study Areas (WSA's) are located on BLM lands in close proximity to the Refuge.

IV. FIRE ECOLOGY

A. Introduction

Historical fire information for the Browns Park area is generally lacking, however due to the numerous fire scars on the mountains above the Refuge it is apparent that the area is prone to fire. Fire acts as a disturbance factor in the vegetal development of most plant communities and invokes secondary succession processes (Bunting 1984). Because of the prevalence of lightning activity in the area and the historical prominence of humans in the area it is probable that fire was a major disturbance factor in the development of vegetative communities in the Browns Park area. Heavy livestock grazing in the middle 19th century and into the 20th century has probably disturbed the pre-European fire regime (Kouris 1980). The best approach to return fire into the Browns Park ecosystem is to determine a desired condition, develop fire strategies to achieve the condition and then to monitor the results of the action. A brief summary of the fire ecology for each vegetative community identified on the Refuge follows this sub-section.

B. Wetland Marsh

There is little documentation on the historical fire ecology of this type. Fire would not have been necessary to maintain the species composition in these wetland systems. Hydrologic factors are more likely the force behind the development of this vegetative community. Prescribed fire can be used as an effective means of reducing vegetative biomass when it is beneficial to do so.

C. Pinyon-Juniper

Domination of sites by pinyon-juniper stands requires an interval without disturbance of approximately 100 years (Miller, et. al 1994). Disturbance at shorter intervals (20-40 years) will result in vegetative types dominated by shrubs or by a combination of grass and shrubs (Kilgore 1981).

D. Northern Desert Shrub

Domination of sites by shrub species such as big sagebrush in this type would require a non-disturbance interval of more than 30 years (Petersburg 1992). With disturbance intervals less than 30 years a community of grass and desert shrub would result.

E. Grassland

This vegetative type could be characterized by a shorter (5-20 year) disturbance interval. Variation in the length of time between fire events, intensity of the fire or season of burn may favor different grass species (Wright 1985). Individual species fire effects analysis can help determine which grass community would result from a particular disturbance interval.

F. Riparian

Fremont cottonwood is an indicator of this vegetative type and has a low tolerance to intense fire intensities (FEIS 1998). Low fire intensities will generally not top-kill Fremont cottonwoods. In related populus species, top-killing of trees is generally followed by sprouting from the stump and root collars (FEIS 1998). The understory species in this vegetative type will generally respond favorably to fire.

V. FIRE EFFECTS

A. Introduction

Fire effects for species of special concern will be characterized below. For a species specific listing of the effects of fire on selected species that occur on the Refuge, see Appendix C.

B. Noxious weeds

Cheat Grass: Frequent fires favor cheatgrass over perennial native vegetation (FEIS 1998). Cheatgrass seed is stored in the ground and because of its rapid growth and vigorous reproduction it has the potential to dominate sites. In areas with substantial perennial herbaceous cover prior to the burn, cheatgrass would not be expected to dominate the site following burning (Bunting 1985).

Perennial pepperweed: Dense stands of perennial pepperweed retard the spread of fire. When fire does penetrate a stand of perennial pepperweed, top-killing of the plant is accomplished. Perennial pepperweed resprouts from rhizomes following fire (FEIS 1998). Areas of severe disturbance within seeding distance of perennial pepperweed may be invaded and soon dominated by this plant.

Saltcedar: Saltcedar is a fire adapted, introduced species. Upon burning, saltcedar sprouts from the root crown and flowers profusely. Saltcedar will invade favorable seedbeds. Burning alone does not usually control saltcedar (FEIS 1998).

Russian knapweed: Russian knapweed is top-killed by fire, however it probably resprouts from rhizomes (FEIS 1998). There is no evidence that Russian knapweed will invade burned areas immediately after the burn.

Leafy spurge: Leafy spurge is top-killed by fire, but resprouts from underground rhizomes. Fall burning has a tendency to reduce the abundance of leafy spurge more so than with spring burns (FEIS 1998).

C. Species of Special Concern

Bald eagle: The greatest effect to Bald eagles on the refuge is through the loss of roosting habitat when cottonwood trees are killed by intense fire behavior (FEIS 1998). Eagles do not nest on the refuge so loss of nesting is not a consideration.

Peregrine falcon: The falcon nests in the cliffs outside of the refuge boundaries. There would be little effect of fires on refuge.

White-faced ibis: The major effect to the ibis would be burning during the nesting season. Avoidance of fire during the nesting season or inventorying prior to a burn would assure that white-faced ibis are not impacted by fire management activities.

American bittern: No data listed. Avoid burning during nesting season.

Northern harrier: Burns during nesting season are discouraged.

Loggerhead shrike: No data listed. Avoid burning during nesting season.

Brewer's sparrow: Avoid burning during nesting season. Determine successional habitat requirements before converting large amounts of Northern Desert Shrub vegetation.

River otter: River otter is not effected by fire since most of the habitat is on the river's edge.

Ute ladies'-tresses orchid: Data is not conclusive, however it appears that early season burns (prior to July) improve flowering and July-August burns caused increased mortality.

D. Non-Biological Resources

Soils: Soils should be unaffected by fire on the Refuge. Fuels are generally flashy and will not provide for a fire that has a long enough residence time to cause significant soils damage due to heating. Soil erosion caused by removing vegetation from the land is not likely since most areas that will burn on the Refuge do not have a steep slope.

Air Quality: Any fire on the Refuge will cause a temporary degradation in the local air quality. The air quality in the area around the refuge is very good and can absorb and buffer the effects of smoke from fire burning on refuge.

Cultural Resources/Refuge Improvements: There are three historical sites located on Refuge; Fort Davy Crockett, the old Lodore School and the Two Bar Ranch. In addition there are Refuge improvements in the form of buildings at the headquarters and the subheadquarters. All that remains of Fort Davy Crockett is below the surface of mineral soil and would not be adversely affected by fire burning above it. The Lodore School, Two Bar Ranch and Refuge buildings are all subject to damage from fire. Prevention activities to protect these structures is outlined in the Prevention section of this plan.

VI. FIRE BEHAVIOR

A. Introduction

Fire behavior will generally be the greatest in the period of June, July and August. Thunderstorms and gusty winds are most severe during this time period. More moderate fire behavior can be expected during the remaining portion of the year. Winds are generally out of west-southwest but can occur from any direction when thunderstorms or a frontal passage moves through the area. Wind speed can be expected to increase with these weather events.

Live fuel moisture (LFM) is a good indicator of larger fuel conditions and how well they will burn. Live fuel moisture for key species which will indicate that intense burning will occur if weather conditions are favorable are as follows:

Table 2: Live Fuel Moisture

Species	LFM INDICATING SPECIES WILL BURN	LFM INDICATING INTENSE BURNING IS PROBABLE
Sagebrush (<i>Artemisia tridentata</i>)	<120%	<100%
Grass	<80%	<60%

B. Fuel Models and Estimated Fire Behavior

Fuel models are simple tools to help the user realistically estimate fire behavior (Anderson 1982). The vegetation types described in Section III - D have been assessed and the Northern Forest Fire Lab (NFFL) fire behavior fuel model most closely describing the predominate fuel type has been used to estimate fire behavior in these various habitat types. The following descriptions of NFFL fuel models and the corresponding estimated fire behavior have been adapted from Hal E. Anderson's Aids to Determining Fuel Models for Estimating Fire Behavior (1982). The National Fire Danger Rating System (NFDRS) is used in combination with environmental conditions, rainfall amounts and duration, and other factors to assess fire danger.

1. NFFL Fuel Model 3 - NFDRS N (Tall Grass)

This fuel type (Marsh vegetation) occupies approximately 1,245 acres of Refuge and is located specifically in river and stream corridors. The main vegetation is bulrush and cattail. Fire in this fuel model is the most intense of grass fuel models and displays high rates of spread under the influence of wind. Wind may drive fire into the upper heights of the grass and across standing water. Fuel loads consist of fine and course dead fuels averaging 3.0 tons/acre and a fuel bed depth of 2.5 feet.

2. NFFL Fuel Model 6 - NFDRS Fuel Model F (Intermediate Brush)

Local fire managers utilize this fuel model to estimate fire behavior in stands of pinyon-juniper, which occurs on about 1,083 acres of the Refuge, generally on upper slopes. Because of the woodland nature of this vegetation, crown closure is not common and ground fuel is sparse. Because of this, the intensity that this vegetation type burns is highly dependent on wind. Ignitions during low to moderate fire weather conditions generally result in a single or small group of trees burning with little fire spread. However, in wind events where fuel moistures are low and winds in excess of 20 mph occur, an independent crown fire is possible. The spatial extent of the fire will usually be limited by discontinuous fuels and natural barriers. NFFL Fuel Model 6 may over-predict rate of spread except during high wind events. Rate of spread is estimated to be 32 chains/hour with flame lengths of 6 feet. Total fuel loading for live and dead fuels is 6.0 tons/acre and fuel bed depth is 2.5 feet.

3. NFFL Fuel Model 2 - NFDRS Fuel Model T (Grass with brush overstory).

Northern Desert Shrub is by far the predominant vegetative type on the Refuge occurring on approximately 7,930 acres or 59% of the land area. Rates of spread are highly dependent on fuel continuity and wind or slope gradient. On the Refuge, intensities in this type will vary depending on species composition. Most of the area in this type is composed of low-growing sagebrush and grass. Fire spread in this type is generally not a concern even under extreme fire weather conditions. The remainder of this type is composed of greasewood. When greasewood is involved and live fuel moisture is low, intense burning can occur. Generally the extent of burning in this type is limited on the Refuge by natural barriers and areas of discontinuous fuels. A rate of spread of 35 chains/hour could be expected with a flame length of 6 feet. Total live and dead fuel loading averages 3.0 tons/acre with a fuel bed depth of 2.5 feet.

4. NFFL Fuel Model 1 - NFDRS Fuel Model L (Short Grass)

The grassland fuel type occurs on approximately 1,906 acres of the Refuge. After grasses have completed curing, high rates of spread can be expected, however resistance to suppression efforts is low. Flame lengths under severe fire weather conditions can make it nearly impossible to attack the fire directly with hand tools. Safety zones are few in this type and would generally be restricted to the already burned blackened areas. Rate of spread can reach 78 chains/hour with flame lengths of 4 feet. Fuel loading is relatively light at 0.74 tons/acre and a fuel depth of 1 foot.

5. NFFL Fuel Model 2 - NFDRS Fuel Model C

This fuel type occurs in the riparian areas and is composed mostly of open cottonwood stands with a grass understory. Areas where this fuel type occurs are restricted to river and stream bottoms and is representative on 1,112 acres of the Refuge. Several areas where this fuel type occurs have experienced higher fuel loading due to dead trees falling to the ground, thus creating a high fuel load, which could lead to fires with intensities greater than those predicted. Generally fire is restricted to the grassy understory in this type, however when fuel jackpots are burned, intense heavy fuel burning on the forest floor can cause mortality in live cottonwoods. Rates of spread average 35 chains/hour with flame lengths of 6 feet. Total fuel loading for both live and dead fuels is 4.0 tons/acre and fuel depths are approximately 1 foot.

VII. FIRE MANAGEMENT OBJECTIVES

A. Introduction

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

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

Figure 7 outlines the flow of fire management activities on Browns Park NWR.

Figure 7: Fire Management Flow Chart

B. Refuge Fire Management Goals and Objectives

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

Objectives:

- a. Safely suppress all wildfires using strategies and tactics appropriate to safety considerations, values at risk, and in accordance with Service policy.
- b. Minimize the cost and impact of wildland fire suppression activities.
- c. Prevent human-caused wildfires.
- d. Take actions to reduce vulnerability of refuge resources to fire.

2. Goal: When practical, use prescribed fire as a tool to accomplish habitat management objectives.

Objectives: Use wildland fire:

- a. To increase vigor in native grasslands.
- b. To reset selected habitats to more productive early successional stages.
- c. To create a mosaic of life stages within Refuge habitats, to provide habitat for the greatest diversity of wildlife.
- d. To prepare non-native plant infestations for more efficient herbicide treatments.
- e. As part of an integrated pest management plan to control non-native plants.

VIII. FIRE MANAGEMENT STRATEGIES

A. Overview

In keeping with Service policy, the Refuge will utilize the appropriate management response concept to manage all wildland fires consistent with values at risk occurring within the boundaries of the Refuge. Strategies employing a range of suppression options depending on the situation will be used. Minimum impact suppression tactics (MIST) will be used, where appropriate.

B. Strategy and Tactics

The strategies outlined below will be used to meet Refuge wildland fire management objectives.

1. Minimum impact strategies and tactics will be used whenever possible.
2. A suppression oriented response will generally be the appropriate strategy for most of the Refuge, which is described as Polygon B-6 in the Little Snake Office and Browns Park National Wildlife Refuge Fire Management Plan (Appendix D). The use of natural or manmade barriers to contain the fire may also be appropriate when increased firefighter safety or reduced cost per acre over aggressive attack can be attained.

Tactics used to manage a wildland fire in Polygon B-6 will be unique to each incident and are dependent on safety considerations, current and predicted weather conditions, current and predicted fire behavior, fuel conditions, cost of suppression, availability of resources, and location of the fire in proximity to structures and cultural resource sites. Guidance will be provided in this plan and the Little Snake Office and Browns Park National Wildlife Refuge Fire Management Plan (Little Snake Plan), but specific tactics will be determined by the Incident Commander on site.

The following table is intended to illustrate through the use of a matrix, some of the various options available to the Incident Commander.

Table 3: Appropriate Management Response

SITUATION	STRATEGY	TACTIC
1. Wildland fire on Refuge lands which does not threaten life, natural or cultural resources or property values.	Restrict the fire within defined boundaries established either prior to the fire or during the fire.	<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 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 or indirect line construction 2. Engine and water use. 3. Aerial retardant 4. Burn out and back fire. 5. Mop-up all or part of the fire area.

3. A small area of the Refuge adjacent to the BLM's Diamond Breaks WSA has been included within the D-2 polygon. The area lies south of the Green River. The boundaries for the narrow strip of land are Moffat County Road 83 and an unimproved dirt road on the north and the boundary with BLM lands on the south (see Figure 8). Wildland Fire Use for Resource Benefit (WFURB) has been identified as an appropriate wildland fire management consideration for lands in polygon D-2. How the determination will be made and the strategies to be used will be based on the procedures outlined in the Wildland and Prescribed Fire Management Policy - Implementation Procedures Reference Guide (Appendix D) and in the AOP for the Little Snake FMP (Appendix L). Additional guidance can be found in Section XIV.D.4 of this plan.

4. Prescribed fire will be utilized to modify vegetative communities for improved wildlife habitat, ecosystem function and fuel reduction.

5. Mechanical treatment of natural fuels will be utilized to reduce potential for damage from wildfire. These treatments must be in compliance with resource management goals and objectives.

6. Following an assessment of fuel loading and vegetation composition and any necessary fuel treatment, Wildland Fire Use for Resource Benefit (WFURB) will be considered when determining the appropriate management response in Fire Management Unit C (See Sections XIV- D and XV-D).

C. Rationale for Determining Fire Management Strategies

1. The Refuge and the BLM have entered into an agreement to manage their respective lands under a joint wildland fire management plan that tiers off the Browns Park FMP.

2. Wildland Fire Use for Resource Benefit (WFURB) has been identified as an appropriate consideration by BLM and the Refuge for lands in Polygon D-2. The road within the Refuge provides firefighters is a logical and easily recognized boundary for the Maximum Manageable Area (MMA) for that polygon, and provides a safe and effective barrier manage a WFURB as illustrated by the actions taken to manage the Ecklund Complex in July 2001.

3. A suppression oriented response to manage all unwanted wildland fires will increase the likelihood that a fire will not escape Refuge boundaries and values at risk will be protected.

4. Wildland fire has been proven effective as a means to manage many vegetative communities; and certain resource management practices are enhanced through the use of wildland fire (e.g. cattail control).

5. Hazard fuel reduction on some areas of the refuge are not conducive to the use of prescribed fire due to potential damage to resource values. Prescribed fire would be an option for the maintenance of these areas once mechanical treatment of high fuel loading has been completed.

D. Constraints on Refuge Fire Management Strategies

1. When heavy equipment is used for fireline construction, the Project Leader or his/her designated representative should assign a fireline qualified resource advisor to provide guidance to suppression forces.
2. 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.
3. Load limits on the swinging bridge will be observed. The Taylor Flats crossing, located approximately 8 miles upstream by road should be used by fire equipment for access to the portion of the Refuge lying south of the river.
4. Prescribed burning in areas where threatened, endangered, and candidate species exist will not be conducted if the prescribed fire may be detrimental to the species or if any adverse impacts cannot be mitigated. Section 7 clearance will be secured, as appropriate.
5. The use of prescribed fire may be constrained due to the following: firefighter and public safety, adverse weather, improper wind direction and speed, danger of damage to adjacent lands or residences by smoke or escaped burns, adverse public reactions, practicality due to limited manpower and equipment, and seasonal timing (e.g. nesting).
6. Prescribed burns will not be conducted during periods of high fire danger when county or State-wide burning bans are in effect.
7. Generally, no more than one prescribed burn will be active at one time although multiple burns may be conducted consecutively in one day. Only in circumstances where burns are closely situated and can be safely managed by the Refuge staff and contingency forces are available, will multiple fires be conducted simultaneously.
8. Protect nesting habitat for the Brewer's sparrow and stands of Wyoming big sagebrush and mature cottonwood trees in the riparian corridor from wildland fire.

9. Protect the limited amount of pinyon-juniper woodlands from wildland fire when suppression actions would not be unduly hazardous.

E. Effects of Fire Management Activities

Fire management activities initiated by the Refuge are not expected to adversely impact neighboring landowners and, in fact, may increase firefighter safety, aid in wildland fire suppression and fuels management, and reduce suppression costs through fuel treatments and defensible boundaries. Game winter range is expected to increase and other benefits to wildlife can be expected to occur. Impacts from prescribed fire activities such as smoke can be mitigated through proper planning.

The Refuge and the Little Snake Field Office have jointly developed a fire management plan to better manage wildland fires in the area (Appendix E). This course of action is expected to improve public and firefighter safety, reduce suppression costs, and create an ecosystem that will benefit wildlife.

The actions taken by the Refuge can be expected to reduce the likelihood that a wildland fire starting outside the boundary will enter the Refuge and damage or destroy values at risk.

IX. FIRE MANAGEMENT RESPONSIBILITIES

A. Refuge Staff

The Refuge staff is limited and, using a team approach, all participate in one way or another in the fire management program. The Refuge Manager is the official ultimately responsible for all fire management decisions concerning both wildfire and prescribed fire on the Refuge. The Refuge Manager is also responsible for the daily assessment to determine if prescribed burn units are within prescription. The authority to make these decisions may be delegated in writing by the Project Leader to others in whole or part.

1. Refuge Manager

- a. Responsible for the overall management of the Refuge, including the fire program.
- b. Insure that Department, Service, and Refuge policies are followed and maintained.
- c. Insure sufficient collateral duty firefighters meeting Service standards are available for initial attack
- d. Supervise the writing of prescribed burn plans for the Refuge.
- e. Approves prescribed fire plans.
- f. Certifies that the level of risk in managing a wildland fire to achieve resource management benefit is acceptable.
- g. Serves as a collateral duty firefighter and prescribed fire burn boss, as qualified and available.

2. Assistant Refuge Manager

- a. Supervise the resource management activities on the Refuge including the selection of objectives and tools to be used in achieving objectives (including prescribed fire).
- b. Prepares annual FIREBASE budget request, approves and tracks use of FIREBASE accounts.
- c. Responsible for planning, coordinating, and directing preparedness activities including:
 1. Fire training.
 2. Physical fitness testing and Interagency Fire Qualification System (IFQS) data entry.
 3. Fire cache and equipment inventory accountability, maintenance, and operation.
 4. Coordination with cooperative agencies. Revises cooperative agreements as necessary.

- 5. Insures step-up plan is followed.
- d. Insures fire management policies are observed.
- e. Has lead responsibility for managing the prescribed fire program including:
 - 1. When available, serve as prescribed fire burn boss.
 - 2. Propose prescribed fire projects.
 - 3. Write prescribed fire plans.
- f. Maintains liaison with Regional Fire Management Coordinator and Zone Fire Management Officer.
- g. Updates the Fire Management Plan, maintains fire records, reviews fire reports (DI-1202) for accuracy.
- h. Serves as a collateral duty firefighter and prescribed fire burn boss, as qualified and available.

3. Seasonal and Collateral Duty Firefighters

- f. Maintain assigned fire equipment in ready state and use required Personal Protective Equipment (PPE)
- g. Responsible for their personal protective equipment and physical conditioning.
- h. Qualify annually with the work capacity test before June 15.

4. Wildfire Incident Commander (as assigned)

- a. The Incident Commander (IC) will be responsible for the safe and efficient suppression of the assigned fire.
- b. Fulfill the duties described for the IC in the Fireline Handbook (PMS-420-1).
- c. Notify dispatch and/or FMO of all resource needs and situation updates, including the need for an extended attack.
- d. Ensure that personnel are qualified for the job they are performing, and briefs firefighters on expected weather, fire behavior, communications, escape routes, and safety zones, and posts fire lookouts.
- e. Ensure that fire behavior is monitored, data collected and recorded.
- f. Identify and protect sensitive areas.
- g. Utilize minimum impact strategies whenever possible
- h. Ensure that the fire site is fully rehabilitated or that the management of rehabilitation has been assigned.
- i. Submit completed DI-1202 wildfire report, crew time sheets, and a listing of any other fire related expenditures or losses to Assistant Refuge Manager within 3 days of fire being declared out.

5. Prescribed Burn Boss (as assigned)
 - a. Implement approved prescribed burn plans within prescriptions.
 - b. Assist with the administration, monitoring, and evaluation of prescribed burns.
 - c. Document weather and fire behavior (including rates of spread and flame length) and submit to the Assistant Refuge Manager.
 - d. Document necessary information to complete DI-1202 (fire report) and submit within 3 days to Assistant Refuge Manager.

B. Fire Cooperators

The Refuge is almost entirely surrounded by federal lands owned and/or managed by the Bureau of Land Management. There are a few parcels of State Land and one section of private land within the Refuge boundary. Two BLM Districts (Craig and Vernal) adjoin the refuge and have primary fire management responsibilities for these lands. As indicated in a previous section, the Refuge and the Little Snake Field Office have jointly developed a fire management plan to better manage wildland fires in the area (Appendix D).

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

Cooperators will:

1. Provide assistance in suppression of wildfires and prescribed fire implementation as defined in the Interagency Memorandum of Understanding establishing the Craig Interagency Dispatch Center and the Craig Interagency Dispatch Center Annual Operating Plan (Appendix F)
2. Assist, as needed, in the investigation of suspicious fires.

X. FIRE FREQUENCY AND SEASON

A. Fire Frequency

The Refuge is involved in an active interagency management program in cooperation with the Bureau of Land Management, Dinosaur National Monument, U. S. Forest Service, Colorado State Forest Service and Moffat County, Colorado. In the period of 1989-1998, the Refuge has responded to and suppressed 14 on-Refuge fires and 90 interagency assists. The fire frequency for Refuge fires is 1.4 per year. Interagency assists average 9 per year. The Refuge is committed to maintaining its readiness to assist its neighbors in fire management activities as many fires that start adjacent to the Refuge have the potential to burn onto Service lands. A listing of the historical wildland fire activity on the Refuge is contained in Appendix G.

B. Fire Season

The fire season as determined by the Craig Interagency Dispatch Center is April 1, through November 1, although local experience suggests that the majority of wildfires in the Browns Park area occur from 15 June through 15 September.

XI. EQUIPMENT AND STAFFING NEEDS

A. Normal Unit Strength (NUS)

The Refuge will utilize a ten-person cache. Recommended cache items and Type 6 engine inventory are identified in Appendix H.

B. Equipment

Engines are the primary initial attack resource on the Refuge because of the predominance of fine fuels and access roads. Earth moving equipment is available, however it will only be used after approval of the Refuge Manager and when no other alternatives exist. A list of fire funded/maintained equipment is located in Appendix H.

C. Personnel

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

The following table outlines the minimum position needed to implement the Fire Management program at the Refuge. Appendix I contains a listing of current firefighters and their qualifications.

Table 4: Fire Management Staffing

Position	Minimum # Required
Incident Commander Type 5 (ICT5)	2
Prescribed Fire Burn Boss Type 3 (RXB3) or Type 2 (RXB2)	2
Engine Boss (ENGB)	1
Engine Operator (ENOP)	2
Fire Fighter Type 2 (FFT2)	3

XII. PREPAREDNESS

A. Training and Fitness

Fish and Wildlife Service policy sets training, qualification and fitness requirements for all wildland firefighters and prescribed fire positions. All personnel involved in fire management functions will be provided with the training required to meet Service qualification standards for the position they are expected to perform. Interagency training opportunities will be utilized whenever possible.

a. Training

1. The Regional Office may pay for all approved fire management training if the following criteria are met:
2. Participant completes and submits to the Zone Fire Management Officer a National Wildfire Coordinating Group Interagency Training Nomination form (Appendix J), complete with supervisory approval and an estimated cost of training, travel and per diem prior to the commencement of training.
3. The training is approved by the Zone Fire Management Officer.
4. Upon completion of the training, a copy of the Certificate of Completion and a copy of the travel voucher are sent to the Zone Fire Management Officer. Travel vouchers will include the training name and/or number.

b. Annual Refresher

All personnel involved in Fire Management activities are required to participate in 8 hours of fire management refresher training annually to be qualified for fire management activities. Refresher training will concentrate on local needs as well as Standards for survival or Look Up, Look Down & Look Around. The National Wildfire Coordinating Group's (NWCG) course Standards for Survival provides appropriate refresher training. Fire shelter deployment and use training will also be included as part of the annual refresher training.

c. Physical Fitness

All personnel involved in fire management activities will meet the fitness standards established by the Service and Region. At this point in time, firefighters participating in wildfire suppression must achieve and maintain an Arduous rating. Firefighters participating in Prescribed Burns must achieve and maintain a Moderate rating. Information found in Appendix ??? provides specific instructions to administer the tests, a health screening questionnaire to aid in assessing personal health and fitness of employees prior to taking the test, an informed consent form, and safety considerations. A trained and qualified American Red Cross First Responder (or equivalent) who can recognize symptoms of physical distress and who can administer appropriate first aid procedures must be on site during the test.

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

d. 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.

B. Annual Readiness Activities

Table 5: Annual Refuge Fire Management Activities.

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Update Annual Fire Management Operating Plan	X											
Winterize Fire Management Equipment											X	
Inventory fire engine and cache equipment				X								
Identify Refuge Fire Management Training Needs	X											
Seasonal Hiring Completed			X									
Annual Refresher Training					X							
Annual Work Capacity Test	X	X			X							
Pre-season Engine Preparation				X								
Fireline Maintenance around Crook campground, Refuge headquarters, Lodore Hall and Two Bar Ranch					X		X					
Update Fire Management Plan	X											
Review Fire Agreements for Currency	X											
Prescribed Fire Plan Preparation	X											
Weigh engines to determine GVW compliance					X							
Prepare pre-season risk analysis					X							
Live Fuel Moisture Sampling						X	X	X	X			

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

C. Effects of Drought and Other Impacts on Station Activities

As indicated previously, periods of drought can greatly impact fire behavior and resistance to suppression. For that reason the 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 Refuge fire staff can also contact the Craig Interagency Dispatch Center (970-826-5037) 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 (Section XII-E).

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

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

D. 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 unusual climate or a 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>

E. Step-up Plan

**Table 6: Browns Park National Wildlife Refuge Step-Up Plan
NFDRS Fuel Model T, Lodore RAWS**

PREPAREDNESS ACTION	ERC

	0-18	19-36	37-72	73-84	85+
Fire-ready engines at Refuge Headquarters	X	X	X	X	X
Fire crew working normal tour of duty	X	X	X		
Fire Crew will dress in nomex and work boots		X	X	X	X
Non-fire funded personnel will have fire gear readily available in Cache		X	X	X	X
Fire crew will remain near engine and in radio contact			X	X	X

Extend or change Fire Crew Tour of Duty to cover peak burning period (10 am-6pm). Provide for daily coverage.				X	X
Fire crew will be on standby throughout burning period				X	X
Refuge fire ban conditional				X	
Refuge fire ban mandatory					X
Collateral duty employees will be dressed in nomex and may be placed on standby to staff secondary engine					X

Stage additional resources such as a TFLD or STEN, additional engine(s), firefighters, tender, or other equipment.					X
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Increase Fire Danger Rating one break point:

- G During the Memorial Day, Independence Day and Labor Day holidays in response to the increased risk of human caused ignitions.
- G When the ERC is 72 or greater and the LAL is forecast to be 4 or greater in response to the increased risk of lightning ignitions.
- G If the Palmer Drought Index (PDI) is - 3. Increase the Fire Danger Rating two break points if the PDI is - 4.

XIII. WILDFIRE PROGRAM

A. Firefighter Safety

Fuels, weather, and topography along with the seemingly “ever present” drought can combine to create extreme fire behavior. For example, in many locations fuels are heavy and can produce wildland fires of great intensity with a high probability of spotting and environmental conditions are present that contribute to a high probability of ignition. During the early summer months, dry thunderstorms often move through northwestern Colorado igniting several wildland fires. The same instability and thunderstorms can produce erratic winds. The topography also lends itself to unusual wind patterns and conditions favorable for rapid rates of spread both up and down slope. LCES must be practiced at all times.

Environmental conditions such as heat, and terrain can stress firefighters and dictate that suppression personnel maintain fluid intake and take other precautions to prevent heat related illnesses.

Narrow, unimproved roads and low capacity bridges and wildlife and livestock, which are often present, require Engine Operators to be constantly alert and drive for conditions.

B. Prevention

Fourteen wildland fires have occurred within the Refuge boundary in the 10-year period of 1989-1998. Seven of these fires have been human caused (158 acres) with the remaining 7 caused by lightning (236 acres). Although the number of ignitions is low, the number of human caused ignitions could be reduced through a well managed fire prevention program. Following are fire prevention steps being used or planned to reduce human caused ignitions on the refuge.

1. Fuel breaks will be maintained around Crook campground, the Refuge headquarters, Lodore Hall and the Two Bar Ranch.
2. Campfire rings will be placed in Crook campground.
3. Signing will take place when the Burning Index reaches or exceeds 80.
4. Signing will take place when Moffat County fire ban is in effect.
5. Public contact will be made with Refuge visitors informing them of fire ban when bans are in effect.

C. Fire Detection

The Refuge does not maintain detection resources of its own, however it utilizes those of its neighbors. Zenobia Lookout is located on the adjacent Dinosaur National Monument and provides fire detection services for all of the interagency cooperators. Other sources of detection are detection flights provided by the Craig District Bureau of Land Management.

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

D. Dispatch Procedures

Dispatch procedures are outlined in the Craig Interagency Dispatch Center Annual Operating Plan (Appendix F). The Craig Interagency Dispatch Center Annual Operating Plan also contains a listing of communication frequencies commonly used on Browns Park NWR as well as those used by Refuge cooperators.

E. Pre-attack Planning

As Pre-attack plans are completed, a copy will be kept in each engine and a copy will be filed in Appendix L.

F. Fire Suppression

Using the Appropriate Management Response concept, the Refuge will manage all wildfires consistent with values at risk. Strategies employing a range of suppression options depending on the situation will be considered. Minimum impact suppression tactics (MIST) will be used, where appropriate. Fire management strategies and tactics are discussed in Section VIII.

G. Wildland Fire Situation Analysis (WFSa)

A Wildland Fire Situation Analysis (WFSa) will be prepared in the event that a wildland fire exceeds the capabilities of the initial attack forces or a prescribed burn exceeds the prescribed fire parameters defined in the prescribed fire burn plan. The WFSa will be completed by the Refuge Manager with the help of the

Zone Fire Management Officer. Due to the size of the Refuge and the adjacent land holdings it may be necessary to consult with the adjacent landowners in the preparation of the WFSA. A blank WFSA and Delegation of Authority are included in Appendix M.

H. Mop up Standards and Emergency Stabilization and Rehabilitation

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

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

- 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 and logs and other woody debris beveled cut to minimize appearance of human impact.
- 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 Project Leader, 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 refuge management plans and the repair or replacement of minor facilities damaged by the fire. Total "rehabilitation" of a burned area is not within the scope of the Emergency Rehabilitation funding. Emergency Rehabilitation funding can be used to begin the rehabilitation process if other funding is committed to continue the rehabilitation throughout the life of the project (beyond the initial 3 years of Emergency Rehabilitation funding). Major facilities are repaired or replaced through supplemental appropriations or other funding.

- G Because of the emergency nature of the fire event, the emergency

stabilization section of the **Emergency Stabilization and Rehabilitation Plan** (ESR Plan) must be developed expeditiously and is frequently developed by a local unit or designated burned area ESR team. The rehabilitation section of the ESR Plan is not considered an emergency, and is developed as other refuge land use plans. The 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.

XIV. PRESCRIBED FIRE PROGRAM

A. Program Overview

The Refuge will use prescribed fire as a tool in two management areas - to achieve resource management objectives and to manage fuel loading. Resource management prescribed burning is used to restore, create, and/or maintain a diversity of plant communities in order to restore and perpetuate native plant and wildlife species. The Refuge may use hazard fuel reduction prescribed burns within or near Refuge development zones, sensitive resources, and boundary area to reduce the risk from wildfire damage. To the greatest extent possible, hazard reduction prescribed fires will only be used when they compliment resource management objectives.

Prescribed fire use on the Refuge has not been consistent in the past. Prescribed fire was used in the mid-1980's but was discontinued until 1994 when the program was reestablished. In the period 1994-1998 the Refuge has completed 13 prescribed burns for 3,024 acres or a yearly average of 233 acres. The Refuge has also participated on 3 interagency prescribed fires with the Bureau of Land Management and Dinosaur National Monument. A complete listing of historical prescribed fire on the Refuge can be found in Appendix G.

Prescribed burning can occur at any time during the year depending on resource and management objectives. Most burning will occur in the period from March through October. A prescribed fire plan will be prepared and approved prior to the accomplishment of any prescribed burning activities. This plan will follow the format approved by the Regional Fire Management Coordinator.

B. Resource Management Objectives

The goal of resource management prescribed fire is to reintroduce wildland fire to the ecosystem in order to:

1. Restore and invigorate native grass species.
2. Maintain and rejuvenate suitable resting, feeding, and nesting habitat for waterfowl, shorebirds, neotropical, and other migratory birds
3. Periodically reduce dead vegetation that hinders new growth.
4. Promote the establishment of desirable forbs for wildlife.

Achieving many of the objectives will require repeated burn cycles for an indefinite length of time. Burn frequency will vary from annually to more than 10 years depending on management objectives, historic fire frequency, weather and other natural factors, funding, and planning. On average, the Refuge plans to treat 300 acres annually.

The Little Snake Office and Browns Park National Refuge Fire Management Plan established that less than 25% (5,284) of the B-6 polygon would be treated over a ten year period. The Refuge's prescribed fire program will be conducted with this figure in mind. The acreage planned for treatment using prescribed fire may be reduced by the number of acres consumed by wildland fire in a vegetative type if it is deemed to be a significant impact to the desired habitat condition of that vegetative type.

Rather than establish targets for the various Fire Management Units, targets have been calculated by vegetation type. Table 6 outlines the anticipated prescribed fire program for the next 10 years. Figures 4, 5 and 6 display the relative positions of these vegetative types.

Table 7: Burn Targets by Vegetative Type

Vegetative Type	Constraints General: No prescribed burning will be conducted in FMU A	10-year Acreage (Acres)	Annual Average (Acres)
Wetland Marsh	None	1,000	100
Pinyon-Juniper	No prescribed burning in this type	0	0
Northern Desert Shrub	Protect pure sagebrush stands when possible	1,000	100
Grassland	None	1,000	100
Riparian	Small experimental plots <5 acres allowed	0	0
TOTAL		3,000	300

C. Hazardous Fuel Reduction

The Refuge may use hazard fuel reduction prescribed burns within or near Refuge developments, sensitive resources, and boundary areas to reduce the risk from wildfire damage. To the greatest extent possible, hazard fuel reduction prescribed fires will only be used when they compliment resource management objectives. The acres to be treated are included in the previous section.

D. Wildland Fire Use for Resource Benefits (WFURB)

1. Introduction

The Refuge and the BLM have agreed to jointly manage wildland fire in the vicinity of the Refuge. Service policy permits the use of naturally ignited wildland fire to achieve resource management objectives. The Little Snake Office and Browns Park National Wildlife Refuge Fire Management Plan (Little Snake Plan) and an Environmental Assessment have been jointly completed that addresses the use of wildland fire to achieve resource management objectives (Appendix E). A portion of the Refuge, FMU C - Polygon D-2, has been identified as an area where the use of fire to achieve resource management objectives is appropriate. The joint plan also indicates that Fire Management Unit C and Polygon B-6, may also be a candidate for similar management following the completion of fuel management programs.

As noted in Chapter 3.3 Wildland Fire Use, the decision to use wildland fire to achieve resource benefit is arrived at through a process designed to determine if Wildland Fire Use for Resource Benefit (WFURB) is indeed appropriate. As part of the process, each step along the way to reaching

the decision is documented (Fire Management Handbook 2000).

2. Goals and Objectives

The Resource management objective for FMU C is to:

- G Encourage fire to promote mosaic of age classes in all plant communities.

The Fire Management Objective for FMU C includes:

- G Use wildland fire to create a vegetative mosaic of age classes in a mix of sagebrush and mountain shrub.

3. Prescriptive Parameters

The initial decision to manage a naturally ignited wildland fire for resource benefits or to suppress the fire using the appropriate management response concept is based on a predetermined set of conditions. The parameters for FMU C and Polygon D-2 are listed in Appendix N.

4. Wildland Fire Use Implementation Plan (WFIP)

The Wildland Fire Use Implementation Plan (WFIP) consists of three stages, with one stage building on the other. The three stages are: Stage I - Initial Fire Assessment, Stage II - Short-term Implementation Action, and Stage III - Long-term Implementation Actions; plus periodic assessments.

Stage I is both an information gathering phase and a decision-making stage. It is necessary to gather enough information to establish a firm foundation on which to document the Project Leader's decision and to manage the fire. (Much of this is done during size-up). This stage also provides the Project Leader with information necessary to make an informed decision as to whether a naturally ignited wildland fire should be managed for resource benefit or to take appropriate suppression action.

Following the report of a wildland fire in FMU C or Polygon D-2, a Stage I: Initial Fire Assessment worksheet will be completed (Appendix N). If the Initial Fire Assessment indicates conditions favorable for fire use, the BLM will be contacted in accordance with procedures outlined in the AOP covering fire use (Appendix N).

For fires starting on the Refuge, the decision to use fire to achieve resource benefit on lands within FMU C should be made jointly by the Project Leader and the BLM Field Office Manager.

The primary consideration is for public and firefighter safety. The other decision criteria to be considered during the Stage I: Initial Fire Assessment will be used to guide the two agency administrators when determining whether to manage a new fire start for the benefit of the resource include:

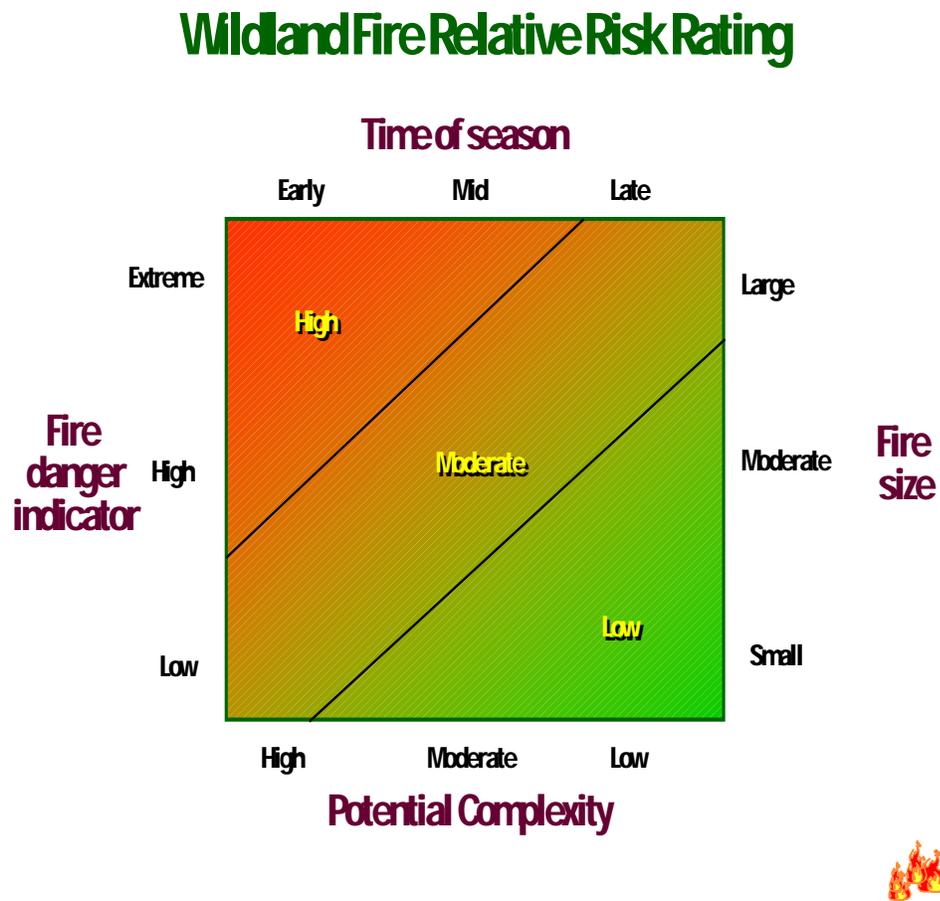
- G Will this fire threaten to cross into an area with more stringent constraints?
- G Do environmental parameters such as maximum temperature, minimum relative humidity, windspeed, live fuel moisture, dead fuel moisture, etc. indicate that the fire will burn as planned?
- G Is the fire meeting resource constraints outlined for Polygon D-2, in Section IV Fire Management Objectives of the Little Snake Plan?
- G Is there a smoke permit in place and are smoke management forecasts favorable?
- G Are there 5 or fewer fires in the area covered by the Little Snake Plan being managed with benefit to the resource?
- G Are there sufficient forces (interagency and Refuge) available, or are National and Regional Preparedness Levels low enough to manage this fire to achieve resource management benefit?
- G Are there any other issues that preclude wildland fire use?
- G Will managing this fire as a fire to achieve resource benefit result in a lower cost per acre than would a more aggressive suppression response?

A Decision Criteria (GO/NO/GO) Checklist listing these elements is included in Appendix N. The Decision Checklist (Initial GO/NO/GO Decision) provides both Agency Administrators with a checklist of standard evaluation criteria to determine if the current wildland fire meets the criteria to be managed for resource benefits. These criteria assess threats from the fire, potential effects of the fire, risks from the fire, effects of other fire activity on management capability, and allows the Agency Administrator to evaluate other, possibly unforeseen or unanticipated, issues (e.g. It may be early in the fire season and the ERCs are already well above what would normally be expected and a long-term weather forecast indicates that less than normal rainfall is expected - or - the area has been in a prolonged period of drought).

As part of the evaluation of the second element, a long-term risk assessment must be completed. In lieu of the quantitative long-term risk assessment provided by the Rare Event Risk Assessment Process (RERAP), a Wildland Fire Relative Risk Rating chart has been devised to

provide the Project Leader with a quick and fairly comprehensive assessment of the "relative risk" of the fire (Figure 8). This indicator can be consulted in a matter of minutes to provide information for the Project Leader to answer the second decision element of the checklist.

Figure 8: Relative Risk Rating Chart



The Relative Risk Rating Chart looks at four variables: Fire danger, point in the Fire season, fire size, and potential complexity. When all four elements are looked at in relationship to each other, a picture of how likely the fire can be successfully managed appears.

G Fire size is one of the first elements to consider. The fire size represents the current fire size and should be available from the Fire Situation information.

G The Fire Danger Indicator uses the Energy Release Component (ERC) and is available from the National Fire Danger Rating System (NFDRS) outputs which can be related to the Adjective Classes which are identified in the Step-up Plan.

G Time of season is an important element to consider. A fire early in the season has the potential to continue to burn for some time and may change over the course of the fire season as the temperatures warm and fuels change in character.

G Complexity can also be pre-planned by identifying in advance the Maximum Management Areas (MMAs) or completing a Wildland Fire Complexity Rating guide. These will be developed and included at a later date in the Fire Management Plan.

A contrary response (e.g. a NO response to a Yes, Continue question) to any of the elements on the GO/NO/GO Checklist indicates that a suppression-oriented appropriate management response may be appropriate. All favorable responses to the decision elements indicate that the fire is a viable *candidate* to be managed for resource benefit. The Agency Administrator must still make the final decision. The maximum time allotted to complete the determination and sign the document is 2 hours.

If, after completing the Decision Criteria (Go-No-Go) Checklist all the responses indicate that the Refuge and BLM can continue with the selected strategy, the decision will be documented and approved by the Project Leader and counter signed by the Field Office Manager. A daily re-certification will take place to ensure that all considerations remain valid. Due to the small size of FMU C, Stage II: Short-Term Implementation Actions and succeeding assessments will be completed by the BLM in consultation with the Project Leader.

Fires starting on BLM lands in Polygon D-2, will be assessed and managed in the same manner. The BLM will serve as the lead agency when completing the Stage I: Initial Fire Assessment worksheet, and if it appears the fire will impact Service lands, the Project Leader or his designated acting will be consulted before the final determination is made.

Additional guidance can be found in the Little Snake Plan and the Federal Wildland Fire Management Policy and Program Review (December 1995), The Wildland and Prescribed Fire Management Policy (August 1998), Review and Update of the 1995 Federal Wildland Fire Management Policy (January 2001), and the U.S. Fish and Wildlife Service Fire Management Handbook (December 2000).

E. Limits

1. The County Sheriff's Office, Craig Interagency Dispatch Center, and others identified in the prescribed burn plan will always be notified by the Burn Boss prior to ignition. Private landowners adjacent to the proposed burn will also be notified. The required notifications will be included in each burn plan.
2. The burn will be conducted in accordance with air pollution regulations.
3. Drought can have an effect on fire severity and control. It is important to track one or more of the drought indicators. Prescribed burns should not be initiated if the Keetch-Byram Fire Danger Index is 400 or higher or the Palmer Drought Index is in "extreme drought". The drought indexes are on the Internet at: <http://www.boi.noaa.gov/fwweb/fwoutlook.htm>.
4. The Refuge will not ignite prescribed fires when adjacent jurisdictions or the State of Colorado have instituted burning bans.
5. Multiple burns will not be conducted when identified contingency forces are not available to adequately respond to an escape.
6. The use of heavy equipment and other ground disturbing devices will be identified in the Prescribed Burn Plan and approved as part of the approval process by the Refuge Manager.

F. Complexity

Prescribed fire complexity will be determined by the U.S. Fish and Wildlife Service Region 6 Complexity Analysis (Appendix O). Most prescribed fires on the Browns Park NWR will be Type 3 burns, however Type 1 and 2 burns are possible. The complexity of a prescribed fire is dependent upon fuels/vegetation, objectives, smoke management, values at risk, burn boundaries, size, and number of personnel involved. All prescribed fires currently being considered are of low complexity. Moderate and high complexity burns will only be undertaken if a burn boss II (RXB2) or burn boss I (RXB1) and adequate resources are available. The Complexity Rating will be reviewed as a matter of standard procedure by the Zone Fire Management Officer.

G. Potential Impacts

An escaped prescribed fire could erode support for the prescribed burn program, especially if neighboring private lands or improvements were impacted. An escape could be difficult to suppress and could potentially impact neighboring federal land. A limited number of structures and improvements such as fences could be destroyed. Grazing lands under permit on BLM lands could also be burned, impacting the grazing rotation schedule or eliminating expected forage. A prescribed burn conducted without consideration for smoke dispersal could impact air quality in the area, including Dinosaur National Monument, which is immediately down river.

H. Planning

Generally, prescribed burns will be conducted in the spring and fall. The Refuge Operations Specialist is responsible for identifying units or areas in need of treatment, and for developing resource and treatment objectives for those units/areas based on Refuge resource management goals and objectives. The Burn Boss is responsible for determining if prescribed fire can be used to meet the treatment objectives. If needed, the Zone FMO or Regional Fire Management Specialist will be consulted for assistance in accomplishing the desired objectives.

Throughout the year, the Refuge Operation Specialist will be monitoring habitat and wildlife populations on Service lands. When it becomes apparent that fire would be an appropriate tool to employ in a certain situation, he will use the information to develop the annual plan. After reviewing the proposal, the Refuge Manager will decide whether to proceed with a planning effort. Guidance provided in the Fire Management Handbook will be adhered to in all

prescribed burning activities on the Refuge.

As indicated, an Annual Burning Plan will be prepared according to the Region 6 format and will contain more specific information on areas proposed for burning. Fire prescriptions will be prepared for every planned habitat burn in accordance with established Service and Regional procedures.

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

The contingency plan will identify:

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

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

At the earliest possible time, but no less than 60 days prior to the expected burn date, the prescribed fire plan for each burn unit should be completed and presented to the Refuge Manager. The burn plan will document objectives and the plan of action for achieving them, and address all requirements specified in the Service Fire Management Handbook. Burn plans can be written by anyone but must be reviewed by the Zone Fire Management Officer prior to implementation. The plan will be reviewed in accordance with Service and

Regional policy. When the plans are returned after the review, the Refuge Manager will make changes to the plan as necessary based upon the review's comments, then approve the plan.

Through out the year, the Refuge Operations Specialist and Zone Fire Management Officer will conduct informal reviews of the Refuge's fire management activities. As part of the process, all prescribed fires will be reviewed to insure that adequate support is available to conduct planned burns and that habitat management objectives were achieved. Written notes attached to the burn plan and the notes will be used to plan the next year's fire management activities.

Multiple prescribed fires may be initiated at the same time within the Refuge. A qualified Prescribed Fire Manager will coordinate multiple burns. Depending on the complexity of the burns, the Prescribed Fire Manager need not be on scene but must be readily available by phone. The maximum number of simultaneous burns will depend upon the cumulative impacts of smoke on sensitive targets and the availability of the specified equipment and personnel.

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

I. Preparation and Implementation

1. Preparation of prescribed burn units will be handled on an individual basis using site preparation standards identified in the burn plan for that unit.
2. Preparation of fire breaks or other site work may begin at any time after a decision has been made to conduct a burn in a specific area and in consideration of the timing of such activities in relation to sensitive resource values such as breeding, feeding, and sheltering areas.
3. Staff and cooperators who are to work on the burn should be notified of the burn schedule at least two weeks prior to the burn to ensure that they plan their work and leave accordingly.

4. The week prior to the burn, all engines, tools, supplies, drip torches, and other items should be checked to assure that things are ready and in good working order. On the day prior to the burn date, the Burn Boss should inspect tools and equipment to be used so that unexpected shortages do not occur on the burn day and delay or prevent the planned burn activity.
5. The public will be notified in advance of any scheduled burn.

J. Monitoring and Evaluation

The monitoring plan, which is part of the prescribed burn plan, should include provisions to document environmental and fuel conditions before, during and after the fire, and fire behavior during the burn. At the very least, the establishment of photo points will provide physical evidence to support any data that is collected. It is much better to take Robel readings and record species composition and fuel loading. The compiling of these data will give fire practitioners and resource managers data on which to evaluate if burn objectives were achieved and to refine burn prescriptions.

Fire monitoring protocols for the Region or Service will be used at the Refuge (Appendix P). Key elements to be monitored and recorded include:

1. Environmental Conditions will be recorded at the site prior to ignition and periodically during the burn. Conditions to be evaluated include air temperature, RH, wind speed and wind direction.
2. Fuel moisture(s) will be measured or estimated using fuel sticks, tables, charts, and/or predictive software (BEHAVE).
3. Fire Behavior such as flame length and rates of spread will be recorded.
4. Post fire effects will be measured or estimated. These effects include scorch height, percent of area burned, percent of fuel consumed by fuel size class (time-lag), amount of duff removed, etc.

Prescribed fire monitoring and evaluation will be used to:

1. Determine whether burn plan criteria are being met.
2. Determine whether resource objectives are being met.
3. Document costs and improve economic efficiency.
4. Document data so results can be replicated.
5. Validate fire behavior predictions and refine prescriptions.
6. Provide baseline data for long-term fire effects studies.
7. Provide intelligence for operational decisions during an ongoing fire.
8. Meet legal and administrative responsibility to document the fire.
9. Provide justification for continuation of the project or program.

Monitoring is divided into 3 categories for prescribed fire; pre-burn, short-term and long-term.

Pre-burn monitoring will consist of monitoring of live fuel moisture. Live fuel moisture plots will be permanently established across the Refuge in representative fuel types as well as temporary plots on the prescribed burn unit. Sampling scheme and calculation of data will follow the format recommended by the report included in Appendix Q.

Short-term monitoring for any prescribed fire will include the first order fire effects (FOFE) live fuel moisture, smoke, fire behavior and weather. First order fire effects are the immediate results of the fire and relate directly to fire treatment objectives. Examples of FOFE include plant mortality, duff consumption, fuel consumption, % of area consumed, etc. These effects should be listed in the prescribed fire plan for a burn unit. Fire behavior and smoke should be monitored during the burn to ensure that the objectives of the prescribed fire plan is being met. Weather will be monitored before and during the actual prescribed burn. Live fuel moisture will be monitored prior to the burn to ensure that the objectives of the prescription will be achieved.

Monitoring of second order or longer term fire effects will be addressed in the Refuge Habitat Management Plan. Items to be considered in long-term monitoring might include: plant community change, increase or decrease in individual species as a result of burning or the overall juxtaposition of successional types on the Refuge.

XV. FIRE MANAGEMENT UNITS

A. Introduction

The Refuge will be divided into four Fire Management Units (FMU's) designated as A, B, C, and D (Figure 9). All fuel types are represented in each of the FMU's. Resource management goals and objectives and strategy and tactics can be found in previous sections of this plan. Following is a description of each FMU.

B. FMU A

Fire Management Unit A is that portion of the Refuge that lies north of Colorado State Highway 318. These lands are administered by the Colorado Division of Wildlife. Wildfires will be suppressed and no prescribed fire is planned for this area.

C. FMU B

Fire Management Unit B is that portion of the refuge generally surrounding the stream corridors within the Refuge boundary. The boundary of this FMU is a combination of roads and the Refuge boundary. Wildfires will be suppressed and prescribed burning is planned within this FMU. Mechanical fuel reduction may be used to reduce the fire impacts to cottonwood trees in the riparian corridor.

D. FMU C

Fire Management Unit C is Refuge lands south of Moffat County Road 83 and the unimproved dirt road paralleling the Green River on the south side between the Colorado-Utah state line and Dinosaur National Monument (Figure 8). Wildfires will be suppressed and prescribed fire will be used in this FMU. As indicated previously, Wildland Fire Use For Resource Benefit will be considered when developing suppression strategies in this FMU.

E. FMU D

Fire Management Unit D is the remaining portion of the Refuge. Roads within the Refuge boundary would provide fire confinement lines in the event of a

wildfire off of the Refuge property. Wildfires will be suppressed and prescribed fire will be used in this FMU. When appropriate, Wildland Fire Use For Resource Benefit may be considered when developing suppression strategies in this FMU.

Figure 9: Fire Mgt. Units

FIRE MANAGEMENT UNIT A
FIRE MANAGEMENT UNIT B
FIRE MANAGEMENT UNIT C
FIRE MANAGEMENT UNIT D

XVI. COMMON ELEMENTS

A. Public Safety

Firefighter and public safety will always take precedence over property and resource protection during any fire management activity. The greatest threat to public safety from Refuge wildfires are entrapment by fast moving fire fronts. The Refuge's first priority during fire management activities will be to keep the area near the fire clear of bystanders. This priority will be reviewed annually with Refuge fire crews and reemphasized as part of the pre-burn meeting prior to a prescribed burn. Wildfires which might escape Service lands and spread to inhabited areas are also a concern. The IC is responsible for informing the appropriate law enforcement agency and requesting the evacuation of the public from potentially dangerous situations.

Reduced visibility on roadway due to smoke is another public safety concern. In the event of a wildfire emitting heavy smoke on to a primary roadway, top priority will be given to safeguarding the travelers using the roadway versus suppressing the fire. During wildland operations, the local law enforcement agency having jurisdiction is responsible for managing traffic hazards from smoke. The Refuge will coordinate with local law enforcement agencies to meditate smoke hazards during prescribed fire operations.

B. Public Information and Education

The public's perception of wildland fire is slowly changing. The beneficial effects of fire are being recognized by the general public, however views that all fire in the wildlands is bad persist. A successful prescribed fire program cannot occur without broad public support. Public information and education are an important part of the fire management program on the Refuge. Fire has in the past and will continue to shape landscape vegetation and animal behavior patterns on the landscape in the Browns Park area. Efforts will be made to incorporate fire effects information into interpretation and environmental education projects on the Refuge.

C. Records and Reports

The following actions will be taken by the Incident Commander (IC) on a wildland fire or the prescribed fire burn boss on a prescribed burn:

- G Complete a DI-1202 Fire Report and Crew Time Reports for all

personnel assigned to an incident, and return these reports to the Assistant Manager within 3 days of the fire being declared out.

G Include with the submission a list of all expenses and/or items lost on the fire and a list of personnel assignments on the DI-1202.

G Complete Taskbooks for all personnel performing as Trainees, as appropriate.

The Assistant Refuge Manager will:

G Enter all data into the Fire Management Information System (FMIS) computer database within 7 days after the fire is declared out.

G Inform the timekeeper of all time and premium pay to be charged to the fire and ensure expended supplies are replaced.

D. Fire Critiques and Annual Review

The Refuge's Fire Management program will be reviewed periodically in an effort to improve performance. The Fire Management Plan will be reviewed annually by the Assistant Project Leader for currency and applicability.

A listing of Fire Management activities that should be completed on an annual basis are included in Table 5. Other reviews and the circumstances when they would occur are as follows:

Prescribed Fire/Wildfire Review: All prescribed fires reclassified as a wildfire will be reviewed by the Refuge manager or their designated representative. A formal report will be prepared, signed by the Refuge manager and a copy forwarded to the Regional Fire Management Coordinator and the Fire Management Branch. A higher level of review in addition to the Refuge level review may be initiated by the Regional Fire Management Coordinator.

Refuge Level Review: This review is conducted by the refuge manager or their designee to provide information to recognize commendable actions and to take needed corrective actions after an incident. An oral review is the required minimum. report.

Regional Level Review: A regional level review will generally be conducted for any fire that:

1. Crosses the Refuge's boundary into another jurisdiction without

the approval of an interagency agreement.

1. Results in adverse media attention.
2. Involves a fatality, serious injury, or significant property damage.
3. Results in controversy involving another agency.

National Level Review: A national level review will generally be conducted for any fire that involves Servicewide or national issues, including:

1. Significant adverse media or political interest.
2. Multi-regional resource response.
3. A substantial loss of equipment or property
4. Multiple, serious fire-related injuries.
5. Any other fire that the director wants reviewed.

Additional information on reviews can be found in the Fire Management Handbook, section 3.4, Reviews.

E. Air Quality and Smoke Management

The Air Pollution Control Division of the Colorado Department of Public Health and Environment is responsible for administering the air quality and smoke management program in the State of Colorado. The U.S. Fish and Wildlife Service was a signatory to the Colorado Smoke Management Memorandum of Understanding & Plan (MOU), dated January 2001. The MOU outlines the procedures for application and granting of prescribed burning and WFURB smoke permits and are available on line at <http://apcd.state.co.us/smoke/smoke.html>. The procedural parts of the MOU will soon become regulations and will be available on the same website.

Securing an air quality permit will be part of the prescribed fire planning process. Therefore, long-range planning is important because it may be necessary to identify a prescribed burn and request a permit up to a year in advance. An approved permit will be in place before a proposed prescribed fire is ignited. The MOU also identifies scenic and/or important views in Colorado. Spitzie Marsh Overlook, located in Browns Park Refuge, is included in this list. This overlook as well as other potential smoke receptors in the area will be identified as a smoke receptor during the smoke management planning process and the effects of prescribed burning operations on all receptors will be identified and the mitigation actions to be taken will be documented in the prescribed fire plan.

A smoke permit is required for all WFURB actions. A permit application will be jointly submitted for Polygon D-2 by the BLM and the Refuge (Appendix R). Directions for reporting WFURB incidents are included with the approved permit. It is important to note that the Air Pollution Control Division is to be notified in the second burning period if a WFURB has the potential to grow significantly.

The MOU states that a smoke permit is not required for a wildfire as long as suppression action is initiated.

F. Fire Research and Monitoring Needs

The need for improved fire effects information on Refuge plant and animal species is evident. Past monitoring and evaluation has not been thorough enough to improve prescription writing capabilities and improving the probability of successful prescribed fire prescriptions. In particular, data is lacking on the effects of fire on greasewood, the Ute ladies'-tresses orchid and several of the avian species of special concern.

G. Cultural Resources

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

Cultural resources are scattered throughout the Refuge. The Refuge contains sites on the Register of Historic Places. Many "tipi ring" and other Native American sites are known to exist on Refuge lands where they occupied the area either in permanent or transient camps.

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

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

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

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

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

G The location of sites discovered as the result of fire management activities will be reported by the ROS to the Regional Archeologist.

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

XVII CONSULTATION

An Environmental Assessment was prepared for the Little Snake Office and Browns Park NWR Fire Management Plan. As part of this process, public participation was sought and received through the use of press releases, public meetings, and plan distribution. Public Participation is noted in Section V - Public Participation, of the Environmental Assessment (Appendix E).

A Finding of No Significant Impact (FONSI) was signed by the Regional Director as part of the Comprehensive Planning Process (CPP) which also sought public input.

A listing of those consulted in the development of this plan include:

Lou Ballard, Assistant FMO, BLM - Lower Snake District, Idaho
Carl Douhan, Wildland Fire Planner, Westaff Temporary Services
Bruce Fields, Assistant FMO, NPS - Dinosaur NM
Kathy Hutton, Center Manager, Craig Interagency Dispatch Center
Ken Kerr, Zone Fire Management Officer, USFWS - Region 6
Jim Kelton, Regional Fire Management Specialist, USFWS - Region 6
Dave Lintz, Deputy Regional FMO, NPS - Inter-mountain Region
Charlie Martin, Fire Ecologist, BLM - Little Snake Field Office
Bruce Miller, Fire Management Officer, NPS - Dinosaur NM
Mike Reiser, FMO, BLM/USDA Forest Service, Craig District
Marcus Schmidt, Air Quality Specialist, BLM - Colorado State Office

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APPENDIX A: COMPREHENSIVE MANAGEMENT PLAN AND NEPA COMPLIANCE

APPENDIX B: LISTING OF SPECIES - BROWNS PARK NWR

APPENDIX C: FIRE EFFECTS

**APPENDIX D: WILDLAND 7 PRESCRIBED FIRE MGT. POLICY -
IMPLEMENTATION GUIDE**

**APPENDIX E: LITTLE SNAKE OFFICE AND BROWNS PARK NWR FIRE
MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT**

APPENDIX F: INTERAGENCY AGREEMENT

APPENDIX G: FIRE HISTORY

APPENDIX H: NORMAL UNIT STRENGTH

Refuge equipment available for fire use. Fire authorized equipment not listed in NUS or engine inventory.

Item	Year of Purchase	Fire Funded %	GVW	Comments
Engine, Type 6	1999	100	14.5k	
Engine, Type 6	1990	100	10k	Replacement or modification needed due to exceedence of GVW
ATV Mounted Torch	1997	100	N/A	
ATV	1999	100	N/A	
Portable Pump	1998	100	N/A	

Additional Equipment on Refuge available for Fire Use.

- 1 Case 1550 T Dozer
- 1 Allis-Chalmers 680 Tractor
- 1 Freightliner Truck/Transport
- 1 John Deere 670-A Motor Grader
- 1 TCM 830 Front-end Loader
- 1 Case 580-C Backhoe

Fire Management Radio Inventory

Radio Type	Serial Number	Comments
Mobile	EMN5990A 501004	
Mobile	EMN5990A 451836	
Hand Held	447092 King	Burned in fire. Awaiting Replacement
Hand Held	446393 King	
Hand Held	446522 King	

APPENDIX I: CURRENT EMPLOYEE QUALIFICATIONS

Table 1: Current Wildland Fire Qualified Employees

NAME	POSITION	QUALIFICATIONS
Jerry Rodriguez	Refuge Manager	FFT2, SEC1
Suzanne Halvorson	Assistant Refuge Manager	FFT2, ENOP, RXB3 (T)
Robert Harding	Maintenance	ENOP, FFT2
Adam Halvorson	Administration	FFT1 (T), ENOP
Seasonal	Fire Fighter	

NAME	POSITION	QUALIFICATIONS
Seasonal	Fire Fighter	

ENOP - Engine Operator
 FALB - Faller, Class B
 FFT2 - Firefighter Type 2
 FFT1 - Firefighter Type 1/Advanced Firefighter
 RXI2 - Prescribed Fire Ignition Specialist Type 2
 RXB3- Prescribed Fire Burn Boss Type 3

Table 2: Position Status As of 11/2001

Position	Need	Have	Development Needed?
Incident Commander Type 5 (ICT5)	2	0	2
Prescribed Burn Boss Type 3 (RXB3)	2	0	2
Engine Boss (ENGB)	2	0	2
Engine Operator (ENOP)	2	3	0
Fire Fighter Type 1/2 (FFT1/FFT2)	3	6	0

An individual may be qualified for more than one position

APPENDIX J: INTERAGENCY TRAINING FORM

NWCG Interagency Training Nomination

PART I Registration

Completion is required.

Submit one form per course.

Course Name		FOR COURSE SPONSOR/HOST USE ONLY
		Priority _____ of _____
Course Date(s)	Course Location	Course Tuition (if required)
Nominee's Name		Date Submitted
Working Job Title		DG, IAMS, or FAX Address
Sponsor or Agency (Name, Address)		Nominee's Mailing Address (if different)
Telephone No.:		Telephone No:
I will notify the Course Coordinator/Training Center if I am unable to attend, so others will be allowed to take the course.		

PART II Experience

Complete or attach Qualification & Experience Record printout, if required.

Do you meet all of NWCG or additional Agency PREREQUISITES for the course? (Reference NWCG 310-1 or Agency Manual.) YES <input type="checkbox"/> NO <input type="checkbox"/>
List your past experience pertinent to this course:
List training completed and dates pertinent to this course:
Nominee's Signature:
Remarks:

PART III Financial

Complete if required.

Attach additional financial forms as stipulated by the Training Announcement or required by the Training Centers.	
Management Code or Charge Code Number _____	
Make payment to Sponsoring Agency.	
This agreement constitutes authority for the Vendor (Sponsoring Agency) to submit a bill to the above agency.	
Authorizing Signature (Agency Administrator)	Date

APPENDIX K: 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 column 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:

- G The administrator is a trained First Responder (American Red Cross) or equivalent.
- G The timer can monitor the course.
- G The safety/med evacuation plan can be executed.
- G Five or fewer people are being tested at one time.
- G 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

- G Fill packs the night before to check for leaks (use plumber's Teflon tape to stop leaks in threaded fitting).
- G Weigh bags before test. Check weight after the test if necessary. Note: Bags are used without trombone pumps.
- G 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 tests administered at elevations above 4,000 ft.

Table 1: 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:

- G An accurately measured flat course with good surface.
- G 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.
- G 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).
- G Candidates should be rested and well informed about the course and the need to maintain a fast pace.
- G Favorable environmental conditions. Avoid adverse conditions.
- G Complete the PAR Q physical activity readiness questionnaire and sign an informed consent form.

Safety

- G A locally developed safety/med evacuation plan must be prepared for the course.
- G 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.
- G 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.
- G Require candidates to read and sign the PAR Q health screening questionnaire and an informed consent form.
- G Check to see that candidates are wearing proper (above ankle) footwear.
- G Encourage candidates to stretch and warm up prior the test.
- G Do not test tired or injured individuals, or test during conditions that could compromise health or safety.
- G Monitor candidates to identify those having difficulties and encourage them to terminate the test if necessary.

- G Encourage fluid intake and replacement and provide fluids in route when heat stress

conditions (temperature /humidity) exist.

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

- G Hike hills (w/pack) to build leg strength and endurance

G

Jog the flat course (w/o pack) to build aerobic fitness.

- G Hike/jog over distance for stamina.

- G Engage in cross-training (mountain biking, weight lifting).

- G 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 is 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 is 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 requirements 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:

G 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.

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

G 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.

G 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.

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"? 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"?

ANSWER: 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 $\dot{V}O_2$), 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.

APPENDIX L: PREATTACK PLANS

APPENDIX M: WFSB 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 *	_____	

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**

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			

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

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

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

Section IV. Evaluation of Alternatives

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

consistent with prescriptions and objectives of the fire management plan.

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

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

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

<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			
B. Pertinent Data Final Fire Size Complexity Suppression Cost Resource Values Probability of Success Consequences of Failure			

C. External / Internal Influences

National & Geographic Preparedness Level _____

Incident Priority _____

Resource Availability _____

Weather Forecast (long-range) _____

Fire Behavior Projections _____

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

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

Section VII. Daily Review

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

Section VIII. Final Review

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

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

			P	I	R	W	F	W	
			R	N	E	E	I	F	F
			E	C	S	A	R	B	S
			P	I	O	T	H	E	A
			R	D	R	H	A	H	V
			E	E	C	E	V	A	I
			N	N	E	A	V	A	I
			S	T	S	I	L	L	A
			L	P	L	R	A	B	I
			E	R	E	I	I	L	I
V	T	V	T	L	I	T			
I	Y	Y							

Date	Time	By						

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

VIII. Objectives	Final Review
The elements of the selected alternative were met on: _____ <div style="display: flex; justify-content: space-between; width: 80%; margin: 0 auto;"> Date Time </div>	
By: _____ <div style="text-align: center; margin-top: 5px;">(Agency Administrator(s))</div>	

A GUIDE FOR ASSESSING FIRE COMPLEXITY

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

Use of the Guide:

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

GLOSSARY OF TERMS

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

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

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

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

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

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

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

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

FIRE COMPLEXITY ANALYSIS

A.	FIRE BEHAVIOR: Observed or Predicted	Yes/No	
1.	Burning Index (from on-site measurement of weather conditions). Predicted to be above the 90% level using the major fuel model in which the fire is burning.	___	___
2.	Potential exists for "blowup" conditions (fuel moisture, winds, etc.)	___	___
3.	Crowning, profuse or long-range spotting.	___	___
4.	Weather forecast indicating no significant relief or worsening conditions.	___	___
	Total	___	___

B. RESOURCES COMMITTED

1.	200 or more personnel assigned.	___	___
2.	Three or more divisions.	___	___
3.	Wide variety of special support personnel.	___	___
4.	Substantial air operation which is not properly staffed.	___	___
5.	Majority of initial attack resources committed.	___	___
	Total	___	___

C. RESOURCES THREATENED

1.	Urban interface.	___	___
2.	Developments and facilities.	___	___
3.	Restricted, threatened or endangered species habitat.	___	___
4.	Cultural sites.	___	___
5.	Unique natural resources, special designation zones or wilderness.	___	___
6.	Other special resources.	___	___
	Total	___	___

D. SAFETY

1.	Unusually hazardous fire line conditions.	___	___
2.	Serious accidents or facilities.	___	___
3.	Threat to safety of visitors from fire and related operations.	___	___
4.	Restricted and/or closures in effect or being considered.	___	___
5.	No night operations in place for safety reasons.	___	___
	Total	___	___

E. OWNERSHIP

			Yes/No
1.	Fire burning or threatening more than one jurisdiction.	___	___
2.	Potential for claims (damages).	___	___
3.	Conflicting management objectives.	___	___
4.	Disputes over fire management responsibility.	___	___
5.	Potential for unified command.	___	___

Total _____

F. EXTERNAL INFLUENCES

- 1. Controversial wildland fire management policy. _____
- 2. Pre-existing controversies/relationships. _____
- 3. Sensitive media relationships. _____
- 4. Smoke management problems. _____
- 5. Sensitive political interests. _____
- 6. Other external influences. _____

Total _____

G. CHANGE IN STRATEGY

- 1. Change in strategy to control from confine or contain. _____
- 2. Large amount of unburned fuel within planned perimeter. _____
- 3. WFSA invalid or requires updating. _____

Total _____

H. EXISTING OVERHEAD

- 1. Worked two operational periods without achieving initial objectives. _____
- 2. Existing management organization ineffective. _____
- 3. IMT overextended themselves mentally and/or physically. _____
- 4. Incident action plans, briefings, etc., missing or poorly prepared. _____

Total _____

Signature _____

Date _____ **Time** _____

DELEGATION OF AUTHORITY

Browns Park National Wildlife Refuge
Maybell, Colorado

As of (Time) and (date) , I have delegated authority to manage the (Fire/Incident Name and Fire Number) , Browns Park National Wildlife Refuge (Refuge), 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 acting.
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 N: WILDLAND FIRE USE FOR RESOURCE BENEFIT

Attachment 1: Annual Operations Plan - Little Snake Office and Browns Park NWP FMP

RESERVED

Attachment 2: Prescriptive Parameters

The initial decision to manage fire for resource benefits or to suppress the fire using the appropriate management response concept is based on a predetermined prescription. The prescriptive parameters for FMU C - Polygon D-2 are based on the Energy Release Component (ERC) and the Spread Component (SC) provided by the Ladore and Pinto RAWS, and the Haines Index. The ERC is a numerical indicator of dryness of the fuels based on large, dead fuel moisture and live fuel moisture. It is a reliable drought indicator for the western United States. The SC uses atmospheric and environmental conditions such as dryness of fuels and air, fuel continuity, and winds to predict fire behavior for given specific conditions. The Haines Index is a scaled indicator (1-6, where 6 is the most unstable) of unstable and dry atmospheric conditions.

G	ERC: <84 or 90 th percentile
G	SC: <40 or 90 th percentile
G	Haines Index: <6

Attachment 3: Fire Situation Recording Sheet

To be completed within first hour of fire being reported in Fire Management Unit D as part of Stage I evaluation.

Fire Situation

Fire Name					
Fire Number					
Jurisdiction(s)					
Administrative Unit(s) eg: BRP, BLM, DINO					
Fire Management Unit					
Geographic Area		Rocky Mountain Area			
Management Code					
Start Date/Time		Date:	Time:		
Discovery Date/Time		Date:	Time:		
Current Date/Time		Date:	Time:		
Current Size					
Location:	Legal Description	T.	R.	Sec.	Sub.
	Latitude				
	Longitude				
	UTM				
	County(ies)				
	State(s)				
Cause					
Fuel Model/Conditions					
Weather	Current				
	Predicted				
Fire Behavior	Current				
	Predicted				
Available Resources					

Attachment 3: Decision Criteria (Go-No-Go) Checklist

Go-No-Go Checklist

- G Will this fire threaten to cross into an area with more stringent constraints? If NO, continue.
- G Do environmental parameters such as maximum temperature, minimum relative humidity, windspeed, live fuel moisture, dead fuel moisture, etc. indicate that the fire will burn as planned? If YES, continue.
- G Is the fire meeting resource constraints outlined for Polygon D-2, in Section IV Fire Management Objectives of the Little Snake Plan? If Yes, continue.
- G Is there a smoke permit in place and are smoke management forecasts favorable? If YES, continue.
- G Are there 5 or fewer fires in the area covered by the Little Snake Plan being managed with benefit to the resource? If YES, continue.
- G Are there sufficient forces (interagency and Refuge) available, or are National and Regional Preparedness Levels low enough to manage this fire to achieve resource management benefit? If YES, continue.
- G Are there any other issues that preclude wildland fire use? If NO, continue.
- G Will managing this fire as a fire to achieve resource benefit result in a lower cost per acre than would a more aggressive suppression response? If YES, continue.
- G Little Snake Office Manager or appropriate BLM official contacted and concurs with the selected strategy? If YES, continue.

Recommended Response Action (Check appropriate box)	No-Go (Initial Attack - Suppression Action)	
	Go (Other Appropriate Management Action)	

Refuge Manager: _____ Date:

Field Office Manager: _____ Date:

Attachment 5: Sample Delegation of Authority

DELEGATION OF AUTHORITY

Browns Park National Wildlife Refuge
Maybell, Colorado

As of this date, I have delegated authority to represent Browns Park National Wildlife Refuge (Refuge) for all aspects of Wildland Fire Use for Resource Management to (Name) . You are authorized to speak for me in the event a decision is needed. I retain the responsibility to make the final determination and sign the Go-No-Go Checklist and the Periodic Assessments.

As my representative, you are accountable to me for the overall management of a Wildland Fire Use for Resource Management action on Refuge lands including the completion of the Go-No-Go checklist, Stage I assessment, periodic assessments, and other procedures outlined in the Little Snake Office and Browns Park NWR Fire Management Plan and associated AOP. I expect you to adhere to relevant and applicable laws and regulations, policies, and professional standards. You are expected to represent the Refuge in all aspects the Wildland Fire Use for Resource Management strategy in a manner that provides for the safety and well being of involved personnel, protects values at risk, and achieves resource management objectives.

Signed: _____ Date: _____
Project Leader, Browns Park National Wildlife Refuge

APPENDIX O: PRESCRIBED FIRE COMPLEXITY

PRESCRIBED FIRE COMPLEXITY ELEMENT RATING CRITERIA

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

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

COMPLEXITY ELEMENTS

1. POTENTIAL FOR ESCAPE:

Score Criteria

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

cause implementation of contingency plan, and prescribed burn will be declared a wildfire. Fuel outside burn unit may be continuous and heavy with no fuel breaks making suppression efforts difficult. Engines and heavy equipment are primary suppression tools. Probability of Ignition greater than 70 percent.

- [9] Good potential for multiple fire escapes. An escaped fire will exceed the capability of the holding resources on site and additional resources will need to be requested. Escaped fires will cause implementation of contingency plan and prescribed burn will be declared a wildfire. Fuel outside the burn unit is extensive and heavy, making suppression actions difficult. Prescription calls for fireline intensity and fuel moisture in the primary fuel model that are known to cause serious spotting potential. Probability of Ignition greater than 85 percent. Wind speeds at the upper end of prescription.

2. VALUES AT RISK

Score Criteria

- [0] No risk to people, property, cultural and natural resources, either inside the designated burn unit or in the event of fire escape.
- [1] Burn is in an area infrequently visited by people and contains no historic structures, buildings, sensitive biological communities, T&E species, or habitats that could be damaged by prescribed fire. The area adjacent to the burn may contain a few locally significant natural or cultural resources, or structures that could be damaged by fire escapes.
- [3] Burn is in an area occasionally visited by people, and may be adjacent to a primary field unit road. The burn unit contains structures, cultural resources, sensitive biological communities, or T&E habitat that must be protected from fire.
- [5] Burn is in an area that receives moderate use. Public safety is a major concern addressed in the burn unit plan, but still requires a minor commitment of project resources. The unit may contain several significant structures; there may be one or two primary natural or cultural resources (as identified in the station fire management plan) inside or immediately adjacent to the burn unit which must be protected from fire. - OR - the area adjacent to the burn unit contains one or two cultural or natural resources, or structures valued between \$50,000 and \$250,000 that could be threatened by fire escapes.
- [7] Burn is in an area that receives moderate use, and protecting public safety requires a modest commitment of project resources. The burn unit may contain several significant structures, and contain or be immediately adjacent to several sensitive biological communities or habitats (as identified in station fire management plan)

that must be protected from fire. - OR - the area adjacent to the burn unit contains three or more cultural or natural resources or developed sites with structures valued between \$250,000 and \$500,000 that could be threatened by fire escapes.

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

3. **FUELS/FIRE BEHAVIOR**

Score Criteria

- [1] Fuels are uniform, and fire behavior is easily predicted using the standard fire behavior models and prediction systems (BEHAVE PROGRAM). Terrain is mostly flat, or the slope is uniform.
- [3] Fuels within the primary model vary somewhat in loadings and arrangement, but are still well represented by one of the standard fire behavior fuel models. There may be small areas of secondary fuel types present, mostly away from the burn unit perimeter. The terrain contains low relief, and slope and aspect cause minor variations in fire behavior. The fire behavior variations present no difficulties in carrying out the burn, and the predominant fire behavior still can be predicted easily under most prescription conditions.
- [5] Considerable variation exists within the primary fuel complex. Prescriptions may be based on two fuel models, or may require a customized model in addition to or in place of a standard model. A few areas of unusual fuel concentrations or atypical fuels not well represented by the prescription-based models may exist on or near the burn unit perimeter. The terrain contains significant relief, but the variations present only minor control problems, and no problems in meeting burn unit objectives. Fire behavior can still be predicted using standard fire behavior prediction systems.
- [7] Major variations in the fuel complex require **two or more** fuel models, and may require several customized models. High fuel concentrations and atypical fuels not well represented by the prescription-based models may be common on or near the burn unit perimeter. The terrain encompasses two or three major vegetative communities through a broad elevational gradient. Variations in slope and aspect have major effects on fuels, fire weather and fuel moisture. The resulting variations in fire behavior may present moderate fire control problems and minor problems in meeting the overall burn unit objectives. Fire behavior cannot be predicted well using standard fire behavior prediction systems without application

of adjustment factors.

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

4. FIRE DURATION

Score Criteria

- [1] Entire burn unit will be burned in one burning period. Some minor residual burning may continue inside the unit, but requires no continued resource commitment. Primarily 1-hour fuels.
- [3] Complete burnout of burn unit requires 1 to 3 days. Some minor residual burning may continue inside the unit, but requires no continued resource commitment. Primarily 10-hour fuels.
- [5] Complete burnout of burn unit requires 2 to 3 days. Significant residual burning inside the burn perimeter may continue for up to 3 days, requiring small holding crew. Primarily 100-hour fuels.
- [7] Complete burnout of burn unit requires 3 days to 1 week. Significant residual burning inside the burn perimeter may continue up to another week, requiring a holding crew on site during the burning period. Primarily 1,000-hour fuels.
- [9] Complete burnout of burn unit requires more than 1 week. Significant residual burning may continue for up to another 3 weeks along most of the burn unit perimeter, requiring a complete holding crew on site.

5. AIR QUALITY

Score Criteria

- [1] Burn is remote from developments or visitor use areas or is of such small size that smoke impacts are insignificant. No critical targets are present. Critical targets are areas that are unusually sensitive to smoke impacts. These include areas such as airports, highways, air quality non-attainment areas, and hospitals in which

health and safety are quickly and severely impacted by even minimal amounts of smoke, targets that already have an air pollution or visibility problem, and any targets where the impact of smoke will be compounded by the presence of emissions from other sources. Burning is outside the non-attainment areas, and RACM/BACM eliminates any impacts to these areas.

- [3] One or more minor developments or visitor use areas may experience noticeably impaired visibility and increased particulate concentrations, but not in excess of secondary Federal standards. The impairment is expected to last no more than 3 days. No critical targets are present. There are no impacts to non-attainment areas.
- [5] Several communities or visitor use areas may experience significantly impaired visibility (as defined in State, county, or field station visibility standard) or particulate concentrations exceeding secondary Federal standards. The impairment is expected to last no more than 1 week. Not more than one health-related complaint is likely to be received from health or medical authorities. No critical targets are present. Smoke trajectory is important, but broad.
- [7] One town (more than 20,000 people) or one major visitor use area may experience significantly impaired visibility (as defined in a State, county or field station visibility standard) or particulate concentrations exceeding secondary Federal standards. The impairment is expected to last not more than 1 week. One to three critical targets are present. Smoke trajectory is critical. Mixing height and transport wind speed may be important.
- [9] Several towns (each of 20,000 people or more) or several major visitor areas may experience significantly impaired visibility (as defined in State, county or field station visibility standard) or particulate concentrations exceeding secondary Federal standards. The impairment is expected to last more than 1 week. Any impact likely to result in a violation of a primary Federal air quality standard would also qualify. Smoke trajectory, mixing height, and transport wind speed are critical.

6. IGNITION METHODS

Score Criteria

- [1] Burn is ignited using drip torches, fusees, or other simple ground methods. Ignition requires not more than two personnel. Ignition patterns are simple, with no chance for confusion or hazardous situations to develop.
- [3] Burn is ignited using simple ground methods or Terra Torch device (or equivalent). Ignition requires three to four personnel who may work in small

teams igniting separate areas simultaneously. Ignition patterns may be complex enough to require detailed planning, but there is only minor chance of confusion. Ignition team is not expected to become involved in hazardous situations.

- [5] Burn is ignited using a combination of ground methods, or both ground and aerial methods. Ignition requires four to six personnel working in teams to ignite separate areas simultaneously. Burn and ignition complexity requires separate position for ignition specialist. Ignition patterns require detailed planning, coordination between teams, and considerable attention to avoid confusion. Ignition teams may be exposed to hazardous situations for short periods.
- [7] Ignition methods are tailored to accomplish different results in different sections of the burn. Burn unit may be composed of several fuel types requiring different ignition techniques and patterns. Ignition team(s) is composed of six to eight personnel, who may ignite separate areas simultaneously. Several ignition specialists may be required for different segments of the burn. Ignition methods require detailed planning and coordination often including an ignition specialist in aerial command post. Ignition teams are frequently exposed to hazardous situations due to fuels, fire line intensity, and complex terrain. Ignition methods or patterns are subject to revision by burn boss to achieve desired results or due to changing conditions.
- [9] Burn requires a combination of complex aerial and ground techniques, often including helitorch, in complex, hazardous terrain and fuels. Ignition team is composed of more than eight personnel. Ignition methods require detailed planning by experts with extensive experience in specialized techniques. Ignition methods are subject to frequent revision by burn and ignition bosses due to changing or uncertain conditions. Detailed coordination is imperative to avoid placing team members in unacceptably dangerous situations.

7. MANAGEMENT TEAM SIZE

Score Criteria

- [1] Burn team consists of two to three personnel, with the burn boss holding several overhead positions.
- [3] Burn team consists of four to six personnel, including separate positions for Burn Boss and Holding Specialist.
- [5] Burn team consists of seven to nine personnel, including separate positions for Burn Boss, Ignition Specialist, and Holding Specialist.
- [7] Burn team consists of 10-12 personnel, including Burn Boss, Ignition and

Holding Specialist, Aircraft Manager (aerial ignitions), and a Fire Weather Observer.

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

8. TREATMENT OBJECTIVES

Score Criteria

- [1] Objectives are limited to fuel reduction or maintenance burning and are easily achieved (e.g., removing cured grasses from grasslands or field maintenance). Prescriptions are broad and encompass safe burning conditions.
- [3] Objectives are limited to dead and downed fuel reduction, or simple habitat restoration projects involving minor changes to vegetation. May involve two or three different fuel models. Objectives are easy to achieve using relatively low-intensity surface fires and simple burning patterns. Range of acceptable results for the burn objectives are broad.
- [5] Objectives include dead and downed fuel, and live fuel reduction burns or change to structure of vegetative/habitat communities. Also include habitat conversion projects requiring changes in the composition of two or more vegetation types. Objectives and results are broad and could be moderately difficult to achieve, and may often require moderate intensity fires involving living fuels. Burning patterns are moderately complex. Flame lengths or scorch heights are critical to meet burn objectives.
- [7] Objectives include living and dead fuels. Include habitat restoration projects requiring changes in the structure and composition of two or more vegetative habitats. Narrow burn parameters (prescription) fire behavior, smoke dispersal, operational constraints, and other burn criteria present a limited opportunity of project success with a single burn. The chance of success is heavily dependent on careful planning and precise timing.
- [9] Objectives include living and dead fuels. Fuel reduction, ecological considerations, and political or operational constraints may be conflicting, requiring careful prioritization of objectives and expert planning. The prescription may require a combination of different fire intensities that makes it difficult to achieve objectives. The prescription criteria and window of opportunity are narrow. Burn objectives are specific, and range of results narrow.

Project includes a major change in structure and composition of burn area. The prescription requires burning under risky conditions that could lead to fire escape.

Prescribed Fire Complexity Worksheet

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

PRESCRIBED FIRES:

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

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

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

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

Prepared by (RXBB/FMO)

Date

APPENDIX P: MONITORING

RECOMMENDED FIRE MONITORING STANDARDS

REGION 6

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

Planning and Preparation

Environmental Conditions Prior to the Burn

Photo Points Established

Fuel

Model(s)

Loading (By Size Class)

% Cover (Type/Model)

Continuity

Crown ratio

Depth of Fuel Bed

Other

Air Temperature (Maximum - Minimum to develop trends)

Relative Humidity (Maximum - Minimum to develop trends)

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

Fuel Moisture

Dead Fuel Moisture (Use of Fuel Sticks and/or Drying Ovens highly recommended)

Live Fuel Moisture (Fuel Models 2,4,5,7,10)

Soil Moisture (Dry, Moist, Wet)

Drought Indicator (Track One or More)

Execution

Environmental Conditions During the Burn

Date/Time

Air Temperature (Every 30 minutes)
Relative Humidity (Every 30 minutes)
Wind Speed and Direction (Eye Level) (Every 30 minutes)
Cloud Cover

Fuel Moisture (Indicate How Determined: Calculated, Actual)

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

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

Fire Behavior

Flame length (Head, Flank, Backing)
Rate of Spread (Forward, Flank, Backing)
Resistance to Control
Spotting Distance

Smoke/Air Quality

Mixing/Dispersion (Good, Fair, Poor)
Trajectory of Column (Surface/Upper Level)
Duration (Active Burning/Smoldering)
Problems

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

Post Burn

First Order Fire Effects

Photo Point

Percent of Area Burned

Percent of Fuels Consumed (By Fuel Loading Size Class, when possible)

Percent of Thatch/Duff Consumed

Scorch Height

Mortality

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

APPENDIX Q: LIVE FUEL SAMPLING

APPENDIX R: SMOKE MANAGEMENT