

U.S. Fish & Wildlife Service

Yukon Flats

National Wildlife Refuge

AMERICA'S NATIONAL WILDLIFE REFUGES...
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Fire Management Plan

September 2001



FIRE MANAGEMENT PLAN

YUKON FLATS NATIONAL WILDLIFE REFUGE

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I. INTRODUCTION.

A. Fire Management Objectives.

As described in the Service Manual (621 FW 2.2), the Refuge Fire Management Plan provides the planning framework for all refuge fire management decision-making and identifies the approved course of action relating to fire as described in other plans. The Refuge Fire Management Plan identifies action to be taken to preserve, protect and enhance natural and cultural resources with specific regard to wildland fire. The Refuge Fire Management Plan provides the background and guidelines for management of wildland fires and prescribed fires. It specifies the uses of fire that are consistent with and can enhance refuge habitat and wildlife management objectives.

1. Guidance for Developing Objectives.

a. Origin of Resource Management Objectives for Refuge.

The Yukon Flats National Wildlife Refuge (NWR) Fire Management Plan has been prepared to achieve resource management objectives by implementing Departmental, Service, Regional, and refuge policies, purposes, and objectives. Refuge objectives were set by the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) and the refuge's Comprehensive Conservation Plan (CCP)(USFWS 1987). ANILCA established the refuge and its primary purposes, and the CCP provides broad policy guidance on the management of the refuge. Service and Departmental policy also guide fire management actions.

The mission of the National Wildlife Refuge System "is to preserve a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Improvement Act of 1997, P.L. 105-57).

The Service has adopted an ecosystem approach to fish and wildlife conservation (National Policy Issuance #94-07, March 1994), which means "protecting or restoring the function, structure, and species composition of an ecosystem, recognizing that all components are interrelated." The fire management program will conform to the ecosystem approach and objectives as they evolve.

b. Specific Refuge Objectives from ANILCA.

The specific purposes for which the refuge was established and is managed, as specified by ANILCA are:

- i. To conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to canvasbacks and other migratory birds, Dall sheep, bears, moose, wolves, wolverines and other furbearers, caribou

(including participation in coordinated ecological studies and management of the Porcupine and Fortymile caribou herds) and salmon;

- ii. Fulfill international treaty obligations with respect to fish and wildlife and their habitats;
- iii. Provide, in a manner consistent with purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- iv. Ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary quantity within the refuge.

c. Guidance from Departmental and Service Manuals.

The Department of Interior policy (620 DM 1.4) also guides this plan. It emphasizes that firefighter and public safety is always the first priority. Protection priorities are (1) human life and (2) property and natural/cultural resources. This policy also recognizes that fire is a "critical natural process," and will be "integrated into land, natural, and cultural management plans and activities on a landscape scale, across bureau boundaries, and will be based upon best available science." In addition, it states that wildland fire will be used to "protect, maintain, and enhance natural and cultural resources and, as nearly as possible, be allowed to function in its natural ecological role." It requires that management actions taken on wildland fires must be "cost effective, consider firefighter and public safety, benefits, and values to be protected, and be consistent with natural and cultural resource objectives."

The Service Manual (620 FW 1.3) dictates that habitat management activities strive for "the attainment and maintenance of naturalness and, to the extent possible, natural diversity" (ecological integrity policy signed?). The goal of fire management as stated in the Service Manual (621 FW 1.2) is "to protect or enhance habitat and ecosystems for the benefit of fish and wildlife." Service policy (621 FW 1.3) states that the Service will use prescribed fire whenever it is an appropriate tool for managing Service resources, and will protect against wildland fire whenever it threatens human health, private property, or Service resources.

d. Guidance from Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review (CCP).

The Refuge CCP, which was adopted in 1987, provided further direction in habitat management objectives, specifically to "emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitat," to "maintain the refuge in an undeveloped state," to "provide opportunities for continued subsistence use of refuge resources," and to "maintain opportunities for hunting, fishing, and other recreational activities" (USFWS 1987).

The refuge's comprehensive conservation plan (USFWS 1987, p. 133) states:

Fires will generally be allowed to burn naturally where not endangering life or property. If fire suppression becomes necessary, state of the art techniques and the "minimum appropriate tool" concept will be used. Private lands within or adjacent to the refuge and special value refuge lands will receive the maximum protection practicable from fires.

One issue identified in the Refuge CCP is the potential impact of fire suppression on fish and wildlife habitats. Other issues of concern identified by the public in the Refuge CCP included management of refuge habitats and the impact of fire on wildlife. The CCP outlines the use of prescribed fire on the refuge "in order to improve moose habitat, to return a portion of the habitat to an earlier vegetational state, and to reduce hazardous fuel loadings." This plan is the implementing document for that use.

e. Guidance from Other Plans.

The CCP also references area-wide fire management planning (i.e., Alaska Interagency Wildland Fire Management Plan (AWFCG 1998) and Upper Yukon/Tanana Fire Management Plan (UYTPT 1984)), which describe the use of suppression to help meet management objectives.

ANILCA established the upper reaches of Beaver Creek as a National Wild River, including 16 river miles within the refuge boundary. By designating the area as a "wild" river, Congress mandated that the river "be managed to be free of impoundments and generally inaccessible except by trail, with watersheds or shorelines primitive, and waters unpolluted... representing vestiges of primitive America." The Beaver Creek National Wild River Management Plan stated that considerations for fire management should include use of fire to maintain the area's "natural, primitive condition" and to benefit wildlife habitat (USDI 1983). That portion of the Sheenjek River within the refuge boundary (99 miles in length) has been recommended for designation as a National Wild River (USDI 1999).

The refuge Fishery Management Plan (USFWS 1990) describes the importance of aquatic resources on the refuge and calls for monitoring of fish species and water quality to maintain fisheries for subsistence, commercial, and sport fishing uses.

The North American Waterfowl Management Plan (USDI 1986) identifies the Yukon Flats as a waterfowl habitat area of major concern. That plan stresses the value of maintaining an adequate habitat base to ensure perpetuation of North American waterfowl populations.

The Fortymile Caribou Herd Management Plan (BLM and others 1995) calls for allowing a natural fire regime to help maintain habitat quality. The refuge is partly within the herd's historic range.

f. Compliance with Other Legislative Mandates.

This plan must also comply with Section 106 of the 1966 National Historic Preservation Act, Section 7 of the Endangered Species Act, Section 810 of the Alaska National Interest Land Conservation Act, and Section 118 of the Clean Air Act. An Environmental Assessment and ANILCA Section 810 analysis is included in Appendix I. A Section 7 clearance is included in Appendix II. Smoke management is detailed in section IV. No properties on the refuge are included in or eligible for inclusion in the National Register of Historic Places.

The management direction and actions specified in this fire management plan have been evaluated in the approved Refuge CCP, in accordance with National Environmental Policy Act (NEPA) and Sections 304 and 810 of ANILCA. Public participation in the CCP planning process was used in the development of alternatives and in the selection of a preferred management alternative, and the direction and intent of this fire management plan is based on that. An Environmental Assessment for this Refuge Fire Management Plan is attached in Appendix I. Copies of a draft of this plan were provided to each village government in and around the refuge, as well as to the Council of Athabascan Tribal Governments. In addition, visits were made to villages within the refuge, and information received was also used in writing this plan.

The initial interagency fire plan for the area (UYTPT 1984) included an Environmental Assessment, which provided for designation of "protection level." An Environmental Assessment was prepared in 1986 for the refuge prescribed burning program, and a Finding of No Significant Impact was reached (USFWS 1986a), which is on file at the refuge. Material from both of those documents was incorporated into this plan.

2. Refuge Wildland Fire and Prescribed Fire Management Goals and Strategies.

This plan recognizes the boreal forest as a fire-dependent ecosystem and that if fire is excluded, ecosystem character, function, vigor, and diversity will be altered. There are objects and resources within the refuge boundary that warrant special consideration regarding fire and/or protection from fire. They include real property on the refuge, private property within the refuge, sensitive plant and wildlife species, and sensitive biological communities.

Inherent in all fire management decisions is the fact that wildland fire is an integral and necessary part of the boreal forest ecosystem. Departmental policy states "wildland fire will be used to protect, maintain, and enhance natural and cultural resources and, as nearly as possible, be allowed to function in its natural ecological role" (620 DM 1.4.D). Wildland fires are a natural part of the boreal forest, and the plants and animals in it are adapted to fire, which maintains ecosystem health. Wildland fires may be better at

maintaining or restoring ecosystems than prescribed fires, since prescribed fires are generally smaller and ignited at lower intensities (Baker 1994).

Natural habitat diversity is maximized by allowing fires to burn under a wide, natural range of conditions, which creates a rich mosaic of different vegetation types. This creates a large amount of "edge effect," which is highly beneficial to wildlife. In addition, this creates numerous burned areas which hinder fire spread and reduce the probability of large-scale catastrophic events that could result from long-term fire exclusion.

From policy and from objectives outlined in ANILCA, the Refuge CCP, and a prescribed burning position paper (USFWS 1992), the refuge's fire management goals and objectives are:

a. Fire Management Goals.

1. Protect life, property, and identified resources from fire. Priorities in fire suppression are (1) human life and (2) property and natural/cultural resources.
2. Manage wildland fire and prescribed fire to protect or enhance habitat and ecosystems for the benefit of fish and wildlife.
3. Communicate, coordinate, and cooperate with suppression organization staff, adjacent land owners, and the general public.

b. Fire Management Objectives.

1. Protect human life. This is the top priority. (Other objectives are not listed in priority order.)
2. Protect refuge-owned cabins and buildings, permitted cabins, and private property from fire to the extent possible given safety considerations and the availability of suppression resources.
3. Minimize the threat of wildland fire incursion into areas with higher protection levels through sound and timely fire management decisions and through hazard reduction activities.
4. Consider public health and environmental quality in decisions.
5. Maintain naturally ignited fire as a dynamic ecosystem process to the maximum extent possible in order to maintain the natural diversity of wildlife habitat.
6. Manage fire to meet resource objectives.

7. Utilize fire to minimize the occurrence of large catastrophic fires by reducing the extent and buildup of hazardous fuels.
8. Protect critical refuge resources from undue damage from wildland fire and from fire suppression actions.
9. Balance suppression costs against resource values at risk. Balance expenditures for prescribed fire against resource and hazard reduction benefits. Consider commodity, non-commodity, and social values in analyses.
10. Maintain communications with suppression organization staff, adjacent landowners, and the general public, coordinate management actions with them, and cooperate in reaching common goals and objectives.
11. Educate the public through personal contacts, school programs, the media, public meetings, and other ways about fire prevention, hazard reduction, and the role of fire in boreal ecosystems.
12. Continually evaluate protection level designation and change designation as needed.
13. Continually monitor and evaluate effectiveness of actions.

c. Strategies to be Employed.

1. Suppression action will be taken on all wildland fires not managed as wildland fires used for resource benefits (see Chapter III.E). A full range of suppression actions is available, from surveillance to indirect attack to aggressive direct attack.
2. For wildland fires started by natural causes and where prescriptive criteria met, the fire may be managed for resource benefits (see Chapter III.D).
3. Prescribed fire will be used for hazard reduction and resource management objectives (see Chapter III.C).

d. General Constraints to All Strategies.

Protection of human life is the highest priority at all times. The "light hand on the land" concept is encouraged on the refuge. Any activities on refuge lands should use methods that minimize environmental damage and disturbance to wildlife. ANILCA states that subsistence uses of the refuge have precedence over other consumptive uses. Effect of fire management activities, especially the use of prescribed fire, on subsistence uses must be evaluated (see Section 810 of ANILCA). Fire management actions must be cost-effective and consider benefits and values to be protected. Fires in the boreal forest can produce large amounts of smoke, and fires must be managed

to minimize impacts and maintain air quality. Constraints to specific strategies (suppression, fire use, prescribed fire) are listed in the appropriate sections.

B. Fire Management Organization and Responsibilities.

1. Authorities for Implementing Plan.

Alaska National Interest Lands Conservation Act of December 2, 1980 (94 Stat. 2371; 43 U.S.C. 1602-1784).

Alaska Native Claims Settlement Act of December 18, 1971 (88 Stat. 668; 43 U.S.C. 1601).

Departmental Manual, Part 620: Chapters 1-2, Wildland Fire Management.

Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C. 5121).

Economy Act of June 30, 1932 (47 Stat. 417; 31 U.S.C. 315).

Federal Fire Prevention and Control Act of October 29, 1974 et seq. (88 Stat. 1535; 15 U.S.C. 2201) as amended.

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

Federal Property and Administrative Services Act of 1949.

National Wildlife Refuge System Administrative Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997 and the Refuge Recreation Act of 1962. (80 Stat. 927; 16 U.S.C. 668dd-668ee; 16 U.S.C. 460k-460k4).

National Environmental Policy Act of 1969.

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

Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66, 67; 42 U.S.C. 1856, 1856a and b).

USFWS Service Manual, USFWS, 620 FW.

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

Yukon Flats National Wildlife Refuge Final Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review, 1987.

Wildfire Suppression Assistance Act of 1989, (P.L. 100-428, as amended by P.L. 101-11, April 7, 1989).

2. Fire Management Responsibilities and Suppression Authority.

The Refuge Manager is responsible for all fire management activities on the refuge, including wildland fire suppression, wildland fire use, and prescribed fire. Wildland fires are any lightning-caused or human-caused fires that occur on the refuge that are not designated as prescribed fires in an approved prescribed fire plan. Appropriate suppression action must be taken on all wildland fires unless the fire is being managed under an approved Wildland Fire Use Plan. (Surveillance may be an appropriate suppression action.) Fires managed under an approved Wildland Fire Use Plan must be lightning-caused, must have a prescription applied, and must comply with NEPA requirements.

The Departmental Manual (620 DM 2) delegated authority for suppressing wildland fires on refuge lands in Alaska to the Alaska Fire Service (AFS), which is part of the Bureau of Land Management (BLM). Those suppression services must conform to fire management guidelines specified by applicable interagency fire management plans and the refuge fire management plan.

3. Refuge Fire Management Team Organization, Responsibilities, and Qualifications.

Historically, there has been one permanent fire management position on the refuge staff, as well as a varying number of temporaries. The Fire Management Officer (FMO) is permanent full time and also serves Kanuti and Arctic NWRs. Recently, two fire-qualified non-fire staff have assisted with prescribed burning and gone on suppression assignments. The refuge fire management staff should be qualified for and large enough to be able to perform prescribed burns of low complexity on the refuge with little outside assistance. Target minimum qualifications on the station are for one qualified burn boss and one ignition specialist.

Emergency Firefighters (EFF) from villages in the Yukon Flats can provide a pool of fire suppression personnel for use on prescribed burns. Prescribed burns of moderate or high complexities will require assistance from other stations or agencies. The refuge fire management staff may participate in refuge fire suppression assignments, including monitoring fires. They are also available for regional and national callout during high fire occurrence periods. Availability of any refuge employee is based in part on decision criteria for individual preparedness levels listed in the refuge preparedness plan.

Individuals and qualifications can change annually and are listed in the Dispatch Plan portion of the Annual Refuge Fire Management Plan (Appendix IX). Target qualifications for fire staff are set by Departmental and Service policy.

4. Interagency Coordination.

Interagency coordination is critical for successful implementation of the refuge fire management program, especially because fire suppression is delegated to another agency. In addition, fire has ecosystem-wide effects that affect neighboring land owners and managers: Arctic NWR, BLM, State of Alaska (Department of Natural Resources, Division of Forestry), Doyon Corporation, Venetie Reservation, and Native corporations and/or tribal governments for the villages of Stevens Village, Beaver, Birch Creek, Fort Yukon, Chalkyitsik, and Circle. Contacts are listed in the Dispatch Plan in Appendix IX.

II. DESCRIPTION OF REFUGE.

The refuge lies totally within the Service's Interior Ecosystem Unit and contains a diverse mosaic of plant communities representative of all major habitat types occurring in Interior Alaska. Much of the following information comes from and is provided in more detail in other sources such as the Refuge CCP (USFWS 1987), original Refuge Fire Management

Plan (USFWS 1986b), Annual Narrative Reports (e.g., USFWS 1994, 1996), and the Environmental Assessment of this plan (Appendix I).

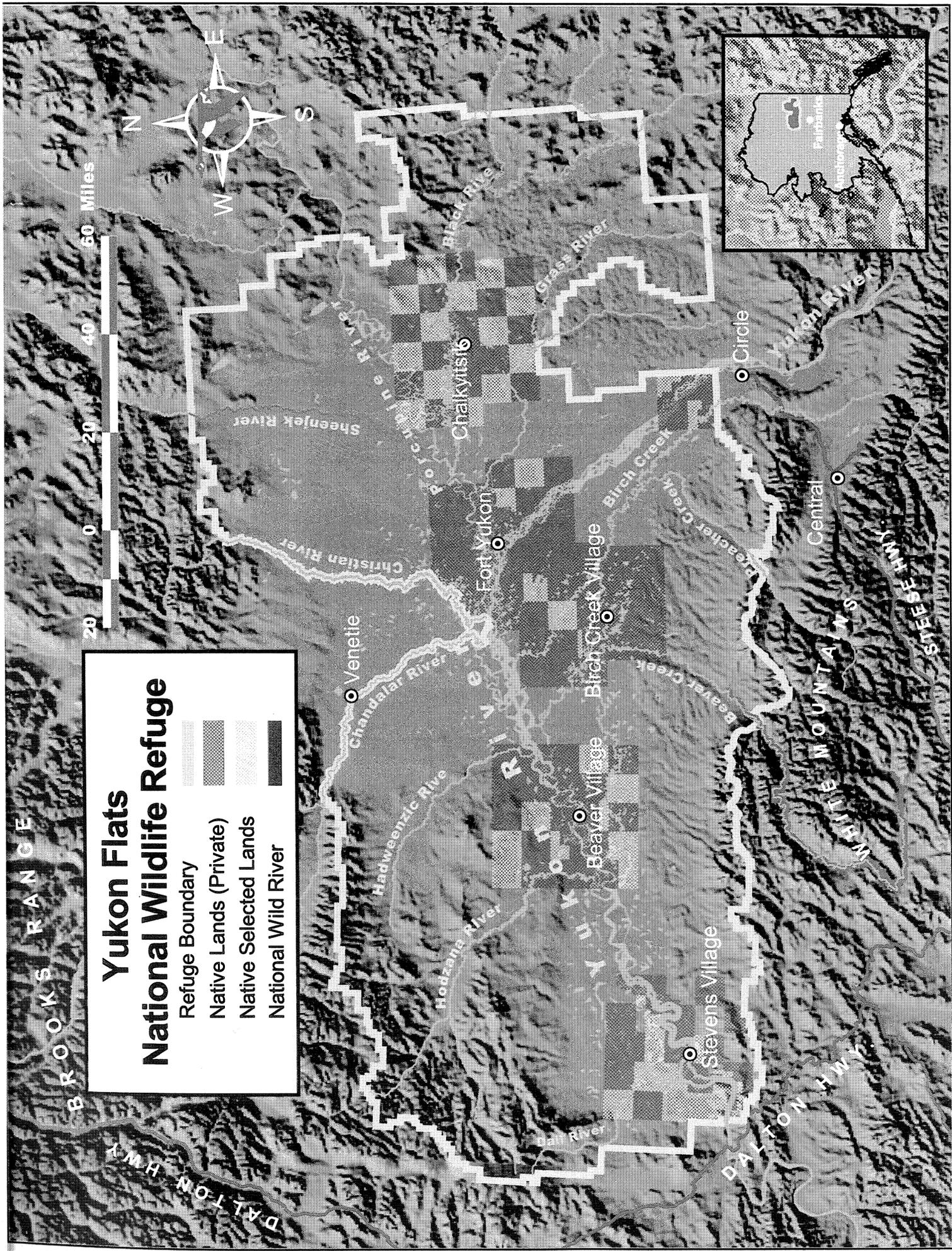
A. Physical Description.

The refuge straddles the Arctic Circle in northeast Alaska, and its dominant physical feature is probably the Yukon River, which flows through the heart of it. The southern boundary of the refuge is about 70 air miles north of Fairbanks, and the refuge stretches about 220 miles east-west. As of 1997, more than 9.27 million acres within the refuge boundary were federally managed (USFWS 1997b).

B. Adjacent Ownership.

Currently, the refuge is surrounded by state selected and conveyed lands to the southwest, southeast, and east; BLM lands to the south, west, and northwest; the Venetie Indian Reservation to the north; and Arctic NWR to the north and northeast. Within the refuge boundaries, there are approximately 2.7 million acres of land selected by or conveyed to Native corporations and Native allotment holders (Figure 1). These tracts range from small lots (160-acre allotments or fractions of them) to entire townships. The status of these allotments is either selected, interim conveyed, or conveyed. Some allotments have cabins or fish camps.

The area is sparsely populated. Some people may spend part of the summer in fish camps on Native allotments, but otherwise they reside in villages. No roads pass through the area, although roads reach Circle, southeast of the refuge, and cross the Yukon River just west of the refuge boundary. Travel is by air throughout the year, mainly by boat in summer, and by snow machine and dog sled in winter. Five villages are within refuge boundaries, and three villages are adjacent to the refuge. The population of the Yukon Flats is currently about 1,365 people (DCRA 1994).



Yukon Flats National Wildlife Refuge

	Refuge Boundary
	Native Lands (Private)
	Native Selected Lands
	National Wild River

C. Climate.

The refuge has a subarctic continental climate, characterized by extreme seasonal variation in temperature and day length. Climate information is taken from USFWS (1994) and Selkregg (1976). Summers are short but warm with temperatures occasionally exceeding 90°F (see Table 1). Because of its northern location, the sun stays up nearly all day for much of the summer, leaving little time for cooling during the short "night." Even when the sun does go down during the summer, lighting conditions still exceed "civil twilight" continuously from May 13 to August 4. Its latitude and climatic patterns cause the Yukon Flats to have higher summer temperatures than at any other place of comparable latitude in North America.

Table 1. Mean temperature and precipitation by month at Fort Yukon, Alaska. From 1922-1984 (excluding 1934, missing), from Arctic Environmental Information and Data Center, University of Alaska, Fairbanks.			
Month	Mean Temperature (°F)		Precipitation (inches)
	Maximum	Minimum	
January	-11.0	-28.4	0.40
February	-4.6	-24.8	0.36
March	13.6	-11.8	0.27
April	34.3	8.5	0.19
May	55.7	31.8	0.30
June	70.2	47.7	0.69
July	72.1	50.7	0.94
August	65.6	44.5	1.22
September	50.5	32.0	0.83
October	27.8	13.2	0.58
November	3.1	-12.3	0.41
December	-11.9	-27.9	0.39
ANNUAL	30.4	10.3	6.58

Precipitation averages 6.58 inches annually at Fort Yukon, ranging from 6 to 10 inches. July and August average the most rainfall, with 0.94 and 1.22 inches, respectively.

Precipitation occurs mainly as thunderstorms and rain showers, and large differences may be recorded within relatively short distances. The refuge is large enough so that part of it may be in a drought, and another part may be well above average in rain. Snow covers the ground from October to May, and average snowfall each winter is about 45 inches. Because of the presence of snow for over half the year and the presence of permanently frozen subsoil, the low precipitation is relatively effective for plant growth, and in some places creates saturated soils. The growing season is short; green-up begins in late May, and leaves begin to drop in mid-August.

Because of high summer temperatures and low precipitation, the area is described by Trigg (1971) as "warm arid" and ranks among the most severe fire climates in the state. The area's high summer temperatures and topography are conducive to lightning activity, which is the primary cause of fires on the refuge.

The prevailing winds are southwesterly or westerly during summer (July and August) and average about 9 miles per hour. Thunderstorms are common during that period, and wind from those storms can quickly change wind direction and increase wind speed. During the rest of the year, prevailing northeasterly winds average five to 10 miles per hour.

The average freeze-up date for the Yukon River is October 28, although open water is usually found until November. The river's average date of break-up at Fort Yukon is May 15. Most ponds and lakes freeze up a week or two before the Yukon River does, and they usually thaw within a week or two of the Yukon River. Flooding sometimes accompanies breakup in the spring, as ice blocks the river channel and water spreads over the broad lowlands along the Yukon. Many ponds and lakes in floodplains depend on this flooding to be recharged because of low precipitation. Summer thundershowers often cause floods along creeks and rivers that drain mountainous areas.

D. Topography.

The Yukon River flows through the center of the refuge. The river has formed the largest interior basin in Alaska, and the refuge completely encompasses that basin and some of its surrounding highlands and mountains. Selkregg (1976) breaks the area down into four physiographic regions: Yukon Flats, Porcupine Plateau, Kokrine-Hodzana Highlands, and the Yukon-Tanana Uplands.

1. Yukon Flats: This region lies in the middle of and covers over half the refuge. The central part consists of marshy, lake-dotted flats rising from 300 feet above sea level on the west to 900 feet on the north and east. The northern part of the region is made up of gently sloping outwash fans of the Chandalar, Christian, and Sheenjek Rivers, and the southern part is a broad, flat outwash fan of the Yukon River. Rising above the flats are rolling, silt and gravel-covered terraces, often with sharp escarpments 150 to 600 feet high, which slope gradually upwards to surrounding uplands and mountains.

2. Porcupine Plateau: This region covers much of the eastern and northeastern portions of the refuge. The topography consists of relatively low, gentle ridges and mountains with rounded or flat summits 1,500 to 2,800 feet high. The Porcupine River flows through the center of this region. The Black and Little Black Rivers drain rolling to steep uplands in the southeastern part of this region.
3. Kokrine-Hodzana Highlands: Northwest of the Yukon Flats is a region with rounded ridges, 1,000 to 2,500 feet high, and some rugged mountains to 4,200 feet. Some drainages are quite steep and dissected.
4. Yukon-Tanana Uplands: This region lies along the southern boundary of the refuge and is the northern edge of the White Mountains (including the Crazy Mountains). It is characterized by rounded ridges and small mountains, with peaks reaching 2,500 to 4,100 feet.

E. Geology and Soils.

Much of the Yukon Flats region is covered by deep, poorly drained wind and water-deposited soils (histic pergelic cryofibrists). Also present are deep, well-drained silts (typic cryochrepts) and deep, well-drained loess and silty or sandy, well-drained loams (typic cryorthents). Intermediate elevations and higher alluvial fans have well-drained, deep silt loams and fine sandy loams (typic fluvic cryofluvents) and deep, well-drained silts (typic cryochrepts). Rolling hills in the area have shallow, poorly drained soils with a thick organic layer (histic pergelic cryaquepts); deep, well-drained silty soils (typic cryochrepts); and rock outcrop (SCS 1979).

Permafrost is continuous under large parts of the refuge and discontinuous under the rest. Subsoils may be permanently frozen to depths exceeding 300 feet. Over the permafrost is the active surface layer of soil and duff, which thaws each summer. This layer may be from a few inches to several feet thick, depending on aspect, distance to a river, soil type, time since last wildland fire, vegetation type, and characteristics of the moss and litter layer. Soil drainage is poor in many places because of permafrost and lack of relief.

F. Air Quality.

Air quality is generally good. Wind occasionally stirs up silt off river bars, and air pollution from Europe and Asia is present as "Arctic haze." Smoke from fires can be significant and linger for extended periods, although most summers have little smoke. See Section IV for smoke management procedures.

G. Water Resources.

Abundant and diverse wetlands (including marshes, wet meadows, muskeg, lakes, ponds, rivers, and streams) are dominant features of the refuge. The lowland Yukon Flats region contains an estimated 40,000 lakes and ponds, which average 20 acres in size (USDI 1974), and more than 7,000 miles of streams and rivers (USFWS 1997b). See the Fishery

Management Plan (USFWS 1990) for descriptions of the types of water bodies on the refuge. Much of the rest of this section is drawn from the Refuge CCP (USFWS 1987) and Selkregg (1976).

Water quality today is little affected by human activities, and there are few unnatural oils, chemical residues, or sewage products. Sediment loads range from 10-100 parts per million (ppm) in major streams in the flats and up to 500 ppm in steep uplands. Dissolved solids average less than 200 milligrams per liter. Mean annual runoff for the region is very low, about 0.5 cubic feet per second per square mile.

Mechanical disturbance can and has caused increases in sediment load in refuge waters. Water quality in Birch Creek and Beaver Creek has been poor, mainly caused by mining in their headwaters outside the refuge, but that has been largely repaired (USFWS 1990). Local residents are concerned about water quality because of its effects on fish and wildlife populations and because at least some residents in each village depend on streams and rivers within the refuge for drinking water.

Sixteen miles of Beaver Creek within refuge boundaries, as well as 111 miles within adjacent Bureau of Land Management lands, have been designated as a National Wild River. A corridor containing about 8,500 acres of refuge lands is to be managed in accordance with the Wild and Scenic Rivers Act "to protect and enhance the values which caused it to be included in said system" (USDI 1983, p. 1). The entire length of the lower Sheenjok River within the refuge boundary is also being proposed as a National Wild River (USDI 1999).

H. Vegetation.

The refuge currently has vast and diverse woodlands, an even broader diversity of wetlands, and alpine tundra at higher elevations. Over one-third of the refuge is covered by forest; about one-quarter is covered by recent burns (1988 or later), which are dominated by herbaceous plants, shrubs, and seedlings; about one-quarter is covered by other shrubby types; and meadows, alpine tundra, and open water make up the rest (Table 2).

Table 2. Land cover type and estimated extent on Yukon Flats NWR.			
Land Cover Class	Percentage of Refuge	Approximate Acreage	Subtotals (acres)
Open spruce forest	15	1,383,000	
Closed spruce forest	8	768,000	
TOTAL SPRUCE FOREST	(23)	--	2,151,000
Mixed spruce/deciduous forest	15	1,416,000	
Deciduous forest and scrub	14	1,324,000	
Closed deciduous scrub	9	834,300	
Open deciduous scrub	1	92,700	
TOTAL DECIDUOUS FOREST/SCRUB	(40)	--	3,667,000
RECENT BURN, 1988+ Herbaceous/Seedling spruce /Deciduous shrub	(27)	--	2,525,000
Grass-sedge marsh	2	185,400	
Alpine scrub/barren	1	92,700	
Prostrate dwarf shrub tundra	2	185,400	
TOTAL MARSH/TUNDRA	(5)	--	463,500
Lowland alluvium and mud	<1	<92,700	
Open water	4	370,800	
TOTAL UNVEGETATED	(<5)	--	<463,500
Cover class percentages from Yukon Flats NWR CCP (USFWS 1987), adjusted for area burned from 1988-1999.			

The most conspicuous characteristic of vegetation on the refuge is the complex mosaic of different vegetation types caused by differences in soils, drainage, erosion, permafrost, flooding, and fires. Fire and other disturbances and the resulting successional changes cause cover types to vary considerably in acreage over time.

The major cover types are pure or mixed stands of spruce and deciduous trees. (Refer to Appendix III for scientific names of plants mentioned in the text.) Spruce forests are made up of black and white spruce. Deciduous tree species on the refuge are quaking aspen, paper birch, balsam poplar, and tamarack. Woody species in scrub habitats include two alder species, bog birch, and many species of willow. See Foote and others (1989, 1995) for descriptions of vegetation on the refuge and also Viereck and others (1992). See Heglund (1992) for a discussion of wetland vegetation types.

Chemical composition and vegetation structure make many species of the boreal forest quite flammable. Black spruce is the typical example, but crowberry and Labrador tea burn even hotter (Johnson 1992). A more thorough discussion of vegetation types as fuel for wildland fire is found in Section II.M.

1. Threatened and Endangered Plants.

One Species of Concern (formerly known as a Category 2 Species), Yukon wild-buckwheat, has been identified from a location on a bluff above the Porcupine River. Other Species of Concern potentially occurring on the refuge are Yukon aster, Shacklette's catseye, Murray's whitlow-grass, and Yukon podistera.

2. Sensitive Biological Communities.

Steppe-bluff communities are generally restricted to steep, south-facing bluffs near the larger rivers and are quite unique in comparison to surrounding boreal forest communities. Steppe-bluff communities contain sagebrush and grasses and drought-tolerant forbs, including many endemic plant species such as the Species of Concern listed above (Murray and Lipkin 1987, Wesser and Armbruster 1991). Two species new to science have recently been discovered in this community: a fleabane (*Erigeron*), and a liverwort (*Asterella*). The community is mapped on interagency fire maps.

- I. Wildlife.

The quality of habitat within the refuge is reflected in its diversity and abundance of wildlife: 159 bird species, 39 mammal species, 18 fish species, and one amphibian species have been found on the refuge (USFWS 1996). See Appendix IV for a list of species present on the refuge. Wildlife present on the refuge are described more fully in the Environmental Assessment of this plan (Appendix I).

The refuge provides breeding habitat for more than one hundred species of birds and serves as a migration corridor for birds breeding farther north and west. The Yukon Flats was identified as a major breeding ground for waterfowl in the early 1950's, which was a major factor leading to its designation as a national wildlife refuge. Ducks banded on the Yukon Flats have been recovered in 45 states, 8 provinces of Canada, several Latin American countries, and Russia. The Yukon Flats is considered one of the most productive waterfowl breeding grounds in North America.

Thirty-nine species of mammals, representing seven orders and 17 families, have been recorded on the refuge. Some of the more important or noteworthy species include moose, caribou, black bear, brown (grizzly) bear, gray wolf, marten, wolverine, lynx, beaver, muskrat, and snowshoe hare.

Eighteen species of fish have been found on the refuge. Important species include three species of salmon that move up the major rivers and spawn in side channels. Other important species include northern pike and whitefish, which are found in many streams and stream-connected lakes, and burbot and sheefish, which are found in the major rivers (USFWS 1990). An important spawning area for sheefish has been identified on the Yukon River between Fort Yukon and Circle (R. Brown, personal communication).

The American peregrine falcon (*Falco peregrinus anatum*) was delisted from Endangered status in 1999 and still is of management concern. It nests on bluffs along portions of the Yukon and Porcupine Rivers and in the White Mountains. These sites are shown on interagency fire maps. Five to eight breeding pairs have been observed during recent surveys.

Arctic peregrine falcons (*Falco peregrinus tundrius*) migrate through the refuge, and they were downlisted from threatened status in 1994. American bald eagles, listed as Endangered in the Lower 48, but not listed in Alaska, are present on the refuge primarily along lake margins and in riparian areas.

Three species termed by the federal government as Species of Concern (formerly Category 2 Species) are found on the refuge; such a designation means that there is significant concern about a species but insufficient data exists for listing. The olive-sided flycatcher occurs on the refuge mainly in mature spruce forest associated with edges, especially streams and rivers. The northern goshawk is fairly common in forested areas. The harlequin duck nests in rapid streams and is extremely rare on the refuge.

In addition, five species listed by the State as being "Species of Special Concern" exist on the refuge: American peregrine falcon, Arctic peregrine falcon, olive-sided flycatcher (all mentioned above), gray-cheeked thrush, and blackpoll warbler. These species and subspecies are of concern because of a long-term decline in abundance or are vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance.

Little is known about the biology and status of scoters (USDI 1986), and concern has been expressed over their declining numbers. On the refuge, their nesting is concentrated in lakes in foothills of the White Mountains, and they may be sensitive to disturbances or erosion around these lakes.

J. Cultural Resources.

1. Human history.

The Yukon Flats is considered to have been part of the route traveled by the ancestors of the American Indians from Asia to the Americas. The earliest human inhabitants may have arrived in the area from 9,000 to 11,000 years ago (Clark 1981a). The Native people currently living in the area are mainly of Gwich'in Athabascan descent, but also include Koyukon Athabascan and Inupiat Eskimo (USFWS 1994).

Historically, these peoples spent much of the year wandering the region in bands to exploit seasonal abundances of fish, wildlife, and plant materials (Nelson 1973). Fort Yukon was established in 1847 as a Hudson's Bay Company's trading post (Caulfield 1983). Few Europeans lived in the area, but impacts on the Native population through smallpox, measles, and other diseases were severe (McClellan 1981).

The pure subsistence lifestyle of local natives began to change with introduction of trapping for European fur traders. A cash economy was begun in the late 1800's by cutting wood for steamboats, hauling freight, and building boats and further developed later by other wage employment (Caulfield 1983; Hosley 1981b; McClellan 1981; Nelson 1973, 1983). Despite these changes, in the 1940's, subsistence hunting and fishing was still providing all or a major part of the food to 70% of the people in the area (Caulfield 1983).

2. Archeological Resources.

While there is a likelihood of significant archeological sites within the refuge boundary, few sites have been documented (see Andrews 1977, Hart-Crowser and Associates 1985, Slaughter n.d., Smith 1984, West 1965). Sites are difficult to locate because they are hidden by moss growth, leaf litter, and thick plant growth, or because they have been obliterated by changing water courses or wildland fire. The way the early peoples lived means that older sites likely contain very few artifacts.

Most prehistoric sites are likely found at prime hunting and fishing locations--on ridges overlooking river valleys, at confluences of rivers and streams, and at lake outlets. Village sites were likely along rivers. Many sites in riverine lowlands have been destroyed and their artifacts redistributed by the meanderings of the rivers (West 1965, Slaughter n.d.). Fossilized animal remains have been recovered from the refuge, usually found buried in riverine sediments (Slaughter n.d., Smith 1984). Wooden caribou fences are susceptible to fire, and place names indicate that some were built on the refuge (Caulfield and others 1983, maps 2 and 3a).

Historic sites of the 19th and 20th centuries are most likely found on lowland terraces near rivers or old river channels. Historic era sites often contain wooden cabins and outbuildings associated with trapping and mining. They are very susceptible to wildland fire, and many have already burned. Cemeteries are often associated with

old villages or homesites and have wooden markers. Erosion of riverbanks is also a major threat and has destroyed many of these sites (Slaughter n.d., West 1965).

As a result of ANCSA, the areas most heavily used by Native peoples within refuge boundaries have been selected for conveyance or have already been conveyed to local village corporations or regional corporations (USFWS 1986b). Many historic sites identified from records of the Alaska Historical Survey are on corporation, village, or private land (Andrews 1977, Slaughter n.d., USDI 1974). Known cultural sites are identified on refuge fire maps.

The objectives of cultural resource management include to "protect, maintain, and plan for the use of Service managed cultural resources for the benefit of present and future generations" (614 FW 1.2.A). Cultural resources include archaeological resources, historic property, objects of antiquity, cultural items, and traditional/religious values. The refuge CCP (USFWS 1987) states that archeological and historical sites will be protected in accordance with all federal and state laws. Section III.F discusses constraints to fire suppression tactics imposed to protect these sites.

K. Refuge Facilities and Public Use.

1. Facilities.

Refuge lands have no developed recreational or interpretive sites. One interagency interpretive site is planned along the Dalton Highway west of the refuge. A refuge-owned administrative cabin is located on Canvasback Lake near the center of the refuge. The refuge has a cabin and warehouse in Fort Yukon. Refuge headquarters are in Fairbanks. Real property located on the refuge is listed in Table 3. About forty cabins and tent frames are located on refuge property, and they are used by private individuals for trapping or subsistence purposes through special use permits.

Table 3. Real Property on Yukon Flats NWR.		
Property	Number	Value (\$)
Canvasback Lake Administrative Cabin	1	130,000
Fort Yukon Administrative Site	1	340,000
TOTAL	2	470,000

2. Public Use.

There are two primary categories of public use on the refuge: subsistence use and recreational use. Subsistence uses are provided for by ANILCA and account for the vast majority of public use on the refuge. Subsistence users harvest more than 50

species of fish, mammals, birds, and plants (Sumida 1988). Priority recreational uses, dictated by the National Wildlife Refuge System Improvement Act of 1997, are "hunting, fishing, wildlife observation, and photography, or environmental education and interpretation." The main recreational activities are hunting, fishing, floating rivers, and incidental activities such as camping and wildlife observation (USFWS 1994). For a more detailed discussion of subsistence activities on the refuge see the Environmental Assessment (Appendix I), Refuge CCP (USFWS 1987), annual narrative reports (USFWS 1994, 1996), Caulfield (1983), Sumida (1988, 1989), and Sumida and Andersen (1990).

L. Cultural, Social, and Economic Considerations.

Cultural, social, and economic considerations are more fully described in the Environmental Assessment (Appendix I). The refuge provides an area in which local residents conduct subsistence activities, an area for them and others to ply commercial ventures, and a wild, remote area for recreationists. All recreation and subsistence uses depend on healthy habitat and wildlife populations. Much of the following discussion is drawn from USDI (1974), USFWS (1994), and USFWS (1987).

The refuge is mandated by ANILCA to provide for subsistence uses by local residents, and those uses have precedence over other consumptive public use. Subsistence uses are important not only for providing food, clothing, tools, and housing, but are important culturally and socially as well (Caulfield 1983, USFWS 1987). The residents of the eight villages in and adjacent to the refuge depend heavily on the refuge's resources. Exact usage is not documented, because users often do not differentiate between refuge land or Native corporation land, and many wildlife species move back and forth across these boundaries. Recent surveys have documented that 90-100% of households in area villages harvest wild resources, and that 450-680 pounds of wild resources are harvested for human consumption per person per year. Much larger amounts of fish are harvested for dog food (Sumida 1988, 1989; Sumida and Andersen 1990).

The refuge has social importance beyond its value for subsistence and recreational activities. Although the area's remoteness and isolation result in relatively low levels of public use, those characteristics are what make it attractive to many people.

Fish and wildlife that are spawned, hatched, or which spend part of their life on the refuge are also important to commercial, subsistence, and recreational users elsewhere. Salmon, waterfowl, migratory non-game birds, and caribou are important to people downstream on the Yukon, out on the Pacific, in Canada, in the Lower 48, and in Russia, Mexico, and Central and South America.

Cash-paying jobs are scarce in the refuge area. Unemployment averages 32% in area villages, and 38% of people live below the poverty level (DCRA 1994). Cash incomes assist subsistence activities by allowing the purchase of supplies such as gasoline, oil, firearms, ammunition, tools, and other materials. Economic exploitation of the refuge is

limited by law and by the nature of the area. Tourism, trapping, and commercial fishing take place on the refuge.

Commercial harvesting of timber is not allowed on the refuge (USDI 1987). Although no commercial logging currently occurs in the area, white spruce stands on adjacent private lands are in Full Management Option areas partly because of their potential value as timber. Commercial firewood and house log cutting does take place on private lands.

Firefighting is and has been an important source of income for many local residents, mostly connected with organized village Emergency Firefighting (EFF) Crews involved in the suppression of large fires. Gross earnings of local residents from firefighting have totaled more than \$5 million during the years 1985-1994 (latest figures available), although there is high variability from year to year because this income follows the boom-and-bust cycle of large fires (Sylvester 1971). Most EFF use is within Alaska, but use in the Lower 48 is increasing.

There are opportunities for village EFF crew participation in other aspects of fire management. The refuge has used village EFF in prescribed burning, and EFF may be used in any projects constructing fuel breaks to improve the protectability of developed areas from wildland fires. The refuge places a high priority on involving local crews in the refuge fire management program.

M. Fire Regimes and Fuels.

The mosaic of habitats present on the refuge today is obvious even to untrained observers. Wildland fire has long been and still is one of the most important forces of nature in the boreal forest. Fire exerts a powerful influence on the entire ecosystem, including hydrologic, carbon, and nutrient cycles, landscape diversity, wildlife and plant species diversity, and species distributions and abundances (Bryant and others 1994, Clark and Sampson 1995, Kelsall and others 1977, Pyne 1982, Pyne 1984). Fire effects are discussed more thoroughly in the Environmental Assessment (Appendix I).

Agencies responsible for fire management in the North American boreal forest recognize that fire exclusion is not possible, and not economically or ecologically desirable (Stocks 1993, Pyne 1982). Vegetation pattern in the boreal forest is largely controlled by a few intense, stand-replacing fires that burn in extreme weather conditions and cover hundreds of thousands of acres (Johnson 1992).

Fire is one of the human race's oldest tools and was used by Athabascans in Alaska for signaling, creating areas for hunting, killing trees to be pushed over and lined up to create caribou fences, driving off mosquitos and other insect pests, and killing trees for firewood. Wildland fires were also started accidentally in other uses of fire (Lutz 1956, Pyne 1982). Athabascans in northern Alberta (Slavey and Chipewyan) burned meadows in spring before snow-melt was complete for fire hazard reduction, wildlife habitat manipulation, and other reasons (Lewis 1982). Native groups used fire similarly up to historic times in the Fort Yukon and Chalkyitsik areas (C. Alexander, personal

communication; W. James, personal communication; P. Williams, personal communication; Paragi 1994), but stopped when Americans brought in the European fire prevention ethic. In the past, Birch Creek residents did not extinguish fall hunting campfires so that the fires might spread and improve hunting areas (Natcher 1996).

1. Refuge Fire History

In the Yukon Flats, low precipitation, very long summer days with high temperatures, the presence of highly flammable fuel types, and frequent lightning (up to 2,000 strikes in a 24-hour period) combine to create one of the most extreme fire climates in the state (Trigg 1971). The Yukon Flats and the Yukon-Tanana Uplands (including the White Mountains) are among the most lightning-prone areas in the state. Most lightning activity occurs from 4-6 p.m. during late June and early July. Activity starts earlier in the day at higher elevations and later at lower elevations (Dissing and Verbyla 1998).

Figure 2 displays the perimeters of all recorded fires 1950-2000 larger than 1,000 acres. Since the creation of the refuge, an average of over 120,000 acres has burned each year (Table 4). Lightning has accounted for about 98% of acres burned on the refuge since its creation in 1981. The refuge is located mainly within the Yukon Flats Unit of the Upper Yukon Tanana fire planning area. From 1956 through 1982, 443 fires burned 969,809 acres in that unit. Lightning is believed to have started 62% of those fires, and the rest were attributed to humans (UYTPT 1984). Most of the human-caused fires were accidental. Since the refuge's creation (1981-2000), 9% of all fires have been caused by humans, and all but one of those have been in along creeks in Modified or Full protection areas. All but two were initial attacked and extinguished. Almost two-thirds of these fires were attributed to abandoned campfires. Most (86%) were under about a half acre in size and in the spring or fall.

Before 1940 an average of 1.5 to 2.5 million acres burned each year in Interior Alaska. With the creation of the Alaska Fire Control Service in 1939, the annual average decreased to 900,000 acres (Lutz 1956). Until 1984, policy dictated that all wildland fires be suppressed (UYTPT 1984). Aggressive suppression from the 1950's to 1984 succeeded in controlling all but a few fires in the refuge area, and an average of only about 56,000 acres burned each year in and around the refuge during this period (USFWS 1986b). Although suppression actions were successful most of the time, some large fires did occur because some fires defied suppression efforts, and some were not suppressed because of higher priorities. After the policy change in 1984, an average of nearly 120,000 acres has burned per year.

Although 89% of the refuge is now within Limited Management Option areas, where wildland fires are usually intended to be monitored, from 1988 through 2000, 49% of all fires have been initial attacked with the intent of extinguishment (85 of 172 fires). Eight percent of the total number of fires were human-caused, so a fairly large number of lightning-caused fires are still being extinguished for a number of reasons.

Figure 2. Large Fires, 1950-2000, Yukon Flats NWR.

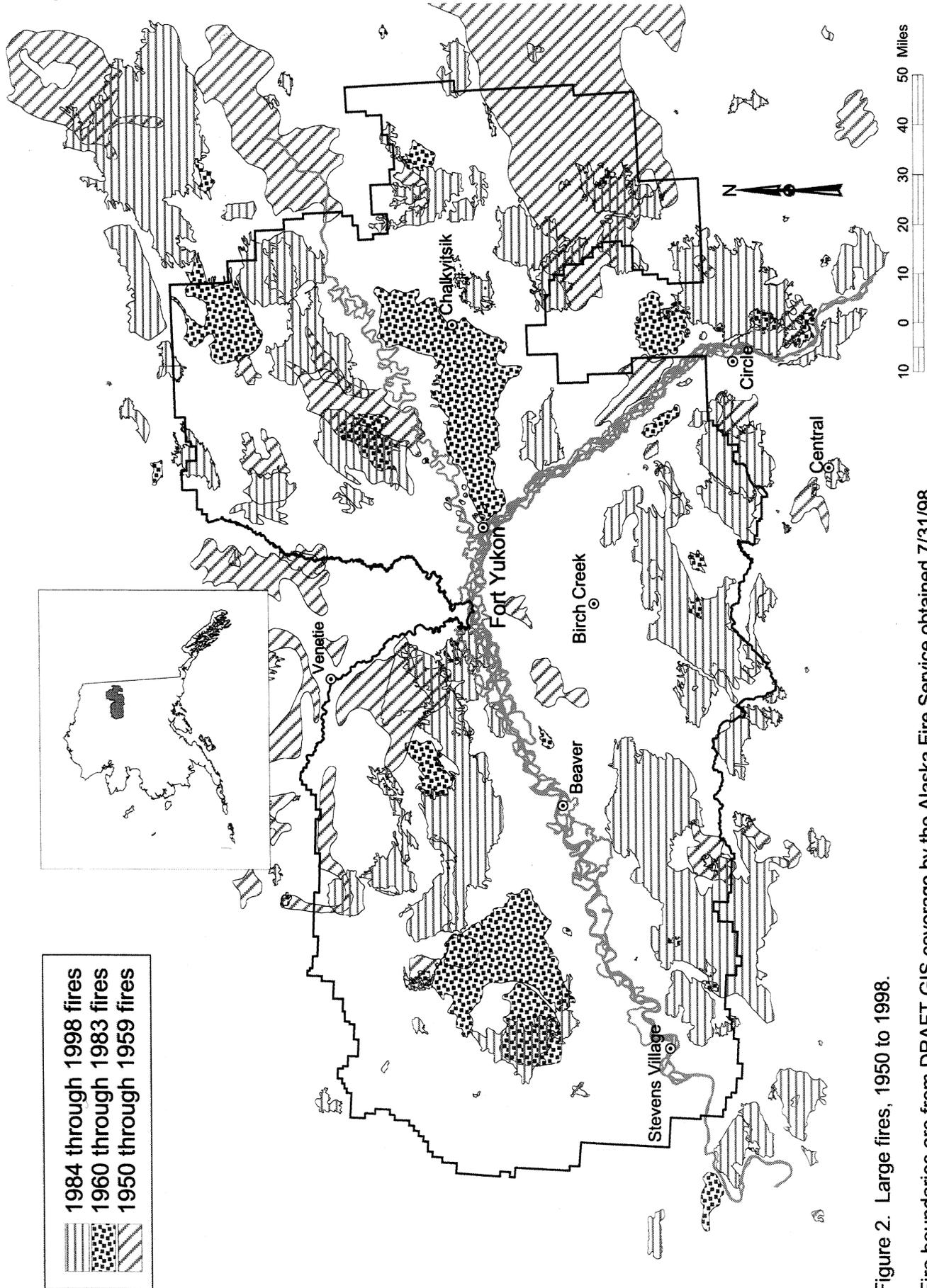


Figure 2. Large fires, 1950 to 1998.
Fire boundaries are from DRAFT GIS coverage by the Alaska Fire Service obtained 7/31/98.

2. Fire Frequency.

The refuge lies within the boreal forest, which is characterized by a combination of high intensity crown fires and severe surface fires. Weather, fuels, and topography can combine to create extremely large fires (Viereck 1983). Large-scale weather patterns are responsible for setting up conditions that control fire activity over large areas (Cahoon and others 1994, Johnson 1992). Much of the area burned is accounted for in periodic severe fire years (Davis and Mutch 1994, Johnson 1992).

Over the last 400-500 years, the fire cycle in the boreal forest of Interior Alaska has been fairly stable at about 100 years (D. Mann, personal communication). That means, mathematically, that all parts of a large area would be expected to burn within 100 years; however, some areas would not burn at all during that time, and areas with high lightning frequency, few natural barriers, and flammable fuel types would burn more than once.

Examination of fire history maps shows that about 45% of the area within refuge boundaries burned between 1950 and 1999, which gives a calculated fire cycle of 109 years. On average, about 1% of the refuge has burned each year. Highly flammable areas such as continuous black spruce stands would burn more frequently than 100 years. Moist sites or sites protected by fuel breaks, such as riparian white spruce stands along rivers, would burn less frequently. Closer examination of the map shows the existence of different fire regimes within the refuge boundary. Lowlands along the Yukon River corridor (Yukon Flats), which are broken up by many streams and wetlands and covered mainly with white spruce, have a calculated fire cycle of about 450 years. (Most of this region is also in Full Management Option, so this figure is probably quite high compared to "natural" conditions.) Rolling uplands and gravelly outwash plains with black spruce or stunted white spruce (Hodzana Highlands, north slope of the White Mountains, Porcupine uplands, and Black River uplands) have fire cycles of 70-100 years. Steep, broken terrain in the upper Hodzana Highlands has a calculated fire cycle of about 560 years.

The number and extent of fires vary widely between years and decades (Kelsall and others 1977). Within a ten to fifteen-year period, there are generally some years with practically no fires or area burned (for example, on the refuge in 1989 and 1998), some years with a few fires reaching moderate size (such as 1985 and 1993), and one or two severe fire years with many large fires, some burning tens or hundreds of thousands of acres (such as 1988). Over the last 12 years, area burned annually on the refuge has ranged from five acres to well more than a million acres (Table 4).

Table 4. Fires and Acreage Burned by Protection Level on Yukon Flats NWR lands, 1981-2000.

Year	Full Protection		Modified Protection		Limited Protection		Total	
	Fires	Acres	Fires	Acres	Fires	Acres	Fires	Acres
1981	9	4,184	0	0	0	0	9	4,184
1982	5	9	0	0	0	0	5	9
1983	24	1,622	0	0	0	0	24	1,622
1984	3	2	7	105	6	62	15	169
1985	6	3,847	4	18,282	4	144,442	12	166,573
1986	3	600	3	10,613	7	34,942	10	46,156
1987	0	0	4	83	5	18,001	9	18,084
1988	5	6,667	18	203,576	30	942,071	49	1,152,313
1989	1	1	2	4	1	4	4	9
1990	3	412	9	277,525	8	77,216	19	355,153
1991	3	42	12	64,580	8	227,450	22	292,072
1992	0	0	1	1	9	42,002	10	42,003
1993	2	22	4	29,101	9	63,467	13	92,590
1994	2	2	0	0	10	22,533	12	22,535
1995	4	1	0	0	2	420	6	421
1996	3	7,587	7	2,552	6	145,880	14	156,019
1997	2	1	2	10	4	30,750	8	30,761
1998	0	0	0	0	1	5	1	5
1999	0	0	0	0	7	151,531	7	151,531
2000	1	1	1	1	5	6,161	7	6,163
TOTAL	76	25,000	74	606,433	122	1,906,937	256	2,538,372
AVERAGE	3.8	1,250	3.7	30,322	6.1	95,347	12.8	126,919

¹ Number of fires in each protection category may exceed total number of fires because some fires burned in more than one category.

3. Fuel Models and Fire Behavior.

There are seven broad vegetation types on the refuge. Vegetation types found on the refuge may be described by models from the Northern Forest Fire Laboratory (NFFL), National Fire Danger Rating System (NFDRS), and Canadian system (Table 5). Fire behavior likely to be encountered in each fuel type is discussed below (from BLM 1995, USDI 1982, USFWS 1995). Fuel loadings are from sampling conducted on the refuge and described in Foote and others (1989, 1995).

Fire behavior is strongly tied to fuel moisture levels, especially in the duff and moss layer. Those fuels are relatively quick to change in response to rain and changes in humidity. Number of sequential days without rain significant enough to penetrate the forest canopy has been found highly correlated with area burned (Flannigan and Harrington 1988). As time since precipitation increases, moisture is lost, increasing susceptibility to ignition and availability of fuel. Prolonged dry periods result in progressive drying deeper into the duff layer, as well as drying in live fuels (Johnson 1992, Pyne 1984). Depth of burn is extremely important in determining resistance to fire control efforts and fire effects on vegetation (Schimmel and Granstrom 1996).

Van Wagner Van Wagner (1983) divides fuels into four types: subsurface organic layers, surface fuels, down dead trees and branches, and standing live and dead vegetation. Deep organic layers are made up of partly decomposed plant parts, and although some may burn during the flaming front passage, much consumption occurs in a smoldering fire. If deeper layers are dry, fires can be sustained there during rainy periods that wet the surface. Surface fuels largely determine whether a fire will spread or not, and they are composed of dead foliage, litter, mosses and lichens, and fine shrubs. Down woody fuels may be heavy and contribute to crowning and flare-ups. Live foliage is highly flammable in some species, and crown fire behavior depends on the presence of ladder fuels, the amount of foliage present and its density, moisture content, and content of flammable waxes, oils, and/or resins.

Ignitions usually occur when there has been minimal rain for one to two weeks and on days with low relative humidity, high temperatures, high wind, and lightning. Ignitions can also occur during wet thunderstorms, but these "holdover" fires may not spread much until dry conditions return. Van Wagner (1983) describes five main types of fires: smoldering fires in deep organic layers; surface backfires (burning against the wind); surface headfires (burning with the wind); crown fires (advancing as a single front); and high-intensity spotting fires.

Johnson (1992) states that the climate and vegetation of the boreal forest produce high intensity crown fires that have created some of the largest fires in the world. Large fires and extreme fire behavior are most common in black spruce and stunted white spruce

stands. Burned areas are generally not susceptible to large fires for 20-50 years after burning. It usually takes that long for a continuous moss/litter layer and fairly continuous spruce canopy to develop, which are largely responsible for carrying the fire (Van Wagner 1983). Large burns on the refuge from the 1950's have only begun to have significant burns within them in the last decade, and often fire behavior is still significantly less severe than in surrounding long-unburned areas.

Increases in wind speed can also have major impacts on fire behavior, quickly turning creeping fires into crown fires. The AFS Alaska Fire Suppression Field Handbook (BLM 1995, p. 7) contains good information on fire behavior. For black spruce, it states that a relative humidity from 30-40% and mid-flame wind speed above 10 miles per hour will likely generate increasing fire intensity and some crowning. With those winds and humidity below 30%, conditions are referred to as "dangerous," creating a "full-blown, running crown fire that spots ahead."

During "extreme" burning conditions the flaming front may be more than a mile wide, fires may run several miles during a day, flame lengths may reach a hundred feet, and spot fires may occur hundreds of yards ahead of the main fire. Suppression options will be severely limited by the fire, and direct attack is rarely possible (BLM 1995, Alexander and Cole 1994)

Alexander and Cole (1994, in their Table 1) state that under "super critical" conditions, extreme fire behavior is certain, with behavior including "rapid spread rates, continuous crown fire development, medium to long-range spotting, firewhirls, massive convection columns, (and) great walls of flame." Suppression is "virtually impossible," and the only place for effective and safe control action is at the back and along the flanks until the fire stops its run.

Table 5. Fuel models for fire behavior prediction and fire danger rating for vegetation types of Yukon Flats NWR. From the Canadian Forest Fire Danger Rating System (see Stocks and others 1989), the Northern Forest Fire Laboratory (NFFL--Anderson 1982), and National Fire Danger Rating System (NFDRS--Deeming and others 1978).

Vegetation Type	Canadian Fire Behavior/ Danger Model	NFFL Fire Behavior Model	NFDRS Fire Danger Prediction Model	Estimated Acreage on Refuge ²
Black Spruce Forest	C-2	custom black spruce ¹	Q	2,151,000
White Spruce Forest	C-2	8 or 10 (heavy downed fuel)	H	
Mixed Spruce/ Hardwood Forest	M-2 (can set amount of spruce)	8 (few spruce) or 9 (moderate spruce)	R	1,416,000
Hardwood Forest	M-2	8	R	1,324,000
Shrublands/Brush	M-2	2 (grass w/ flammable shrubs) or 5 (dwarf flammable shrubs) or 6 (heavy dead woody load)	B	3,452,000
Marsh Grasses	O-1	3	N	185,400
Tundra	O-1	1 (tussocks < 1 foot high) or 3 (tussocks > 1 ft.)	S	278,100

¹ Also see discussion below and Norum (1982)

² Derived from Table 2.

a. Black Spruce.

Black spruce woodlands usually occur on poorly-drained permafrost sites. White spruce stands in poor sites are often mistaken for black spruce stands. Ground cover in these stands dries rapidly and becomes quite flammable. It is mainly composed of

feathermosses, lichens, and low shrubs such as bog blueberry, Labrador tea, and lowbush cranberry.

Fires in black spruce (and stunted white spruce) are carried by surface fuels and generally burn with relatively high intensities and slow rates of spread. Ignition of the tree crowns (individuals or groups of torching trees) will occur just behind the flaming fire front if flame lengths are high enough (two feet or more) to ignite the lower branches. Because black spruce often grows on poor sites, the trees are commonly moisture stressed. This, coupled with the fact that the surface fuels respond quickly to changes in relative humidity, causes this fuel type to be flammable through a longer part of the fire season than any other fuel type. Areas where fire has only partially burned surface fuels are susceptible to reburns. Dead and down fuel loads are about two tons/acre. After 30-40 years, these sites have accumulated sufficient amounts of continuous fuels to be able to sustain large fires again. Spotting by aerial firebrands from torching trees is common, which increases overall rate of fire spread. Instability of the atmosphere, surface winds, and moisture content of receptor fuels are critical factors influencing the amount and distance of spotting.

Norum (1982) correlated fire behavior in these fuels with NFFL fuel models. Rate of spread was generally 1.2 times that predicted by model 9 (hardwood litter). Flame length was approximated by model 5 (short brush). The Canadian system can predict not only rate of spread and flame length, but also likelihood of ignition, crown involvement, crown fire effect on rate of spread, fuel consumption, and fire shape and growth rate. The hauling chart produced by Alexander and Cole (1994)(Appendix V) relates fire behavior outputs from the Canadian system to resistance to control.

b. White Spruce.

White spruce stands usually occur on warm, well-drained sites. Paper birch and balsam poplar are often abundant in riparian stands, and aspen is present in upland stands. The stands may be open and park-like or have a dense shrub layer (often alder).

Fires in stands of large white spruce are generally slow spreading and burn with lower intensities than in black spruce. White spruce along drainages often do not burn when fires burn surrounding vegetation. Smoldering fires in the root systems are common. Increased canopy cover and shading tempers the response of fine fuels to changes in relative humidity. Ladder fuels are not as common as they are in black spruce. Crowning occurs only under very dry conditions or near jackpots of dead fuels. Dead and down woody fuels generally range from four to eight tons/acre, but may be as much as three times higher.

c. Hardwoods and Mixed Spruce/Hardwoods.

Young hardwood stands are often dense with little understory. In mixed spruce-hardwood forests, fire intensity generally increases in relation to the amount of spruce in the stand. Pure hardwood stands can serve as natural fuel breaks under certain moisture conditions. Because surface fuel loading is light and composed primarily of leaf litter, fires in this fuel type are usually slow spreading and burn with relatively low intensities. Fuel and soil moistures are relatively high in this type because of shading and a compacted leaf litter layer. Crown fires in spruce stands will normally drop to the forest floor when they encounter a hardwood stand.

These stands are flammable under very dry conditions. In addition, hardwoods may burn with fairly high intensity and carry a crown fire in the spring during green-up. Smoldering fire in duff/litter layer and dead logs is common. Dead and down fuel loads generally range from five to 14 tons/acre and increase with stand age.

d. Brush and Shrublands.

Included in this type is recent burns (less than 10-15 years old). In wet sites or where surface fuels are sparse, fires will not carry in this fuel type. The presence of grasses and sedges, shrubs with flammable chemicals (such as bog birch, crowberry, lowbush cranberry, and Labrador tea), and significant amounts of dead woody material make stands much more flammable. Dead and down fuel loads are generally around four tons/acre, but are much less in small brush and may be up to 20 tons/acre in decadent stands of large willows. Loadings may be more than twice that where large trees have been killed and toppled by fire.

e. Tundra and Marshes.

Substantial accumulations of fine flashy fuels (especially cured grasses and sedges) can result in fires with high rates of spread and high intensities, especially in windy conditions. Where tussocks are present, taller tussocks correspond with higher fire intensities and rates of spread. Some types of tundra rarely burn because moist conditions and/or sparse fuels create slow rates of spread and low intensities. These types include low shrub, mesic graminoid herbaceous, wet sedge, and *Dryas* dwarf shrub tundra (names from Viereck and others 1992).

4. Fire Season.

Fires can occur on Yukon Flats NWR from early May to mid-September. The peak for ignitions, with about 60% of the starts for the refuge or for AFS' Upper Yukon Zone, is in the 30-day period from June 10th to July 10th. Nearly 70% of ignitions have occurred by July

10th, about 80% by July 20th, and around 90% by August 1st. Most of the total acreage burned is usually accounted for by the end of July, although "late" fire seasons can see active burning into August and September. The fire season on the refuge proper tends to be shorter than adjacent Native corporation lands, because early- and late-season fires are usually started by humans, and human activity is concentrated on Native lands.

The seasonal fire cycle for the refuge generally can be broken down into four time periods, which are dictated by weather (lightning activity, temperature, and precipitation), ignition sources, and plant phenology. The normal cycle is described below, but not all periods may occur each year. To have large fires requires dry fuels, especially on the surface, ignition sources, and wind. Some days or fire seasons have much lightning, but few fire or large fires because of accompanying rain. Some fire seasons are extremely dry, but no or very few ignitions occur. The refuge is large enough that different parts of the refuge may have different fire activity levels during fire season, because of differences in rainfall and lightning. Efforts to predict fire activity in advance have been unsuccessful.

The first period consists mainly of human-caused fires of low intensity in winter-cured fuels. This period begins in late April or early May when snow cover disappears and ends in late May or early June when green-up begins. Fires during this period usually burn with low intensity because of high relative humidity at night, moderate daytime temperatures, and high soil and duff moistures. However, strong winds and low humidity can produce higher intensity fires. Black spruce is moisture stressed and has relatively low live fuel moisture at this time of year, promoting crown fires. Birch and aspen also can sustain crown fires during green-up because of low foliage moisture content and high concentration of flammable compounds. Spring fires can smolder through this period and flare up in later periods when fuels are more dry. Figure 3 shows how the Canadian Buildup Index (BUI), which is a measure of dryness in the forest floor, changes throughout the fire season (see section III.C.6 and Stocks and others 1989 for an explanation of BUI).

Figure 3. CFFDRS Buildup Index Average By Unit, 1994-1998.

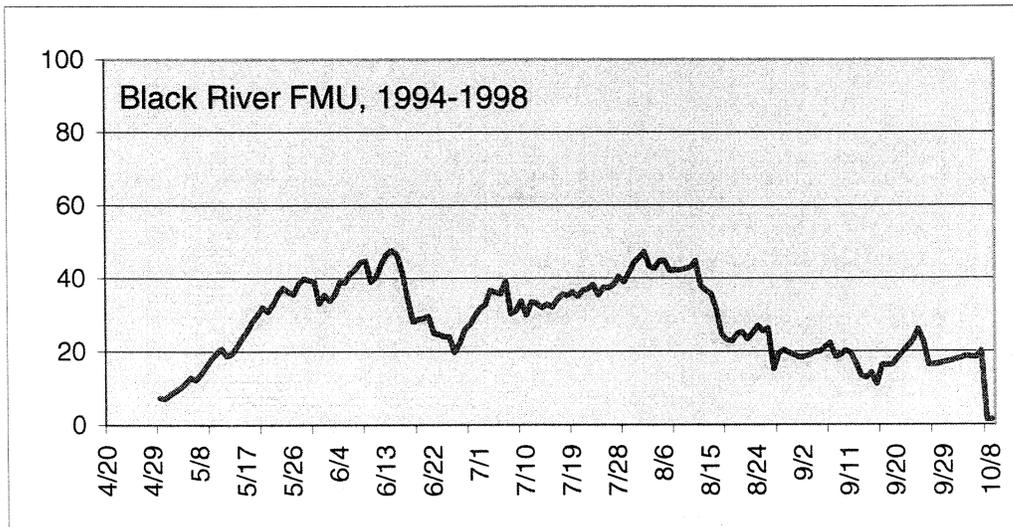
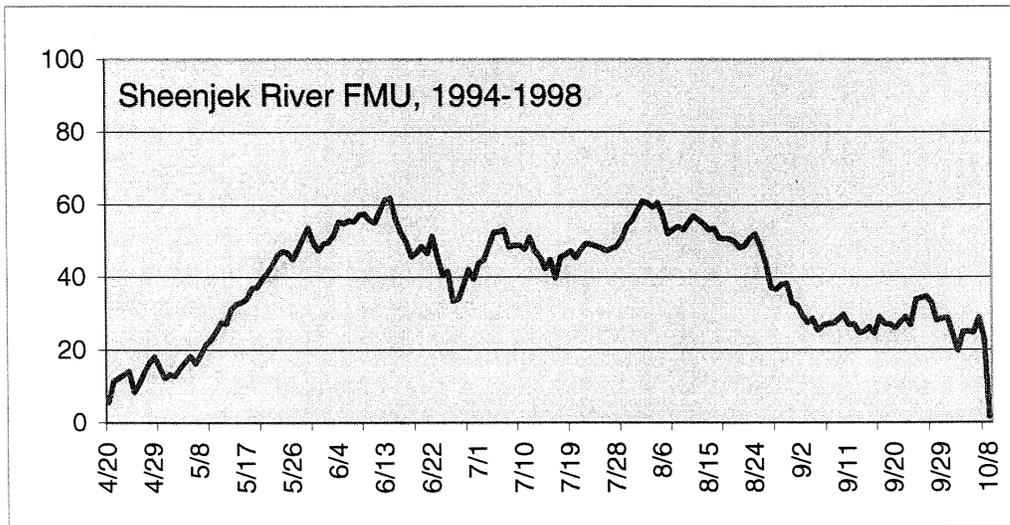
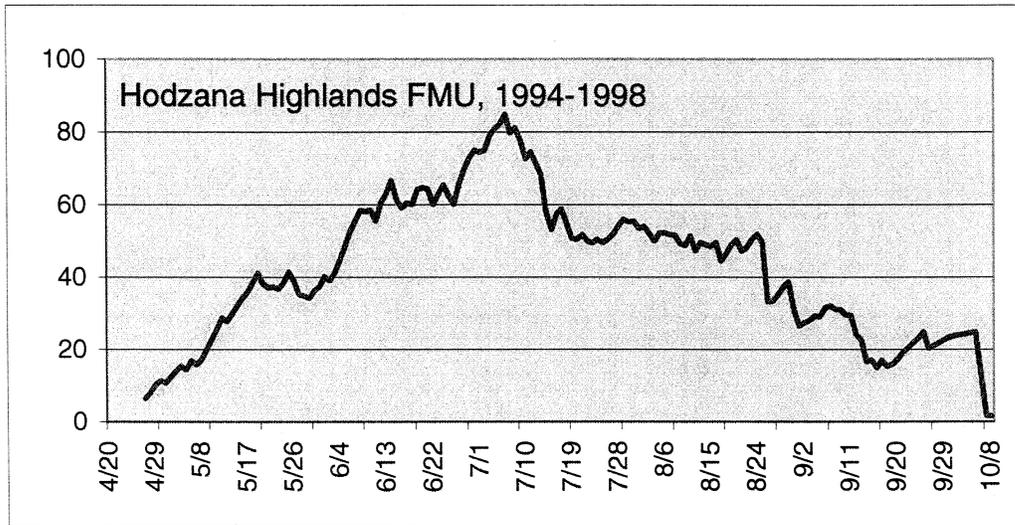
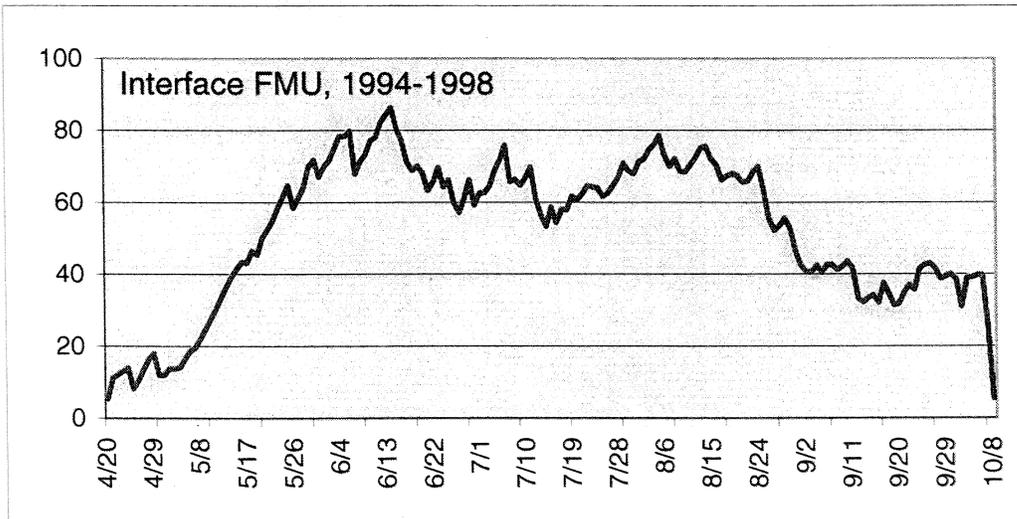
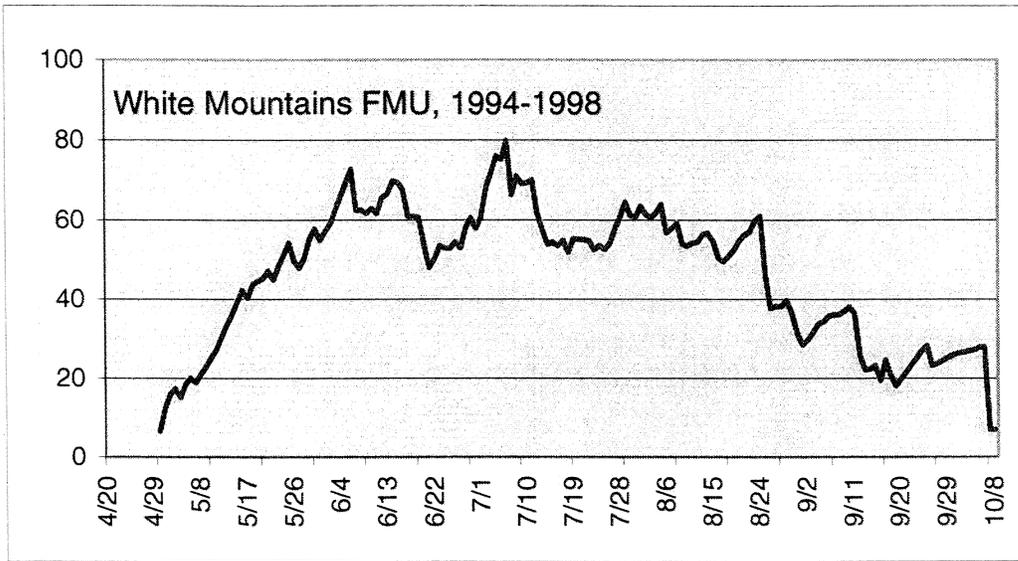


Figure 3. (Continued)



The second period usually consists of the middle part of June, is characterized by thunderstorms, and sees the majority of ignitions. Depending on moisture content of the air mass, thunderstorms may be predominantly dry or very wet. Wet storms may produce much lightning, but start few or no fires, and any fires remain small. Drier storms start more fires, and the fire behavior is not dampened. Early hot, dry, and windy weather allows fires to become large, and the resulting large perimeters allow rapid burning of large areas when conditions become warmer and drier. Wet weather and/or little lightning in this and the following period result in few ignitions and little acreage burned during the fire season. A few human-caused fires occur during this period.

The third period runs from late June through the end of July and is normally the period of highest fire activity. Fire danger indices commonly reach very high or extreme levels during this period because temperatures are high, nighttime cooling is minimal, humidities are low, and little precipitation occurs. In addition, new lightning-caused fires add to the fires still burning from the first and second periods. A few human-caused fires occur during this period as well. As fuel moistures continue to drop, fire rates of spread and intensities increase. Resistance to control efforts may be high, and indirect attack may be the only viable option. Low pressure weather systems bringing in rain usually dictate how long this period lasts.

The final period usually occurs from the beginning of August through mid-September. Few fires are started, and most of them are human-caused, often related to hunting, fishing, and other subsistence or recreational activities. Fires normally burn with lower intensities during this period because of increased humidity at night. However, years with continuing warm, dry, and windy conditions create "late fire seasons," when fires can burn extremely large acreages (e.g., 1979 and 1988). During 1988, numerous ignitions, rapid early fire growth, and an extended burning season resulted in 49 fires that burned more than 1.1 million acres on the refuge. Nine of those fires each burned more than 20,000 acres, and the largest burned 375,000 acres of refuge lands.

5. Fire Effects.

Fire can have major impacts, which some people view as negative, especially in the short term. However, fire is an important factor in the function of the boreal forest ecosystem and has contributed to the evolution of the ecosystems and its member plant and animal species. Fire influences nutrient cycling, hydrology, landscape diversity, standing biomass, plant succession and diversity, wildlife diversity, insect populations, and disease levels (Bryant and others 1994, Davis and Mutch 1994, Kelsall and others 1977, McCullough and others 1998, Pyne 1982).

Habitat diversity is a key to long term ecological stability and a limiting factor in the occurrence of large-scale, catastrophic events, including fire. Animals found on the refuge are thriving in the diverse array of habitats that are available as a result of fire, not in spite of fire (Heinselman 1971). Maintaining the natural role of fire is important to fulfilling a primary purpose for which the refuge was set aside, namely to conserve fish and wildlife populations and habitat in their natural diversity. Fire affects soil, permafrost, vegetation, fish, wildlife, and water and air resources.

Fire suppression activities can have longer lasting negative impacts than the fire does. Heavy equipment can cause soil erosion, stream siltation, subsidence, and gully formation. These activities may also destroy above ground and sub-surface cultural resources. Long-lasting impacts to visual resources result from straight line construction of firelines.

Fire exclusion and resulting changes in plant and animal communities are other effects of past suppression policies. These in turn affect subsistence and recreational users (Natcher 1996). Fire exclusion has altered natural processes on parts of the refuge, slowing nutrient cycling, reducing productivity, slowing tree growth, and altering wildlife habitat. See the Environmental Assessment (Appendix I) for a more full discussion of the role of fire in the boreal forest.

III. WILDLAND FIRE MANAGEMENT PROGRAM

A. Fire Management Units.

Refuge fire management objectives generated the existing wildland fire management option area boundaries, which help define refuge Fire Management Unit boundaries (Table 6, Figure 4). General resource management objectives and habitat modification alternatives are nearly identical for all Fire Management Units. Slight differences in resource management objectives may exist between specific sites. Wildland fire management option designation is the main factor influencing how wildland fires are managed on the refuge. Wildland fire management objectives for each Fire Management Unit are included in Table 6. Boundaries for Fire Management Units may be changed with changes in resource management objectives or fire management option designation on the refuge or on adjacent private land. Descriptions of the topography and fuels are included in the general refuge description (Sections II.A-H.). Fire suppression constraints are included in Sections III.F-G.

1. Hodzana Highlands, Sheenjek River, Black River, and White Mountains Units.

The four units with Limited management option designation total about 8,259,000 acres and are the areas farthest from villages. Fire suppression objectives for the four units are

identical, except for protection of special areas contained in the White Mountains and Sheenjek River units. The White Mountains Unit includes part of the Beaver Creek National Wild River, and the Sheenjek River unit contains a proposed National Wild River. All fuel types are present in each unit. The dominant types include black spruce/stunted white spruce and herbaceous or shrub types caused by recent burns.

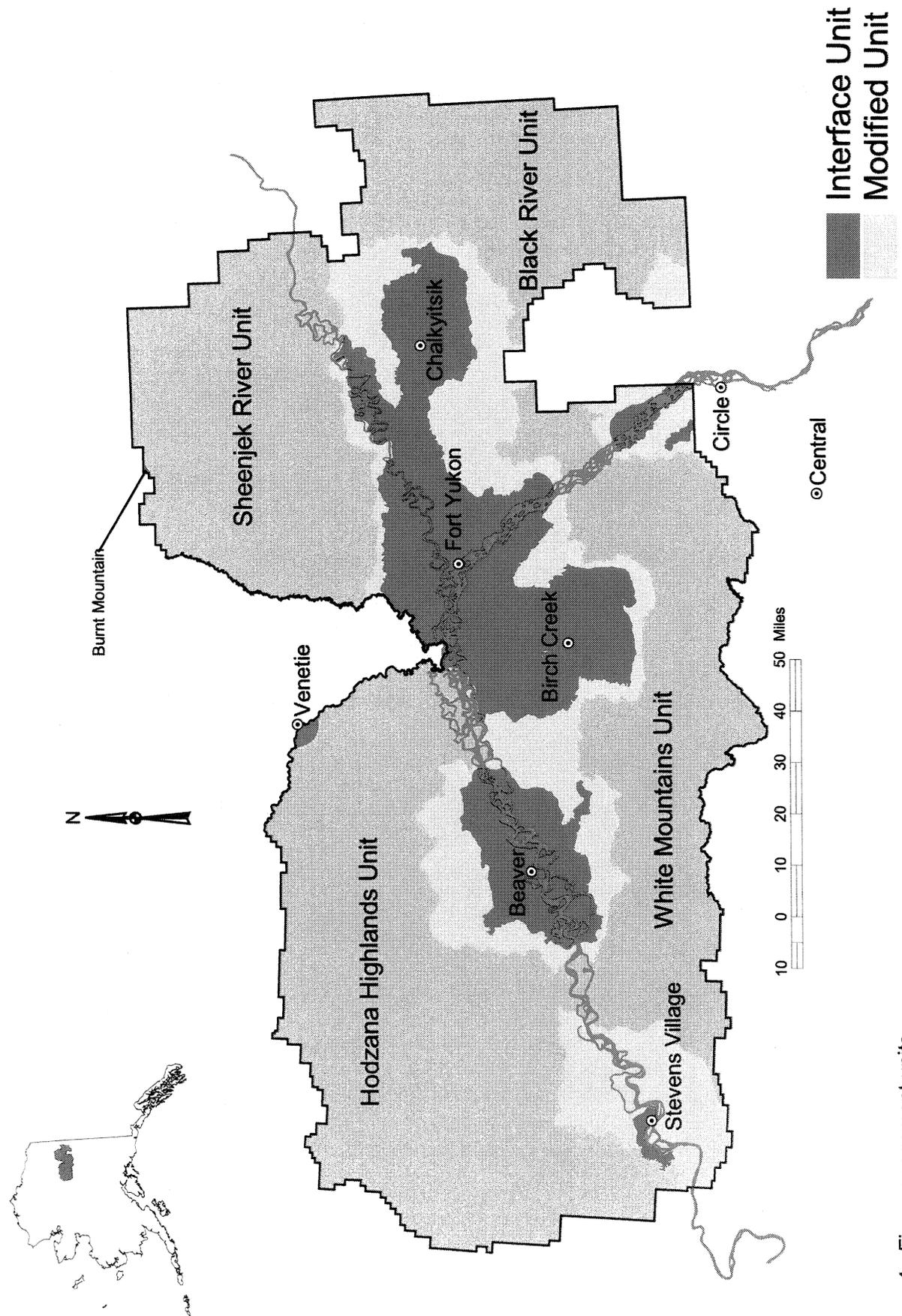
Because it is normal for most of the acreage burned to be claimed by a few fires during periodic severe fire years, no limits are placed on the number of wildland fires burning at a time or on the cumulative acreage burned during a year. Decisions on whether to take more aggressive suppression action will be based not only on the number of fires burning and acreage burned, but also on anticipated fire behavior and acreage likely to be burned, existing and anticipated smoke problems, likelihood of the actions' success, the experience and judgment of Service and AFS zone personnel, and decisions of the Multi-agency Coordinating Group (MAC Group).

The refuge management goals include managing for natural habitat diversity. Extinguishing or limiting the spread of naturally-ignited wildland fires has potentially serious and long-lasting effects on the landscape, and should not be done unless absolutely necessary. Human-caused wildland fires, accidental and intentional, have also affected the landscape for centuries (Lutz 1956, Pyne 1982), but it is against Departmental policy to use these fires to achieve resource objectives. Management of human-caused fires will be based on other factors, including protection of human life, property, and identified values, as well on suppression costs and potential damage from suppression operations.

Wildland Fire Use and prescribed fire may be used in these Fire Management Units. A variety of reasons may exist for employing either type of fire. See Section III.D for a discussion of Wildland Fire Use and Appendix XV for prescriptive criteria and Section III.C for a discussion of Prescribed Fire.

Table 6. Fire Management Units and fire suppression objectives on Yukon Flats NWR.			
Fire Management Unit	Size (acres)	Wildland Fire Management Option	Wildland Fire Suppression Objectives
Hodzana Highlands	3.2 million	Limited	<ol style="list-style-type: none"> 1. Protect human life and site-specific values. 2. Allow fire to burn under the influence of natural forces within predetermined areas, subject to item 1 above. 3. Prevent fire from burning into Full or Critical management option areas. 4. Reduce overall suppression costs through minimum resource commitment. 5. Protect integrity of designated National Wild Rivers.
Sheenjok River	1.83 million	Limited	
Black River	1.29 million	Limited	
White Mountains	1.94 million	Limited	
Modified	884,000	Modified	<ol style="list-style-type: none"> 1. Protect human life and site-specific values. 2. Protect identified resources and prevent the fire from burning into Full or Critical management option areas. 3. Reduce overall suppression costs through minimum resource commitment. 4. After conversion to Limited status, adopt objectives of units with Limited management option.
Interface	127,000	Full & Critical	<ol style="list-style-type: none"> 1. Protect human life, property, designated sites, and designated natural resources. 2. Minimize acreage burned during initial attack.

Figure 4. Fire Management Units.



HH Dec. 1998. Albers, Clark 1986. Cent. Mer. 146d. (File: Fireplan89)

Figure 4. Fire management units.

2. Modified Unit.

This unit consists of areas with Modified management option designation, currently totaling about 884,000 acres. During early planning efforts, this level of protection was often given to land to help protect adjacent high value areas. Very little of this unit has burned since fire suppression was begun, which will contribute to an increase in extent of hazardous fuels next to high value areas. Fire management objectives for this unit include careful and continual evaluation to identify areas that should be changed to Limited management option and areas in need of prescribed burns for hazard reduction or resource purposes. Wildland Fire Use may also be employed in this unit. Minimizing acreage burned by wildland fire is not a management priority in this unit. All fuel types are present in this unit. Dominant types include white spruce, hardwoods, and willow shrublands, although some large areas of black spruce/stunted white spruce are also present.

3. Interface Unit.

This unit contains areas given Full or Critical management option designation. The refuge currently has about 128,000 acres in this unit, mainly around villages and concentrations of Native allotments. Land ownership around villages is in a checkerboard pattern. Wildland fires in this unit have highest priority for suppression and initially receive aggressive suppression action. Minimizing acreage burned in Full management option areas is an objective during initial attack, but costs shall be an important factor in selecting strategies and tactics for extended attack and escaped fires. Safety and protection of identified sites or features is a priority. All fuel types are present in this unit. Dominant types include white spruce, hardwoods, and willow shrublands, although some large areas of black spruce/stunted white spruce are also present.

Very little of this unit has burned since fire suppression was begun. The large size of these areas may result in hazardous fuel situations around the settled areas. Hazard situations should be identified and mitigated.

Full management option areas should be discussed with village and regional corporation representatives to ensure that the true values are being protected. Interest has been expressed in having fire in these areas for resource reasons (W. James, personal communication, R. Mayo, personal communication, P. Williams, Sr., personal communication, Natcher 1996). An increase in area burned may be accomplished by increasing the incidence of wildland fire (by changing designation to Limited or Modified management option or through the Wildland Fire Use process) or with the use of prescribed fire.

B. Preparedness.

1. Hazard Reduction/Fuels Management.

Given the potential for fires that defy control efforts, hazard reduction prescribed fire is an important tool. The fire management policy implemented in 1984 was primarily to aid prioritization of resources and to save money. However, preparedness also benefitted because the policy allows some wildland fires to burn under moderate conditions, helping break up continuous fuels and reducing fuels for fires burning later under hotter, drier conditions. Mechanical reduction of hazard fuels is not permitted on the refuge unless the CCP is revised, because the entire refuge was placed in the minimal management category. The Refuge may cooperate with adjacent landowners on mechanical treatments of their lands where the treatment will benefit both parties. Prescribed burning for hazard reduction is discussed further in section III.C.2.

2. Fire Prevention.

An aggressive fire prevention program is called for by Departmental and Service policy. In addition, follow-up on trespass fires should be done to recover cost of damages and suppression (see Departmental Manual, 620 DM 1; 50 CFR 28.32; and FWS fire management handbook). Prevention of human-caused fires and techniques to protect dwellings from the threat of wildland fire are promoted by the refuge. The refuge periodically prepares news releases that outline planned activities and/or discusses prevention of human-caused fires. School programs also include discussion of fire prevention.

From 1956 to 1982, 31% of ignitions were attributed to human causes within the AFS fire planning units that include the refuge (UYTPT 1984). Most of these were around villages and along water courses used for travel, and because most of these lands have been conveyed to Native corporations, the refuge has few human caused fires. Since the refuge's creation, less than 10% of fires on refuge-owned land have been caused by humans, accounting for less than 5% of the acreage burned. Because these fires are usually near inhabited areas, they are quickly reported and suppressed. However, because they are usually near inhabited areas, they are also more likely to threaten human life and property than more remote fires. More than half of the human-caused fires on the refuge have been started by campfires or warming fires, and most of those are in May and early June and in August, during spring waterfowl season and fall moose season.

3. Emergency Preparedness (step-up plan).

The refuge will adhere to regional and national preparedness levels. A refuge preparedness (step-up) plan, which guides fire management actions based on local fire danger, is attached as Appendix X. It will be updated periodically as historic weather data is accumulated.

4. Fire Detection.

Detection activities on the refuge are considered part of the suppression operation and are provided by AFS. Visual fire detection is provided by fixed wing aircraft. A lightning detection system is also in place that plots lightning ground strikes and aids in planning detection flights. The refuge has aircraft available to assist with detection and surveillance during critical times or periods when AFS aircraft are unavailable. Refuge aircraft are often in the field during fire season and provide supplemental, incidental detection. Private aircraft are a common mode of transportation in the area during the summer and frequently report fires or flare-ups for ongoing fires.

5. Pre-attack Plan.

A separate pre-attack plan has not been prepared. The refuge and AFS use fire management option designation (Critical, Full, Modified, Limited) for pre-attack planning, because management option designations point out and automatically prioritize values at risk (Figure 5). AFS maintains its own pre-attack planning checklist. See the Fire Preparedness Guide for Line Managers (Appendix VIII) for a pre-season checklist.

6. General Preparedness.

Fire equipment readiness should be restored before fire season commencement in June. At present the only activity is maintenance of remote automated weather stations (RAWS) stations on the refuge. Annual maintenance is provided via an Interagency Agreement between FWS, BLM and NPS. The refuge FMO should accompany the technicians and visit each site at least every three years to retain familiarity with them. To ensure that fire danger indices are reliable, refuge staff should visit the refuge during breakup to determine snow-free dates.

The refuge maintains a cache of fire equipment for use on both wildland fire suppression activities and prescribed fire activities. The Normal Unit Strength (Appendix XVI) outlines minimum numbers of items maintained in the cache that are available for use in the local area in support of those activities.

A portable pump and accessories will be placed at the Canvasback Lake administrative cabin and should be checked annually by the refuge FMO or biological technician. Fuel loading and arrangement around the cabin should be monitored annually, and manual cutting of brush be carried out as necessary.

Yukon Flats NWR has a reliable UHF Base/UHF-VHF Base Link/VHF Repeater radio system that provides coverage from the Fairbanks area to 90% of the refuge. The refuge has all hand-held and mobile radio units programmed with refuge operations frequencies as well as frequencies designated for use by suppression forces. All refuge radios have radio telephone interface capability. Satellite telephones have been purchased.

The refuge has one desktop computer and two laptop computers dedicated for fire management program use. The computers are used to access the Service Fire Management Information System to enter wildland fire and prescribed fire reports, provide and obtain refuge fire program budget information, and maintain training records.

An accurate map of fuel types aids prescribed fire and wildland fire planning and decision-making by helping predict direction and rate of spread of fire, as well as intensity and smoke emissions. It also helps identify hazardous fuel areas and quantify risk. Because the fire regime of the boreal forest, about 10% of the refuge will burn every ten years. A way to update the fuel map economically and quickly is required.

The refuge and regional staff have been engaged in the development of a vegetation/land cover map off-and-on since 1984. The initial product was a computer enhanced LANDSAT map using LANDSAT-Multispectral Scanner (MSS) scenes. This product did not meet management needs because resolution was poor and the classification did not conform to the more useable and widely accepted Alaska vegetation classification of Viereck and others (1992). In addition, over 2 million acres burned on the refuge after those images were taken, changing about 25% of the vegetative cover on the refuge.

In 1996 more recent, higher-resolution, remote sensing imagery (LANDSAT-Thematic Mapping (TM)) was purchased. In 1991, 1992, 1993, 1996 and 1997, plant communities were identified from aerial photos, visited by helicopter, and results compared with remote data. Work continues on this project to interpret TM scenes and to develop a high quality fuels map. The large size of the refuge, complexity of the vegetation mosaic, lack of committed staff, and absence or errors in auxiliary data (e.g., hydrology, digital elevation model) have hindered this process. Intensive work on Marten Island, Plot D, and Plot G (see below) also aids fuel classification. Succession and new fires will require continual updating of the fuels map through many means, possibly including mapping of new fires, documenting fire severity and modeling succession, digitizing, acquisition and classification of new remote data, and ground-truthing.

7. Training

The refuge FMO should have sufficient training to assist decision-making, to plan prescribed burns, and to conduct low to moderate complexity prescribed burns. Training should include fire behavior prediction, smoke management, and aviation safety, and will meet current Departmental, Service, and NWCG requirements. AFS provides fire detection and suppression services on the refuge and trains its staff to meet National Wildland fire Coordinating Group (NWCG) standards.

C. Prescribed Fire Program

The Service recognizes that wildland fire is an important part of many ecosystems. In places where lightning-ignited fires are not filling the natural role or where other needs are identified, prescribed fire may be used as a tool. There are risks associated with the use of

prescribed fire, but there are also risks and negative ecological impacts from not employing prescribed fire as well. Sound risk management will help minimize risks associated with the use of fire (USDI and USDA 1995, USFWS 2000).

Prescribed fires are fires ignited under conditions specified in an approved prescribed fire plan to achieve specific resource management, hazard reduction, or other objectives. Goals and procedures are derived from ANILCA, Departmental and Service policy, and the refuge CCP (USDI 1987). Preparedness level and guidance from the AWFCG or MAC Group are to be used when implementing burns.

Burns will be conducted with minimal or no negative impact on subsistence users and generally should improve hunting and gathering opportunities by increasing plant and animal productivity and diversity. Hazard reduction burns will be conducted mainly for the benefit of local residents by helping protect their lives and property from wildland fire. Use of village crews for prescribed burning will contribute to the local economy.

1. Goals and Strategies.

The Alaska Region of the Service "is committed to a prescribed fire management program that emphasizes hazardous fuels reduction, wildlife habitat improvement, and management-oriented research on the use and effects of fire on Service lands" (Region 7 Fire Management Policy, RW-25, March 1990, p. 2).

The refuge CCP provides for prescribed burning for "hazardous fuel reduction or restoration of natural vegetation patterns" (USFWS 1987, p. 118). Because the management alternative selected dictates "minimal management" for the entire refuge, prescribed burning is one of the few habitat management tools allowed.

Problems resulting from fire exclusion were identified in the early and mid-1980's. The following list of fire-related concerns is summarized from the original refuge fire management plan (USFWS 1986b):

- a. Undesirable changes in plant and animal diversity, abundance, and distribution were being caused by fire exclusion. Prescribed burning was proposed to help solve the problem.
- b. Concern was expressed by local villagers about low moose density, and interest was expressed in a program to correct this situation. Staff from the refuge and from the Alaska Department of Fish & Game felt that the best option was a long-term prescribed burning program to improve habitat.
- c. Hazardous fuel conditions can be caused by fire exclusion. Prescribed burning was listed as a means of breaking up continuous fuels and reducing fuel loadings.

In initial planning efforts, four sites were identified for fairly large-scale use of prescribed fire (10,000 to 20,000 acres), after consultation with the Alaska Department of Fish and Game. One site was burned by management ignited prescribed fire in 1989, and one was burned by a wildland fire in 1988. Large acreages burned by wildland fire on the refuge in recent years have reduced the need for large scale prescribed fire: 1.1 million acres burned in wildland fires in 1988; 355,000 acres burned in 1990; and 292,000 acres burned in 1991. A position paper written for the refuge in 1992 changed the focus of prescribed burning to emphasize hazard reduction burns (USFWS 1992).

Although about 89% of refuge lands are within Limited management option zones, from 1988-1999, 46% of the fires starting on the refuge were initial attacked with the intent of extinguishment. About 45% of the refuge has burned in the last 50 years. Although wildland fire has largely resumed its natural role on much of the refuge, a role for prescribed fire, and wildland fire use, still exists. Prescribed burning done on the refuge is listed in Table 7. The program is small and still in its infancy.

year	number of burns	acres burned	ignition method	burned during	vegetation
1989	1	1,200	aerial	Jul-Aug	mosaic: spruce, spruce-shrub
1998	1	740	hand	April	meadows, lake margins
1999	3	930	hand	May	meadows, lake margins
2000	1	125	hand	May	meadows, lake margins
2001	1	750	hand	May	meadows, lake margins

2. Objectives.

Overall prescribed fire objectives for the refuge, derived from overall fire management objectives are hazard reduction (including training), resource management, investigations into fire effects, and to help establish prescriptions.

a. Hazard Reduction.

Prescribed fire will be used for reduction of hazard fuels where wildland fires, when ignited, threaten public safety, structures and facilities, cultural resources, natural resources, and natural processes, or could permit the spread of wildland fires to higher management option areas.

Prescribed burning for hazard reduction is a widely used practice and is identified in the refuge CCP. Past experiences in Alaska (e.g., the Tok Fire of 1990, Miller's Reach Fire of 1996) have shown that towns and villages are at risk, which highlights the importance of preparedness work in preventing disasters. Hazard reduction burns reduce risk from catastrophic wildland fire and make suppression operations easier by breaking up and reducing fuels.

Priority for hazard reduction efforts is highest near inhabited areas, which are surrounded by checkerboard land ownership patterns. In order to shorten fuel breaks and to use natural barriers, which keeps costs down and makes for more secure lines, burns will probably involve Service and Native corporation lands. Hazard reduction goals may include, but are not limited to:

1. Break up continuous stands of black spruce that contribute to huge wildland fires.
2. Reduce and remove hazardous fuels, especially dead and decadent black spruce that exhibits extreme fire behavior.

In 1992, a fire threatened the U.S. Air Force seismic facilities on Burnt Mountain, generating a costly fire suppression effort. To help ensure future safety and prevent such costly emergency operations in the near future, a hazard reduction burn was conducted on the unburned part of the mountain in 1994. The burn was a cooperative effort between AFS, the Air Force, and the Yukon Flats and Arctic NWRs. The area should be continually evaluated for hazard as long as the site is in place.

Prescribed fire will be used for training of fire suppression crews in order to improve crew effectiveness and reduce hazard from fires. Availability of well-trained crews will aid suppression efforts and improve protection of public safety and identified resources. Use of wildland fires for training is preferred.

b. Resource Management.

Prescribed fire will be used for resource management objectives where a need is identified. Selection of strategies for resource management prescribed burns is based on the cost effectiveness of achieving the resource management objective(s) identified in the refuge CCP. Specific goals will be identified in individual prescribed burn plans. Resource management goals may be, but are not limited to:

- i. Restore fire to its natural role in the ecosystem and maintain fire as a dynamic ecosystem process.
- ii. Increase plant productivity and diversity by removing dead and decadent growth and recycling nutrients.

- iii. Increase edge effect and create vegetation mosaics by altering successional stages of vegetation and by breaking up extensive stands of black spruce.
- iv. Increase production of forage used by big game species.
- v. Increase production of grasses and sedges and remove dead plant growth along marsh margins to enhance waterfowl feeding and nesting habitats.

Spring burning of meadows has been conducted on the refuge, and fall burning is under consideration. Waterfowl arrive in the spring when green forage is scarce. Spring or fall burning removes litter and blackens the soil surface, bringing on earlier greenup and improving forage quality and quantity (Bendell 1974). Spring burning has also been done on Tetlin NWR. Some Native residents of the Yukon Flats have reported that this practice was carried up to the present times as part of their traditional hunting practices. Henry T. Lewis documented spring burning of meadows and sloughs by Athabascans of northern Alberta, Canada, who burned for many reasons, including to benefit ducks, moose, muskrat, beaver, fox, lynx, hares, and wood bison (Lewis and Ferguson 1988).

c. Fire Effects Investigations and Fire Prescription Development.

Prescribed fire will be used where necessary to better understand fire effects and to help establish and refine prescribed fire prescriptions. Results will help achieve resource management and hazard reduction objectives. Such burns are anticipated to be small and will be conducted following procedures for all prescribed fires.

The Departmental Manual defines a "prescription" as "measurable criteria which guide selection of appropriate management response and actions. Prescription criteria may include safety, public health, environmental, geographic, administrative, social, or legal considerations" (620 DM 1.3K).

3. Desired Effects.

General goals for prescribed fire on plant communities are presented below. Burn patterns that include unburned areas and enhance the mosaic effect are generally preferred. Site-specific objectives for individual burns may be significantly different from those listed.

- a. Meadows: burn with low intensity to remove dead thatch and leave most of the root systems intact.
- b. Shrublands: burn with low to moderate intensity to remove dead downed fuels and litter and promote regeneration of shrub species.

- c. Broadleaf and Mixed Forest: burn with low to moderate intensity to consume dead downed fuels and litter and allow regeneration of deciduous species that are preferred by many wildlife species that are of interest to subsistence users.
- d. Black Spruce: burn with moderate to high intensity to kill most of the live trees, consume dead downed fuels, and create favorable conditions for germination of deciduous plant species.

4. Prescribed Fire Objectives, Constraints, and Alternatives by Unit.

Objectives and constraints are identical for all fire management units. Specific management objectives for a site will help point out if fire is needed, and they will form the objectives for use of prescribed fire. Hazard reduction burns are more likely in units with Modified and Full management option because they surround and include inhabited areas, where risk is higher and wildland fires are largely excluded. Resource management burns may occur in all units. Prescribed fires tend to be smaller and less intense than wildland fires (Baker 1994), so hazard reduction objectives may be met, but resource objectives may be only marginally or partly met. Use of hotter prescriptions or wildland fires is riskier, but will better achieve objectives.

Constraints are identical to those listed for suppression operations (see Sections III.F and G). The refuge CCP (USFWS 1987) placed the entire refuge under "minimal management," which means that the "minimum appropriate tool" concept will be used. The "light hand on the land" concept is encouraged on the refuge. Any activities on refuge lands should use methods that minimize environmental damage.

5. Prescriptions and Fire Behavior.

Prescribed burn plans must be prepared for individual burns, and those plans will have detailed objectives and prescriptions. A detailed prescription is developed as a key part of each individual prescribed burn plan, which is directly oriented toward attaining the specific objectives on a specific site. Generally, prescriptions should be written for prescribed burns that present a window of easily measured environmental conditions and a reasonable time frame. A fire burning within these parameters can reasonably be expected to achieve the stated objectives without undue risk. The refuge will suspend burning when fire behavior exceeds that called for in the burn prescription. Extended drought conditions, which can result in very low duff moistures and live fuel moistures, must be monitored.

Fireline intensity, the measure or estimate of the heat released per unit of time for each unit of length of fire edge (BTUs/foot/second), can be correlated to the likelihood of success in controlling a prescribed fire should it need to be extinguished. Fires burning above an intensity level of 100 BTUs/ft/sec may be difficult or impossible for hand forces to control using direct attack. However, fires of this intensity may be necessary to remove hazardous fuels and thick moss and litter layers to achieve regeneration of desired

species. Using high intensity fires requires extra precautions, including construction of fire breaks or use of substantial natural barriers or burned fireline.

6. Measurement and Effects of Drought.

The refuge preparedness plan incorporates regional fire activity and local drought indicators into preparedness levels, which determines whether prescribed burns may be initiated or continued. Using the National Fire Danger Rating System is of limited value in Alaska because of the lack of weather data and the questionable accuracy of fuel models. The refuge currently uses the Canadian Drought Index (CDI) system to track drought conditions for fire management planning. Drought indices developed in Canada apply to fuel types found in Alaska.

The buildup index (BUI) generated by the CDI system is a useful indicator of drought conditions. The BUI combines a Drought Code (DC) value and Duff Moisture Code (DMC) value, both of which are measures of subsurface fuel dryness. Drought codes are started up each spring three days after the snow-free date (less than 10% cover) for each weather station. Refuge staff and AFS staff cooperate in reporting snow-free dates to the National Weather Service. Drought affects fire behavior and therefore fire effects and resistance to suppression efforts. Drier conditions result in deeper burns, which kills plant roots and seeds deeper in the duff and makes suppression more difficult.

7. Burn Complexity.

Burn complexity will vary greatly between burns, depending on risk, potential consequence, and technical difficulty. For example, a small burn under mild conditions and very far from any habitation would be of low complexity. A large burn with moderate potential for escape, complex logistics and coordination, potentially severe fire behavior, and potential smoke management problems could be considered high complexity. A National Wildland Fire Coordinating Group prescribed fire complexity rating guide will be completed during planning for all prescribed fires.

8. Seasonal Patterns.

Seasonal differences in weather and fuel moisture can be used to meet different goals.

- a. Spring burning. Before green-up (April to mid-May), meadows and black spruce or shrub fuel types with continuous grass/sedge cover can be burned. Fire spread and duff consumption are limited because ground fuels are still relatively moist. In addition, these open sites are surrounded by snow in adjacent sites with more dense tree cover. South-facing deciduous forest and shrubland sites may be burned to remove leaf litter and dead downed material and generate resprouting from April to mid-May. During this time, there is still snow in adjacent spruce fuels and on other aspects. Suppression and mop-up are relatively easy during this period.

- b. Summer burning. Prescribed fire activities between early June and mid-July should be scheduled with caution. This is often the peak of the fire season, and contingency forces may not be available. Fires can quickly become difficult to control because of changes in weather. Prescribed fires started during the spring period can cause problems if they burn into this period.

- c. Late summer burning. Marsh margins can be burned after waterfowl broods have hatched and grasses have cured, usually between early July and early August. This is often the best time to burn shrubland and broadleaf forest sites if the summer has been somewhat dry. With the normal rain pattern during the summer, Duff Moisture Content (DMC) and Drought Code (DC) drought indices are at their highest toward the end of summer, meaning forest floor fuels are drier, especially in spruce types. This increases impact of the burn, risk of escape, and cost of suppression and mop-up (Hawkes and others 1990). The time from late-July to early September can be the best time to burn in black spruce fuel types because "end of fire season" weather is imminent. Days are much shorter and nights are cooler by August, and weather often turns cool and rainy. However, relying on the normal weather pattern to help control fire spread and extinguish the fire does have risks. August can have little rain, and fires have burned well into September in some years.

9. Preparation.

Guidelines about publicizing burns are contained in the Service Fire Management Handbook (USFWS 2000). Adjacent landowners will be kept informed during the entire planning process and will be advised of impending burns. Written approval for prescribed burns is required from the Alaska Department of Environmental Conservation. The Department should be consulted during initial stages of planning for burns to ensure compliance with state regulations.

Different prescribed burning activities dictate different levels and amounts of coordination. Because the refuge has very limited staff, AFS personnel and village fire crews will fill most positions on large prescribed burns. On small burns, AFS/village involvement will be as holding crews or backup suppression forces. The areas around villages are where hazard reduction burns are most needed to protect life and property. Many of the most advantageous sites for these burns include Native corporation land and will be cooperative efforts. AFS equipment may be available for use, although these burns are the refuge's responsibility, and AFS is not mandated to outfit resource projects (radios especially are not likely to be available). Preparation for early season burns using Emergency Firefighters will require administering the fireline safety refresher and fitness test.

Because of the remote setting and lack of a road system within the refuge, prescribed burning may be accomplished primarily through aerial ignition. The refuge owns an aerial ignition device, a PREMO Mark III Plastic Sphere Dispenser. Hand ignition may

be used on small burns or on parts of large burns. Wetlands and old burns provide many excellent natural fuel breaks that can be used to confine prescribed fires. These barriers may be supplemented by handline or blackline when necessary. A go/no-go checklist will be completed prior to ignition.

10. Certification of Fires Remaining in Prescription.

The Service fire management handbook (2.1.6) states that the Refuge Manager or the designated Acting Refuge Manager will certify in writing, daily, (including weekends and holidays) for all prescribed fires not contained in the first burning period that:

- a. The prescribed fire is within prescription and is expected to remain in prescription for the next 24 hours.
- b. Adequate funds are available to manage the prescribed fire.
- c. Sufficient fire management resources have been assigned or committed to manage the prescribed fire and implement the approved suppression alternatives.

While it is understood that the information for making this certification will be collected and compiled by the prescribed fire staff, the final, certifying signature must be the Refuge Manager's.

Prescribed fires that exceed the limits of an approved prescription will be managed as unwanted wildland fires and handled under appropriate management response(s) as defined in the contingency section of the Prescribed Fire Plan or by the Wildland Fire Situation Analysis. Once a prescribed fire has been declared an unwanted wildland fire, a Wildland Fire Situation Analysis will be completed to determine the appropriate management action to be taken. Once a prescribed fire has been reclassified to an unwanted wildland fire it cannot revert back to prescribed fire status. All situations where prescribed fires are reclassified as unwanted wildland fires will be reviewed by the Refuge Manager or their designated representative.

11. Monitoring and Evaluation.

Monitoring and evaluation are critical activities that must be accomplished before, during, and after any prescribed burn on the refuge to insure that the fire is burning within prescription and to determine if treatment objectives were met. This is mandated by the refuge CCP, which states "the effects of wildfire on refuge wildlife populations and habitats will be closely monitored and will be subject to ongoing research" (USFWS 1987, p. 133). Monitoring will improve effectiveness of future burns.

Prescriptions should be written so that fire behavior can quickly show whether the prescribed fire is in prescription or not. Prescribed fire objectives should be attainable and clearly written to make evaluation easy.

Intensity of monitoring and variables monitored will depend on burn objectives. Observations of fire behavior should be made in each fuel type and include rate of spread, flame length, and fire character (e.g., creeping, torching, crowning, deep-burning). Environmental conditions that may need to be measured during prescribed fire operations include relative humidity, mid-flame wind speed and direction, temperature, direction of smoke transport, atmospheric mixing and stability, and state of the weather. Measurements should be obtained and recorded on a regular basis during the active phase of the burn as specified in the burn plan. The Fire Surveillance Form (Appendix XII) and a map of the fire are required each time a prescribed fire is monitored.

Evaluation of the burn should consist of a narrative of events that occurred during the operation, measurements taken during the burn, discussion of effects/results, and at least a preliminary evaluation of whether the results accomplished the objective(s) stated in the burn plan. Specific fire effects objectives will require specific means of measuring results, and should be described in the prescribed fire plan. For prescribed burns requiring long term monitoring, the evaluation and reporting schedule should be specified. Upon completion of a prescribed burn, the refuge is to submit a fire report (DI-1202) through channels. A critique of each burn is to be conducted afterwards and recorded by the refuge FMO. Results are to be forwarded to the Regional Fire Management Coordinator.

In many cases, baseline pre-fire data will need to be obtained to establish measurable objectives. Many wildlife objectives will require relatively long-term monitoring efforts. The refuge has a small fire effects monitoring program and lacks staff and funding to perform extensive monitoring. Fire effects monitoring is also being conducted on other refuges in Interior Alaska, and comparing data and results improves confidence in the results of each.

12. Preparedness Level.

The state interagency fire preparedness plan details agreed upon restrictions for prescribed burning. That plan calls for suspension of some prescribed burning at preparedness level IV and possible suspension of all prescribed burning at preparedness level V. The plan is included in the Alaska Fire Service Operational Procedures, Policies, and Guidelines "Brown Book." Daily fire situation reports issued by AFS list the day's preparedness level.

13. Impacts.

Impacts of fire are thoroughly discussed in the Environmental Assessment of this Plan, which is included as Appendix I. Prescribed fire will be managed to minimize or eliminate negative impacts. The strongest need for prescribed burning identified to date is in areas near villages where suppression has mostly excluded fire. Potential impacts from an escaped fire are higher there than in remote areas. Smoke impacts are most likely, and damage to trails, native allotments, and cabins is also possible. Overall,

prescribed burning helps prevent these negative impacts by eliminating or breaking up hazardous fuels, by burning under the most favorable conditions possible.

D. Wildland Fire Use.

Naturally-ignited fires play an important role in the boreal forest and on Yukon Flats National Wildlife Refuge. A lightning-caused fire can be managed for resource benefits if it meets prescriptive criteria for the area. The process and forms for the required Wildland Fire Implementation Plan are included in Appendix XV, as well as the prescriptive criteria for each Fire Management Unit. If the use of wildland fire to achieve resource management objectives is not appropriate, then suppression action will be taken using objectives for that area (Table 6).

For the Fish and Wildlife Service, there are distinctions between a refuge wildland fire use program and how fires are managed under the scope of the Alaska Interagency Wildland Fire Management Plan. Although interagency cooperation and assistance is essential, authority for operational control of wildland fire use activities has not been delegated to another agency and is under direct refuge supervision. Differences between wildland fires managed under the interagency plan and those managed for wildland fire use are described in Table 8.

Table 8. Comparison of Wildland Fire Managed under Interagency Plan and Wildland Fire Use Managed for Resource Benefits under Refuge Fire Management Plan.

	Alaska Interagency Wildland Fire Management Plan	Refuge Wildland Fire Use Program
Primary Goal	Provide an opportunity through cooperative planning, for land and resource managers/owners to accomplish fire-related, land-use and resource management objectives in a cost-effective manner, consistent with owner, agency, and departmental policies.	Wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role.
Fire Cause	human or natural	natural only
Prescriptive Criteria Applied	- geographic location - threats to identified values at risk determine initial suppression response	- drought indicator - threats to identified values at risk - other criteria specific to incident or unit
Operational Control	Incident Commander→ Suppression Agency→ Refuge Manager (under 620 DM 2)	Incident Commander→ Refuge Manager (under 620 DM 1)
Determination	- pre-designated initial responses - WFSA if pre-designated response fails or if incident beyond initial attack capability	- individual incident assessment by Refuge Manager required first to determine fire use or suppression - WFSA if fire use response fails
Documentation	periodic surveillance report (Appendix XII) and map	Wildland Fire Implementation Plan completed in 3 stages: Initial fire assessment; Short-term implementation actions; Long-term implementation actions (Appendix XV). Plan progressively developed, examining fuel continuity, current fire activity, fire location, predicted weather and fire behavior, and risk assessment. Periodic fire assessment done.

E. Fire Suppression.

Suppression action will be taken on all wildland fires not managed as wildland fires used for resource benefits. A full range of suppression actions is available, from surveillance to indirect attack to aggressive direct attack. Appropriate suppression responses are based on identified values to be protected. A combination of actions may be appropriate on a specific fire; for example direct attack may be used on one flank of a fire that is threatening identified values, and containment may be used on the rest of the fire using natural barriers and backfiring.

The strategy of aggressively suppressing all wildland fires was practiced in the area until 1984. This approach was expensive and, following the passage of ANILCA, conflicted with the refuge management objective of maintaining a natural diversity of wildlife and habitat. Since the adoption of interagency fire management plans in 1984, about 89% of the refuge has been placed in Limited management option. This has resulted in the cost of suppression actions being more aligned with the values at risk. This strategy also recognizes the important, historic role of fire as a natural process in the creation and maintenance of the diversity of wildlife habitats on the refuge.

The Departmental Manual (620 DM 2) delegated authority for suppressing wildland fires on refuge lands in Alaska to the Alaska Fire Service (AFS), which is part of the Bureau of Land Management (BLM). Those suppression services must conform to fire management guidelines specified by applicable interagency fire management plans and the refuge fire management plan.

Guidelines for determining appropriate suppression action are provided in the Alaska Interagency Wildland Fire Management Plan (AWFCG 1998). That plan provides for a range of suppression responses to wildland fire that protect human life and property and other identified resources and developments, balances suppression costs with values at risk, and is in agreement with refuge resource management objectives. Initial attack of fires is largely pre-planned with "wildland fire management option" designations described in the Alaska Interagency Wildland Fire Management Plan.

1. Suppression Strategies Related to Designated Wildland Fire Management Option.

Preferred initial response actions for wildland fires are described below for each wildland fire management option and summarized in Table 9. Management option boundaries are shown in Figure 5. Management option designation is the main factor that determines initial response to a wildland fire, through the use of decision charts in the interagency wildland fire management plan (AWFCG 1998). All actions are dependent on the availability of suppression resources and other factors, such as weather and current and expected fire behavior.

Figure 5. Fire Management Option Designation (Protection Level), 2001.

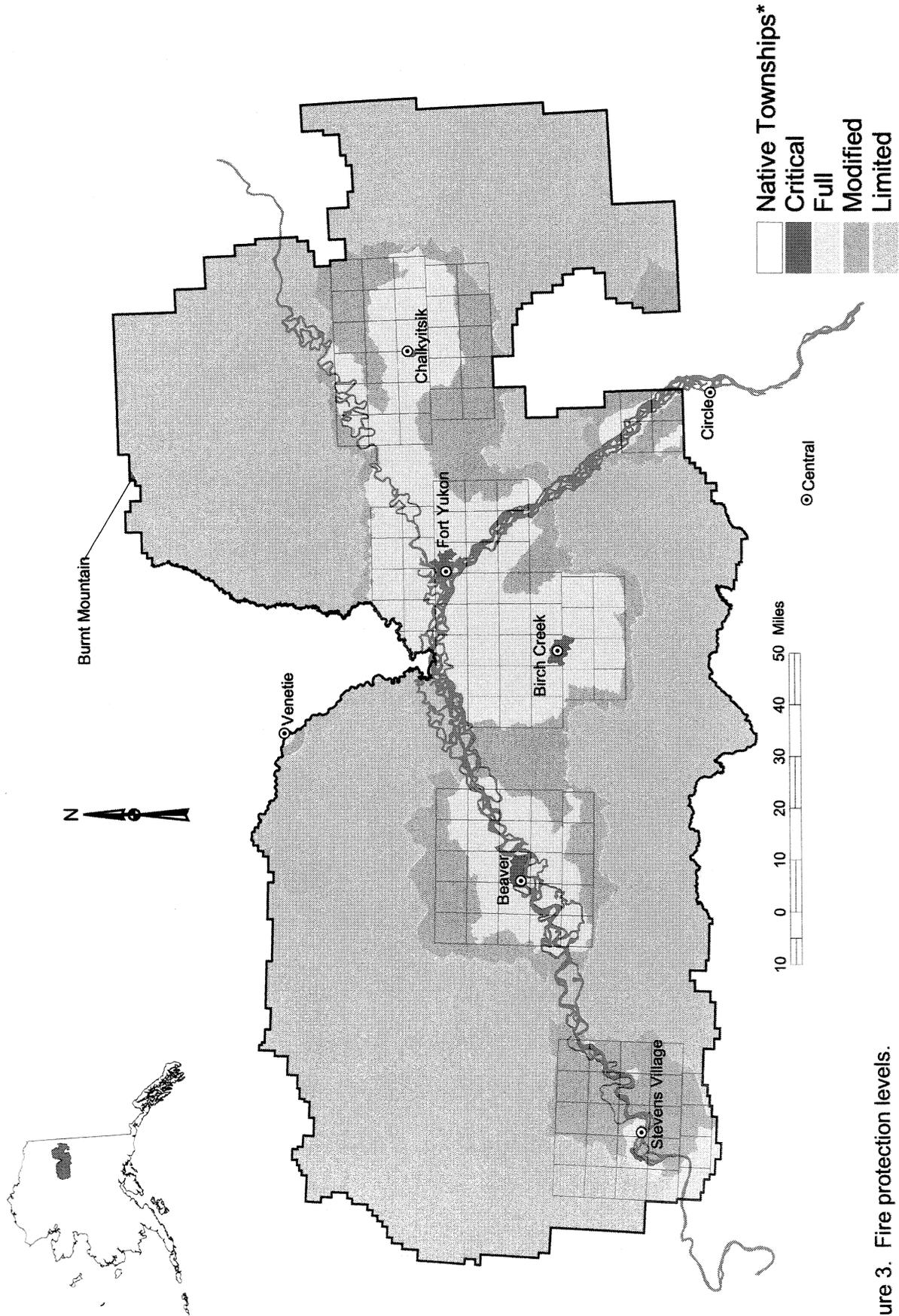


Figure 3. Fire protection levels.

*The Native-owned or selected townships shown include some small areas that were not selected.

Table 9. Management Option Designation and Suppression Response to Wildland Fire.		
Wildland Fire Management Option (formerly Fire Protection Level)	Appropriate Initial Response	Suppression Objectives
		Common to all is the top priority of <u>protection of human life</u> and secondarily the protection of property and natural/cultural resources.
Critical	Aggressive initial attack--usually direct attack	<ol style="list-style-type: none"> 1. Protect inhabited property and designated developments. 2. Usually continue control tactics until fire is declared out.
Full	Aggressive initial attack--usually direct attack	<ol style="list-style-type: none"> 1. Protect designated sites and values. 2. During initial attack--minimize acreage burned.
Modified, before conversion to Limited	Initial attack--use of indirect attack to contain the fire is encouraged, but aggressive attack is permitted.	<ol style="list-style-type: none"> 1. Prevent fire from spreading into Full and Critical management option areas. 2. Protect designated sites.
Modified, after conversion to Limited	Surveillance	<ol style="list-style-type: none"> 1. Prevent fire from spreading into Full and Critical management option areas. 2. Protect designated sites.
Limited	Surveillance	<ol style="list-style-type: none"> 1. Prevent fire from spreading into areas with Full and Critical management option designations. 2. Protect designated sites.

a. Wildland Fires in Critical Management Option Areas.

Fires in Critical management option zones will receive priority for suppression over fires in all other management options. Objectives are to protect human life and identified sites from fire. Aggressive suppression action will normally be pursued until the fire is declared out. Protecting human life, inhabited property, and designated physical developments are of top priority. Minimizing acreage burned is

not a management priority, but the protection of identified values is, e.g., inhabited dwellings.

As of December 1999, the refuge has no land designated as Critical management option. Some areas of Native-owned lands within the refuge boundaries do have this designation.

b. Wildland Fires in Full Management Option Areas.

In terms of suppression priority, fires occurring in these areas are second only to fires in Critical management option areas. Aggressive suppression action will normally be used on fires in Full areas until the fire is declared out. Protecting designated sites is a priority, and minimizing acreage burned is a management priority during initial attack, but not necessarily if a fire goes into extended attack. In that case appropriate management action would be determined by the Wildland

This designation is intended for protection of cultural and historical sites, uninhabited private property, natural resource high-value areas that may be damaged by fire, and other high-value areas that do not involve the protection of human life, human health, and inhabited property.

The refuge, as of December 1999, has about 127,000 acres designated as Full, which is about 1% of the refuge. These lands are around villages and concentrations of allotments. Management option boundaries were placed on refuge lands to take advantage of natural barriers in order to maximize protection of adjacent lands.

c. Wildland Fires in Modified Management Option Areas.

Fires in this category are third in priority for receiving suppression resources, behind Critical and Full management option areas. The intent of this designation is to allow as much flexibility as possible in managing wildland fire, to balance acres burned with suppression costs, and to accomplish land and resource management objectives. Refuge objectives are to protect identified values and to prevent the fire from burning into Full or Critical management option areas. Minimizing acreage burned within Modified areas is not a management priority.

Modified management option area boundaries were located to take advantage of natural barriers. This helps protect adjacent land in the Full category, provides flexibility to allow suppression of fires in cost-effective ways, and allows wildland fires to break up hazardous fuel stands and generate resource benefits.

Containment of fires with indirect attack is encouraged during initial attack before the conversion to Limited status. A fire may be actively suppressed from discovery until it is out, or it may have containment tactics used on the entire fire or only on part of it.

At designated annual evaluation dates (the most common one is July 10th), consideration is given for conversion of these areas to the Limited Management Option. Consideration can be given for earlier conversion if weather and fuel moisture levels allow. A later conversion may be prudent in drought years with high fire activity. As of December 1999, the refuge has about 884,000 acres in Modified, about 10% of the refuge area.

d. Wildland Fires in Limited Management Option Areas.

The overall objective in this category is to allow wildland fire to fill as much of its natural role as possible to help maintain natural habitat diversity. Priorities in managing fires are to protect identified resources and to prevent fire from burning into Full or Critical management option areas. Minimizing acreage burned is not a management priority in this category. Preventing a fire from burning into a Modified management option Area is not an absolute priority; the priority is to keep that fire from burning through Modified and into Full and/or Critical management option areas. Likelihood of success, suppression cost, and availability of resources, among other factors, will determine what actions are taken by using the Wildland Fire Situation Analysis described in section III.E.3 below.

Surveillance is used to ensure the that fire remains confined within the management option area. The frequency of surveillance depends on the regional fire situation, weather trends, potential threats, and past and anticipated fire behavior. If suppression action is required, confinement tactics or site protection tactics are preferred. Minimum resource commitment is desired, without compromising firefighter safety. Fire suppression actions receive the lowest priority for allocation of suppression resources. As of December, 1999, the refuge has about 8,259,000 acres in Limited, about 89% of the refuge area.

e. Risks Inherent to Managing Wildland Fires in Modified and Limited Management Option Areas.

There are risks associated with managing wildland fires in Modified and Limited management option areas. In Modified management option areas there is a risk that fires occurring after the conversion date will become problems. In addition, the existence of Modified areas does not guarantee that fires will not burn into Full management option areas.

Fires in Limited management option areas may become problems before an effective response can be made, especially in busy fire years. Fires with a surveillance-only response can cause smoke problems that impact the ability to detect and suppress fires in higher priority areas. As fires become larger, the number of options for containing or confining the fire are reduced. Suppression efforts on large, hot fires are usually ineffective without favorable changes in weather. Use of aerial ignition to manage or

herd fires during major runs should be experimented with to perfect the technique for major fires threatening high priority sites.

Decisions about responses in Modified and Limited management option areas are based on predicted weather. The effectiveness of these decisions can be compromised by inaccurate weather predictions and unpredicted or unnoticed changes. Keys to minimizing risks include effective surveillance, having access to representative weather conditions to accurately predict fire behavior, obtaining accurate weather forecasts, developing realistic contingency plans, confirming availability of suppression forces, and refining management option area boundaries. New federal policy recognizes that attempting to exclude fire also has risks and undesirable side effects (hazardous fuel creation and ecological degradation). Those negative factors involving the use of fire can be overcome by sound risk assessment (USDI and USDA 1995).

f. Surveillance Requirements.

Fire surveillance procedures follow those in the interagency fire management plan (AWFCG 1998). Frequency of surveillance will depend on current and predicted fire behavior and weather, values at risk, and other factors. Surveillance will normally be performed by air, although personnel are occasionally placed on the ground for more detailed fire behavior observations. Close cooperation with the suppression agency is essential to avoid duplication of surveillance efforts. If surveillance is performed by refuge staff, the refuge FMO will provide a copy of the report to AFS zone dispatch as soon as possible following the flight and will notify the zone FMO.

2. Protection of Permitted Cabins.

Fish and Wildlife Service policy states that all permitted cabins will be protected from wildfire, "to the extent possible," and "subject to available suppression resources." Cost-effective site protection tactics are preferred to extinguishment of the fire in Limited management option areas. Refuge cabin permits have the stipulation that flammable woody fuels within 20 feet of structures be removed to make these cabins more defensible.

3. Use of Other Than Preferred Initial Response, Escaped Fires, and Extended Attack.

a. Geographic Area Responses by MAC Group.

The Multi-Agency Coordinating (MAC) Group, is convened periodically and is made up of representatives from all agencies responsible for land management and wildland fire suppression in Alaska. The MAC Group has been given the authority to make local and broad-scale changes in fire suppression responses on a temporary basis. These decisions are based on factors such as severity of the fire season, demands on suppression resources, and smoke management problems.

The MAC Group may make broad changes in suppression response or to adjust the conversion date of Modified management option areas to Limited management option. The MAC Group may also determine that new fire starts will or will not be suppressed regardless of wildland fire management option designation because of a large number of fires, smoke problems, suppression resource shortages, or unusually wet or dry conditions.

b. Non-standard Initial Responses to Wildland Fires.

The interagency plan states that "non-standard responses" may be made for initial response to any fires in any of the Wildland Fire management option areas (AWFCG 1998, p. 34). The initial attack Incident Commander, AFS zone FMO, or refuge FMO may select that response because of firefighter or public safety concerns, lack of suppression resources, imminent threat to areas with higher management option areas or to identified resources, anticipated failure of strategy, or other compelling reasons. Suppression personnel will contact refuge staff immediately in these cases, preferably before actions are taken. A "Decision Criteria Record" (Appendix XVI; from AWFCG 1998, Appendix E) will be completed for such responses.

c. Wildland Fire Situation Analysis.

A Wildland Fire Situation Analysis (WFSA) is used for wildland fires that escape initial attack or that require a different suppression strategy than initially selected or for prescribed fires that have been declared unwanted wildland fires (template included in Appendix VI).

From 1988-1999, 165 wildland fires were reported on the refuge. Of those, 76 were initially attacked with the intent of control and extinguishment, and 9 of those fires escaped initial attack or were beyond initial attack capabilities and required a different strategy. Those fires happened under extreme burning conditions, during dry and/or windy conditions. During the same period (1988-1999), 24 fires that were not initially attacked did later require suppression action other than monitoring. A few of those fires were not initially attacked because resources were not available at the time of detection. The other fires started in Limited management option areas and later threatened sites that warranted protection, such as Full management option areas or permitted cabins.

The WFSA is a process that employs a systematic and reasonable approach to determine the most appropriate strategy for a particular situation. Reasonable suppression alternatives are identified, analyzed, and evaluated in light of the expected probability of success and consequences of failure. Evaluation criteria include anticipated suppression costs, resource impacts, and environmental, social, and political considerations. The evaluation of alternatives must clearly identify the point at which the failure of the alternative is imminent. This becomes the triggering mechanism for re-evaluation of the WFSA.

The WFSAs will be completed by the suppression organization FMO or Fire Control Officer and refuge FMO. A WFSAs lists suppression strategy alternatives, the pros and cons of each alternative, and management constraints and priorities. A preferred alternative is selected by the Refuge Manager or Acting Refuge Manager, and the document is signed and dated. The completed WFSAs provides direction to suppression forces and specifies the scope of the effort required. Alternatives may include surveillance, active suppression efforts concentrated on a specific portion of the fire with certain limitations specified, or a full control effort. Limits may be placed on the number of crews committed to the fire, on the organizational level of suppression forces committed (for example, specifying an extended attack/Type III operation or a "short" Type II Overhead Team), on amounts of certain types of equipment and where it can be deployed, or on suppression costs. Any revisions must be signed by the Refuge Manager or Acting Refuge Manager.

Objectives for the WFSAs may include, but are not limited to:

1. Protect human life, considering smoke impact on public health and air travel.
2. Protect site-specific values:
 - property and natural/cultural resources have equal priority,
 - value of protected item will be balanced against protection cost.
3. Prevent fire from burning into Full or Critical management option areas, and consider smoke impacts on other suppression operations.
4. Allow wildland fire to function in its natural ecological role as nearly as possible, and consider resource benefits accrued in decisions.
5. Reduce overall suppression costs through minimum resource commitment, and consider benefits accrued to resources and hazard reduction.
6. Base all actions on current and expected fire behavior, considering likelihood of success under those conditions.
7. Consider external factors such as existence of extended drought conditions, number and size of other fires, and existing or anticipated shortages of suppression resources.
8. Consider detailed constraints listed below (Sections III.F and G).

d. Type I and Type II Incidents.

For large or complex fires requiring Type I or Type II Overhead Teams, refuge staff will take an active role in providing direction to the local suppression organization and Incident Command Team. Refuge staff (primarily the refuge FMO) will help

prepare the WFSA. The Refuge Manager or Acting RM will select a strategic alternative. Refuge staff will also have input into the delegation of authority, which authorizes the Incident Command Team to undertake suppression activities on the refuge and provides specific guidance and constraints on the suppression effort. The WFSA will be re-validated periodically by the Refuge Manager or designee, local suppression agency FMO, and Incident Commander to ensure that the strategic objective selected is still appropriate.

All Type I and Type II incidents occurring on the refuge will have a line officer's representative designated by the refuge to provide and maintain a conduit of communication between the Incident Command Team and the Refuge Manager, as well as between the local suppression agency and the Refuge Manager. The refuge FMO will usually function as line officer's representative, but in the case of multiple incidents, other staff may also be assigned. The local suppression organization will maintain direct supervisory control of the Incident Command Team at all times. Refuge staff will provide strategic direction, not tactical supervision. See also the Fire Preparedness Guide for Line Managers (Appendix VIII) for a checklist of actions to complete.

F. General Wildland Fire Management Constraints.

"Fire management programs and activities will be based on economic analyses that incorporate commodity, non-commodity, and social values" (USDI and USDA 1995, p. 6). Fire management on the refuge has been very successful in holding down suppression costs and protecting values. The refuge is within AFS' Upper Yukon/Tanana Zone, which continually ranks high in acres burned by wildland fires each year. In the 1994 fire season, 20% of the acreage burned in the zone was on Yukon Flats NWR, although this accounted for only 4.8% of the zone's total expenditures. This low level of spending was achieved because much of the refuge is under Limited management option, where suppression costs are lowest on a cost per acre basis.

Adjacent lands in Modified, Full, or Critical management option designation affect fire management on the refuge. Of the 1.89 million acres of conveyed Native lands within refuge boundaries, about 76% is designated Full or Critical management option, about 23% is Modified, and less than 1% is Limited.

1. Preferred Methods of Suppression.

"Light hand on the land" is the preferred approach for suppression activities occurring on the refuge. For fires requiring containment in Limited and Modified management option areas, strategies that use natural barriers, indirect attack, and changes in weather are preferred. Innovative approaches and adoption of techniques to foster cost-effective fire suppression are encouraged.

In compliance with the "light hand on the land" concept, suppression methods that minimize the potential for environmental damage are preferred in all areas. Except for fires that threaten identified values or are in Critical or Full management option areas, minimizing acreage burned is not a priority. For example, indirect attack on larger fires using natural barriers is an effective strategy that allows fires to be suppressed on the suppression force's terms rather than the fire's terms. The use of suppression forces can be timed to take advantage of changes in the weather to maximize effectiveness.

On fires that must be suppressed, blacklining is the preferred method of direct attack on smaller fires. Aerial ignition in combination with indirect attack strategy is encouraged on larger fires. Suppression restrictions are detailed in Sections III.F and G.

2. Public Safety.

Public safety is a critical concern in all aspects of the refuge fire management program. One way that the refuge seeks to improve public safety is by managing wildland fire so that hazardous fuels are broken up or reduced. The main benefit of this strategy is in the protection of villages and specific sites from burning. Smoke management also benefits in the long-term in a fire management strategy that employs fire.

People may have to leave villages because of fire for a variety of reasons. Unhealthful amounts of smoke may require evacuation of all residents or only those who are particularly sensitive to smoke (e.g., very young or old, asthmatic). In addition, there may be a precautionary evacuation because of fire threat, or there may be an evacuation under imminent threat from fire. Responsibilities of agencies involved varies with each of these scenarios, and is described further in Appendix XVII.

Because the refuge operates under minimal management strategies, there are no developed recreational sites on the refuge. Refuge staff are unable to notify recreational users of hazards because the users are widely scattered, and their locations are not known to refuge staff. Nearly all recreation is associated with river systems, which provides high mobility and will allow recreational users to avoid fire and smoke. Fire is one of many hazards present on lands as remote and wild as the refuge, others include bears, the rivers, and the weather.

3. Coordination with Adjacent Landowners.

The refuge places a high priority on informing owners of lands adjacent to and within the refuge of the fire situation. Strategy decisions about fires that threaten to encroach onto adjacent lands must take into account that landowner's/manager's concerns and priorities. A contact list with phone numbers is included in the refuge Dispatch Plan in Appendix IX.

G. Specific Constraints for Implementing Strategies.

Protection of human life is the highest priority at all times. Departmental policy (620 DM 1.4H) states:

Protection priorities are (1) human life and (2) property and natural/cultural resources. If it becomes necessary to prioritize between property and natural/cultural resources, this is done based on relative values to be protected, commensurate with fire management costs. Once people have been committed to an incident, these human resources become the highest value to be protected.

To the extent possible, all actions will use the minimum practical tools. See suppression guidelines for additional requirements. The constraints for Yukon Flats NWR are listed below.

1. Restrictions may be placed on suppression aircraft flight altitudes over certain waterfowl and raptor nesting and/or staging areas depending upon time of year and amount of flyovers required.
2. Peregrine falcons were recently downlisted from Endangered status and are still a species of management concern. The falcons often nest on the tops of bluffs, which are attractive as helispots and fire camp locations. Nesting sites are marked on interagency fire maps; they are all in Limited management option areas, but some are near Native allotments. AFS will notify the refuge immediately when fires are discovered near these areas. The refuge will notify AFS of new nest sites. Extreme care must be taken to not disturb nests during the critical period from April 1st to August 15th because adults may abandon eggs or young.
 - a. Ground personnel are to keep away from nesting sites unless absolutely necessary. If they must be near a nest site, they should stay there the absolute minimum of time required and be as unobtrusive as possible.
 - b. Camps must be located at least two miles from nesting sites.
 - c. Aircraft will avoid operating within one mile horizontal distance and below 1,500 feet above ground level over known nesting sites unless it is absolutely necessary to do so.
 - d. No retardant or foam is to be dropped over known nesting sites.
3. All-terrain vehicles, tractors, tracked vehicles, or other equipment that causes long-lasting adverse impacts on resources will not be used without specific approval of the Refuge Manager on a case-by-case basis, to be documented in writing.

4. Use natural fuel breaks where possible to reduce construction and rehabilitation cost and to reduce resource damage. Firelines will be built with the following considerations:
 - a. Control lines constructed during suppression activities should be located to minimize erosion. If possible, lines dug down to mineral soil or permafrost should be located to meander obliquely across slope rather than to run straight downhill. Straight lines should be avoided, especially on large fires.
 - b. A buffer of vegetation should be left immediately adjacent to water bodies to avoid running lines directly into them.
 - c. Any control lines constructed on fires will have appropriate erosion control measures taken prior to the release of suppression forces. Those measures include building waterbars on slopes and replacing organic material back into lines where permafrost or mineral soil has been exposed. Standards for rehabilitation will be set by the Refuge Manager or designee in a timely manner.
 - d. Sawlines should be used sparingly and only where they are essential for holding and accessing hot perimeter and for holding indirect attack line during burnout operations. Direct attack blacklining is encouraged where possible, to reduce the amount of sawline that would be visible from the air.
 - e. Fireline explosives may not be used for surface trenching without specific approval by the Refuge Manager, to be documented in writing.
 - f. Constructed firelines will avoid known cultural sites. If cultural sites (e.g., graves, collections of artifacts) are discovered during fire suppression operations, care will be taken to not damage the sites, and refuge staff will be notified of the site as soon as possible.
5. Every effort should be made to avoid getting retardant or foam (from aircraft) or fuel (from pump operation, camps, helibases, etc.) in water bodies and surface water, especially:
 - a. directly upstream from villages, where surface water is commonly used for drinking;
 - b. in important fish spawning areas during and after spawning;
 - c. in existing and proposed National Wild Rivers (see item 10 below).

6. Helispots:
 - a. Helispots should only be constructed where they are essential for the safe and efficient deployment and retrieval of suppression resources.
 - b. Avoid sensitive biological communities.
 - c. Minimize the cutting of large trees, sites should be made by enhancing natural openings if possible.
7. Camp site selection:
 - a. Camps must be located away from known historic or archaeological sites.
 - b. Camps must be located away from sensitive biological communities.
 - c. Latrines must be located at least 200 feet from lakes, ponds, and streams.
8. Camp site rehabilitation:
 - a. Create minimal disturbance during rehabilitation.
 - b. Dismantle and remove all tent and shelter frame materials. Local plant materials (e.g., logs and poles) used for construction should be spread throughout the site.
 - c. Completely fill fire pits with natural materials, such as duff, plant litter, and branches.
 - d. Remove all garbage, such as food waste and plastics, from camp sites and firelines. Trash such as paper products, and small amounts of visqueen, may be burned.
 - e. For large camps or camps that have been used for several days, camp rehabilitation must be approved by Refuge Manager or designee before demobilization is completed.
9. Both black bears and grizzly bears are very abundant on parts of the refuge, and some have been shot for the protection of life or property during fire suppression operations.
 - a. Incident Commanders will emphasize preventive measures. Camps will be kept clean. Food waste is to be removed as promptly as possible. All attempts at driving a bear away from camp or suppression operations must be exhausted before destroying the bear.

- b. Any person who takes a bear in defense of life and property must comply with all state regulations and immediately report the incident to refuge personnel through their chain of command. A Service bear incident report will be completed and filed.
10. Protect the integrity of designated and proposed National Wild Rivers (Figure 1). These areas receive considerable public use, and little or no trace of suppression operations should remain after demobilization.
- a. Those areas are:
 - 1. Beaver Creek National Wild River--within one-half mile of the bank, from the refuge boundary to river mile 127, at the extreme northern end of Township 12 North, Fairbanks Meridian.
 - 2. Sheenjek River, recommended for designation as National Wild River status--within one-half mile of the bank, from the refuge boundary to its mouth at the Porcupine River.
 - b. Extra care should be taken to protect the "natural, primitive" condition of the land, to protect water quality from retardants, foams, fuel, other chemicals, and minimize erosion caused by fireline construction. Measures to be used are:
 - 1. Use natural features for fuel breaks where possible.
 - 2. Place strong emphasis on the use of Minimum Impact Suppression Tactics (attached as Appendix VII).
 - 3. Avoid making retardant or foam drops in, across, or directly adjacent to the stream bed and sloughs that feed into it.
 - 4. Portable pumps and fueling operations will be staffed and run to ensure that no fuel or other chemicals are spilled into the stream or sloughs that feed into the stream.
 - 5. Strictly adhere to constraints on fireline and helispot construction and camp placement.
 - 6. Thoroughly rehabilitate firelines, camps, helispots, and all other signs of suppression operations before demobilization, with approval by Refuge Manager or designee.
11. Artifacts are not to be collected. The refuge will be notified of any artifacts found.

12. Specific constraints for extended attack situations will be addressed in a Wildland Fire Situation Analysis.

13. Final authority for actions not authorized by this plan or that are specifically prohibited herein lies with the Refuge Manager.

H. Rehabilitation.

Soils and plant communities on the refuge are highly sensitive to some types of disturbance, mainly because of permafrost. Rehabilitation of damages resulting from suppression activities will be carried out before demobilization. The site will be returned to pre-fire condition or to standards set by the Refuge Manager. Section III.H contains specific standards for rehabilitation.

Department of Interior policy states that fire suppression funds (subactivity 9261) can be used for repair or rehabilitation of damage to lands, resources, and facilities directly attributable to the wildland fire suppression effort or activities. Emergency Fire Rehabilitation/Burned Area Emergency Rehabilitation (subactivity 9262) may be done "to stabilize and prevent unacceptable resource degradation or to minimize threats to life or property resulting from the fire." Non-emergency replacement of facilities and resources damaged by wildland fire or the re-establishment of ecosystem structure and functions must be budgeted and funded through normal procedures. Fuels management project rehabilitation should be included in the fuel treatment project description and funding request. Specific guidelines are in the fire management handbook.

I. Records, Reports, and Plan Updates.

Surveillance reports are available at AFS' zone dispatch office, and may be requested via fax. Daily situation reports are available via the internet. Fire reports are completed by AFS and sent to the Service Regional Fire Management Coordinator then entered into the Fire Management Information System or sent to the refuge FMO for entry. AFS maintains a file on all active fires in their zone dispatch center, and they are available for inspection at any time by refuge staff.

The Service fire management handbook (USFWS 2000) states that individual fire reports, annual narrative reports, fire weather records, records on vegetation, and records about fires should be kept permanently on file at the refuge. An accomplishment report will be completed each calendar year and sent to the regional Fire Management Coordinator.

All fires involving Type I and Type II Overhead Teams will be critiqued before demobilization of the team. Critiques will be attended by key team members, representatives from the refuge, representatives from AFS, and other individuals if warranted. Critiques on other fires may be scheduled if warranted. The FWS fire management handbook should be consulted to find other instances when a review will be conducted, e.g., escaped prescribed

fire, or an incident that results in fatality, serious injury, or controversy involving another agency.

The Refuge Fire Management Plan is updated periodically--at a minimum of every five years. New information may be substituted (e.g., new fuels maps), or added as appendices. Changes in policy and regulations (e.g., Departmental policy, new state air control regulations) may prompt revision of certain parts of the plan.

The Annual Refuge Fire Management Plan is prepared annually by April 30 to allow for adequate time for approval and review of individual prescribed burn plans prior to the fire season. The Annual Plan includes the refuge dispatch plan, the refuge preparedness plan, and individual prescribed burn plans.

Refuge maps of wildland fire management option designation are reviewed annually. Any changes in management option designation are submitted to AFS by their deadline (usually around March 15) to allow for timely incorporation into the master fire suppression atlas.

IV. AIR QUALITY AND SMOKE MANAGEMENT GUIDELINES.

Under some conditions, smoke from wildland fires may threaten human health. Policy states that provisions of the Clean Air Act and the State Implementation Plan (SIP) for that Act must be followed (621 FW 3.4) in relation to prescribed burns. In addition, the refuge is to take "aggressive action to manage smoke from wildland fires to minimize impacts and maintain air quality" (fire management handbook 2.3.1). No Class I airsheds are nearby. The nearest nonattainment area (for carbon monoxide) is Fairbanks, which is at least 70 miles from the refuge boundary.

Wildland fires can have a significant impact on air quality. Local residents have phoned or submitted written complaints about discomfort caused by smoke, especially to the elderly. In addition to local fires, smoke also enters the Yukon Flats area from fires in Siberia, Canada, and other parts of Alaska (Barney and Berglund 1974). Smoke from large fires in the area can reach down the Yukon River to Tanana and into Fairbanks.

Smoke concentrations are usually localized and quickly dispersed. However, extremely large fires can affect air quality over a wide area, producing smoke that covers hundreds of square miles and is several miles thick (Barney and Berglund 1974). In 1988, when several large fires burned more than a million acres on the refuge, visibility at Fort Yukon was often less than two miles during a several-week period. Also that year, residents of Beaver report that their satellite phone link was interrupted because of dense smoke, cutting their link to the outside world. Fires that develop convection columns take smoke higher into the atmosphere, allowing smoke to be transported farther and dispersed better (Hawkes and others 1990).

Barney and Berglund (1974) found that from 1948 to 1963, there were 79 days with smoke present in Fort Yukon (major fire years on the refuge during that period were 1950 and 1954). On 22% of those 79 days, visibility was less than one mile for at least part of the day. Once smoke was present, there was a good likelihood of it persisting for up to eleven days. Chances of having smoke were highest in July and August. Heaviest smoke concentrations tended to be late evening or early morning.

A strategy that employs wildland fire and prescribed fire helps maintain air quality and human health in the long term. Attempting to exclude fire actually results in fire "deferral" (Stocks 1993). Attempted fire exclusion results in numerous mild and moderate intensity fires being extinguished and some practically smoke-free years, but the nature of the fire regime in the boreal forest guarantees that eventually suppression forces will be overwhelmed. Control attempts will fail in the periodic severe fire years that usually occur with high drought codes and outbreaks of numerous lightning fires. Fires that burn under drier conditions consume more of the moss/duff layer and produce more emissions per unit area than fires burning under more damp conditions (Kasischke and others 1995). A more natural fire regime includes fires of all sizes and severities, and the smaller burns produce less smoke, break up continuous spruce stands, and therefore help limit spread of potentially larger, deeper-burning fires.

Smoke management guidelines are included in the prescribed fire management handbook. Smoke management objectives should be included in all prescribed burn plans and fire situation analyses for wildland fires. Established procedures for managing smoke will be followed. Five steps for managing smoke listed in the Service's prescribed fire management handbook are: plot the trajectory of the smoke plume, identify smoke sensitive areas, identify critical targets, determine fuel type, and minimize risk. Health hazard complaints will be documented and confirmed. Visibility will be used to measure smoke impact.

Smoke management restrictions set by the Alaska Department of Environmental Conservation (DEC) are included as conditions to open burning permits, which are required for prescribed burns. Restrictions include burning when smoke will not have an adverse impact on people and notifying neighbors and other agencies. Coordination with DEC, other agencies, and local residents will improve operations and help prevent problems. During "periods of extensive fire activity," DEC and the Multi-Agency Coordinating (MAC) Group may determine that new fires will be suppressed because of smoke and air quality concerns, even in Limited Management Option areas (AWFCG 1998).

V. PUBLIC INFORMATION AND EDUCATION

Information about routine suppression operations is normally handled by AFS staff. The refuge FMO and other staff may be called upon and should, when the situation dictates, issue statements to the media about wildland fires and prescribed fires burning on the refuge. Those situations may include major fires, smoke problems, or controversial fires.

Information about prescribed fires should be given out as early as possible in the planning process. Benefits and potential impacts should be explained.

If extensive media contact is anticipated or experienced, Service Fire Information Officers may be requested. AFS and Service Information Officers are included in the Dispatch Plan (Appendix IX). A list of media contacts and the regional policy on contacts with the press are included in Appendix XIII. Copies of press releases should be sent to regional External Affairs office at the time they are issued. Press questions about national or regional Service policy, individual employees, or topics of extreme sensitivity or controversy should be referred to External Affairs. The refuge FMO should brief staff on the refuge and in the regional office as appropriate to keep them current on the fire situation.

The opinions of many village residents about wildland fire is derived from their experience as Emergency Firefighters, and they view fire as a "destroyer." They see the immediate effects of fire, but do not realize that wildland fire is a recurring event that is critical for maintaining productive wildlife habitat. It is important to the success of the refuge fire management program that local organizations and residents are involved in the fire planning process, kept informed about refuge fire management activities and progress of wildland fires, and educated about the role of fire in the region. This is accomplished through personal contact, press releases, and broad public education efforts.

Incorporating fire management information into the environmental education program on the refuge has been a priority and will continue to be an important part of the refuge fire management program. The "Teach About Fire" curriculum was designed for use by school teachers in their classrooms. Refuge staff teach teachers about the curriculum and assist them in teaching it to their students. The "Role of Fire in Alaska" display is normally set up at the Yukon Flats NWR headquarters, but is portable and is taken to meetings and environmental education programs.

A more extensive program of sharing knowledge about fire effects with local residents should be considered. Part of that program would be discussing results of fire effects and fire ecology studies on Yukon Flats NWR and other refuges nearby. Villagers' knowledge about the natural history of the area would complement and may help explain scientific data.

It is also important for local residents to participate in operational aspects of wildland fire and prescribed fire management activities. Involvement of local people results in an increased awareness of the role of fire on the refuge and in refuge operations in general, allows local residents a voice and role in protecting and enhancing refuge resources that many of them use, and benefits local residents through employment and improved subsistence opportunities.

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Appendix I.

Environmental Assessment, Alaska National Interest Lands Conservation Act Section 810 Evaluation, and Compatibility Determination for station Fire Management Plan

FINDING OF NO SIGNIFICANT IMPACT
ENVIRONMENTAL ASSESSMENT AND
FINDING OF NO SIGNIFICANT RESTRICTION OF SUBSISTENCE USES

Yukon Flats National Wildlife Refuge Fire Management Plan

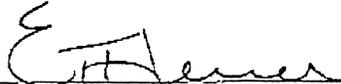
Yukon Flats National Wildlife Refuge is proposing to adopt a fire management plan that continues the current management situation and adds the newly authorized Wildland Fire Use program (Alternative B in the attached document).

The proposal is in compliance with Departmental and Service policy. The proposal was developed in consultation with local residents and is backed by scientific literature that details fire's critical role in the boreal forest. Short-term impacts can be substantial in localized areas, but long-term impacts will include the maintenance of the biological integrity, diversity, and environmental health of refuge ecosystems. Measures have been planned to avoid or minimize negative impacts. The full range of suppression options (from surveillance to aggressive attack) will be used to protect life, property, and natural resources. Prescribed burning and small-scale mechanical projects will be used where hazardous situations are identified. Prescribed burning will also be done to achieve resource objectives. Wildland Fire Use will be used to manage wildland fires for resource benefits.

Based on my review and evaluation of the attached Environmental Assessment and Refuge Fire Management Plan, I have determined that adopting Alternative B is not a major Federal action which would significantly affect the quality of the human environment within the meaning of Section 102(2)(C) of the National Environmental Policy Act of 1969. Accordingly, preparation of an environmental impact statement on the proposed action is not required.

In addition, the U.S. Fish and Wildlife Service, acting for the Secretary, is required by section 810 of the Alaska National Interest Lands Conservation Act to evaluate effects on subsistence uses and needs of proposed land use decisions on National Wildlife Refuges in Alaska. Evaluation is necessary to determine whether such decisions would result in significant restriction to subsistence uses and needs and compel initiation of further procedural requirements of Section 810.

Based on review and evaluation of available information (see section IV, ANILCA Section 810 Summary), I have determined that the activities proposed under this plan will not significantly restrict subsistence uses.



Ted Heuer, Refuge Manager
Yukon Flats National Wildlife Refuge

9/24/01

Date

Appendix II.

Endangered Species Act Section 7 consultation



IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE

NORTHERN ALASKA ECOLOGICAL SERVICES

101 12th Ave., Room 232, Box 19

Fairbanks, AK 99701

August 26, 1996

Memorandum

To: Refuge Manager, Yukon Flats National Wildlife Refuge, Fairbanks *ETH*

From: Field Supervisor, Ecological Services, Fairbanks *Patrick Sousa*

Subject: Listed Species Consultation for Refuge Fire Management Plan

This responds to your July 16, 1996, memorandum requesting concurrence that enactment of a new fire management plan (FMP) for the Yukon Flats National Wildlife Refuge will not adversely affect endangered or threatened species pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act).

We are in favor of the stipulations included in the FMP which are designed to minimize disturbance to the endangered American peregrine falcon (*Falco peregrinus anatum*), and the guidelines to minimize impacts on sensitive plant communities. Based on the information provided in your memorandum, and the stipulations included in the FMP, we concur that enactment of the FMP is not likely to adversely impact listed species. Further consultation under section 7 of the Act regarding this plan is not necessary at this time. If activities or stipulations presented in the FMP change, additional information on listed or proposed species becomes available, new species are listed, or listed species are introduced that may be affected by the FMP, consultation should be reinitiated.

This letter relates only to endangered species under our jurisdiction. It does not address other legislation or responsibilities under the Fish and Wildlife Coordination Act, Clean Water Act, or National Environmental Policy Act.

Thank you for your cooperation in meeting our joint responsibilities under the Act. If you require further assistance, please contact Cathy Donaldson at (907) 456-0354.

Appendix III.

Scientific names of plant species mentioned in text

Plant names used in the text (mainly following Hultén 1968)

<u>Common Name (other common name)</u>	<u>Scientific Name</u>
American green alder (mountain alder)	<i>Alnus viridis</i> spp. <i>crispa</i> (Ait.) Turrill
Balsam poplar (cottonwood)	<i>Populus balsamifera</i> L.
Bearberry (red-fruit bearberry)	<i>Arctostaphylos rubra</i> (Rehd. & Wilson) Fern.
Bebb willow (diamond willow)	<i>Salix bebbiana</i> Sarg.
Bent grass	<i>Agrostis</i> spp. (L.)
Bluejoint grass	<i>Calamagrostis canadensis</i> (Michx.) Beauv.
Bog birch (shrub birch, resin birch)	<i>Betula nana</i> L. (incl. former <i>B. glandulosa</i>)
Bog blueberry (alpine blueberry)	<i>Vaccinium uliginosum</i> L.
Black spruce	<i>Picea mariana</i> (P. Mill.) B.S.P.
Bunchberry (bunchberry dogwood)	<i>Cornus canadensis</i> L.
Caribou mosses (reindeer lichens)	<i>Cladonia</i> spp. (P. Browne)
	<i>Cladina arbuscula</i> (Wallr.) Hale & Culb.
	<i>Cladina rangiferina</i> (L.) Nyl.
Ceratodon moss	<i>Ceratodon purpureus</i> (Hedw.) Brid.
Cloudberry (salmonberry)	<i>Rubus chamaemorus</i> L.
Cottongrass	<i>Eriophorum</i> spp. (L.) (fam. Cyperaceae)
Crowberry (blackberry)	<i>Empetrum nigrum</i> L.
Dryas (mountain-avens)	<i>Dryas</i> spp. (L.)
Feathermosses	<i>Hylocomium splendens</i> (Hedw.) Schimp. in B.S.G.
	<i>Pleurozium schreberi</i> (Brid.) Mitt.
Feltleaf willow (Alaska willow)	<i>Salix alaxensis</i> (Anderss.) Coville
Felt lichens	<i>Peltigera aphthosa</i> *
	<i>Peltigera canina</i> *
Field horsetail	<i>Equisetum arvense</i> L.
Fireweed	<i>Epilobium angustifolium</i> L.
Golden buckwheat*	<i>Eriogonum flavum</i> var. <i>aquilinum</i> *
Grasses	
Bent grass	<i>Agrostis</i> spp. (L.)
Bluejoint grass	<i>Calamagrostis canadensis</i> (Michx.) Beauv.
Polar grass	<i>Arctagrostis latifolia</i> (R.Br.) Griseb.
Reed bent grass (reedgrass)	<i>Calamagrostis</i> spp. (Adans.)
Grayleaf willow	<i>Salix glauca</i> (L.)
*Green-tongue liverwort	<i>Marchantia polymorpha</i> *
Highbush cranberry	<i>Viburnum edule</i> (Michx.) Raf.
Kathul Mountain whitlowgrass	<i>Draba murrayi</i> Mulligan
Labrador tea (marsh Labrador tea)	<i>Ledum palustre</i> L.
Liverwort	<i>Asterella</i> sp. (P. Beauv.)
Lowbush cranberry (lingonberry)	<i>Vaccinium vitis-idaea</i> L.
Northern comandra (false toadflax)	<i>Geocaulon lividum</i> (Richards.) Fern.
Paper birch	<i>Betula papyrifera</i> Marsh.
Peltigera lichen (foliose lichen)	<i>Peltigera aphthosa</i> (L.) Willd.

Polar grass	<i>Arctagrostis latifolia</i> (R.Br.) Griseb.
Prickly rose	<i>Rosa acicularis</i> Lindl.
Quaking aspen	<i>Populus tremuloides</i> Michx.
Lesser rattlesnake plantain	<i>Goodyera repens</i> (L.) R.Br. ex Ait.f.

<u>Common Name (other common name)</u>	<u>Scientific Name</u>
Reed bent grass (reedgrass)	<i>Calamagrostis</i> spp. (Adans.)
Shacklett's catseye	<i>Cryptantha shackletteana</i> , Higgins
Sedge	<i>Carex</i> spp. (L.)
Sphagnum moss	<i>Sphagnum</i> spp. (L.)
Twinflower	<i>Linnaea borealis</i> L.
White spruce	<i>Picea glauca</i> (Moench) Voss
Yukon aster	<i>Aster yukonensis</i> Cronq.
Yukon podistera	<i>Podistera yukonensis</i> Mathias & Consance

REFERENCES:

- Hultén, Eric. 1968. Flora of Alaska and Neighboring Territories: a manual of vascular plants. Stanford University Press, Stanford, California.
- Viereck, Leslie A., and Elbert L. Little, Jr. 1972. Alaska Trees and Shrubs. USDA Forest Service Agr. Handbook 410, reprinted 1986. University of Alaska Press, Fairbanks, Alaska.
- USDA. 1997. National PLANTS database. U.S. Department of Agriculture, Natural Resource Conservation Service. <http://plants.usda.gov/plants/plntmenu.html>.

Appendix IV.

Wildlife species present on refuge

Appendix IV.A. Wildlife species present on
refuge: Birds.

From refuge observations and published
records. Compiled by K. M. Sowl, May 1997.
Taxonomy updated November 1998, AOU.

ABUNDANCE (seasonal for migrants)

- C = Common** (certain to be seen or heard in
suitable habitat)
U = Uncommon (present but not certain to be
seen; or locally distributed)
R = Rare (seen only a few times annually)
O = Occasional (seen only a few times in a
five-year period)
X = Accidental (has been seen only once or
twice; may not be seen again)

STATUS

- Y = Year-round** resident
B = Breeding species (migratory)
* Breeding has been documented for this species
through observation of eggs, nests, or dependent
(unfledged or recently fledged) young.
M = Migrant non-breeder traveling between
summer and winter range
V = Visitor from outside its normal range

LOONS

___ Red-throated Loon	R	B
___ Pacific Loon	C	B*
___ Common Loon	U	B*

GREBES

___ Horned Grebe	C	B*
___ Red-necked Grebe	C	B*

CORMORANTS

___ Double-crested Cormorant	X	V
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SWANS, GEESE, DUCKS

___ Tundra Swan	R	M
___ Trumpeter Swan	U	B*
___ Greater White-fronted Goose	U	B*
___ Snow Goose	R	M
___ Brant	X	V
___ Canada Goose	U	B*
___ Green-winged Teal	C	B*
___ Mallard	C	B*
___ Northern Pintail	C	B*
___ Blue-winged Teal	R	B*
___ Northern Shoveler	C	B*
___ Gadwall	U	B*
___ American Wigeon	C	B*
___ Canvasback	U	B*

___ Redhead	R	B*
___ Ring-necked Duck	R	B*
___ Greater Scaup	U	B*
___ Lesser Scaup	C	B*
___ King Eider	X	V
___ Harlequin Duck	R	B
___ Oldsquaw	R	B
___ Black Scoter	R	B*
___ Surf Scoter	U	B*
___ White-winged Scoter	C	B*
___ Common Goldeneye	U	B*
___ Barrow's Goldeneye	U	B*
___ Bufflehead	U	B*
___ Common Merganser	R	B
___ Red-breasted Merganser	U	B*
___ Ruddy Duck	O	B*

EAGLES, HAWKS

___ Osprey	U	B*
___ Bald Eagle	U	B*
___ Northern Harrier	U	B
___ Sharp-shinned Hawk	U	B
___ Northern Goshawk	R	B*
___ Swainson's Hawk	O	B
___ Red-tailed Hawk	C	B*
___ Rough-legged Hawk	U	B
___ Golden Eagle	U	B*

FALCONS

___ American Kestrel	U	B*
___ Merlin	R	B
___ Peregrine Falcon	U	B*
___ Gyrfalcon	O	B

GROUSE

___ Spruce Grouse	C	Y*
___ Willow Ptarmigan	U	Y
___ Rock Ptarmigan	U	Y
___ Ruffed Grouse	C	Y*
___ Sharp-tailed Grouse	R	Y*

COOTS

___ American Coot	O	V
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CRANES

___ Sandhill Crane	C	B
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PLOVERS

___ Black-bellied Plover	R	M
___ American Golden-Plover	R	B*
___ Semipalmated Plover	C	B*
___ Killdeer	O	B*

SANDPIPERS

___ Greater Yellowlegs	O	M	___ Northern Flicker	U	B*
___ Lesser Yellowlegs	C	B*			
___ Solitary Sandpiper	C	B*	TYRANT FLYCATCHERS		
___ Spotted Sandpiper	C	B*	___ Olive-sided Flycatcher	U	B
___ Wandering Tattler	O	B	___ Western Wood-Pewee	U	B*
___ Upland Sandpiper	O	B*	___ Alder Flycatcher	C	B
___ Stilt Sandpiper	O	M	___ Hammond's Flycatcher	R	B
___ Whimbrel	R	M	___ Say's Phoebe	R	B
___ Hudsonian Godwit	O	M	___ Eastern Kingbird	X	V
___ Ruddy Turnstone	O	M			
___ Surfbird	R	B	LARKS		
___ Sanderling	O	M	___ Horned Lark	U	B
___ Semipalmated Sandpiper	U	M			
___ Western Sandpiper	U	M	SWALLOWS		
___ Least Sandpiper	U	B	___ Tree Swallow	U	B*
___ Baird's Sandpiper	R	M	___ Violet-green Swallow	U	B*
___ Pectoral Sandpiper	U	M	___ Bank Swallow	C	B*
___ Dunlin	O	M	___ Cliff Swallow	C	B*
___ Buff-breasted Sandpiper	O	M			
___ Long-billed Dowitcher	R	M	JAYS, MAGPIES, CROWS		
___ Common Snipe	C	B*	___ Gray Jay	C	Y
___ Red-necked Phalarope	U	B*	___ Black-billed Magpie	X	V
___ Red Phalarope	R	M	___ Common Raven	C	Y*
___ Wilson's Phalarope	X	V			
			CHICKADEES		
JAEGERS, GULLS, AND TERNS			___ Black-capped Chickadee	U	Y
___ Long-tailed Jaeger	R	B	___ Gray-headed Chickadee	O	Y
___ Bonaparte's Gull	U	B*	(Siberian Tit)		
___ Mew Gull	C	B*	___ Boreal Chickadee	C	Y*
___ Herring Gull	C	B*			
___ Glaucous Gull	X	V	NUTHATCHES		
___ Arctic Tern	C	B*	___ Red-breasted Nuthatch	O	V
PIGEONS AND DOVES			DIPPERS		
___ Rock Dove	O	V	___ American Dipper	R	B
___ Mourning Dove	X	V			
			KINGLETS		
OWLS			___ Ruby-crowned Kinglet	U	B
___ Great Horned Owl	C	Y*			
___ Snowy Owl	O	V	THRUSHES		
___ Northern Hawk Owl	U	Y*	___ Northern Wheatear	R	B
___ Great Gray Owl	U	Y*	___ Townsend's Solitaire	O	B
___ Short-eared Owl	U	B	___ Gray-cheeked Thrush	U	B
___ Boreal Owl	U	Y*	___ Swainson's Thrush	C	B*
			___ Hermit Thrush	U	B
KINGFISHERS			___ American Robin	C	B*
___ Belted Kingfisher	U	B	___ Varied Thrush	C	B
WOODPECKERS			WAGTAILS, PIPITS		
___ Downy Woodpecker	U	Y	___ White Wagtail	X	V
___ Hairy Woodpecker	U	Y			
___ Three-toed Woodpecker	C	Y*			
___ Black-backed Woodpecker	U	Y			

___ American Pipit U B

WAXWINGS

___ Bohemian Waxwing U B*

SHRIKES

___ Northern Shrike R B

STARLINGS

___ European Starling O V

WOOD WARBLERS

___ Orange-crowned Warbler U B*

___ Yellow Warbler C B*

___ Yellow-rumped Warbler C B*

___ Blackpoll Warbler U B

___ Northern Waterthrush C B*

___ Wilson's Warbler R B

SPARROWS, BUNTINGS

___ American Tree Sparrow U B*

___ Chipping Sparrow R B*

___ Savannah Sparrow C B*

___ Fox Sparrow U B

___ Lincoln's Sparrow U B*

___ Golden-crowned Sparrow O M

___ White-crowned Sparrow C B*

___ Dark-eyed Junco C B*

___ Lapland Longspur R B

___ Smith's Longspur O B

___ Snow Bunting U M

BLACKBIRDS

___ Red-winged Blackbird U B*

___ Rusty Blackbird C B*

FINCHES

___ Rosy Finch U B

___ Pine Grosbeak U Y

___ White-winged Crossbill C Y

___ Common Redpoll C Y*

___ Hoary Redpoll U M

Appendix IV.B. Wildlife species present on refuge: Mammals.

Nomenclature follows Jarrell, G.H., S. O. MacDonald, and J. A. Cook. 1998. Checklist to the Mammals of Alaska. University of Alaska, Fairbanks.

ORDER INSECTIVORA

Family Soricidae

Common (Masked) Shrew	<i>Sorex cinereus</i>
Dusky Shrew	<i>Sorex monticolus</i>
Pygmy Shrew	<i>Sorex hoyi</i>
Tundra Shrew	<i>Sorex tundrensis</i>

ORDER CHIROPTERA

Vespertilionidae

Little Brown Bat	<i>Myotis lucifugus</i>
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ORDER CARNIVORA

Family Canidae

Wolf	<i>Canis lupus</i>
Coyote	<i>Canis latrans</i>
Red Fox	<i>Vulpes vulpes</i>
Arctic Fox	<i>Alopex lagopus</i>

Family Felidae

Lynx	<i>Lynx canadensis</i>
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Family Mustelidae

Marten	<i>Martes americana</i>
Ermine	<i>Mustela erminea</i>
Least Weasel	<i>Mustela nivalis</i>
Mink	<i>Mustela vison</i>
Wolverine	<i>Gulo gulo</i>
River (Land) Otter	<i>Lontra canadensis</i>

Family Phocidae

Harbor Seal	<i>Phoca vitulina</i>
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Family Ursidae

Brown (Grizzly) Bear	<i>Ursus arctos</i>
Black Bear	<i>Ursus americanus</i>

ORDER CETACEA

Family Monodontidae

White (Belukha) Whale	<i>Delphinapterus leucas</i>
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ORDER ARTIODACTYLA

Family Cervidae

Moose	<i>Alces alces</i>
Caribou	<i>Rangifer tarandus</i>

Family Bovidae

Dall's Sheep	<i>Ovis dalli</i>
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ORDER RODENTIA

Family Sciuridae

Hoary Marmot	<i>Marmota caligata</i>
Yukon Flats Ground Squirrel	<i>Spermophilus parryii osgoodi</i>
Red Squirrel	<i>Tamiasciurus hudsonicus</i>
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>

Family Castoridae

Beaver	<i>Castor canadensis</i>
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Family Dipodidae

Meadow Jumping Mouse	<i>Zapus hudsonicus</i>
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Family Muridae

Northern Red-backed Vole	<i>Clethrionomys rutilus</i>
Yellow-cheeked Vole	<i>Microtus xanthognathus</i>
Tundra Vole	<i>Microtus oeconomus</i>
Meadow Vole	<i>Microtus pennsylvanicus</i>
Brown Lemming	<i>Lemmus trimucronatus</i>
Northern Bog Lemming	<i>Synaptomys borealis</i>
Muskrat	<i>Ondatra zibethicus</i>

Family Erethizontidae

Porcupine	<i>Erethizon dorsatum</i>
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ORDER LAGOMORPHA

Family Ochotonidae

Collared Pika	<i>Ochotona collaris</i>
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Family Leporidae

Snowshoe Hare	<i>Lepus americanus</i>
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Appendix IV.C. Wildlife species present on refuge: Fish.

From USFWS 1990. Taxonomy follows International Center for Living Aquatic Resource Management. 1995. Fishbase WWW (<http://ibs.uel.ac.uk/ibs/sp2000/fishbase/>).

ORDER PETROMYZONTIFORMES

Family Petromyzontidae

Arctic lamprey *Lethenteron japonica*

ORDER SALMONIFORMES

Family Salmonidae

Coho (silver) salmon *Oncorhynchus kisutch*
Chinook (king) salmon *Oncorhynchus tshawytscha*
Chum (dog) salmon *Oncorhynchus keta*
Dolly Varden char *Salvelinus malma*
Arctic grayling *Thymallus arcticus*
Broad whitefish *Coregonus nasus*
Humpback whitefish *Coregonus pidschian*
Sardine (least) cisco *Coregonus sardinella*
Bering cisco *Coregonus autumnalis laurettae*
Round whitefish *Prosopium cylindraceum*
Inconnu (Sheefish) *Stenodus leucichthys*

Family Umbridae

Alaska blackfish *Dallia pectoralis*

Family Esocidae

Northern pike (Jackfish) *Esox lucius*

ORDER CYPRINIFORMES

Family Catostomidae

Longnose sucker *Catostomus catostomus*

Family Cyprinidae

Lake chub *Couesius plumbeus*

ORDER GADIFORMES

Family Lotidae

Burbot (Lush) *Lota lota*

ORDER SCORPAENIFORMES

Family Cottidae

Slimy sculpin *Cottus cognatus*

Appendix IV.D. Wildlife species present on refuge: Amphibians.

Taxonomy follows Animal Diversity Web, University of Michigan.
(<http://www.oit.itd.umich.edu/projects/ADW/>)

ORDER ANURA

Family Ranidae

Wood frog

Rana sylvatica

Appendix V.

Fire intensity and fire potential (hauling chart)

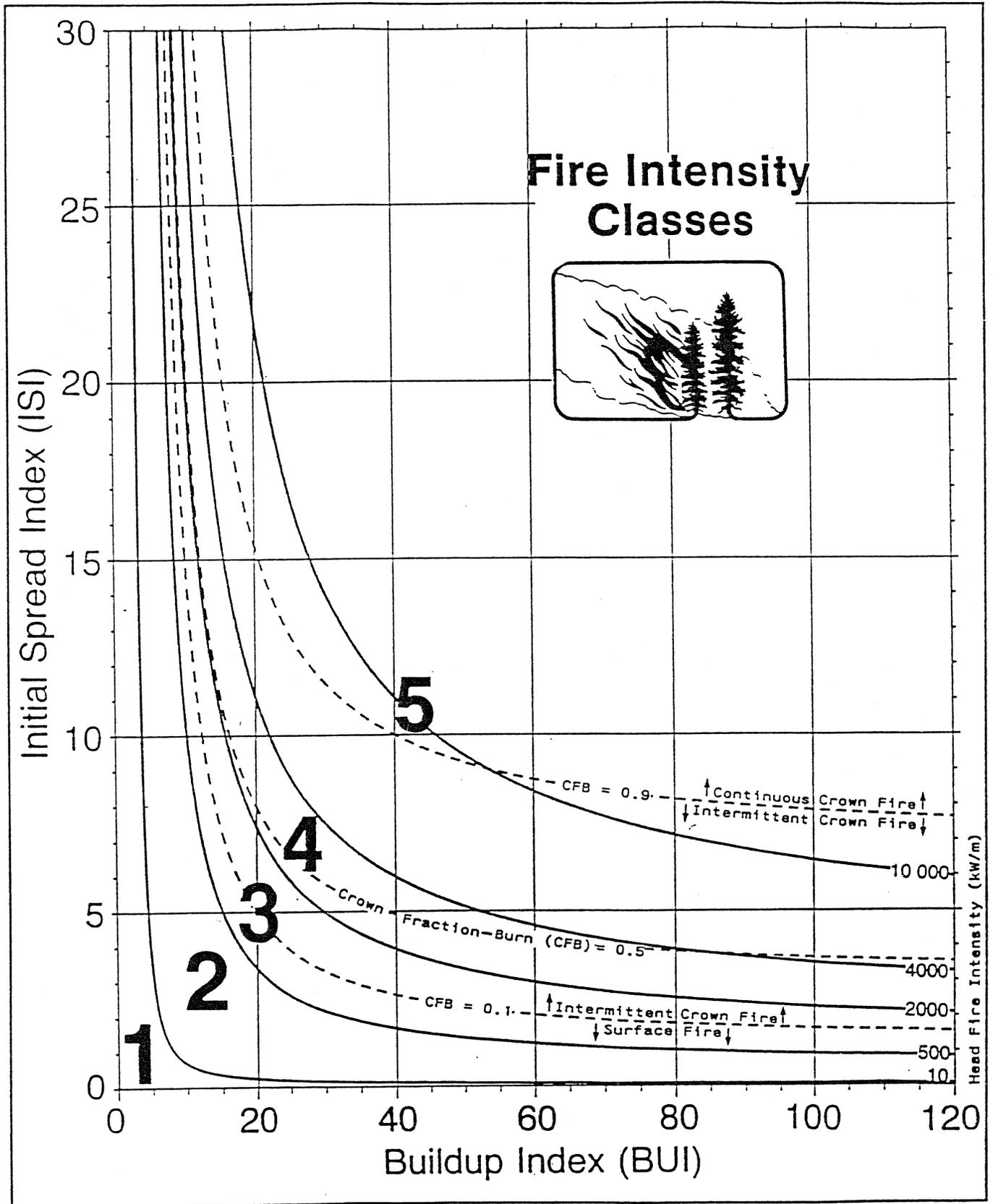


Figure 1. Head fire intensity class graph for Canadian Forest Fire Behavior Prediction System Fuel Type C-2 (Boreal Spruce) on level to gently undulating terrain and at 85% foliar moisture content. Refer to table 1 for the associated fire control and fire behavior interpretations.

Table 1. Interpretations associated with the head fire intensity class graph for Canadian Forest Fire Behavior Prediction System Fuel Type C-2 (Boreal Spruce) on level to gently undulating terrain and at 85% foliar moisture content.

Fire Intensity Class	Description of Probable Fire Potential and Implications for Wildfire Suppression [†]
1	New fire starts are unlikely to sustain themselves due to moist surface fuel conditions. However, new ignitions may still take place from lightning strikes or near large and prolonged heat sources (e.g., camp fires, windrowed slash piles) but the resulting fires generally do not spread much beyond their point of origin and if they do, control is very easily achieved. Mop-up or complete extinguishment of fires that are already burning may still be required provided there is sufficient fuel and it is dry enough to support smouldering combustion*. Color code is GREEN. [< 10 kW/m]
2	From the standpoint of moisture content, surface fuels are considered sufficiently receptive to sustain ignition and combustion from both flaming and glowing firebrands. Fire activity is limited to creeping or gentle surface burning with maximum flame heights of less than 1.3 m (= 4 ft). Control of these fires is fairly easy but can become troublesome as adverse fire impacts can still result, and fires can become costly to suppress if not attended to immediately. Direct manual attack by "hotspotting" around the entire fire perimeter by firefighters with only hand tools and water from back-pack pumps is possible; a "light" helicopter(s) with bucket is also very effective. Fireguard constructed with hand tools should hold. Color code is BLUE. [10-500 kW/m]
3	Both moderately and highly vigorous surface fires with flames up to just over 1.5 m (= 5 ft) high or intermittent crowning (i.e., torching) can occur. As a result, fires can be moderately difficult to control. Hand-constructed fire guards are likely to be challenged and the opportunity to "hotspot" the perimeter gradually diminishes. Water under pressure (e.g., fire pumps with hose lays) and heavy machinery (e.g., bulldozer, "intermediate" helicopter with a bucket) are generally required for effective action at the fire's head. Color code is YELLOW. [500-2000 kW/m]
4	Burning conditions have become critical as intermittent crowning and short-range spotting is common place and as a result control is very difficult. Direct attack on the head of a fire by ground forces is feasible for only the first few minutes after ignition has occurred. Otherwise, any attempt to attack the fire's head should be limited to "medium" or "heavy" helicopters with buckets or fixed-wing aircraft, preferably dropping long-term chemical fire retardants; control efforts may fail. Until the fire weather severity abates, resulting in the subsidence of a fire run, the uncertainty of successful control exists. Color code is ORANGE. [2000-4000 kW/m]
5	Intermittent crown fires are prevalent and continuous crowning is also possible as well in the lower end of the spectrum. Control is extremely difficult and all efforts at direct control are likely to fail. Direct attack is rarely possible given the fire's probable ferocity except immediately after ignition and should only be attempted with the utmost caution. Otherwise, any suppression action must be restricted to the flanks and back of the fire. Indirect attack with aerial ignition (i.e., helitorch and/or A.I.D. dispenser), if available, may be effective depending on the fire's forward rate of advance. [> 4000 kW/m] The situation should be considered as "explosive" or super critical in the upper portion of the class. The characteristics commonly associated with extreme fire behavior (e.g., rapid spread rates, continuous crown fire development, medium- to long-range spotting, firewhirls, massive convection columns, great walls of flame) is a certainty. Fires present serious control problems as they are virtually impossible to contain until burning conditions ameliorate. Direct attack is rarely possible given the fire's probable ferocity except immediately after ignition and should only be attempted with the utmost caution; an escaped fire should in most cases, be considered a very real possibility. The only effective and safe control action that can be taken until the fire run expires is at the back and up along the flanks. Color code is RED. [> 10 000 kW/m]

[†]THE ABOVE **SHOULD NOT** BE USED AS A GUIDE TO FIREFIGHTER SAFETY AS WILDLAND FIRES CAN BE POTENTIALLY DANGEROUS OR LIFE THREATENING AT ANY LEVEL OF FIRE INTENSITY.

*General rule(s) of thumb: certainly when the Drought Code (DC) or Buildup Index (BUI) components of the Canadian Forest Fire Weather Index System exceeds about 300 or is greater than around 40, respectively, one can generally expect ground or subsurface fires. Please note, however, these threshold values are for moderately well-drained sites but in actual fact they will vary according to soil type and drainage conditions and should be determined locally on the basis of past wildfire suppression and/or prescribed burning experience.

Appendix VI.

Wildfire Situation Analysis template

WILDLAND FIRE SITUATION ANALYSIS

Incident Name: _____

Jurisdiction: _____

Date and Time Completed: _____

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

Section I, WFSA Information Page

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

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

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

Section II. Objectives and Constraints

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

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

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

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

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

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

II.

Objectives and Constraints

To be Completed by the Agency Administrator(s)

A. Objectives (Must be specific and measurable)

1. *Safety*

- Public

- Firefighter

2. *Economic*

3. *Environmental*

4. *Social*

5. *Other*

B. Constraints

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

Section III. Alternatives

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

III. Alternatives (To be completed by FMO / IC)			
	A	B	C
A. Wildland Fire Strategy			
B. Narrative			
C. Resources needed			
Handcrews	_____	_____	_____
Engines	_____	_____	_____
Dozers	_____	_____	_____
Airtankers	_____	_____	_____
Helicopters	_____	_____	_____
D. Final Size			
E. Est. Contain/ Control Date			
F. Costs			
G. Risk Assessment			
- Probability of success	_____	_____	_____
- Consequence of failure	_____	_____	_____
H. Complexity			
I. Attach maps for each alternative			

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

Section IV. Evaluation of Alternatives

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

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

IV.

Evaluation of Alternatives

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

A. Evaluation Process	A	B	C
Safety			
Firefighter			
Aviation			
Public			
<i>Sum of Safety Values</i>			
Economic			
Forage			
Improvements			
Recreation			
Timber			
Water			
Wilderness			
Wildlife			
Other (specify)			
<i>Sum of Economic Values</i>			
Environmental			
Air			
Visual			
Fuels			
T & E Species			
Other (specify)			
<i>Sum of Environmental Values</i>			
Social			
Employment			
Public Concern			
Cultural			
Other (Specify)			
<i>Sum of Social Values</i>			
Other			

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

Section V. Analysis Summary

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

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

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

Section IV. Decision

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

V. Analysis Summary			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
Alternatives	A	B	C
A. Compliance with Objectives Safety Economic Environmental Social Other			
B. Pertinent Data Final Fire Size Complexity Suppression Cost Resource Values Probability of Success Consequences of Failure			
C. External / Internal Influences National & Geographic Preparedness Level _____ Incident Priority _____ Resource Availability _____ Weather Forecast (long-range) _____ Fire Behavior Projections _____			
VI. Decision			
The Selected Alternative is: _____			
Rationale:			
_____		_____	
Agency Administrator's Signature		Date/Time	

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

Section VII. Daily Review

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

Section VIII. Final Review

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

VIII.

Daily Review

To be completed by the Agency Administrator(s) or Designate

Selected to be reviewed daily to determine if still valid until containment or control

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

Date	Time	By					

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

VIII. Objectives Final Review

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

By: _____
(Agency Administrator(s))

A GUIDE FOR ASSESSING FIRE COMPLEXITY

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

Use of the Guide:

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

GLOSSARY OF TERMS

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

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

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

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

Disputed fire management responsibility - Any wildland fire where responsibility for

management is not agreed upon due to lack of agreements or different interpretations, etc.

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

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

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

FIRE COMPLEXITY ANALYSIS

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

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

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

G.	CHANGE IN STRATEGY		
	1. Change in strategy to control from confine or contain.	___	___
	2. Large amount of unburned fuel within planned perimeter.	___	___
	3. WFSA invalid or requires updating.	___	___
	Total	___	___

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

Signature _____

Date _____ **Time** _____

Appendix VII. Guidelines for Minimum Impact Suppression Tactics

Minimum Impact Operations

From U.S. Fish and Wildlife Service Handbook, section 3.2.

Utilizing minimum impact fire management tactics is a desirable goal of the Fish and Wildlife Service if the resource objectives can be achieved. Minimum impact tactics are defined as the aggressive application of those strategies and tactics which effectively meet management objectives with the least cultural and environmental impact. Minimum impact operations require that short- and long-term values at risk be evaluated and compared to suppression costs. This is a difficult task and is usually subjective. The decision(s) to use minimum impact tactics should be documented in the Fire Management Plan and/or WFSA. At no time should minimum impact tactics be used if suppression objectives cannot be accomplished.

The change from FIRE CONTROL to FIRE MANAGEMENT has added a new perspective to the role of fire manager and the firefighter. The objective of putting the fire "dead-out" by a certain time has been replaced by the need to make unique decisions with each fire start, to consider the land and resource objectives, and to decide the appropriate management response which result in minimum costs and resource damage.

Two major areas that pose great challenge are suppression and mop-up. Traditional thinking that "the only safe fire is a fire without a trace of smoke" is no longer valid. Fire management now means managing fire "with time" as opposed to "against time." This change in thinking and way of doing business involves not just the firefighter, but all levels of management as well.

Fish and Wildlife Service fire management requires the fire manager and firefighter to select an appropriate management response commensurate with the fire's potential or existing behavior, yet leaves minimal environmental impact.

The intent of this guide is to serve as a checklist for the Incident Commander and Planning Section Chief, Operations Section Chief, Logistics Section Chief, Division/Group Supervisors, Strike Team/Task Force Leaders, Single Resource Bosses, and firefighters. Accomplishment of minimum impact tactics originates with instructions that are understandable, stated in measurable terms, and communicated both verbally and in writing. Evaluation of these tactics both during and after implementation will further the understanding and achievement of good land stewardship ethics during fire management activities.

The following guidelines for minimum impact tactics are for Agency Administrators, Incident Management Teams, and firefighters to consider. Some or all of the items may apply, depending upon the situation; consider:

Command and General Staff

Evaluate each tactic during planning and strategy sessions to see that they meet agency administrator objectives and minimum impact guidelines.

Include agency resource advisor and/or local representative in above session.

Discuss minimum impact tactics with overhead during overhead briefings, to gain full understanding of tactics.

Ensure minimum impact tactics are implemented during line construction as well as other resource-disturbing activities.

Planning Section

Use resource advisor to evaluate and ensure that tactics are commensurate with land/resource objectives, and incident objectives

Use an assessment team to get a different perspective of the situation.

Use additional consultation from "publics" or someone outside the agency, especially if the fire has been or is expected to be burning for an extended period of time.

Adjust line production rates to reflect the minimum impact tactics.

When a dozer line is needed, use brush blade for line building.

Leave some trees randomly in fireline.

Ensure that instructions for minimum impact tactics are listed in the Incident Action Plan.

Detail objectives for extent of mop-up necessary--for instance: "_____ distance within perimeter boundary."

If helicopters are involved, use long-line remote-hook in lieu of helispots to deliver/retrieve gear.

Anticipate fire behavior and ensure all instructions can be implemented safely.

Consider coyote camps versus fixed camp site in sensitive areas.

In extremely sensitive areas, consider use of portable facilities (heat/cook units, latrines).

Operations Section

Emphasize minimum impact tactics during each operational period briefing.

Explain expectations for instructions listed in Incident Action Plan.

Consider showing minimum impact slide-tape program or video to the crews upon arrival at airport/incident.

Consider judicious use of helicopters--consider long-lining instead of helispot construction.

Use natural openings so far as practical.

Consider use of heli-bucket and water/foam before call for air tanker/retardant.

Monitor tactics and conditions.

Distribute field guide to appropriate supervisory operations personnel.

Logistics Section

Ensure actions performed around areas other than Incident Base, i.e., dump sites, camps, staging areas, helibases, etc., result in minimum impact upon the environment.

Division/Group Supervisor and Strike Team/Task Force Leader

Ensure crew superintendents and single resource bosses understand what is expected.

Discuss minimum impact tactics with crew.

If helicopters are involved, use natural openings as much as possible; minimize cutting only to allow safe operation.

Avoid construction of landing areas in high visitor use areas.

Monitor tactics and conditions.

Crew Superintendents

Ensure/monitor results expected.

Discuss minimum impact tactics with crew.

Provide feedback on implementation of tactics--were they successful in halting fire spread; what revisions are necessary?

Look for opportunities to further minimize impact to land and resources during the suppression and mop-up phase.

Minimum Impact Operations - Implementation Guidelines

Minimum impact operations emphasizes the job of managing a wildland fire while maintaining a high standard of caring for the land. Actual fire conditions and your good judgment will dictate the actions you take. Consider what is necessary to halt fire spread and ensure it is contained within the fireline or designated perimeter boundary.

Safety

Safety is of utmost importance

Constantly review and apply the Situations That Shout Watch Out and Standard Fire Orders.

Be particularly cautious with:

Burning snags you allow to burn down.

Burning or partially burning live and dead trees.

Unburned fuel between you and the fire.

Identify hazard trees with either an observer, flagging, and/or glow-sticks.

Be constantly aware of the surroundings, of expected fire behavior, and possible fire perimeter one or two days hence.

Fire Lining Phase

Select procedures, tools, and equipment that least impact the environment.

Give serious consideration to use of water as a firelining tactic (fireline constructed with nozzle pressure, wet lining).

In light fuels, consider:

Cold-trail line.

Allow fire to burn to natural barrier.

Consider burn out and use of "gunny" sack or swatter.

Constantly re-check cold-trailed fireline.

If constructed fireline is necessary, use minimum width and depth to check fire spread.

In medium/heavy fuels, consider:

Use of natural barriers and cold-trailing.

Cooling with dirt and water, and cold-trailing.

If constructed fireline is necessary, use minimum width and depth to check fire spread.

Minimize bucking to establish fireline; preferably build line around logs.

Aerial fuels--brush, trees, and snags:

Adjacent to fireline: limb only enough to prevent additional fire spread.

Inside fireline: remove or limb only those fuels which if ignited would have potential to spread fire outside the fireline.

Brush or small trees that are necessary to cut during fireline construction will be cut flush with the ground.

Trees, burned trees, and snags:

MINIMIZE cutting of trees, burned trees, and snags.

Live trees will not be cut, unless determined they will cause fire spread across the fireline or seriously endanger workers. If tree cutting occurs, cut stumps flush with the ground.

Scrape around tree bases near fireline if hot and likely to cause fire spread.

Identify hazard trees with either an observer, flagging, and/or glow-sticks.

Indirect Attack

Do not fall snags on the intended unburned side of the constructed fireline, unless they are an obvious safety hazard to crews working in the vicinity.

On the intended burn-out side of the line, fall only those snags that would reach the fireline should they burn and fall over. Consider alternative means to falling, i.e., fireline explosives, bucket drops.

Mop-up Phase

Consider using "hot-spot" detection devices along perimeter (aerial or hand-held).

Light fuels:

Cold-trail areas adjacent to unburned fuels.

Do minimal spading; restrict spading to hot areas near fireline only.

Use extensive cold-trailing to detect hot areas.

Medium and heavy fuels:

Cold-trail charred logs near fireline; do minimal scraping or tool scarring.

Minimize bucking of logs to check for hot spots or extinguish fire: preferably roll the logs.

Return logs to original position after checking or ground is cool.

Refrain from making bone-yards: burned/partially burned fuels that were moved would be arranged in natural position as much as possible.

Consider allowing larger logs near the fireline to burnout instead of bucking into manageable lengths. Use lever, etc., to move large logs.

Aerial fuels: Brush, small trees and limbs: remove or limb only those fuels which, if ignited, have potential to spread fire outside the fireline.

Burning trees and snags:

First consideration is allow burning tree/snag to burn themselves out or down (ensure adequate safety measures are communicated).

Identify hazard trees with either an observer, flagging, and/or glow-sticks.

If burning trees/snags pose serious threats of spreading fire brands, extinguish fire with water or dirt. FELLING by chainsaw will be last means.

Consider falling by blasting, if available.

Camp Sites and Personal Conduct

Use existing campsites if available.

If existing campsites are not available, select campsites that are unlikely to be observed by visitors/users.

Select impact-resistant sites such as rocky or sandy soil, or opening within heavy timber. Avoid camping in meadows, along streams or lake-shores.

Change camp location if ground vegetation in and around the camp shows signs of excessive use.

Do minimal disturbance to land in preparing bedding and campfire sites.

Do not clear vegetation or do trenching to create bedding sites.

Toilet sites should be located a minimum of 200 feet from water sources. Holes should be dug 6-8 inches deep.

Select alternate travel routes between camp and fire if trail becomes excessive.

Evaluate coyote camps versus fixed campsite in sensitive areas.

Restoration of Fire Management Activities

Firelines:

After fire spread is secured, fill in deep and wide firelines and cut trenches.

Water bar, as necessary, to prevent erosion, or use wood material to act as sediment dams.

Ensure stumps from cut trees/large size brush are cut flush with ground.

Camouflage cut stumps, if possible.

Any trees or large size brush cut during fireline construction should be scattered to appear natural.

Camps:

Restore campsite to natural conditions as much as possible.

Scatter fireplace rocks, charcoal from fire; cover fire ring with soil; blend area with natural cover.

Pack out all garbage and un-burnables

General:

Remove all signs of human activity (plastic flagging, small pieces of aluminum foil, litter).

Restore helicopter landing sites.

Cover, fill in latrine sites.

S

Appendix VIII. Fire Preparedness Guide for Land Managers

AGENCY ADMINISTRATOR'S FIRE PREPAREDNESS GUIDE

Objective:

To provide the Agency Administrator with a short list of key responsibilities and guidance needed to effectively manage the area fire management program. While not exhaustive, this section provides a checklist that will remind the Agency Administrator of steps in an effective process:

PREPAREDNESS

Through an on-going, pro-active planning effort, you will be in a better position to respond to any fire related eventually. Planning activities listed below are key to adequate preparedness:

- Fire Management Plan - approved and updated annually.
- Staffing - sufficient trained people available to implement the plan.
- Equipment and Supplies - adequate to implement the plan.
- Agreements and Memorandum of Understanding - prepared, reviewed, and approved to meet needs of the plan.
- Community Relations program - assures that media and local publics are Informed of current fire program (prevention, suppression, and prescribed fire) as part of a pro-active public relations program.
- Pre-season Risk Analysis - prepared and compared to the normal fire years. When conditions indicate the need, requesting and pre-positioning of resources should commence. Seek funding/staffing if local resources are insufficient to prepare adequately.
- Fire readiness inspections completed.
- Agency Administrator's Briefing Package - prepared and current

Includes:

- Delegation of Authority - may be "fill in the blanks" type, simple or complex, but directed to the Incident Commander and tailored to meet needs of your unit. Tactics defined for your unit, including applicable minimum impact.
- Briefing Statement - utilized by the Agency Administrator at the briefing of the Incident Management Team. Reflects the Agency Administrator's interests and concerns. Includes area fire protection priorities, characteristics of past area fires, cooperative agreements, facilities available, resources available, area personnel assignments (Information Officer, Agency Advisor, Resource Advisor), financial considerations, demobilization considerations, cultural resource concerns, special natural resource concerns, and other items important to you and the assisting Incident Management Team.
- Wildland Fire Situation Analysis (WFSA) - Either pre-attack or incident specific.

- Provide separate written evaluations to the Incident Commander's and Incident Management Team's performance.

Agency Administrator's Expectations of the Incident Management Team:

- Relieve area staff to manage the area.
- Perform smooth and responsive transitions.
- Keep you informed of any critical items.
- Assure that no surprises result from communication failures.
- Maintain positive interagency relations.
- Clarify the IMT's expectations of your staff.
- Consult you at your schedule.
- Reflect positively on your agency in surrounding communities.
- Effectively manage human resources to enhance employee development and protect human rights.
- Conduct frugal fiscal management consistent with Values-To-Be-Protected.
- Provide daily ICS-209 with detailed narrative.
- Review WFSAs for adequacy each operational period.
- Utilize Resource Advisor and respect staff input.
- Follow the Delegation of Authority and WFSAs with updates.
- Use Incident Business Advisor's advice and counsel.
- Implement a pro-active safety program.
- Prepare a complete and accurate final fire package.

INDICATORS OF NEED FOR ADDITIONAL RESOURCES

If several of the following occur you should seriously consider calling for outside assistance:

- Staff is not available to maintain area operations. Visitor services are significantly curtailed, or other major program areas are severely hampered.
- Staff is working longer than 12 hour shifts on a sustained basis and/or consistently working days off.
- Essential staff is absent from area for extended period.
- Span of control exceeds acceptable limits.
- Rumors are running rampant.
- Staff is no longer able to maintain clear picture or understanding of what is happening with incident(s).
- Inordinate time and effort is being expended on a single issue.
- Financial obligations are increasing rapidly.
- Information updates occur frequently.
- Accident frequency rate has increased.
- All unit's communications are tied up with incident(s).
- Multiple incidents have occurred or if another incident occurs area resources cannot respond adequately.
- Fire weather forecast indicates potential for additional problems.
- Local cooperators are experiencing problems and/or are unable to provide assistance, - Closures are occurring as a result of incident(s).
- Continuing threat to visitor safety.
- Fire is threatening more than your jurisdiction.
- Current control efforts are not meeting objectives.

Numerous people are dependent upon you incessantly for decisions on a variety of issues.

MANAGING THE INCIDENT

Agency Administrator's responsibilities to the Incident Management Team (IMT).

- Assure that cause of fire is investigated immediately and that the ignition site is protected. Make clear assignment to the IMT for further investigation of ignition source.
- Conduct initial briefing following a well prepared briefing guide so that your expectations and concerns are understood by the IMT and you understand the IMT's expectations and concerns. DEFINE YOUR ROLE IN THE MANAGEMENT OF THE INCIDENT.
- Complete and approve Delegation of Authority.
- Provide signed initial WFSAs and establish daily re-certification procedure.
- Assign Resource Advisor(s) to IMT.

Define public information responsibilities and delegations so that all parties understand their roles. Establish standards for IMT liaison with local communities. Assure that all appropriate public, media and government contacts are made.

- Assure that employee briefings occur.
- Utilize the capabilities of the IMT Information Officer but remain involved.
- Assure that you receive briefings on fire situation in enough detail to meet your needs.
- Consider the realities of today's suppression costs. A comparison between suppression costs and "VALUED-TO-BE-PROTECTED" should be made. "VALUED-TO-BE PROTECTED" is a total assessment of the resource and political and economic considerations which may be affected by the incident now and in the foreseeable future.
- Assign an Incident Business Advisor.
- Set clear and measurable standards for safety. Highlight known hazards of the area. You may require a safety analysis on the tactical alternatives.
- Assign clear responsibility for additional initial attack action responses.
- Assure that Regional Fire Management Staff is briefed regularly on incident status.
- Assure that the IMT addresses your fire training needs.
- Assure that rehabilitation of all effects of fire suppression activities are addressed by the IMT.
- Assure that all fiscal matters are resolved to your satisfaction prior to release of the IMT. You may choose to establish follow-up contact procedures with team for fiscal matters.
- Assure that a written re-Delegation of Authority has been completed prior to release of the IMT.

Appendix IX.

Refuge Dispatch Plan

2001 FIRE DISPATCH PLAN FOR

YUKON FLATS NATIONAL WILDLIFE REFUGE ARCTIC NATIONAL WILDLIFE REFUGE KANUTI NATIONAL WILDLIFE REFUGE

1. Fire suppression on the Yukon Flats, Arctic, and Kanuti National Wildlife Refuges is conducted by the Alaska Fire Service (AFS) of the Bureau of Land Management, under guidance provided by the Departmental Manual, Service Manual and Handbooks, Interagency Fire Management Plans, and Refuge Fire Management Plans, and as guided by the Refuge Fire Management Officer (FMO) or the Refuge Manager. The Yukon Flats and Arctic Refuges are located within the Upper Yukon Zone, and the Kanuti Refuge is located within the Tanana Zone. Those two zones are handled by a single dispatch office, and all refuge fires are to be reported to the Chief Dispatcher (see section 7 below).
2. AFS is responsible for dispatching, monitoring, and administering field operations on wildfires; therefore, a fire dispatch plan as described in the Service Manual is not necessary for the Yukon Flats, Arctic, or Kanuti Refuges.
3. The Yukon Flats Refuge FMO is the primary refuge contact for all wildland fire management on the Yukon Flats, Arctic, and Kanuti Refuges, and all fire suppression and monitoring will be coordinated in a timely manner with that person. AFS will notify the refuge FMO in accordance with the Interagency Wildland Fire Management Plan. If the refuge FMO cannot be reached, the Chief Dispatcher will attempt to contact other refuge personnel in the order listed in this dispatch plan. These attempts will be documented and will continue until contact is made. If contact can not be made in a timely manner, under emergency conditions the AFS Zone FMO may act without prior consultation.
4. This refuge fire dispatch plan will be updated annually before the fire season starts. Other numbers are found in the regional dispatch plan, which is attached.
5. If information about a new fire is received:
 - A. Get as much information from the caller as possible (using the form in the yellow fire binder), including:
 - (1) Name, telephone number, and location of caller.
 - (2) When fire was observed and cause of the fire, if known.
 - (3) Location of the fire (latitude and longitude, township and range, or distance and bearing from landmarks).
 - (4) Size of the fire.
 - (5) Types of fuels in the area.
 - (6) General fire behavior (running, smoldering, etc.).
 - (7) Weather at fire location (wind direction, wind speed, and precipitation).
 - (8) If the call is from AFS, also get the fire number, protection level, and whether suppression forces will be dispatched and how many and what type.
 - (9) Notify AFS if they have not been notified yet.

- B. Check location of the fire on refuge fire maps (1:63,000) in wooden binder in FMO's office to confirm the fire protection level (critical, full, modified or limited) and to look for other significant resources in the area such as endangered species, sensitive sites, historical or cultural resource sites, Native allotments, and permitted cabins. If such resources are near the fire, then the AFS FMO should be advised.
- C. Notify the Refuge Manager of the situation and log in the fire in the "fire log" kept in the refuge FMO's office. The Regional Fire Management Coordinator should be kept informed about major fires and is available for advice on all fire-related matters.
- D. Maintain a record of all telephone, radio, and other communications about the fire.
- E. If requested by the Refuge Manager or AFS staff, fly to the fire to assess the situation. Document observations and recommendations. Help prepare and get a copy of any Escaped Fire Situation Analysis (EFSA). A blank EFSA is included in the dispatch plan. The refuge representative is also responsible for inspecting camp sites and insuring proper rehabilitation of areas where suppression action was taken prior to fire fighting crews demobilizing.
- F. Further assignments may be made by the Refuge Manager. Consult the refuge Fire Management Plan, which details policy and is the step-down plan from other refuge plans. Interagency Fire Management Plans mainly deal with initial attack, but do contain some information about extended attack. These plans are located in the Refuge FMO's bookcase.
- G. Questions from the press about fire operations should be directed to the AFS Public Affairs Specialist listed in section 7 below. Copies of press releases should be sent to the regional External Affairs office at the same time they are issued. Press questions about national or regional Service policy, individual employees, or topics of extreme sensitivity or controversy should be referred to External Affairs (section 8 and regional dispatch plan).

6. The following is the list of contacts in priority order for the Yukon Flats, Kanuti, and Arctic National Wildlife Refuges, as well as other useful numbers.

<u>Yukon Flats National Wildlife Refuge</u>	<u>office</u>	<u>home</u>	<u>pager/cell</u>
FMO	vacant		
Refuge Manager	Ted Heuer	456-0407	479-9370
Deputy Refuge Mgr	vacant		
After June 18th, Deputy Refuge Manager will be Barry Whitehill, from Kanuti NWR			
Deputy Ref. Mgr	Barry Whitehill	456-0409	488-0234
Biologist/Pilot	Mike Vivion	456-0429	488-9827
Wildlife Biologist	Mark Bertram	456-0446	474-8577
FAX		456-0447	
Ft. Yukon cabin		662-2919	

<u>Kanuti National Wildlife Refuge</u>	<u>office</u>	<u>home</u>	<u>pager/cell</u>
FMO	vacant		
Refuge Manager	Bob Schulz	456-0331	455-4701 322-9377
Asst. Ref. Mgr	Barry Whitehill	456-0330	488-0234
After June 18th, Asst. Refuge Manager will be vacant			
Biologist	Lisa Saperstein	456-0508	458-7259
FAX		456-0506	
Bettles bunkhouse		692-5555	

<u>Arctic National Wildlife Refuge</u>	<u>office</u>	<u>home</u>	<u>pager/cell</u>
FMO	vacant		
Deputy Refuge Mgr.	vacant	456-0362	
Refuge Manager	Richard Voss	456-0253	452-6880 378-7446
Asst. Refuge Mgr	Barbara Boyle	456-0322	479-0716
Asst. Refuge Mgr.	vacant	456-0549	
Asst. Refuge Mgr.	Tom Edgerton	456-0275	457-4801
Barter Island bunkhouse		640-6320	
FAX		456-0428	

7. ALASKA FIRE SERVICE. Numbers for other personnel are listed in the FMO's phone directory (yellow binder) under BLM AK AFS:

Upper Yukon/Tanana Zone Dispatch/Initial Attack

Chief Dispatcher Corey Doolin 356-5551
 Initial Attack Marty Scharf 356-5555 (to report fires/info. on)
 Logistics 356-5553 (info. on large incidents)
 FAX 356-5556
 Toll Free 1-800-237-3652

Upper Yukon Zone (for Arctic and Yukon Flats NWRs)

FMO Mike Silva 356-5550
 Asst. FMO vacant 356-5558
 Fuels Specialist Kato (Tim) Howard 356-5561
 Admin Person Sharon Falcon 356-5579

Fort Yukon Station

. 662-2378 or 662-2476
 FAX 662-2636

Tanana Zone (for Kanuti NWR)

FMO Ed Strong 356-5570
 FCO Dave Jandt 356-5562
 Fuels Specialist Dave Whitmer 356-5574
 Admin Person Sharon Falcon 356-5579
 FAX 356-5556

Public Affairs Andy Williams 356-5511 or 474-2230

8. U.S. FISH AND WILDLIFE SERVICE, EXTERNAL AFFAIRS

	<u>office</u>	<u>home</u>
Karen Boylan	907-386-3309/3431	
	FAX	907-786-3495

9. NATIONAL WEATHER SERVICE:

Fire Weather 458-3705

10. ADJACENT LAND OWNERS:

<u>Bureau of Land Management, Northern Dist.</u>	<u>office</u>	<u>home</u>
FMO Skip Theisen	474-2332	
(External) Dist. Mgr		
Asst. District Manager		

<u>Division of Forestry (Alaska DNR)</u>		
Chief Forester Chris Maisch	451-2666	474-0507
Asst. Forester Vacant	479-2243	479-3689

<u>Doyon Corporation</u>		
Land Specialist Gary Lee	452-4755	452-3094
Land Specialist Sherry Bestard	452-4755	456-2676

<u>Tanana Chiefs Conference</u>		
administers allotments . . . Jim Bell	452-8251,	ext. 3373

<u>Beaver Village</u>	<u>phone</u>	<u>fax</u>
1st Chief Bob Winer	628-6126	(Village Council #)
2nd Chief		
Council members:		
Honorary elder:		
Secretary Anna Joseph	628-6329	
Council FAX		628-6815

<u>Birch Creek Village</u>	<u>phone</u>	<u>fax</u>
1st Chief Winston James	221-2035	
Trad. Chief Randall Baalam		
Resource Specialist Orville Baalam		
Admin/Planner Gene Baalam		
Council FAX	221-	221-2312

<u>Canyon Village</u>	<u>phone</u>	<u>fax</u>
1st Chief Stanley Jonas		
2nd Chief John S. Jonas		
Council Members: Rebecca Jonas, Grafton Jonas		
Council FAX		662-3333

Chalkyitsik Village phone fax
 1st Chief Woody Salmon
 2nd Chief
 Council Members:
 Chairperson
 Advisor
 Village Council 848-8117/8893 . 848-8986
 Resource Specialist

Circle Village phone fax
 1st Chief Louie John
 Traditional Chief Albert Carrol, Sr. 773-1280
 Council Members: Terry Carroll, Ronnie Carroll
 Village Council 773-2822
 Secretary Angie Ludwick 773-1290

Fort Yukon Village phone fax
 1st Chief Cheryl Williams 662-2591
 2nd Chief Clarence Alexander .. 662-2345
 Traditional Chief Titus Peter
 Council Members: Mary Beth Solomon (662-2916), Bonnie Thomas, Mardow Solomon
 (662-2371), Clyde Williams
 Resource Specialist Mardow Solomon, Jr.
 Village Council 662-2581/2685 . 662-2222
Gwitchyaa Zhee Corp. phone fax
 Offices 662-2933
City of Fort Yukon
 Offices 662-2479/662-2379 . 662-2717

Stevens Village phone fax
 1st Chief Randy Mayo
 2nd Chief
 Council Members: Don Stevens, Horace Smoke, Jr., Robert Joseph, Virginia Smoke, Ron
 Smoke, Mary Dery, Debra George, Darrell Kriska
 land manager Ben Stevens 478-7228 (Village Council #)
 Village Council 478-7228 .. 478-7229
Dinyee Corporation phone fax
 General Manager Dave Lacey 474-8224

Venetie/Arctic Village Tribal Council phone fax
 1st Chief (Venetie) Allen Tritt 849-8165 (Tribal Office)

2nd Chief (Arctic Village)
Venetie Village phone fax
 1st Chief Earl Henry
 2nd Chief

Council Members:
 Village Council 849-8212 .. 849-8513

Arctic Village phone fax
 1st Chief Allen Tritt

2nd Chief Mike Garnett
 Council members: Fannie Gemmill, Gregory Gilbert, James John (587-5325), Mabel
 Christian, Steve Lee (alt.)
 Village Council 587-5328

Allakaket phone fax
 1st Chief

2nd Chief Christine Vent
 Village Office 968-2237 .. 968-2255
 City Office 968-2241 .. 968-2251
 Council members: Harold David, David David, Elsie Bergman, Caroline Bergman, Beattus
 Moses

Alatna phone fax
 1st Chief Larry Edwards

2nd Chief Harding Sam
 Council members: Jerry Sam (388-2915, home, FAI), Calvin Moses
 Village Council (in AET) . Lucy Strassberg 968-2237 .. 968-2255

Bettles/Evansville phone fax
 Evansville Council 692-5005

Evansville Village Council 692-5006
 Bettles City Office 692-5191
 Bettles Admin. Rich Thorne 692-5191

Appendix X. Refuge Preparedness Plan

Yukon Flats National Wildlife Refuge Preparedness Plan

The preparedness levels and management actions listed below are intended to be a guide. These preparedness levels are localized for the refuge, although they are based on regional and national preparedness level categories. Management actions specified are a minimum response. Unanticipated circumstances may dictate more rigorous action than that listed. The activation of a particular preparedness level is based on a subjective evaluation of the criteria listed for each level, not necessarily based on meeting one single criterion or on meeting all criteria listed for each level.

The Canadian Buildup Index (BUI) referenced in each preparedness is an indicator of drought conditions based on a Drought Code and Duff Moisture Code (see Stocks and others 1989). There are seven Remote Automated Weather Stations (RAWS) on the refuge, two others nearby, and one station in Fort Yukon where BUI is calculated daily during the fire season. Average BUI will be calculated for five Fire Management Units (FMUs): Hodzana Highlands, Sheenjek River, Black River, White Mountains, and Interface.

The Departmental Manual authorizes BLM Alaska Fire Service to provide suppression services on refuge lands. The Refuge Manager maintains ultimate responsibility for all wildfire management activities that occur on the refuge. Initial attack strategies are outlined in appropriate interagency Fire Management Plans. Suppression guidelines are also included in the refuge Fire Management Plan.

Refuge Preparedness Level	1 - Low - Moderate	2 - Moderate	3 - High	4 -- Very high	5 - Extreme
Criteria	Any <u>Unit Ave</u> BUI	70 - 84	85 - 99	100 - 119	greater than 119
	Any <u>One Station</u> BUI	80 - 89	90 - 119	120 - 129	greater than 129
	Refuge	Possibly small fires	Small to moderate fires	Numerous or large fires	Large fires, Type II team
	Local	Possibly small fires	Moderate activity	Numerous fires, including large fires	Major fires, Type II team
	Regional	Possibly small fires	Moderate activity	Numerous fires, including large fires	Major activity
	Suppression Resource Availability	No shortages.	Some local and regional resources may be committed to fire assignments.	Many local and regional resources committed to fires. National resources still available.	Shortages in local, regional, or national suppression resources.
New wildfires receive response as outlined in interagency and refuge Fire Management Plans?	Yes.	Yes.	Yes.	Yes, but Multi-Agency Coordinating (MAC) Group may require suppression of new starts.	Yes, but MAC Group may impose restrictions. AFS and refuge may agree to suppress new starts, using WFSA.
Restrictions on Prescribed Fire?	None.	None.	Before July 10th, not allowed unless prescription specifically calls for BUI in that high range.	No new fires. Confinement and/or containment of ongoing prescribed burns. MAC Group may request action.	No new fires. Confinement and/or containment of ongoing prescribed burns. MAC Group may request action.

Refuge Preparedness Level	1 - Low - Moderate	2 - Moderate	3 - High	4 -- Very high	5 - Extreme
Monitoring frequency for fires in Limited Protection (given aircraft availability, weather, fire behavior, and location)	n/a	Every 10 days.	Every 7 days.	Every 2-3 days. Prioritize fires and sites to monitor.	Every 1-2 days. Smoke will likely limit ability to fly, and aircraft may not be available. Consider satellite imagery for high priority fires.
FMO Checks	Weather forecasts	daily	daily	twice daily	twice daily
	Indices or RAWS and/or lightning	periodically	daily	daily	twice daily
	Situation report	periodically	daily	daily	daily
Qualified personnel available for fire assignments?	Yes, if no prescribed burn being conducted.	Yes, if no prescribed burn being conducted.	Yes, if no prescribed burn being conducted.	Yes, if no prescribed burn being conducted.	Yes, if no prescribed burn being conducted. FMO not available.
Other		Refuge fire activity assessment updated every 10 days.	Refuge fire activity assessment updated every 7 days.	Refuge fire activity assessment updated every 1-3 days.	Refuge fire activity assessment updated every 1-3 days. Consider curtailing non-fire activities on refuge because of fire danger and limited visibility from smoke. Consider ordering Information Officer, FMOs from other refuges, fire monitors.

Appendix XI. Regional and National Preparedness Plans

20.4 ALASKA PREPAREDNESS PLAN

20.41 PURPOSE

The purpose of the Alaska Wildland Fire Preparedness Plan is to identify specific management actions to be considered within each level of statewide preparedness. These levels are based on existing wildland fire activity, probability of new wildland fire starts, burning conditions, prescribed fire activities and the commitment of resources. Levels of preparedness will be determined daily throughout the Alaska fire season. Criteria used to determine daily level of preparedness include:

1. Current and forecasted weather.
2. Wildland fire activity statewide.
3. Resources committed, demand for resources, and predicted demand. Types include:

Tactical resources include smokejumpers, air tankers, air attack, and lead planes.

Non-tactical resources include helicopters, engines, overhead, and crews.

Critical resources include radio systems, equipment and supply.

4. Historical high risk periods.
5. All risk incident support.
6. Planned and ongoing prescribed fire operations.

The Alaska Wildland Fire Preparedness Plan will be managed by the Alaska Interagency Coordination Center (AIICC). The AIICC Manager will be responsible for daily monitoring of the criteria used to establish various levels of preparedness and will determine the appropriate level of Alaska preparedness.

20.42 PREPAREDNESS LEVELS

The preparedness level will be identified daily on the Alaska Wildland Fire Situation Report. Contained within each preparedness level are management actions to be considered as well as the responsible position designated to ensure the management action is initiated.

PREPAREDNESS LEVELS.

I. Preparedness Level I - No significant fire activity, most units having low to moderate probability of ignition and low burning condition in all fuel types. Resistance to extinguishment by initial attack forces is low.

Management Action

Responsibility

- | | |
|---|-----------------------------|
| a. Zones/Areas/Forests will determine appropriate action. | Zone/Area/
Forest FMOs |
| b. Approved prescribed burning to be carried out. | Responsible
Land Manager |

II. Preparedness level II - Multiple units experiencing fire starts or one unit experiencing multiple starts. Probability of ignition is low to moderate and burning conditions generally low to moderate in all fuel types. Resistance to extinguishment by initial attack forces is low to moderate. Minimal mobilization of local unit resources with no shortages of tactical resources.

Management Action

Responsibility

- | | |
|--|-----------------------------|
| a. Zones/Areas/Forests will determine appropriate action. | Zone/Area/
Forest FMOs |
| b. Adjust staffing level requirements as needed. | All Agencies/
Offices |
| c. Approved prescribed burning to be carried out. | Responsible
Land Manager |
| d. Activate daily morning fire situation and fire weather briefings. | AICC Manager |

III. Preparedness level III - Multiple units experiencing fire starts and/or one (1) project fire. Probability of ignition is high, burning conditions of moderate to high in all fuel types. Resistance to control is moderate to high, resistance to extinguishment is moderate. Up to 50% of non-tactical resources being mobilized, up to 75% of tactical resources committed to new ignitions. Existing weather pattern supporting fire activity is forecasted to remain for the next 48 hours.

Management Action

Responsibility

- | | |
|--------------------------|---------------|
| a. Adjust staffing level | All Agencies/ |
|--------------------------|---------------|

- | | |
|--|--------------------------|
| requirements as needed. | Offices |
| b. Notify AFS Divisions and DOF Zones of anticipated support requirements due to current and expected fire activity. | AICC Manager |
| c. Consider ordering lower 48 smokejumpers. | AICC Manager |
| d. Consider ordering overhead positions to fill overhead pool. | AICC Manager |
| e. Establish Aerial Ignition Group availability. | AICC Manager |
| f. Consider AICC 24-hour operations. | AICC Manager |
| g. Notify MAC Group of on-call status. | AICC Manager |
| h. Notify Interagency Fire Information Officer of on-call status. | AICC Manager |
| i. Activate fire behavior analyst function at AICC. | AICC Manager |
| j. Implement minimum daily tactical resource levels of two loads smokejumpers, two air tankers and two air attack | AICC Manager |
| k. Determine need for USFS Liaison at AICC. | AICC Manager |
| l. Prescribed burning to be carried out with approval of responsible suppression agency. | Responsible Land Manager |

IV. Preparedness level IV - Multiple units experiencing fire starts and/or two (2) project fires. Probability of ignition is high and burning conditions of high to extreme in all fuel types. Resistance to control is high to extreme and resistance to extinguishment is high. Over 50% of non-tactical resources are committed, over 75% of tactical resources are committed to new ignitions. Existing weather pattern supporting fire activity is forecasted to remain for the next 3 to 5 days.

- | <u>Management Action</u> | <u>Responsibility</u> |
|--|--------------------------|
| a. Adjust staffing level requirements as needed. | All Agencies/
Offices |

- | | |
|--|--------------------------|
| requirements as needed. | Offices |
| b. Notify AFS Divisions and DOF Zones of anticipated support requirements due to current and expected fire activity. | AICC Manager |
| c. Consider ordering lower 48 smokejumpers. | AICC Manager |
| d. Consider ordering overhead positions to fill overhead pool. | AICC Manager |
| e. Establish Aerial Ignition Group availability. | AICC Manager |
| f. Consider AICC 24-hour operations. | AICC Manager |
| g. Notify MAC Group of on-call status. | AICC Manager |
| h. Notify Interagency Fire Information Officer of on-call status. | AICC Manager |
| i. Activate fire behavior analyst function at AICC. | AICC Manager |
| j. Implement minimum daily tactical resource levels of two loads smokejumpers, two air tankers and two air attack | AICC Manager |
| k. Determine need for USFS Liaison at AICC. | AICC Manager |
| l. Prescribed burning to be carried out with approval of responsible suppression agency. | Responsible Land Manager |
- IV. Preparedness level IV - Multiple units experiencing fire starts and/or two (2) project fires. Probability of ignition is high and burning conditions of high to extreme in all fuel types. Resistance to control is high to extreme and resistance to extinguishment is high. Over 50% of non-tactical resources are committed, over 75% of tactical resources are committed to new ignitions. Existing weather pattern supporting fire activity is forecasted to remain for the next 3 to 5 days.

- | <u>Management Action</u> | <u>Responsibility</u> |
|--|--------------------------|
| a. Adjust staffing level requirements as needed. | All Agencies/
Offices |

- | | |
|--|---|
| b. Consider a resource order for additional tactical resources. | AFS Mgr/DOF Ops Forester |
| c. Activate Interagency Fire Information Center. | AICC Manager |
| d. Activate interagency helicopter coordinating group. | AICC Manager |
| e. Activate statewide interagency radio/communications coordinator. | AICC Manager |
| f. Activate MAC Group. Establish meeting schedule. Identify MAC Group Coordinator. | AICC Mgr. (any MAC Group principal member may call for a MAC Group meeting) |
| g. Consider options on limited fire suppression with FMO input. | MAC Group |
| h. Suspend all prescribed fire activities except those posing no significant risk. | MAC Group/
Responsible
Land Manager |
| i. Consider burn ban implementation | MAC Group |
- V. Preparedness level V - Multiple units experiencing fire starts and/or three (3) or more project fires. Probability of ignition is high and burning conditions of extreme in all fuel types. Resistance to control is high to extreme and resistance to extinguishment is high. Over 75% of non-tactical resources are committed, over 75% of tactical resources are committed to new ignitions. Existing weather pattern supporting fire activity is forecasted to remain for the next 3 to 5 days.

Management Action

Responsibility

- | | |
|---|--------------------------|
| a. Consider suspending all prescribed fire. | MAC Group |
| b. All offices on 24-hour response capability | All Agencies/
Offices |

Preparedness Level V to IV - Burning conditions have moderated. 50% of tactical resources are available. Favorable weather pattern for next 3 to 5 days is forecasted.

Preparedness Level IV to III - Burning conditions are moderate. Significant demobilization of resources is occurring from project fires. 50% of non-tactical

resources are available. Higher humidities and lower temperatures are forecasted in major fire areas. Favorable weather pattern for next 3 to 5 days is forecasted.

Preparedness Level III to II - Burning conditions are low to moderate. Project fires are contained and/or interagency management teams released. Mobilization contained to local unit with no shortages of resources. Existing weather pattern supporting current fire activity to continue for the next 48 hours.

Preparedness level II to I - Burning conditions are low with no significant fire activity occurring. Existing weather pattern supporting current fire activity to continue for the next 48 hours.

20.5 WEATHER REPORTING PROGRAM

20.51 RESPONSIBILITIES

AFS participates in a Master Agreement with the State of Alaska, USFS, and the National Weather Service (NWS), (AK-950-IAO-2), which provides for an annual Alaska Fire Weather Forecasting System Operating and Financial Plan which outlines the participation and funding for fire weather forecasting in Alaska.

20.52 ACTIVATION

The Operating and Financial plan calls for a period of activation of April 20 to August 21 for forecasting services provided by the Anchorage NWS office, and May 1 to August 21 by the Fairbanks NWS office, for their respective areas of the state.

20.53 OBSERVATION REPORTING

Access to RAWs observations is provided through the AFS Initial Attack Management System (IAMS) computer. RAWs data will also be accessible through the Alaska Fire Service Home Page on the Internet (<http://fire.blm.gov>). Each agency transmits Manual Weather Station observations directly to the nearest NWS office.

20.54 METEOROLOGIST PROGRAM

The University of Alaska's Environmental and Natural Resource Institute (ENRI) provides for two temporary fire weather forecasters and two temporary fire weather meteorological technicians for the Fairbanks NWS Office during the period of activation, and two temporary fire weather forecasters for the Anchorage NWS Office during the period of activation.

26 NATIONAL FIRE PREPAREDNESS PLAN

Preparedness levels are established by the National MAC Group at NIFC throughout the calendar year. Preparedness levels are dictated by burning conditions, fire activity and resource availability. Resource availability is the area of most concern. Situations and activities described within the preparedness levels consider wildland and prescribed fire.

26.1 WHY PREPAREDNESS LEVELS ARE ESTABLISHED

PURPOSE:

- A. To identify the level of wildland and prescribed fire activity, severity and resource commitment nationally.
- B. To identify actions to be taken by NIFC and Geographic Areas to ensure an appropriate level of preparedness/readiness for the existing and potential situation.
- C. To guide and direct Geographic Area Fire Management activities when essential to ensure national preparedness or in response to the national situation.

The NICC Coordinator will monitor the national wildland and prescribed fire activity and Geographic Area Preparedness Levels and will recommend to the National MAC Group a National Preparedness Level. Response and support to non-fire incidents requiring a significant commitment of resources may also affect National Preparedness Levels.

National Preparedness Levels are determined from the ground up and may influence resource allocation within Geographic Areas not experiencing significant activity to ensure sufficient resources are available for the national situation.

26.2 GEOGRAPHIC AREA PREPAREDNESS LEVELS

Geographic Area Preparedness Plans should be prepared in accordance with Agency Directives. Copies of Geographic Area Plans should be forwarded to NICC.

26.3 PREPAREDNESS LEVEL DESCRIPTIONS

26.3.1 PREPAREDNESS LEVEL 1:

Description: No large fire activity nationally. Most Geographic Areas have low to moderate fire danger. Little or no commitment of National Resources.

- A. Management Direction/Consideration: Agency/Geographic Areas will determine appropriate actions.

Responsibility: Agency Administrators within Geographic Areas.

26.3.2 PREPAREDNESS LEVEL 2:

Description: One Geographic Area experiencing high fire danger. Wildland fire activity is occurring and a potential exists for escapes to larger (project) fires. Minimal mobilization of resources from other Geographic Areas is occurring. The potential exists for mobilizing additional resources from other Geographic Areas.

A. Management Direction/Consideration: Agency/Geographic Areas will determine appropriate actions.

Responsibility: Agency Administrators within Geographic Areas.

B. Management Direction/Consideration: Daily morning briefings conducted for the NIFC Directorate.

Responsibility: NICC Coordinator.

C. Management Direction/Consideration: Monitor Geographic Area wildland and prescribed fire status, resource commitments and preparedness levels.

Responsibility: NICC Coordinator, Geographic Area Coordinators.

26.3.3 PREPAREDNESS LEVEL 3:

Description: Two or more Geographic Areas are experiencing wildland or prescribed fire activities requiring a major commitment of National Resources. Additional resources are being ordered and mobilized through NICC. Incident Management Teams are committed in two or more areas, or 275 crews are committed nationally.

A. Management Direction/Consideration: Agency/Geographic Areas monitor WFO prescribed fire activities, and suppression requirements to maximize efficient resource utilization for identified priorities.

Responsibility: Agency Administrators within Geographic Areas.

B. Management Direction/Consideration: Ensure agency fire qualified personnel are available for fire assignments.

Responsibility: Agency Administrators within Geographic Areas.

C. Management Direction/Consideration: Daily morning briefing conducted for the NIFC Directorate.

Responsibility: NICC Coordinator.

D. Management Direction/Consideration: Coordinate the prepositioning of National Resources as may be appropriate.

Responsibility: NICC Coordinator.

E. Management Direction/Consideration: Consider requesting Severity Funds to strengthen fire preparedness capability (scarce National Resources).

Responsibility: NICC Coordinator.

F. Management Direction/Consideration: Assess resource availability from Canada.

Responsibility: National MAC Group

G. Management Direction/Consideration: Monitor critical Fire Cache Supply Inventories and provide appropriate direction to Geographic Areas.

Responsibility: NIFC Directorate.

H. Management Direction/Consideration: Geographic Areas provide NICC with timely intelligence on existing and emerging situations.

Responsibility: Geographic Area Coordinators.

I. Management Direction/Consideration: OAS and FS Aviation inspect all Type 1 and Type 2 helicopters.

Responsibility: National Aviation Officer, FS and Director, OAS.

J. Management Direction/Consideration: Advise the military of the need for a Defense Coordinating Officer (DCO) to be assigned to NIFC.

Responsibility: NICC Coordinator.

K. Management Direction/Consideration: Evaluate the need to activate the National Interagency Support Cache Coordinator at NICC.

Responsibility: NICC Coordinator, National Interagency Support Cache Managers.

26.3.4 PREPAREDNESS LEVEL 4:

Description: Two or more Geographic Areas are experiencing incidents requiring Type 1 Teams. Competition exists for resources between Geographic Areas. When 425 crews or five Type 1 Teams are committed nationally.

A. Management Direction/Consideration: Establish MAC Group at NIFC and conduct MAC Group Meetings daily.

Responsibility: National MAC Group.

B. Management Direction/Consideration: WFO and prescribed fire application can be continued or be initiated if the proposed action is approved by an agency at the regional or state office level. This approval must be based on an assessment of risk, impacts of the

feedback from the Geographic Area MAC Group. The Geographic Area MAC Group provides information or perspectives to agencies wishing to proceed with or implement a WFU or prescribed fire application. The final decision to implement resides with the implementing agency.

Responsibility: Agency Administrators, regional and state office.

C. Management Direction/Consideration: Establish IR Coordinator position at NICC, as appropriate.

Responsibility: NICC Coordinator.

D. Management Direction/Consideration: Allocate/Preposition National Resources.

Responsibility: National MAC Group.

E. Management Direction/Consideration: Train additional emergency firefighters as may be appropriate.

Responsibility: Agency Administrators within Geographic Areas.

F. Management Direction/Consideration: Coordinate "off-site" training of emergency firefighters with Geographic Areas.

Responsibility: National MAC Group Coordinator.

G. Management Direction/Consideration: Encourage: (1) assignment of Communications Frequency Managers and Aviation Specialists to all complex multiple incidents; (2) activation of MAC Group as may be appropriate.

Responsibility: Agency Administrators within Geographic Areas.

H. Management Direction/Consideration: Geographic Areas provide NICC with fire priorities and other pertinent information at 10300 and 1700 daily.

Responsibility: Agency Administrators within Geographic Areas.

I. Management Direction/Consideration: Implement Military Training Plan. Assemble Training Cadre for training military.

Responsibility: National MAC Group Coordinator.

J. Management Direction/Consideration: OAS and FS Aviation contract, award, and inspect additional CWN Type 1 and Type 2 helicopters.

Responsibility: National Aviation Officer, FS and Director, OAS.

K. Management Direction/Consideration: Activate the National Interagency Aviation Coordinator position.

Responsibility: National Agency Aviation Offices - FS, BLM, OAS.

L. Management Direction/Consideration: Activate the National Interagency Support Cache Coordinator position at NICC.

Responsibility: NICC Coordinator

26.3.5 PREPAREDNESS LEVEL 5:

Description: Several Geographic Areas are experiencing major incidents which have the potential to exhaust all agency fire resources. When 550 crews are committed nationally.

A. Management Direction/Consideration: Continue with Planning Level 4 activities.

Responsibility: National MAC Group Coordinator.

B. Management Direction/Consideration: Request Canadian Liaison for National MAC Group.

Responsibility: National MAC Group Coordinator.

C. Management Direction/Consideration: Add Coordinator position at NICC to coordinate military mobilizations.

Responsibility: National MAC Group Coordinator.

D. Management Direction/Consideration: WFU and prescribed fire application can be continued or be initiated if the proposed action is recommended by the regional or state level. The National agency representative will assess risk and impacts of the proposed actions and discuss with the National MAC Group. This group will have an opportunity to provide information or perspectives to agencies wishing to proceed with or implement a WFU or prescribed fire application. The final decision to implement resides with the implementing agency.

Responsibility: Agency Administrators, regional and state office fire staff, NIFC staff and National MAC Group.

E. Management Direction/Consideration: Prepare Geographic Area evaluation/assessment of current and projected fire situation when requested by the National MAC Group.

Responsibility: Geographic Area MAC Groups.

F. Management Direction/Consideration: When requested by the National MAC Group, make available and incorporate project equipment into the NFES Fire Cache System.

Responsibility: Geographic Area MAC Groups.

26.3.6 PREPAREDNESS LEVEL 5 TO 4:

Description: There are no resource shortages or competition for resources. Fifty rested crews are available for new fires. No Red Flag conditions forecasted for the next 24 hours and favorable weather conditions are forecasted for the upcoming three to five day period.

26.3.7 PREPAREDNESS LEVEL 4 TO 3:

Description: Significant demobilization is occurring. Fifty plus crews are being released daily and sent to home units. One hundred rested crews are available for new fires. All military resources have been released. No Red Flag conditions are forecasted for the next 24 hours and higher humidity and lower temperatures are forecast for the major fire areas.

26.3.8 PREPAREDNESS LEVEL 3 TO 2:

Description: All large fires are contained. Initial attack resources are again available. Geographic Area crew availability is at or above the 50% level. No Red Flag conditions are forecast for the next 24 hours and large fire areas are expected to receive wetting showers with associated higher humidity and lower temperatures.

26.4 NATIONAL MULTI-AGENCY COORDINATING GROUP (MAC) DECISIONS

All National MAC Group decisions affecting Geographic Areas and/or providing management guidance will be included in the Incident Management Situation Report.

26.5 FOLLOW-UP EVALUATION

The National MAC Group Coordinator will document decisions and their results and will report to the NIFC Directorate during subsequent MAC Group Meeting.

Appendix XII.

Fire surveillance form

ALASKA FIELD FIRE REPORT

Directions:

Initial Attack forces and Detection: Complete both sides of this form for the first day of the fire. For each additional day, complete only the reverse side.

Extended Attack (Type III) and Surveillance: Complete reverse side of form only. For Type I and II fires use the Alaska Incident Status Summary).

Date:	Fire Number:
Time:	Fire Name:

Latitude:	Longitude:
Size:	Cause:

Initial Attack and Point of Ignition Information

Fuel Type at point of ignition

<input type="checkbox"/> Black Spruce	<input type="checkbox"/> Aspen/Birch	<input type="checkbox"/> Tundra	<input type="checkbox"/> Grass
<input type="checkbox"/> White Spruce	<input type="checkbox"/> Mixed trees _____%	<input type="checkbox"/> Brush	<input type="checkbox"/> Tussock
<input type="checkbox"/> Other _____			

Topography

<input type="checkbox"/> Ridgetop	<input type="checkbox"/> Canyon bottom
<input type="checkbox"/> Saddle	<input type="checkbox"/> Valley bottom
<input type="checkbox"/> Upper 1/3	<input type="checkbox"/> Mesa Plateau
<input type="checkbox"/> Middle 1/3	<input type="checkbox"/> Flat/rolling
<input type="checkbox"/> Lower 1/3	

Aspect

<input type="checkbox"/> Ridgetop	<input type="checkbox"/> S
<input type="checkbox"/> N	<input type="checkbox"/> SW
<input type="checkbox"/> NE	<input type="checkbox"/> W
<input type="checkbox"/> E	<input type="checkbox"/> NW
<input type="checkbox"/> SE	<input type="checkbox"/> Flat

Elevation

<input type="checkbox"/> 0-500'	<input type="checkbox"/> 3501-4500'
<input type="checkbox"/> 501-1500'	<input type="checkbox"/> 4501-5500'
<input type="checkbox"/> 1501-2500'	<input type="checkbox"/> 5501-6500'
<input type="checkbox"/> 2501-3500'	

Slope

<input type="checkbox"/> 0-25%	<input type="checkbox"/> 56-75%
<input type="checkbox"/> 26-40%	<input type="checkbox"/> 75%+
<input type="checkbox"/> 41-55%	

Appendix XIII. List of media contacts and regional policy on contacting the press

LOCAL MEDIA LIST

News Editor
Daily News-Miner
200 N. Cushman
Fairbanks, AK 99701
456-6661 ~~452-7447~~

News Editor
The All-Alaska Weekly
P.O. Box 970
Fairbanks, Alaska 99707
479-8022

News Editor
The Tundra Times, Inc.
P.O. Box 1287
Fairbanks, AK 99701

News Director
KFAR/KWLF Radio
P.O. Box 70910
Fairbanks, AK 99707
479-5910

KAYY Radio
3504 Industrial Ave.
Fairbanks, AK 99701
Attn: Public Affairs
452-5299

KIAK Radio *Program Director*
P.O. 73410
Fairbanks, AK 99707
Attn: PSA
457-1921 ~~457-2128~~

News Director
KSUA Radio
P.O. Box 83831
Fairbanks, AK 99708
474-7054

News Director
KCBF/KXLR Radio & KTVB T.V.
P.O. Box 70950
Fairbanks, AK 99707
452-2468 (radio) 452-~~2468~~ (tv)

News Director
KUWL Radio
P.O. Box 70339
Fairbanks, AK 99707
457-5895

News Director
KJNP Radio & T.V.
P.O. Box 0
North Pole, AK 99705 *Box 488-5218*
488-2216 (radio) 488-~~2216~~ (tv)

News Director
KUAC Radio & T.V.
University of Alaska
Fairbanks, AK 99707
474-7491 ~~474-7491~~

News Director *700-~~5118~~*
KATN T.V.
516 2nd Ave.
Fairbanks, AK 99701
452-5118

Alaska Regional Media Policy In Brief

The U.S. Fish and Wildlife Service in Alaska is dedicated to conserving, protecting and enhancing fish, wildlife and plants and their habitats for the continuing benefit of the American people. Our policy is to be open, candid and truthful with the public and the media at all times.

When the Media Contacts the Service:

We are committed to free and open distribution of accurate information to the public. The media provides opportunities for large numbers of people from different segments of the public to learn about the work of the Service and about the resources that the Service manages. The most economical, effective method of communicating with large and widely dispersed publics is through mass media: newspapers, magazines, trade publications, AM and FM radio, television, cable, books and so on. Therefore, effective communication with the media is essential to the Service's success in fulfilling its mission.

It is the policy of Region 7 that inquiries from the media be *answered promptly*. It is the responsibility of every employee to ensure that inquiries from the media are handled in a timely manner. Service employees are neither prohibited from speaking with reporters; nor are they required to speak with reporters. However, every employee *is* required to ensure that media inquiries are answered by an appropriate Service representative, and answered both accurately and in a timely fashion. In many cases media calls are best forwarded to Bruce Woods (bruce_woods@fws.gov; 907-786-3695) or Karen Boylan (karen_boylan@fws.gov; 907-786-3309) in External Affairs. It is also the responsibility of every employee who has contact with the media to advise External Affairs on who the reporter was (including contact information), what media outlet he or she represented and what (in general terms) was discussed.

Important Note: Release of information in response to questions by reporters should be made only by those Service employees whose responsibilities include the issues which are the subject of the queries. In other words, "If you are the decision maker, you may comment." Any queries about subjects beyond your area of expertise/responsibility should be referred to External Affairs immediately.

Press Releases:

A press release is a simple document whose purpose is the dissemination of information in ready- to-publish form. Editors of print and broadcast media to whom these are sent judge them on the basis of news interest for their audience and timeliness, and in some instances on their adaptability to the medium's format. No payment is made to the publication or station if the material appears in print or on the air. A press release faces intense competition when it arrives on the editor's desk among scores or even hundreds of other releases. As editors scan releases, they make almost instant decisions, thus an effective press release makes its "news value" obvious in the headline and first few sentences.

Any employee may write a press release, but in many instances, it will be more productive to

have a program expert work with a member of the External Affairs staff or the properly designated field staff member to assist in drafting and clearing a release. Press releases are official Service documents, and different kinds of press releases require different levels of coordination and approval.

Press releases issued through the Regional Office must follow an established surname/approval process. Press releases issued through field offices do not necessarily need to go through the RO approval process (see below), as long as the Service person quoted is the field station manager.

All releases quoting the Regional Director, regardless of the originating office, must be submitted through the Regional External Affairs office for clearance and distribution. Releases will be circulated for comment within the Directorate, with surnamed approval copies from field office or program area reviewers attached beneath the clean final release for the Regional Director's final review and approval. This approval file will be maintained by ARD for External Affairs for three years.

In every case, the Regional External Affairs Office must be sent a copy of the release for the Region's use as part of the Service's permanent record of activities.

When the Service contacts the media:

Since any issues regarding fire, be it a planned controlled burn or a wildfire (and particularly if this will affect refuge resources or access), please contact the External Affairs Office before contacting the media on such issues. External Affairs will work with on-site staff to determine how to most effectively get the appropriate information to the public. Announcement of a planned controlled burn, for example, might best be made by a press release quoting the Regional Director or the Refuge Manager. A wildfire might require a series of releases as the story develops, and will almost certainly trigger calls from media as well.

Important Note: In the case of any issue that is likely to draw national attention (for example, a controlled burn that escapes, particularly if it endangers life and/or property) External Affairs must be contacted *before* any statements are given or press releases distributed.

Crisis Communication Basics:

1. Call together the crisis management team, call in experts to help analyze and explain the crisis, and open the lines of communication.
2. Notify top management and give them the task of making impact projections in preparation for inquiries from employees, other agencies and the media.
3. Channel all inquiries to a designated spokesperson, preferably one who is trained in crisis management.
5. Set up a news center for media and begin providing information as quickly as it becomes

available. Provide information background packets and give television and radio interviews. Service personnel interviewed on television should wear uniforms whenever practical.

6. Be open and tell the whole story. If you do not, someone will and we will lose control as journalists turn to other sources.

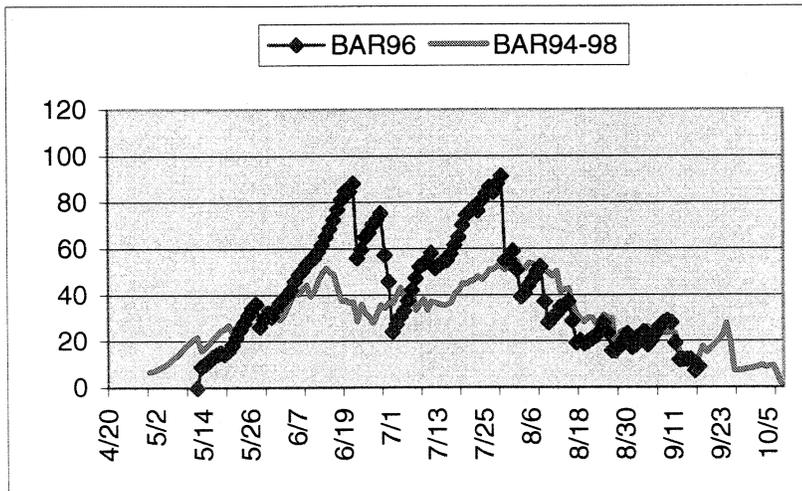
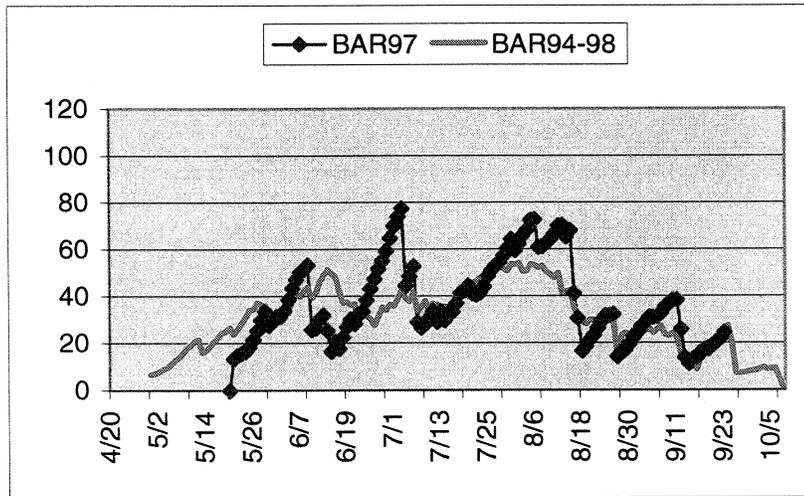
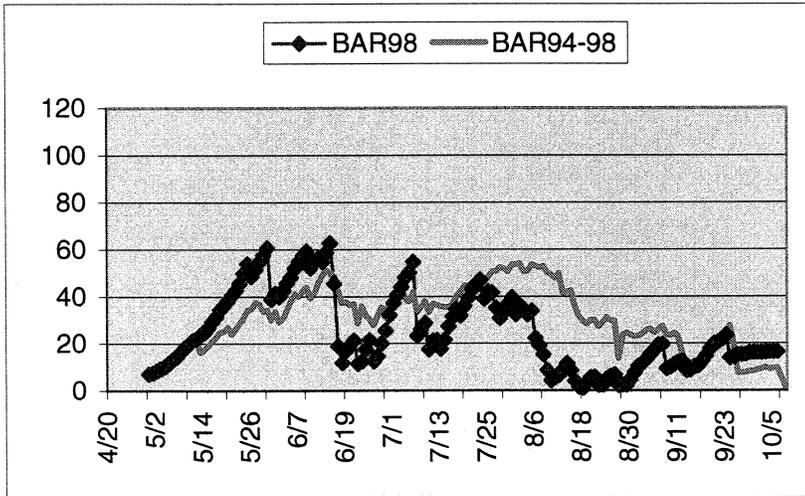
7. Demonstrate the Service's concern for what is happening and for the people involved and affected. Explain what the Service is doing and planning to do to solve the problem.

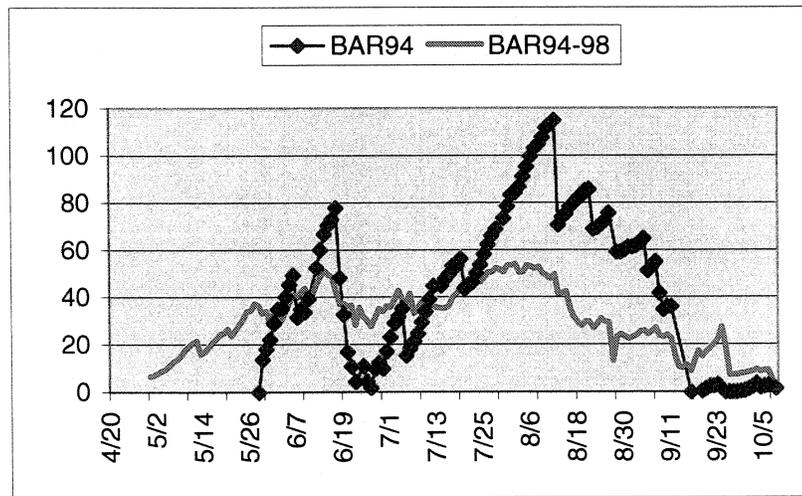
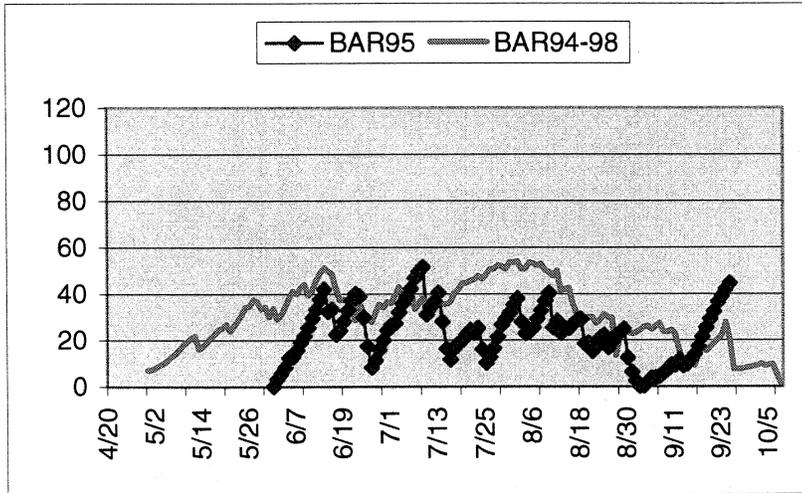
8. Have someone on call 24 hours a day and stay with the story for as long as the media is interested.

9. Reconvene the crisis management team afterward to summarize, review and evaluate how the plan worked and to recommend improvements.

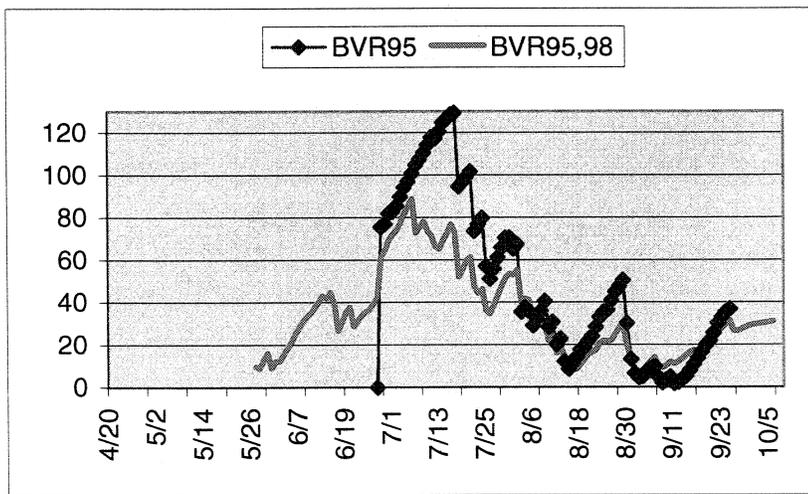
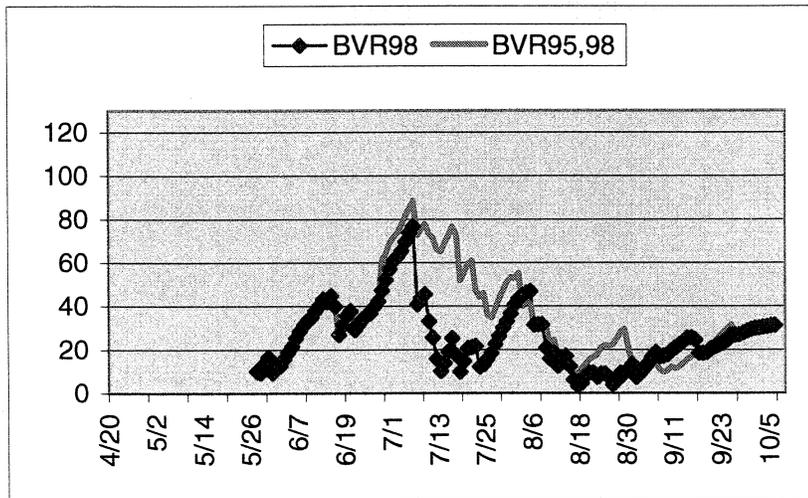
Appendix XIV. Buildup Indices from RAWS sites, 1994-1998

Bear Mountain RAWS. Daily BUI compared with 94-98 average, by year

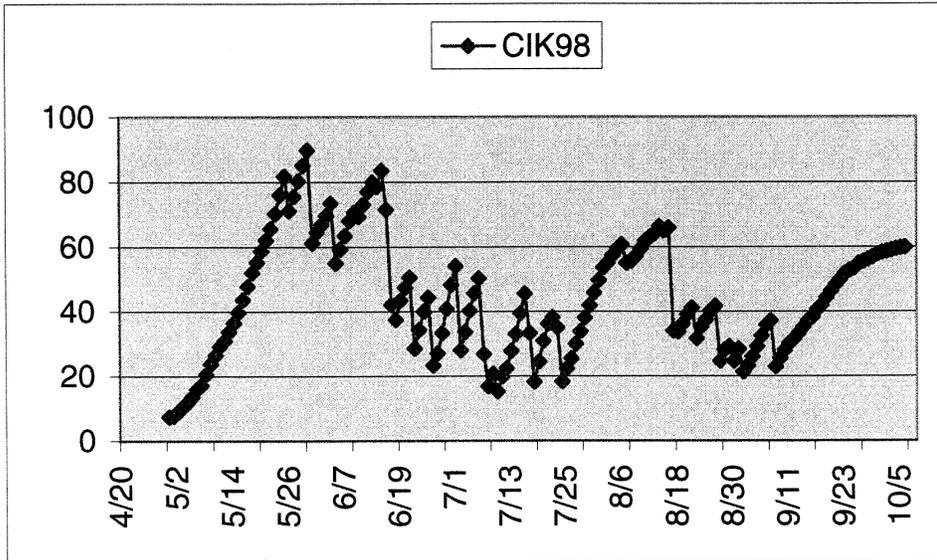




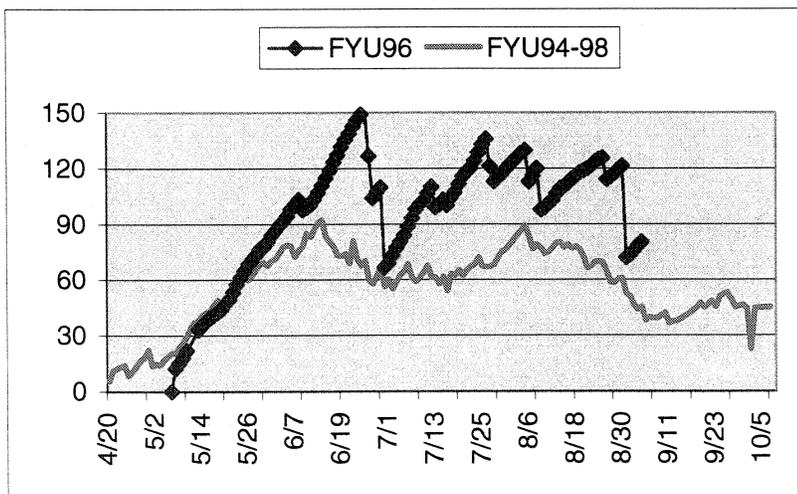
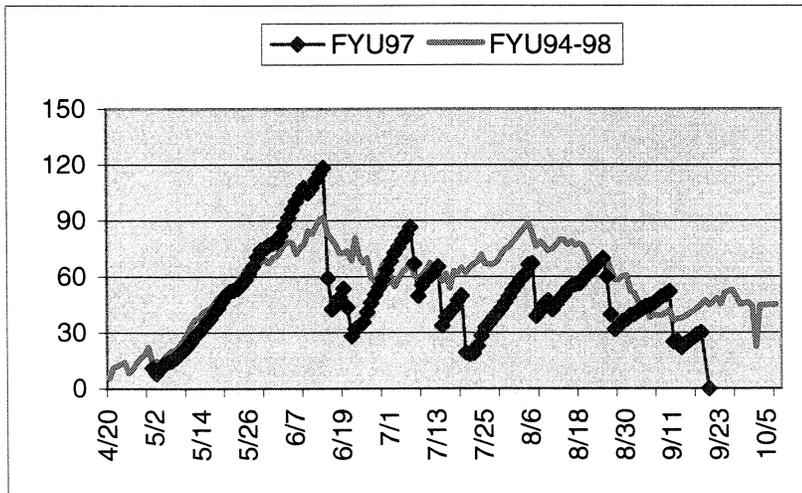
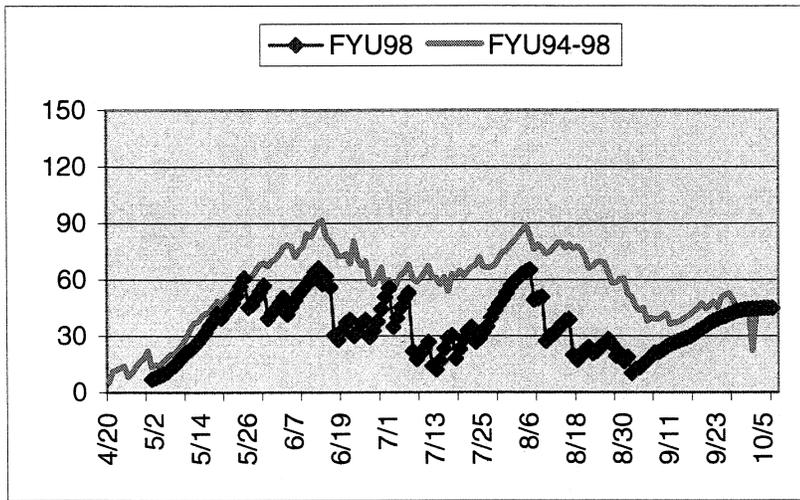
New Lake (BVR) RAWs. Daily BUI compared with average of 1995 and 1998, by year

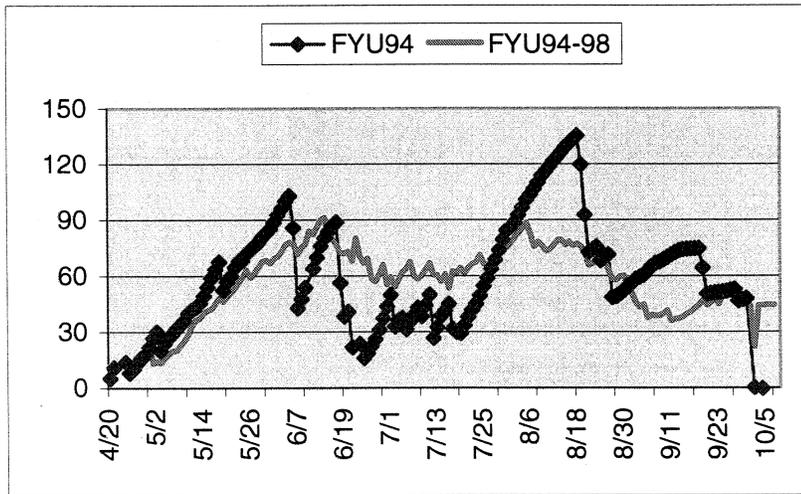
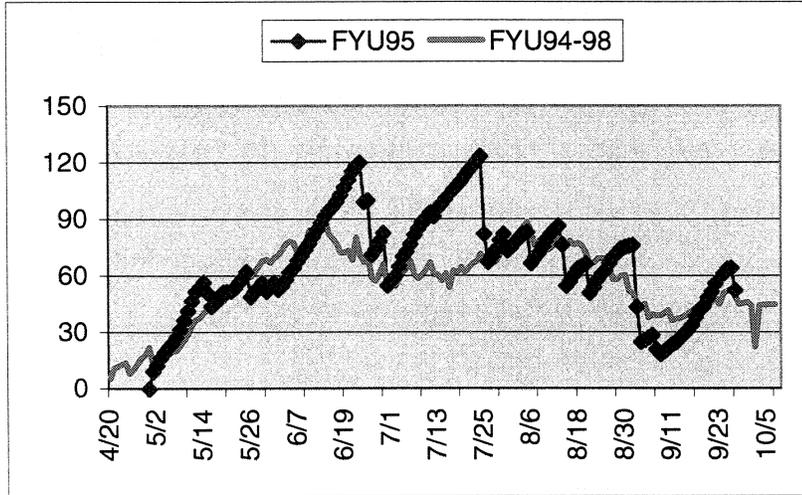


Chalkyitsik RAWS. Daily BUI for 1998 (first year of operation)

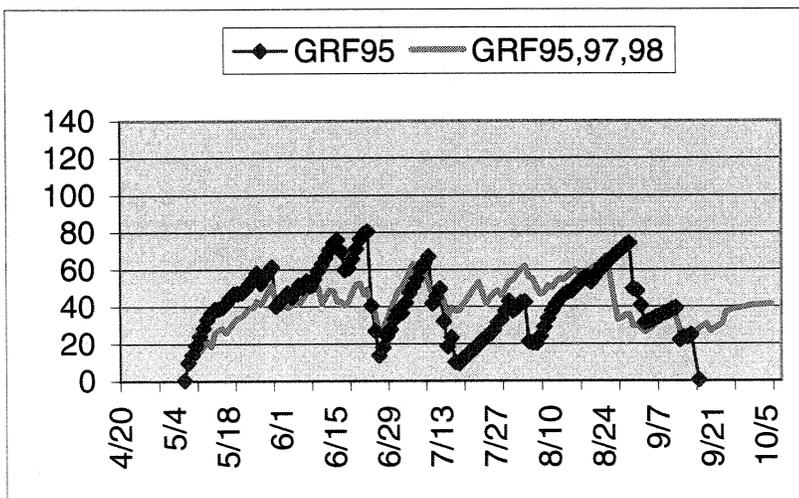
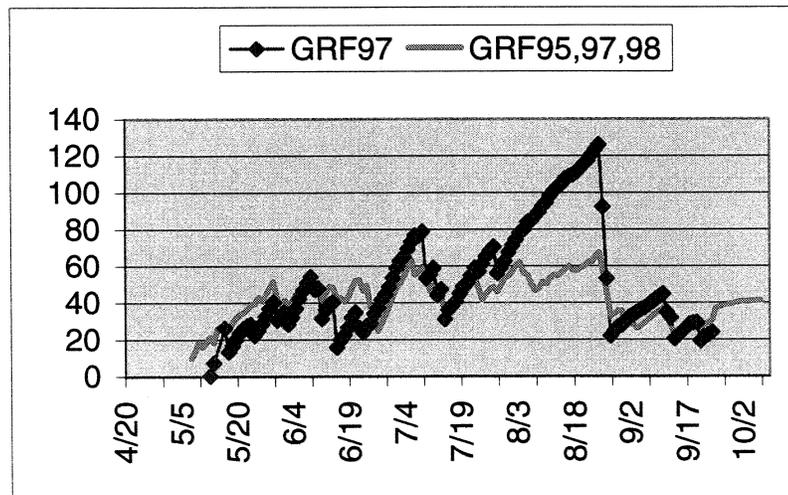
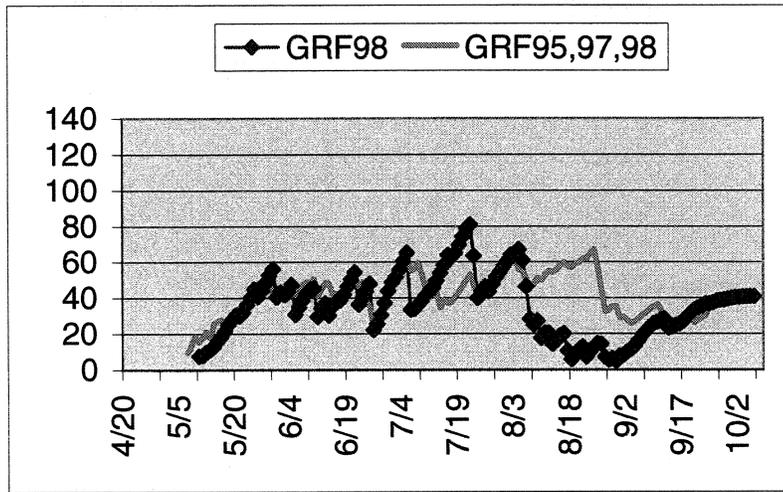


Fort Yukon Station. Daily BUI compared with 1995-1998 average, by year

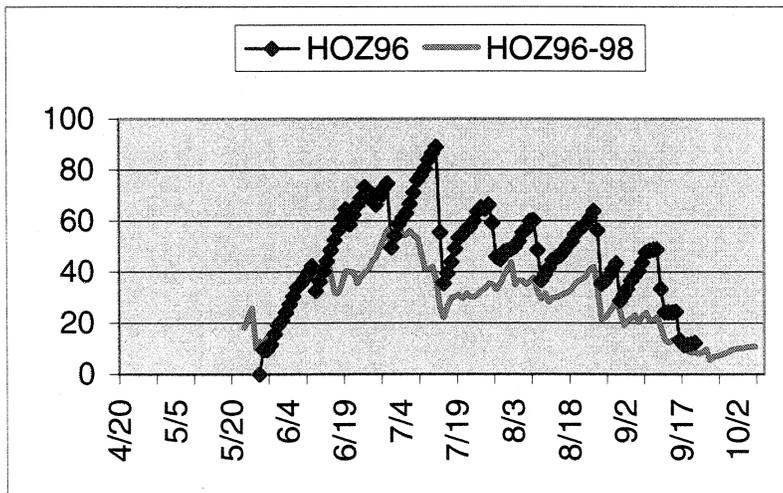
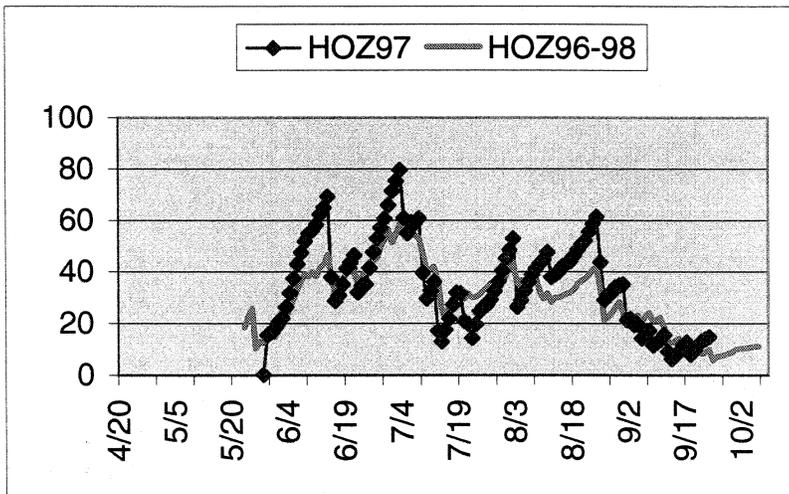
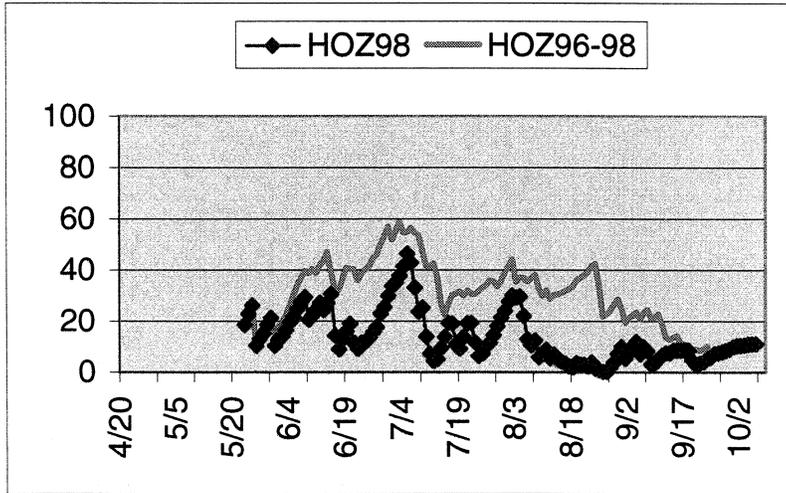




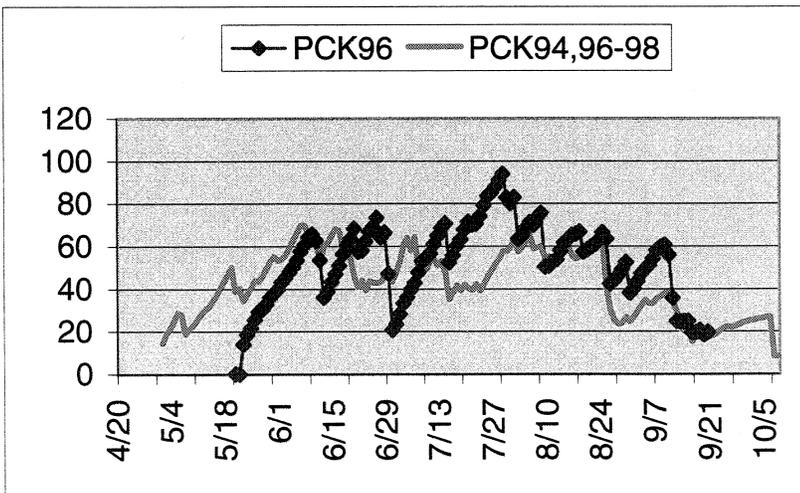
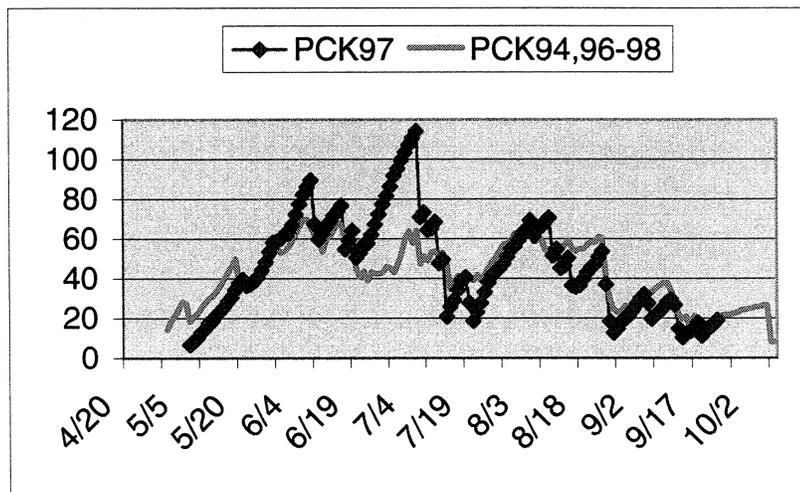
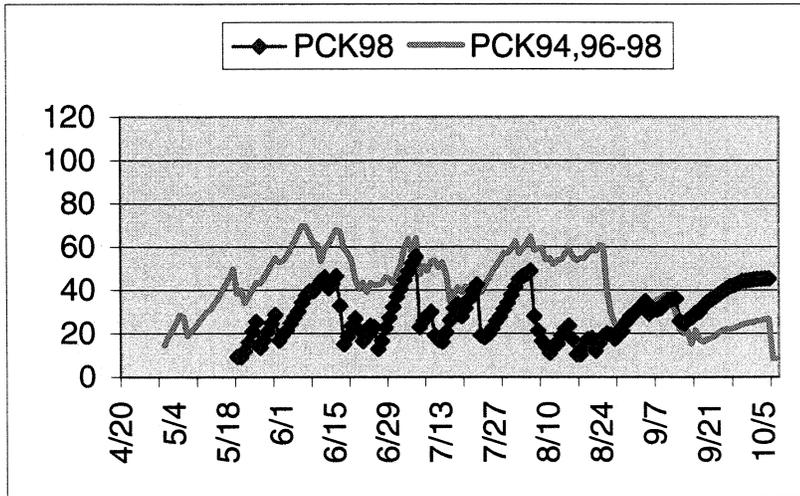
Graphite Lk. RAWs. Daily BUI compared with average from 1995, 1997, and 1998 data, by year

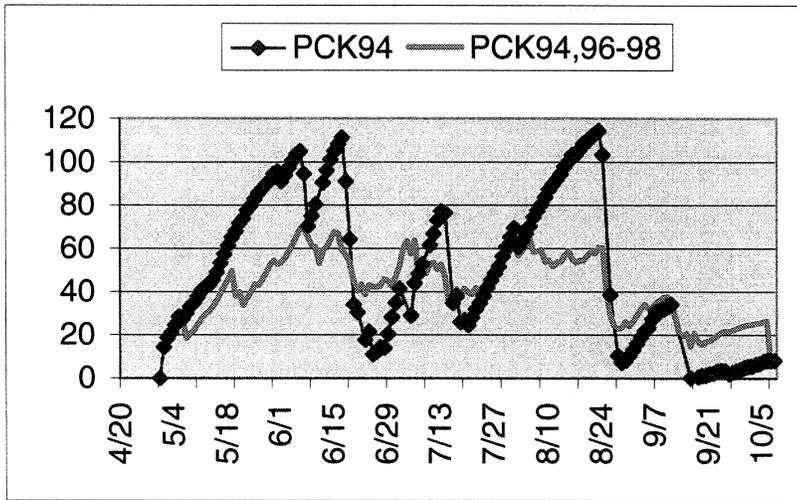


Hodzana RAWs. Daily BUI compared with 1996-1998 average, by year

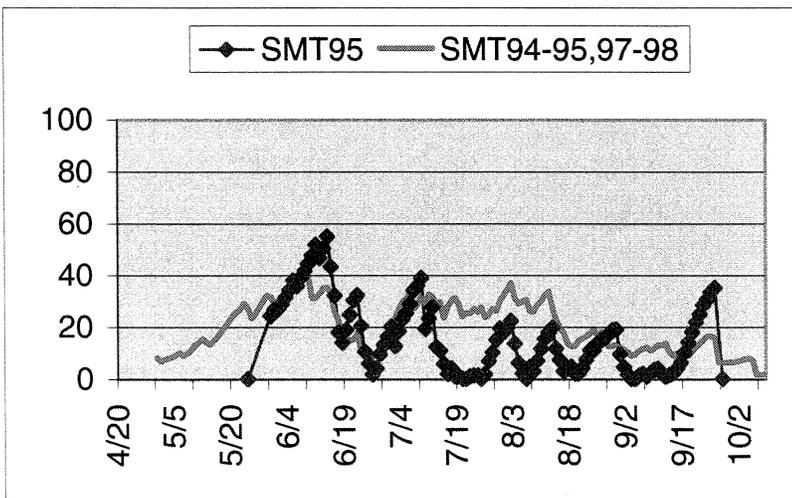
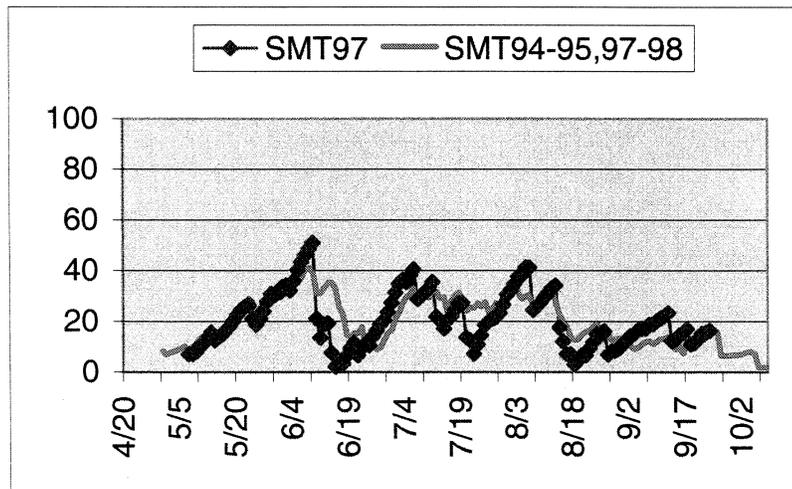
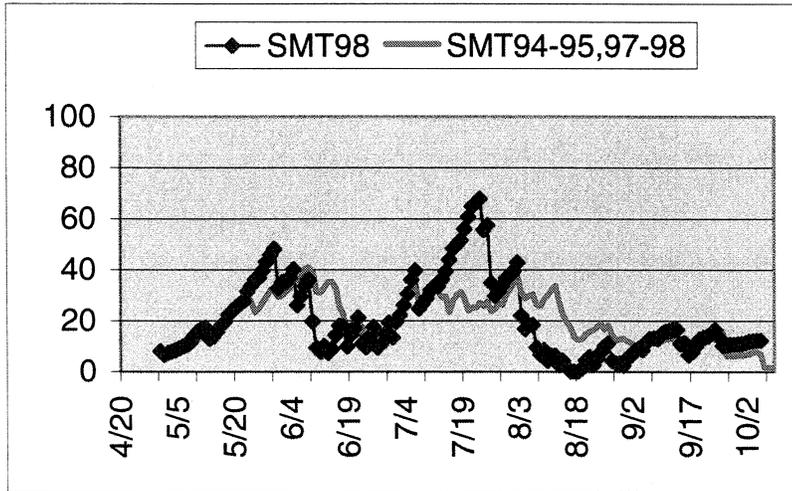


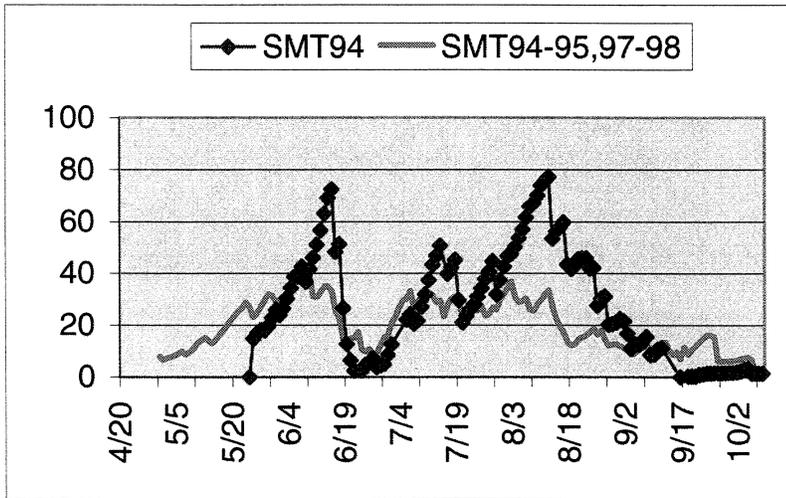
Preacher Creek RAWS. Daily BUI compared with average from 1994, 1996, 1997, and 1998, by year



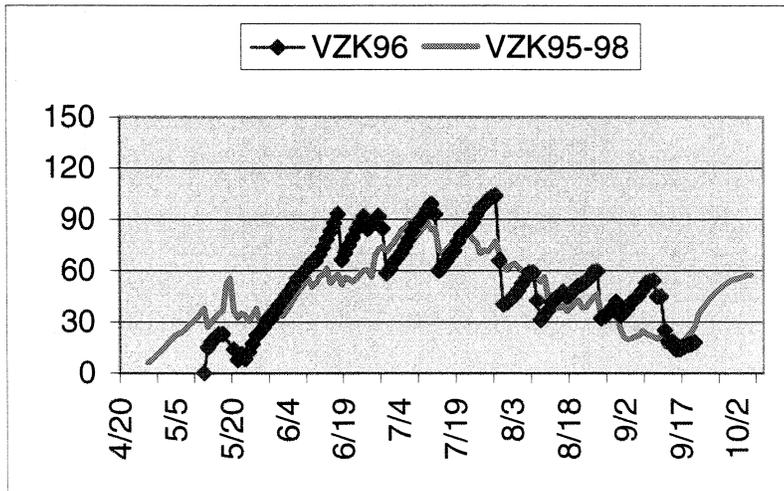
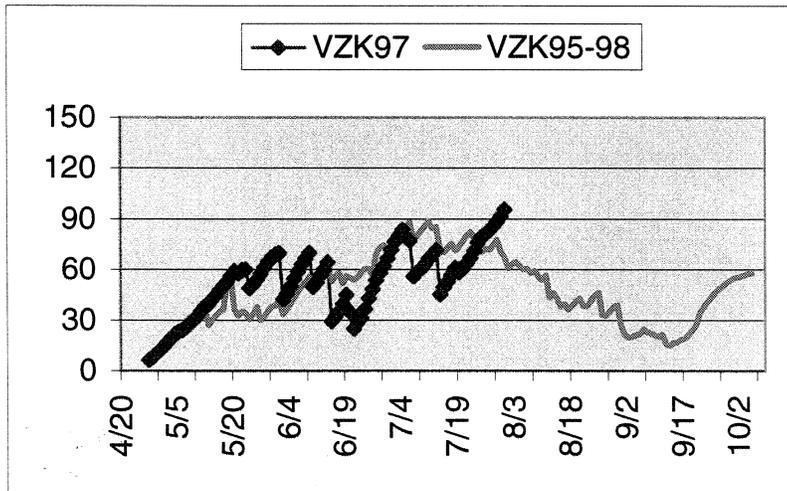
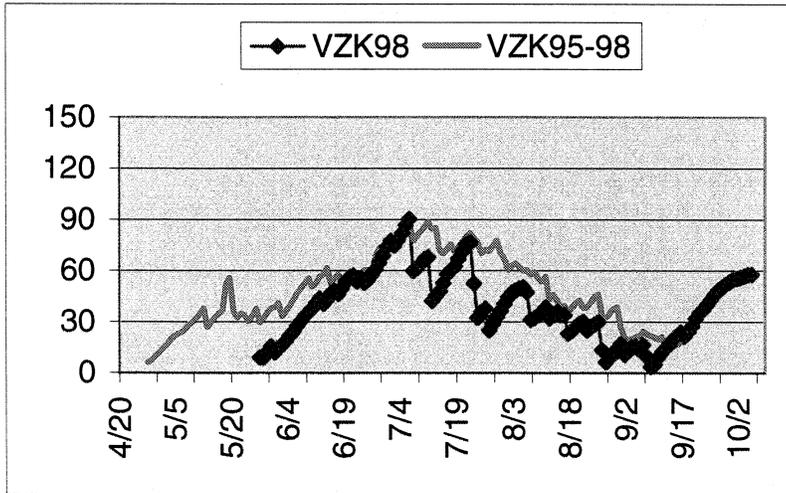


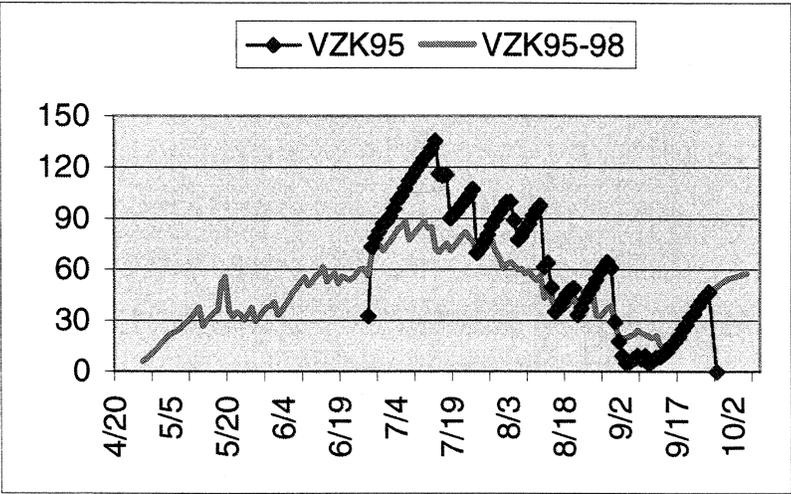
Salmon Trout RAWS. Daily BUI compared with average from 1994, 1995, 1997, and 1998, by year



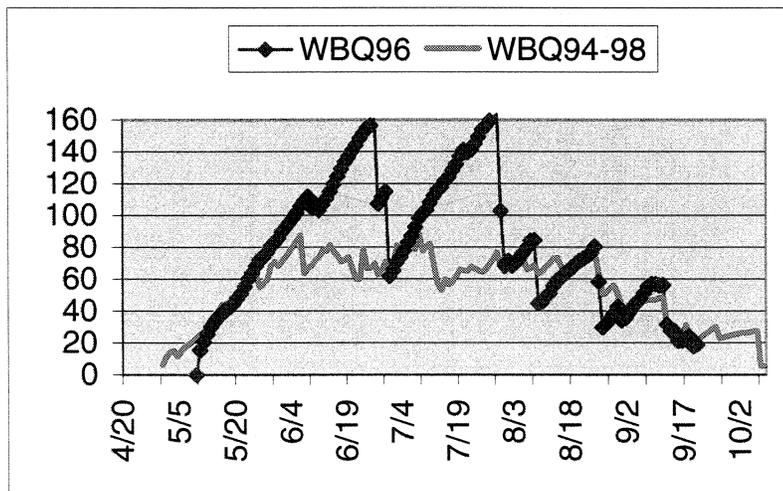
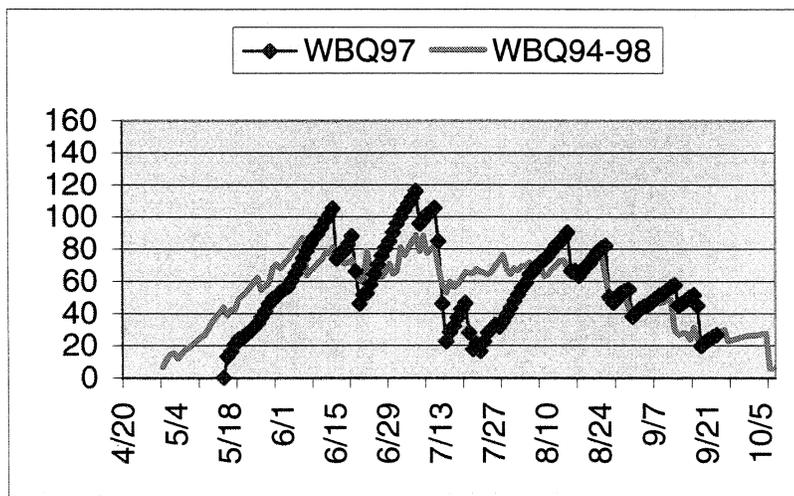
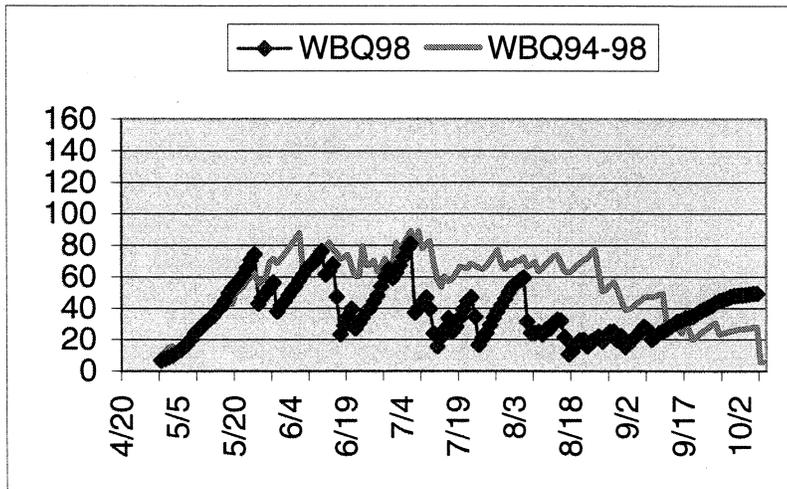


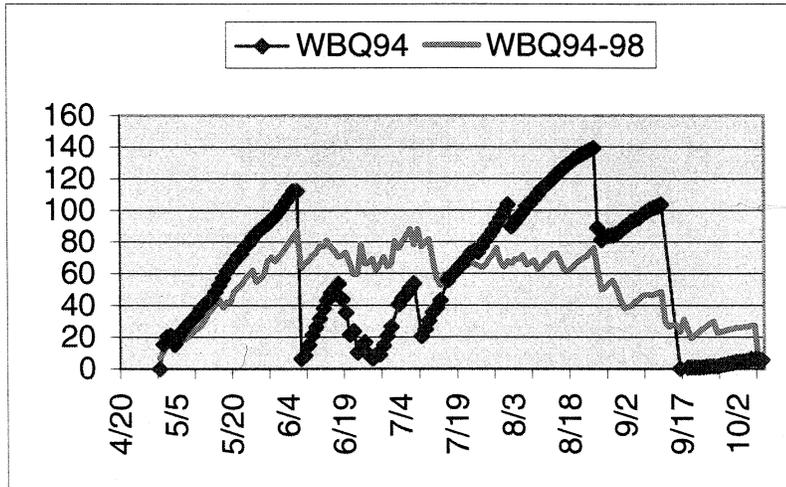
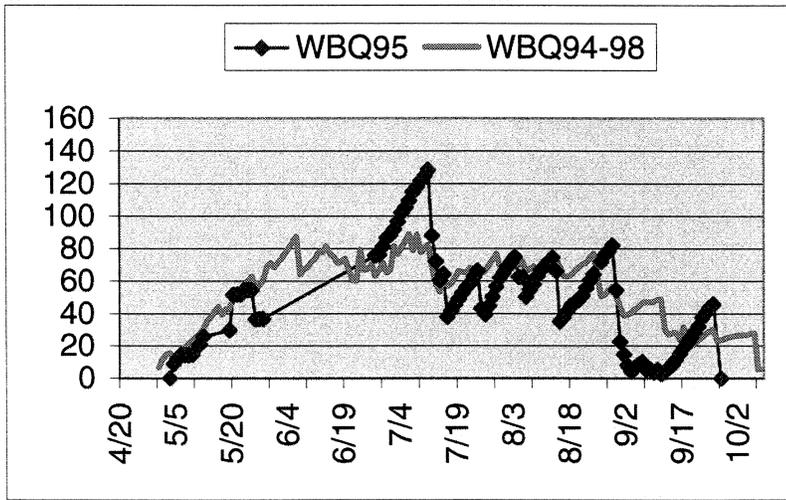
Vunzik Lake RAWS. Daily BUI compared with 1995-1998 average, by year



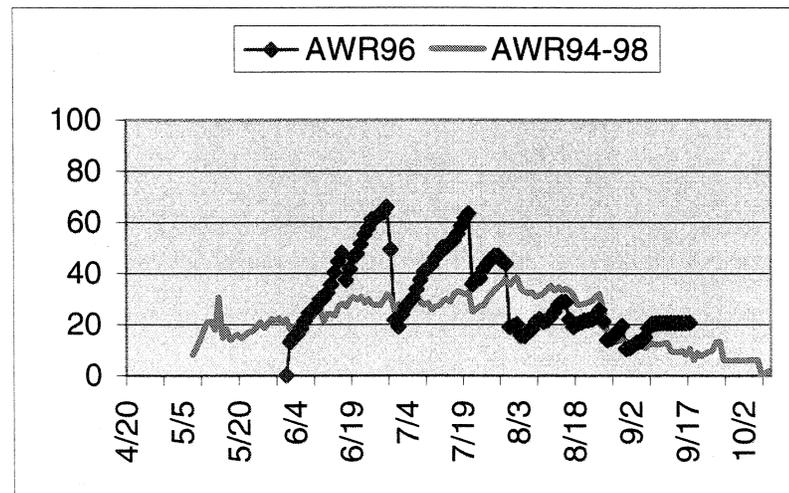
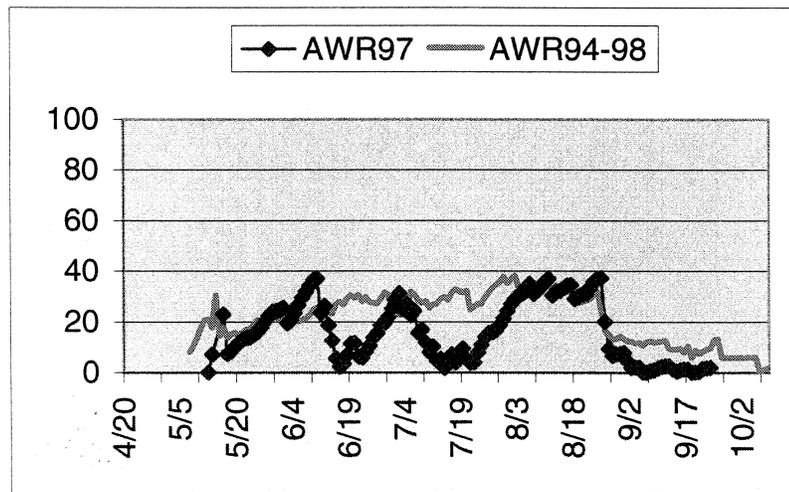
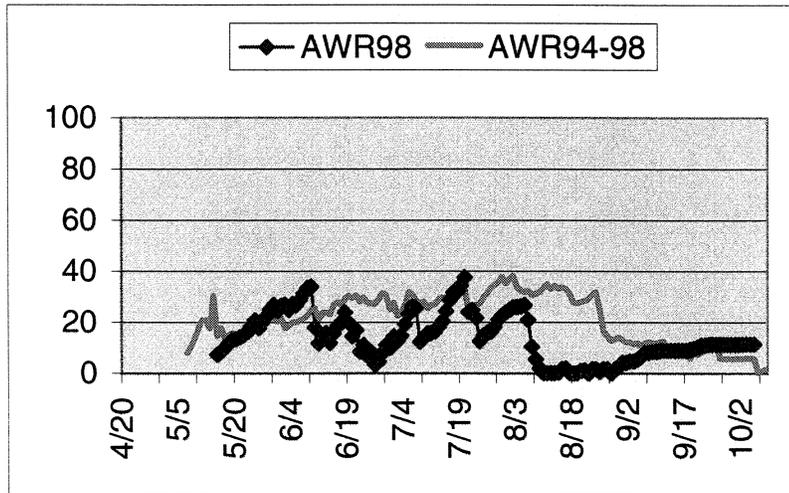


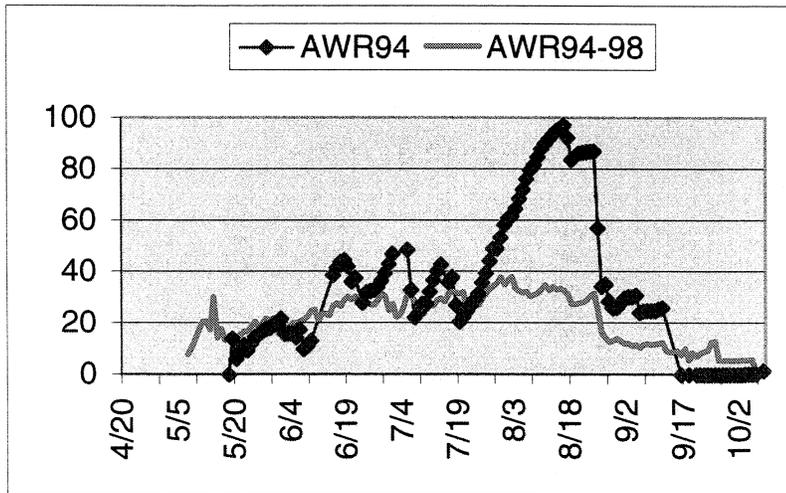
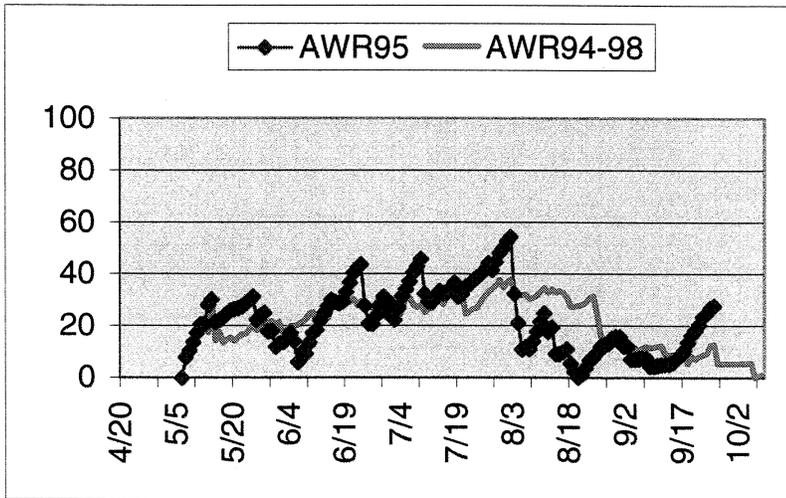
Beaver (WBQ) RAWS. Daily BUI compared with 1994-1998 average, by year



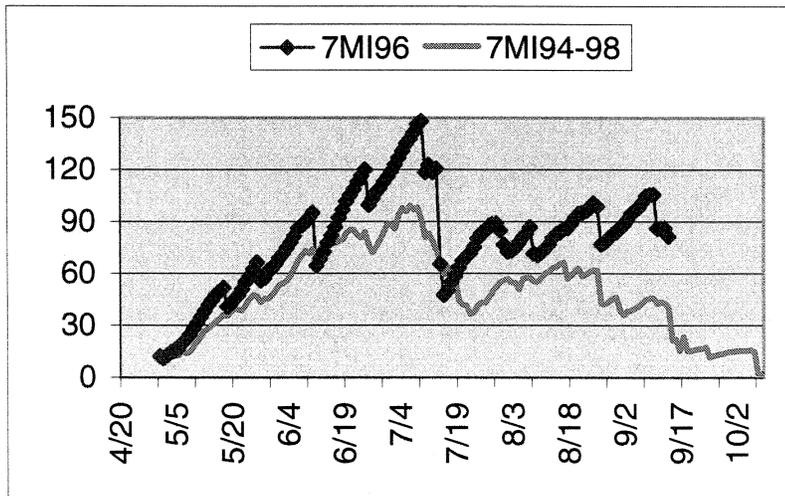
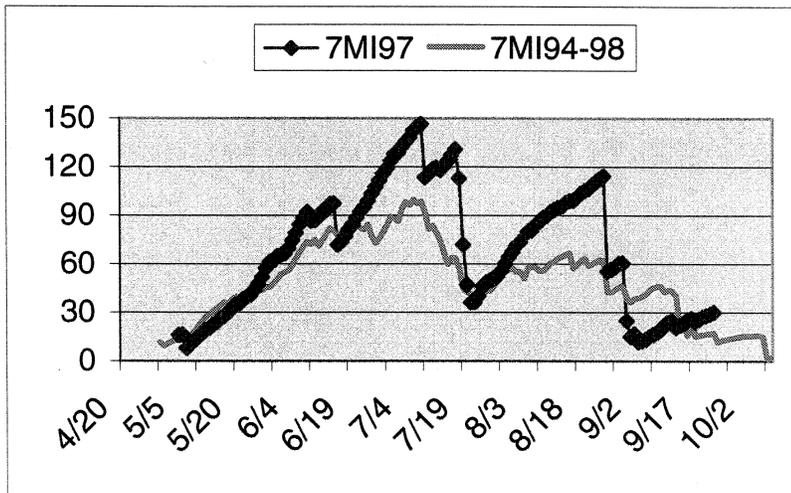
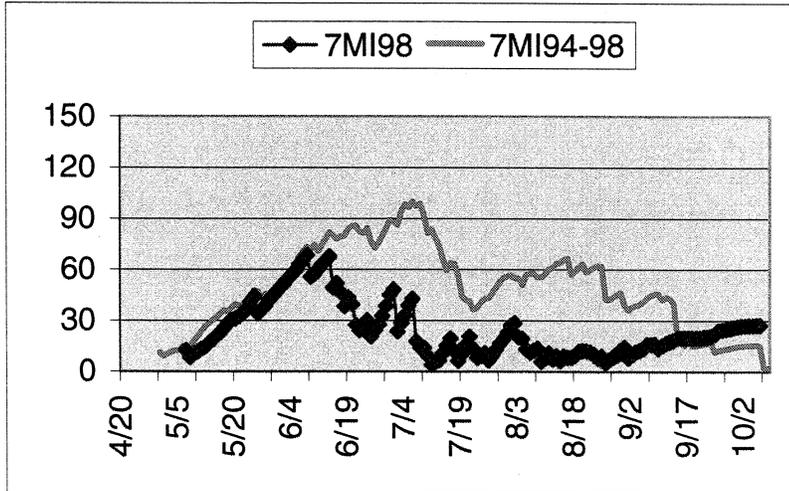


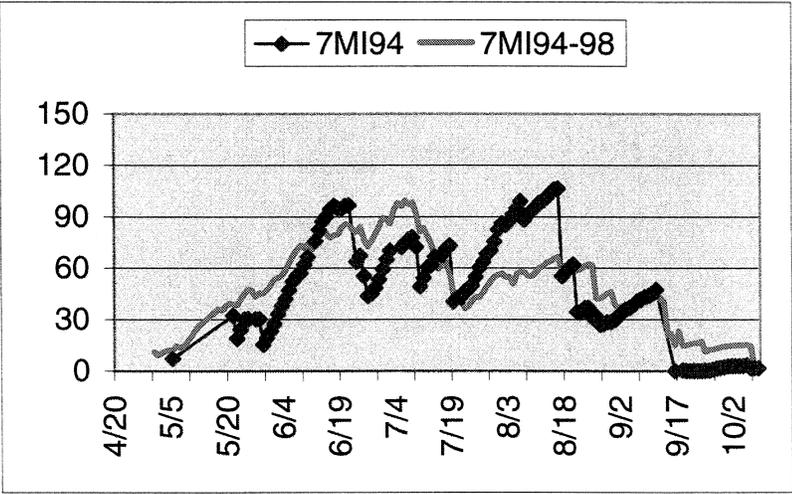
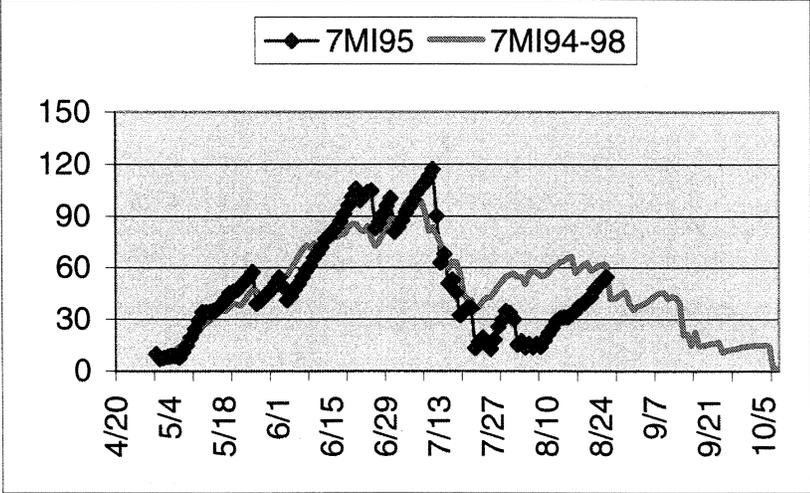
Helmut Mtn (AWR) RAWs. Daily BUI compared with 1994-1998 average, by year





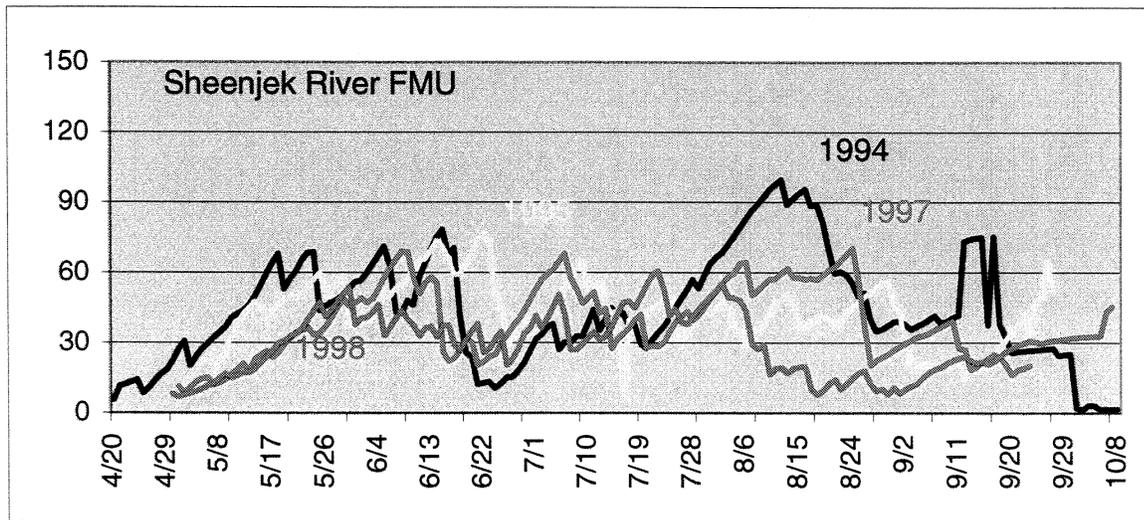
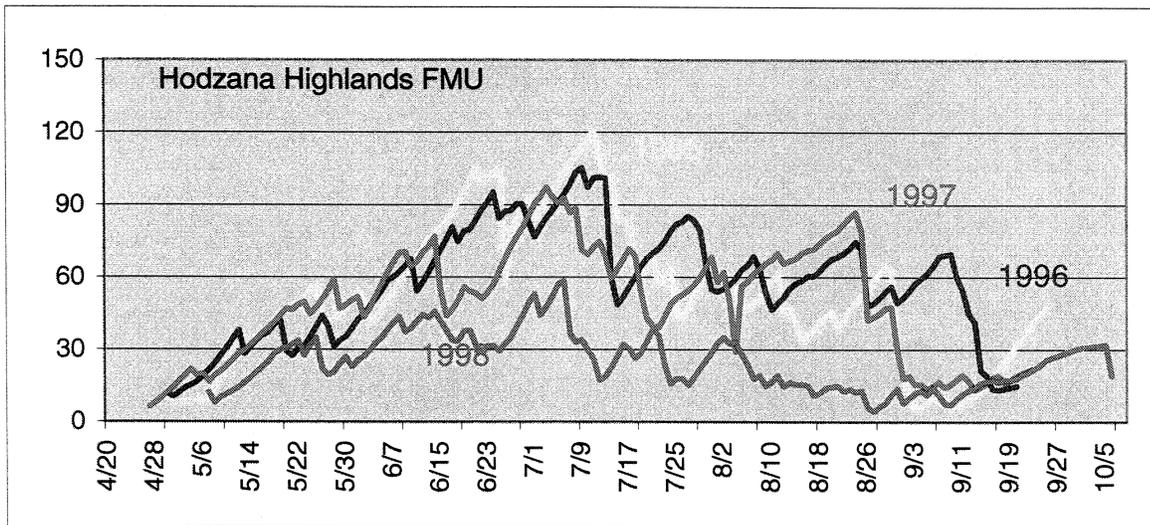
Seven-Mile RAWs. Daily BUI compared with 1994-1998 average, by year

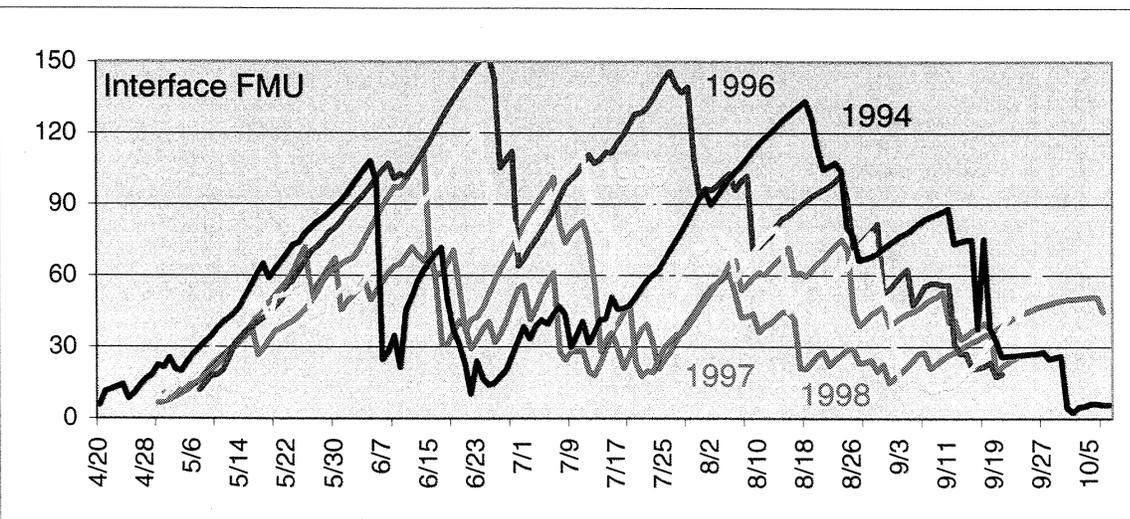
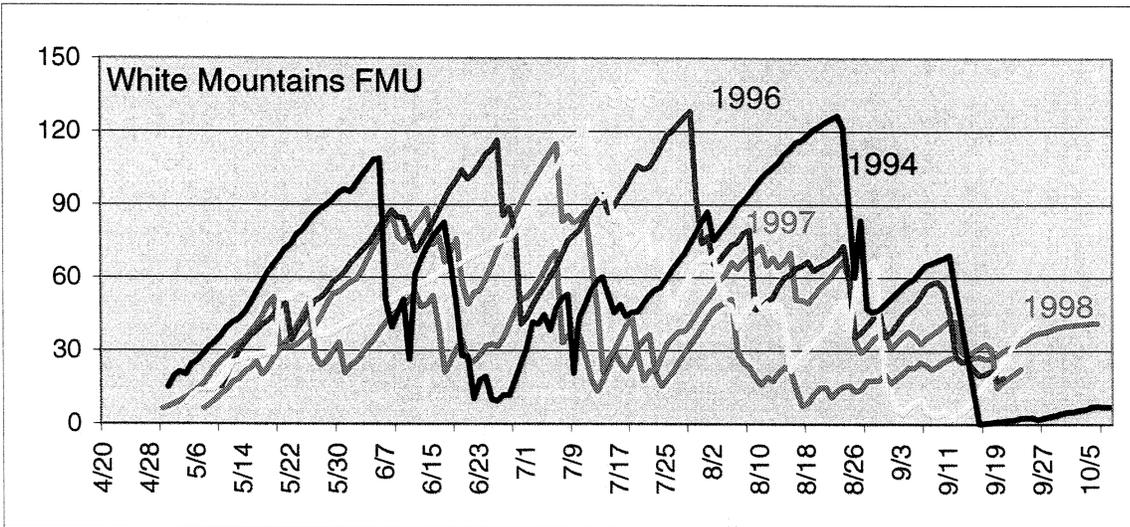
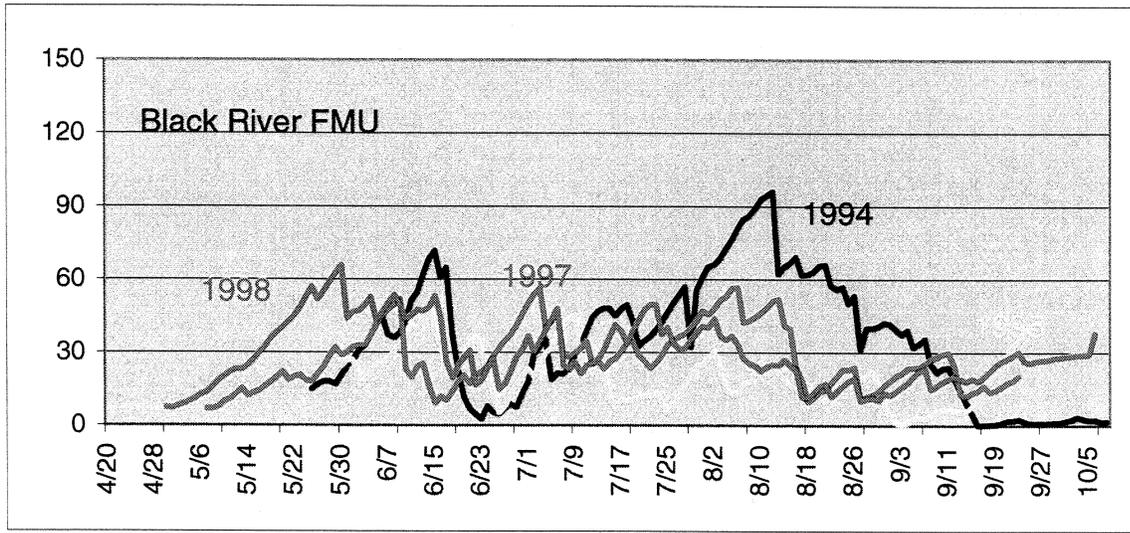




Data available from years:

FIRE MGMT UNITS	RAWS	1998	1997	1996	1995	1994
Black River	BAR	X	X	X	X	X
	CIK	X				
	SMT	X	X		X	X
Hodzana Highlands	7MI	X	X		X	X
	VZK	X	X	X	X	
	HOZ	X	X	X		
Sheenjek River	FYU	X	X	X	X	X
	GRF	X	X		X	
	SMT	X	X		X	X
White Mountains	WBQ	X	X	X	X	X
	PCK	X	X	X		X
	BVR	X			X	
Interface	CIK	X				
	FYU	X	X	X	X	X
	WBQ	X	X	X	X	X





Appendix XV.

Wildland Fire Use Implementation Plan standards

Exhibit A. Prescriptive Criteria for Wildland Fires Managed for Resource Benefit

1. Refuge Preparedness Level One

Fire Weather Index (FWI)* is 0-3, Average Buildup Index (BUI) is less than 70**

- New wildland fires caused by lightning may be managed for resource benefit in all AIWFMP option zones
- Existing fire use incidents will be monitored at least once every 10 days, if weather, fire behavior and flying conditions warrant

2. Refuge Preparedness Level Two

FWI is 4-13, Average BUI is less than 90

- New wildland fires caused by lightning may be managed for resource benefit in all AIWFMP option zones
- Existing fire use incidents will be monitored at least once a week

3. Refuge Preparedness Level Three

FWI is 14-23, Average BUI is between 90 and 100

- New wildland fires caused by lightning may be managed for resource benefit in all AIWFMP option zones
- Existing fire use incidents will be monitored every three days

4. Refuge Preparedness Level Four

FWI is 24-28. Average BUI is between 100 and 110

- New wildland fires caused by lightning may be managed for resource benefit only in Limited AIWFMP option zones
- Existing fire use incidents will be monitored daily

5. Refuge Preparedness Level Five

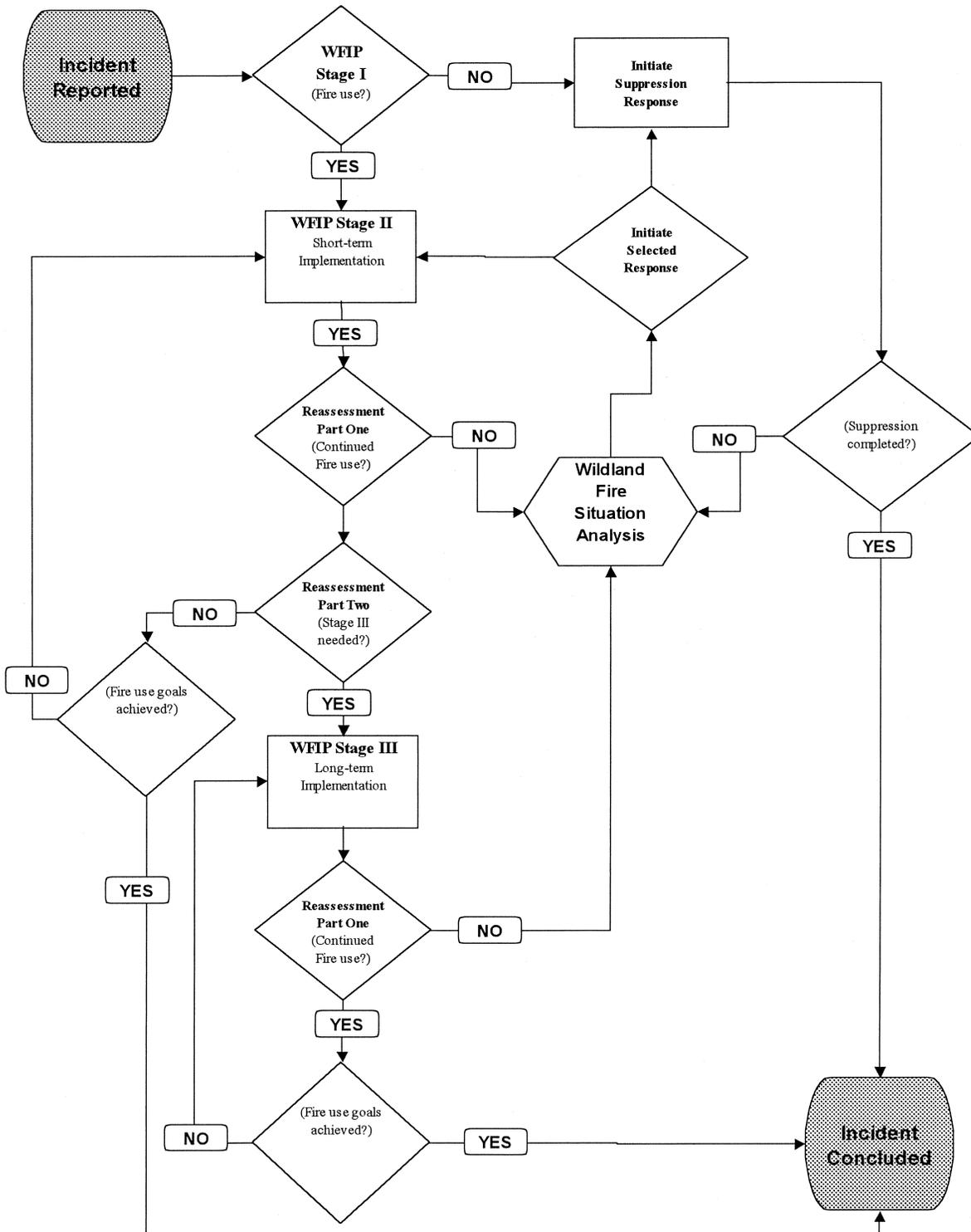
FWI is greater than 28, Average BUI is greater than 110

- New wildland fires caused by lightning may not be managed for resource benefit—all new ignitions will receive appropriate response according to AIWFMP option zone guidance
- Existing fire use incidents will be monitored daily

* **FWI**- A Canadian Forest Fire Danger Rating System index that represents the intensity of a spreading fire.

****BUI**- A Canadian Forest Fire Danger Rating System index that represents the total fuel available for combustion. It includes a seasonal drought component.

Exhibit B. Implementation Path for Wildland Fire Use



DECISION CRITERIA CHECKLIST

- Decision Element
- Is there a threat to life, property, or resources that cannot be mitigated?
 - Are potential effects on cultural and natural resources outside the range of acceptable effects?
 - Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Agency Administrator?
 - Is there other proximate fire activity that limits or precludes successful management of this fire?
 - Are there other Agency Administrator issues that preclude wildland fire use?
 - Do expected management needs for this fire exceed known capabilities?

Yes	No

The Decision Criteria Checklist is a process to assess whether or not the situation warrants continued wildland fire use implementation. A "Yes" response to any element on the checklist indicates that the appropriate management response should be suppression-oriented.

Recommended Response Action (check appropriate box)	NO-GO (Initial attack/suppression action)	
	GO (Other appropriate management response)	

Signature _____ Date _____

**PERIODIC FIRE ASSESSMENT
PART 1: RE-VALIDATION CHECKLIST**

Decision Element

Is there a threat to life, property, or resources that cannot be mitigated?

Are potential effects on cultural and natural resources outside the range of acceptable effects?

Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Agency Administrator?

Is there other proximate fire activity that limits or precludes successful management of this fire?

Are there other Agency Administrator issues that preclude wildland fire use?

Do expected management needs for this fire exceed known capabilities?

Appendix XVI. Decision Criteria Record

ALASKA INTERAGENCY FIRE MANAGEMENT PLAN

DECISION CRITERIA RECORD (1 of 2)

Fire Number:

Fire Name:

Land Manager/Owner:

Fire Management Option:

Adjoining Land Manager/Owner(s):

Adjacent Fire Management Option(s):

Current Fire Size:

Location (Legal Description):

Map Quad:/Meridian:

Lat/Long (if available):

Decision Criteria

Public Safety at Risk	Yes	No
Firefighter Safety at Risk	Yes	No
Threatening Private Property	Yes	No
Improvements at Risk	Yes	No
Threat to Natural/Cultural Resources	Yes	No
Initial Attack Resources Not Available	Yes	No
Unacceptable Factor(s) to Land Manager/Owner(s)	Yes	No
Other Unacceptable Factors	Yes	No

Weather

Current:

Past:

Predicted:

Fire Behavior

Current:

Past:

DECISION CRITERIA RECORD (2 OF 2)

Predicted:

Resistance to Control/Extinguish:

Topography/Natural Barriers:

Fuels:

Other Contributing Factors: (Fire Danger Ratings, Greenness, etc.):

Fire Representative Summary Statement:

Objectives:

Strategy:

Estimate Duration of Actions:

Signature: _____
Fire Representative

Date: _____

Land Manager Summary Statement and Authorization:

Objectives:

Constraints:

Authorization: _____
Land Manager/Owner(s) Representatives

Date: _____

October 1998

Appendix XVII. Evacuation Plan template

DEFINITIONS:

CHECKPOINT: A location that is likely to be traveled and where people are encouraged to stop. If they stop, they will be provided with information regarding conditions they are likely to encounter within the area they are entering.

ROADBLOCK: A location that blocks the passage of people or vehicles and where they are prevented from traveling into an area without providing a specific waiver or justifying their need to enter the area. At a minimum, they will be required to provide:

1. One piece of identification (drivers license, I.D. card, social security card, etc.) and the location to which they are traveling.
2. A reasonable explanation of their need to enter the area.
3. Affirm they understand their presence may hinder emergency workers/operations within the area they are entering.
4. Affirm they understand they may incur some personal liability by hindering emergency operations within the area.
5. Affirm they understand there may be personal risks of injury/death by entering the area.
6. Affirm they understand there may be limited or no opportunities/resources to affect their rescue should they encounter life-threatening circumstances.

ROAD CLOSURE: A barricade or other form of impeding travel into an area along a road, highway, street, trail or other location that reasonably requires a traveler to stop or otherwise recognize travel is prevented into an area. Road closures are usually temporary and are employed only when travel into an area clearly jeopardizes the life or safety of the traveler, emergency workers, or others within the area.

PILOT CAR: A vehicle used to guide other vehicles through a hazardous stretch of road.

TRAFFIC DIRECTIONAL CONTROL: A method of managing traffic in and near an incident that allows the incident management to temporarily restrict traffic flow to a single direction. Flags, pilot cars or any other method available can accomplish this.

EVACUATION WARNING: An evacuation warning is issued by the incident management organization, usually the Incident Commander, when conditions are such that an evacuation may be imminent. This is intended to give the local citizens time to move animals, property that is especially valuable or sick and/or elderly relatives from the area that may be impacted by the incident.

EVACUATION DIRECTIVE: An evacuation directive is issued by the incident management organization, usually by the Incident Commander, when conditions are such that immediate evacuation of an area is warranted to protect life and property. Local citizens will be directed to evacuate. Citizens apparently capable of making reasoned and informed decisions to remain within the evacuated area may do so at their own risk.

EVACUATION ORDER: An evacuation order will NOT be issued by the incident management organization. Evacuation orders can only be issued by on-scene incident personnel on a case by case basis. When a person is issued an evacuation order, the on-scene incident personnel can not allow the person to remain inside the incident area. Force may be used to remove people if necessary when an evacuation order is issued. The purpose of an evacuation order is to remove those people from harms way who apparently can not make a reasonable, informed decision about their personal safety or to remove those who have no physical way to evacuate themselves. For example, an evacuation order may be issued to minors who are home alone, persons under the influence of alcohol or drugs, others who will not be able to

evacuate later if left alone, and others who appear not to be able to make an informed decision for their personal safety or would be incapable of evacuating themselves otherwise due to physical or mental disabilities.

EVACUATION ASSEMBLY AREAS: Sites designated by the Incident Management Team or Local Authorities for citizens to gather while awaiting transportation from the threatened area.

EVACUATION CENTERS: Relocation point where evacuees can be registered, needs for shelters determined and information on shelters posted.

EVACUATION SHELTERS: Facilities managed and staffed by the voluntary agencies for housing and feeding evacuees.

Attachment A
Emergency Evacuation Plan

Working Draft

Emergency Evacuation Plan

As Incident Commander of the _____ incident, I find that certain evacuation actions are necessary to ensure the safety of the public and the assigned emergency responders. Therefore I am (we are) issuing the following instructions:

- Evacuation Warning
- Evacuation Directive

This action is valid for the following area:

Evacuation staging areas or centers will be located at:

Local citizens affected by this action should be told to:

- Prepare for an evacuation.
- Evacuate the area and check in at the evacuation staging area or center
- Other (describe):

Perimeter Controls:

Establish an Outer Perimeter at:	Use the following perimeter control methods:
	<input type="checkbox"/> Check Point <input type="checkbox"/> Road Block

Establish an Inner Perimeter at:	Use the following perimeter control methods:
	<input type="checkbox"/> Check Point <input type="checkbox"/> Road Block <input type="checkbox"/> Road Closure <input type="checkbox"/> Mobile Patrols

Incident Commander

Date

Time

Principal Executive Officer

Date

Time

Attachment B
Incident Evacuation Plan

Working Draft

(INCIDENT NAME / DESCRIPTION)

INCIDENT EVACUATION PLAN

ORIGINAL PLAN

REVISED PLAN

PREPARED BY: _____
(PRINTED NAME and TITLE)

AGENCY: _____

DATE: _____ TIME: _____

SUBMITTED TO: _____
(NAME and TITLE)

THIS PLAN CONTAINS:

- EVACUATION AUTHORIZATION (1 PAGE)*
- THREATS, AREA and OBJECTIVES (1 PAGE)*
- EVACUATION STAGES (1 PAGE)*
- IMPLEMENTATION PLAN (2 PAGES)*
- ANTICIPATED RESOURCE REQUIREMENTS (1 PAGE)*
- SUPPLEMENTAL INFORMATION (___ PAGES)*

INCIDENT EVACUATION PLAN

Evacuation Authorization

1. **AUTHORITY:** Authority for evacuation during this incident is based on the following references:

A. **Legal Authority:** _____

B. **Disaster Plan:** _____

2. **RESPONSIBILITY:** The agency responsible for planning, implementing, and managing an evacuation during this incident is identified as the:

3. **INCIDENT COMMANDER:** I have determined the nature of this emergency may pose significant threat to the health and safety of persons within the area described in the attached *Incident Evacuation Plan*.

A. The affected Principal Executive Officer(s) is/are requested to review the attached plan, initiate necessary proclamations or declarations, and grant extraordinary authority for me to implement elements of the evacuation plan as conditions warrant.

OR

B. The nature of this emergency does not permit prior authorization of evacuation through normal channels. I order the immediate implementation of evacuation efforts as noted in the attached plan.

OR

C. The evacuation was ordered during the Initial Attack of this incident and the attached plan documents the decisions for that action.

SIGNATURE and TITLE of INCIDENT COMMANDER

DATE and TIME

4. **PRINCIPAL EXECUTIVE OFFICER (S):** As the official(s) having legal responsibility for the approval of evacuations within this jurisdiction:

A. The *Incident Evacuation Plan* has been reviewed, necessary proclamations or declarations have been completed, and the Incident Commander is hereby granted authority to implement elements of the plan as conditions warrant.

OR

B. The *Incident Evacuation Plan* has been reviewed, and it is my/our decision to withhold approval of the Incident Commander's request for authority to implement elements of the plan. The basis for this decision is attached. This decision may be reviewed and amended as conditions warrant.

OR

C. I/we have been advised of the Incident Commander's use of extraordinary authority to proceed with evacuation. The basis for that decision has been reviewed and I/we do do not authorize continued evacuation efforts.

SIGNATURE and TITLE

DATE and TIME

INCIDENT EVACUATION PLAN

PART ONE – THREATS, AREA, and OBJECTIVES

A. THREATS TO HEALTH AND SAFETY: _____

B. AREA DESCRIPTION: As of _____
(TIME, DAY and DATE)
this plan is being recommended for the following area(s):

C. OBJECTIVES

1. To identify residents, businesses, public buildings and other areas from which occupants and property may need to be evacuated.
2. To locate and identify special concerns of the incident staff to include persons with conditions requiring extraordinary care, livestock or other property requiring specialized consideration and potentially hazardous materials.
3. To identify resources necessary to accomplish an evacuation.
4. To provide for the timely, safe, orderly evacuation of affected areas as ordered by the Incident Commander.
5. Provide for prompt information dissemination to the affected area.
6. Provide for prompt return of all displaced citizens.
7. A SUPPLEMENT IS ATTACHED DETAILING ADDITIONAL OBJECTIVES.

INCIDENT EVACUATION PLAN

PART TWO (A) - EVACUATION STAGES

- A. Pre-evacuation CONTACTS and BRIEFINGS of persons within affected area(s).

This stage will be implemented under the following conditions:

- B. **EVACUATION WARNING.** Good probability of a need to evacuate. Recommend movement of persons requiring extraordinary care, large mobile property and livestock (if feasible). Checkpoints may be used to inform citizens entering the area.

This stage will be implemented under the following conditions:

- C. **EVACUATION DIRECTIVE.** Occupants of the affected area(s) are DIRECTED to leave within a specified time period, by pre-designated route(s), and report to the evacuation center. Perimeter control will be established.

This stage will be implemented under the following conditions:

- D. **RETURN.** Evacuees allowed to return. Hardship and special needs are evaluated.

PART TWO (B) – PERIMETER AND ACCESS CONTROL

A. **PERIMETER AND ACCESS CONTROL.** Perimeter and access control shall be established to minimize conflicts between civilian and incident traffic. Perimeter and access control shall be accomplished by establishing:

- Outer Perimeter

Location	Type of Control
	<input type="checkbox"/> Checkpoint <input type="checkbox"/> Road Block
	<input type="checkbox"/> Checkpoint <input type="checkbox"/> Road Block
	<input type="checkbox"/> Checkpoint <input type="checkbox"/> Road Block
	<input type="checkbox"/> Checkpoint <input type="checkbox"/> Road Block
	<input type="checkbox"/> Checkpoint <input type="checkbox"/> Road Block

- Inner Perimeter

Location	Type of Control
	<input type="checkbox"/> Checkpoint <input type="checkbox"/> Road Block <input type="checkbox"/> Road Closure
	<input type="checkbox"/> Checkpoint <input type="checkbox"/> Road Block <input type="checkbox"/> Road Closure
	<input type="checkbox"/> Checkpoint <input type="checkbox"/> Road Block <input type="checkbox"/> Road Closure
	<input type="checkbox"/> Checkpoint <input type="checkbox"/> Road Block <input type="checkbox"/> Road Closure

INCIDENT EVACUATION PLAN

PART THREE – IMPLEMENTATION PLAN

A. **EMERGENCY IMPLEMENTATION PROCEDURE:** In the event an evacuation is directed by the Incident Commander and time does not permit personal notification of affected person, the following procedure will be utilized.

B. **OBSTRUCTION RESPONSE PROCEDURE:** The recommended response for persons refusing to cooperate with an evacuation directive is:

C. **TRAFFIC PLAN:**

Routes and Destinations:

Primary Route:	
Primary Destination:	
Alternate Route:	
Alternate Destination:	

Traffic Control

Location	Type of Control
	<input type="checkbox"/> Mobile Patrols <input type="checkbox"/> Traffic Directional Control <input type="checkbox"/> Pilot Cars
	<input type="checkbox"/> Mobile Patrols <input type="checkbox"/> Traffic Directional Control <input type="checkbox"/> Pilot Cars
	<input type="checkbox"/> Mobile Patrols <input type="checkbox"/> Traffic Directional Control <input type="checkbox"/> Pilot Cars
	<input type="checkbox"/> Mobile Patrols <input type="checkbox"/> Traffic Directional Control <input type="checkbox"/> Pilot Cars
	<input type="checkbox"/> Mobile Patrols <input type="checkbox"/> Traffic Directional Control <input type="checkbox"/> Pilot Cars

D. EVACUATION SHELTERS:

Evacuation shelters for this incident will be set up as follows:

Shelter Name/Phone Number	Location	Shelter Manager	Responsible Agency

Public Information Officers will be assigned to shelters as follows:

Shelter Name	Information Officer	Contact Numbers
		Phone: Cell: Pager: E-Mail:

IMPLEMENTATION PLAN - CONTINUED

E. PRE-EVACUATION ACTIVITIES:

- Yes No Teams will complete pre-evacuation contact data sheets as time and circumstances permit.

- Yes No Resident evacuation information will be provided during initial contact.

- Yes No Resident evacuation information will be provided at exit roadblocks.

- Yes No Incident PIO representative will establish a briefing site for residents.

F. RESOURCE LOCATIONS:

- A. Evacuation branch and staging area: _____

- B. Evacuation reporting and briefing site(s): _____

- C. Mobile property holding area(s): _____

- D. Livestock holding area(s): _____

G. COMMUNICATIONS:

A. Radio Frequencies and Telephone Numbers for Evacuation Branch:

	Frequency/Channel	Telephone
1. Evacuation branch:	_____	_____
2. Contact teams:	_____	_____
3. Perimeter & traffic control:	_____	_____
4. Security teams:	_____	_____

B. Public Information Officer:

Name:	
Contact Numbers:	Phone: Cell: Pager: E-Mail:
Location of Community Briefings	
Date and Time for Community Briefings	
Location of Media Briefings:	
Date and Time for Media Briefings:	

C. Designated marking:

1. **Signs:** Appropriate closure signs will be posted at the perimeter as needed.
2. **Flagging:** (identify color for each category):

Description of Action	Color of Flagging
Resident/Occupant has been personally contacted.	
Occupant has a condition that requires extraordinary care.	
Hazardous materials identified on property.	
Occupant request assistance moving property	
Non-Emergency vehicle permitted within perimeter.	

INCIDENT EVACUATION PLAN

PART FOUR (A) – ANTICIPATED RESOURCE REQUIREMENTS

A. PERSONNEL, VEHICLES and RADIOS:

FUNCTION	LAW ENFORCEMENT	OTHER	SUPPORT	VEHICLES	RADIOS
CONTACT/MAPPING TEAMS					
ROADBLOCKS					
TRAFFIC – FIXED LOCATION					
TRAFFIC – MOBILE					
TRAFFIC – ESCORT					
SECURITY – EVACUATED AREA					
SECURITY – PROPERTY STORAGE					
EVACUATION CENTER(S)					
EVACUATION BRANCH					
TOTALS PER SHIFT:					

B. TRAFFIC CONTROL DEVICES: (Specify Type and Quantity)

- A. Signs: _____
- B. Barricades/cones/pylons: _____
- C. Lights:
 - 1. Warning: _____
 - 2. Illumination: _____

C. OTHER RESOURCES REQUIRED: _____

D. SPECIAL NOTE: (Uniform requirements, vehicle accessories, etc.)

PART 4 (B) - EVACUATION EXPENSES

EVACUATION COST MAY INCLUDE:

- Transportation cost for evacuees
- Equipment and Supplies
- Rent for Evacuation Centers
- Food
- Water
- Other (Describe)

EVACUATION COSTS WILL BE DOCUMENTED BY (include the name of the person responsible for documenting evacuation costs and the method that will be used to document these costs):

Submitted: _____
DATE and TIME

By: _____
SIGNATURE and TITLE

INITIAL REQUEST

SUPPLEMENTAL REQUEST

Attachment C
Pre-Evacuation Contact Datasheet

Working Draft

Pre-Evacuation Contact

Incident Name: _____

Date: _____

Time: _____

Name of Person Contacted:				
Address or Location of Contact:				
Number of persons at this location:	Adults		Minors	
	Males	Females	Males	Females
Transportation Available	Yes		No	
Pets/Animals needing attention	Yes		No	
Special Needs or Assistance Required: (explain)				
Phone Number at contact location				
Emergency Contact Name				
Emergency Contact Number				
Electronic media most often on at contact location	Television	Radio	None	
Other information:				
Contact Made By:				

Attachment D
Evacuation Order Report

Working Draft

Evacuation Order Report

Incident Name: _____

Date: _____

Time: _____

I, _____, issued an EVACUATION ORDER for the following individual(s):

This individual(s) was ordered to evacuate from:

This EVACUATION ORDER was issued for the following reasons:

The individual(s) ordered to evacuate:

- Transported themselves out of the area.
- Were escorted out of the area by incident personnel

If the evacuee(s) were escorted out of the area by incident personnel, complete the following:		
Name of the Incident personnel that escorted the evacuee(s) out of the area:		
Location to which the evacuee(s) was escorted:		
If the evacuee(s) was a minor, name of the person who accepted responsibility from the escort:		
Evacuee(s) were escorted from the area under restraint	Yes	No

Signature of person issuing the EVACUATION ORDER: _____

Attachment E
Roadblock Datasheet

Working Draft

Roadblock Datasheet

Incident Name: _____

Roadblock Location: _____

Date: _____

Time: _____

Drivers Name				
Vehicle Description	License No.	Color	Make	Year
ID Confirmed	<input type="checkbox"/> Drivers License <input type="checkbox"/> ID Card <input type="checkbox"/> SS Card <input type="checkbox"/> Other			
Passenger Names				
Reason for entry:				
Destination:				
Do you understand that your presence may hinder emergency workers/operations within the area you are entering.			Yes	No
Do you understand that you may incur some personal liability by hindering emergency operations within the area?			Yes	No
Do you understand that you, and anyone with you, may risk serious personal injury and death by entering this area.			Yes	No
Do you understand that there may be no opportunities or resources available to assist you should you encounter life-threatening circumstances?			Yes	No

Name of Person collecting data: _____

Signature of Driver: _____

Attachment F
Position Descriptions

Working Draft

EVACUATION BRANCH DIRECTOR

The Evacuation Branch Director reports to the Operation Section Chief and is primarily responsible for preparing the Evacuation plan, for managing any evacuation effort associated with the incident, and for coordinating evacuation efforts between the various agencies that may be involved.

- Obtain briefings from the Operation Section Chief.
- Determine authority for executing an evacuation.
- Develop evacuation plan.
- Participate in the development of the Incident Action Plan.
- Coordinate with Incident Information Officer to ensure availability of IOFR's in the evacuation process.
- Coordinate with local law enforcement agencies to ensure availability of law officers for evacuation efforts.
- Coordinate with Red Cross, Salvation Army and other relief agencies to ensure adequate evacuation shelters are available.
- Determine location of inner and outer perimeters and develop perimeter and access control strategy.
- Determine type of traffic control needed and location of traffic control points.
- Develop message that will be used by the contact teams when an "Evacuation Directive" has been issued.
- Develop procedure for dealing with "Evacuation Orders" using law enforcement and contact teams.
- Report all "Evacuation Orders" to the Incident Commander through the Operations Section Chief as soon as possible after the order is issued.
- Ensure that all reports are completed properly and filed.
- Maintain Unit Logs (ICS Form 214)

CONTACT GROUP SUPERVISOR

The Contact Group Supervisor reports to the Evacuation Branch Director and is responsible for managing all contact teams assigned to the incident.

- Obtain briefings from the Evacuation Branch Director or the Operations Section Chief.
- Review assignments with all contact teams.
- Inform Incident Communications and/or Resource Unit of all status changes of resources assigned to the Group.
- Coordinate activities with Divisions and other Groups.
- Keep supervisor informed of situation and resource status.
- Resolve logistics problems within the Group.
- Ensure that all contact teams are getting the correct message out to the citizens.
- Ensure that all contact teams are using a similar message when contacting citizens.
- Collect contact data sheets from all contact teams and process according to incident procedures.
- Keep supervisor informed of hazardous situations and significant events.
- Ensure assigned personnel and equipment go on and off duty in a timely manner.
- Approve and turn in time for all resources assigned to the Group.
- Evaluate performance of all resources assigned to the Group.
- Maintain Unit Log (ICS Form 214).

PERIMETER GROUP SUPERVISOR

The Perimeter Group Supervisor reports to the Evacuation Branch Director and is responsible for locating and securing perimeters and traffic control on the incident.

- Obtain briefings from the Evacuation Branch Director or the Operations Section Chief.
- Review assignments with all Group resources.
- Inform Incident Communications and/or Resource Unit of all status changes of resources assigned to the Group.
- Coordinate activities with Divisions and other Groups.
- Keep supervisor informed of situation and resource status.
- Resolve logistics problems within the Group.
- Locate perimeter control points and set up checkpoints, roadblocks or road closures as directed.
- Set up traffic control points.
- Set up and manage guide cars, flag stops, traffic directional control and other methods to ensure safe traffic flow in and around the incident.
- Ensure that information used at checkpoints and roadblocks is accurate.
- Ensure communications between perimeter control points is operable and reliable.
- Collect "Road Block Datasheets" from all roadblocks and process daily.
- Keep supervisor informed of hazardous situations and significant events.
- Ensure assigned personnel and equipment go on and off duty in a timely manner.
- Approve and turn in time for all resources assigned to the Group.
- Evaluate performance of all resources assigned to the Group.
- Maintain Unit Log (ICS Form 214).

SHELTER GROUP SUPERVISOR

- Obtain briefings from the Evacuation Branch Director or the Operations Section Chief.
- Review assignments with all Group resources.
- Inform Incident Communications and/or Resource Unit of all status changes of resources assigned to the Group.
- Coordinate activities with Divisions and other Groups.
- Coordinate with the Red Cross, Salvation Army and other volunteer groups to ensure that adequate shelters are in place and that they are being managed efficiently and safely.
- Keep supervisor informed of situation and resource status.
- Resolve logistics problems within the Group.
- Ensure that all shelters are safe and secure.
- Ensure that all shelters are properly staffed.
- Ensure that all shelters have adequate food and bedding.
- Ensure that all citizens staying in the shelter are kept informed of the incident and evacuation efforts.
- Maintain a log of unattended minors at the shelter.
- Maintain medical capabilities as necessary for each shelter.
- Ensure that each shelter has a contact point for citizens to locate evacuated relatives.
- Keep supervisor informed of hazardous situations and significant events.
- Ensure assigned personnel and equipment go on and off duty in a timely manner.
- Approve and turn in time for all resources assigned to the Group.
- Evaluate performance of all resources assigned to the Group.
- Maintain Unit Log (ICS Form 214).

DOCUMENTATION GROUP SUPERVISOR

The Documentation Group Supervisor reports to the Evacuation Branch Director and is responsible for accurately documenting the evacuation efforts.

- Obtain briefings from the Evacuation Branch Director or the Operations Section Chief.
- Review assignments with all Group resources.
- Inform Incident Communications and/or Resource Unit of all status changes of resources assigned to the Group.
- Coordinate activities with Divisions and other Groups.
- Keep supervisor informed of situation and resource status.
- Resolve logistics problems within the Group.
- Collect all documentation related to the evacuation and process it according to incident procedures.
- Keep supervisor informed of hazardous situations and significant events.
- Ensure assigned personnel and equipment go on and off duty in a timely manner.
- Approve and turn in time for all resources assigned to the Group.
- Evaluate performance of all resources assigned to the Group.
- Maintain Unit Log (ICS Form 214).

SECURITY TEAM LEADER

The Security Team Leader reports to the Perimeter Group Supervisor and is responsible for security at roadblocks, checkpoints, evacuation shelters and at other locations as assigned.

- Obtain briefings from the Evacuation Branch Director or the Operations Section Chief.
- Review assignments with all Security Team members.
- Inform Incident Communications and/or Resource Unit of all status changes of resources assigned to the Group.
- Coordinate activities with Divisions and Groups.
- Keep supervisor informed of situation and resource status.
- Resolve logistics problems within the Team.
- Ensure that all Security Team members are properly trained and equipped.
- Ensure that all Security Team members understand the obstruction response procedures and that these procedures are followed.
- Report all "Evacuation Orders" to the Evacuation Branch Director through the Perimeter Group Supervisor within one hour after issuance.
- Keep supervisor informed of hazardous situations and significant events.
- Ensure assigned personnel and equipment go on and off duty in a timely manner.
- Approve and turn in time for all resources assigned to the Team.
- Evaluate performance of all resources assigned to the Team.
- Maintain Unit Log (ICS Form 214).

EVACUATION ORDER **REPORT**

DATE: _____

TIME: _____

PERSON ORDERING EVACUATION: (PRINT NAME) _____

TITLE: _____

1. WHO WAS EVACUATED? (FULL NAME AND D.O.B.)

2. WHERE WERE THEY EVACUATED FROM? (SPECIFIC ADDRESS OR PHYSICAL LOCATION THAT WAS EVACUATED)

3. WHERE WERE THEY TAKEN OR TO WHOM WERE THEY DELIVERED? (EVACUATION CENTER, MEDICAL FACILITY, JAIL, DELIVERED TO ANOTHER PERSON, ETC)

4. WHY WAS THE EVACUATION ORDERED? (SPECIFIC REASON(S) THE PERSON(S) COULD NOT BE LEFT AT THE LOCATION EVACUATED)

5. OTHER INFORMATION? (WITNESSES, POLICE CASE NUMBER(S), COMMUNICATIONS WITH I.C. OR SUPERVISORY PERSONNEL, LEVEL OF FORCE REQUIRED, ETC.)

SIGNATURE: _____

FIELD GUIDE TO EVACUATION PLANNING & IMPLEMENTATION

Working Draft

INTRODUCTION:

One element of emergency response is the determination if, and to what extent, the movement and activities of the public should be controlled. Whether directing traffic around the site of an accident or emptying a town, the principles remain the same; assessing risk factors, planning an appropriate response, informing the public, then implementing the plan.

In Alaska, authority for evacuating persons from a threat is limited. Alaska statutes specifically give an official of a fire department registered with the State Fire Marshall's office the authority to authorize an evacuation (AS 18.70.075 and .090]. While state and local law enforcement and various other emergency response organizations have no specific statutory authority to call for an evacuation they do have common law authority. The Department of Natural Resources, Division of Forestry is registered as a fire department with the Alaska State Fire Marshall. Because of this, employees of the Division of Forestry are considered fire officials and have statutory authority to call for evacuations. Federal agencies have no authority to call for an evacuation by either statute or common law.

In an effort to help bridge the gap between concept and implementation, this all-hazard evacuation guide has been developed to meet the following goals:

1. A fill-in-the-blanks field checklist for managers charged with the evacuation effort;
2. Collection and collation of data needed for planning and implementation by the incident command staff and local principal executive officer(s); and,
3. A permanent record of response efforts.

The primary focus of any response must be people. Citizens in the path of a threat must be informed, consulted and protected throughout the emergency. Emergency managers must always be aware of the impact associated with governmental requests or orders to abandon homes, businesses and property; however temporarily.

SCOPE:

This *Field Guide* is a useful tool for incident managers charged with assessing what segments of the public, if any, are at risk during the emergency and how best to protect

them. It forces objective evaluation and is intended to help eliminate knee-jerk reactions to possibly erroneous perceptions of risk.

With today's "instant" communications, the presence of an emergency is usually common knowledge throughout a wide area within minutes. Citizens living or working in or near the affected area want to know what impact an incident will have on them. Emergency telephone lines may become overloaded and responders may become distracted with questions to which they may have no answers.

Once the "who" is determined, decisions should be made about what constitutes an appropriate response. By completing each element of the *Plan*, managers can make objective selection of options: No direct action, movement restrictions, protection in place, limited evacuation or full evacuation. Options are then matched to each group, and that information is communicated as early, and widely, as possible.

NOTE: This guide is intended to assist agencies or assigned incident management teams with the planning and implementation of an evacuation. In municipalities or boroughs with an approved local emergency operations plan the incident management team must coordinate requests for and the implementation of any evacuation with the local authorities. This can best be accomplished through a Unified Command to bring into the incident local authority for an evacuation. Forestry and other agencies should consult with local authorities prior to the emergency and become familiar with local emergency plans and procedures for an evacuation.

PROCESS:

The extent to which an incident evacuation plan will be completed prior to implementation depends entirely upon the nature, scope and severity of the emergency, plus advance notice provided to the responsible agency. **At an absolute minimum, evacuation instructions must be completed and signed by the Incident Commander (IC), Unified Command or local governing authority such as a city, borough etc., prior to any implementation. If there is no local authority the Alaska Division of Emergency Services should be contacted. The authority for initiating an evacuation should be included in any delegation of authority to an Incident Management Team.** Other applicable portions of the plan may be completed later to serve as a written record.

Some emergencies may allow time for sufficient planning and notifications if evacuation branch directors are involved from the earliest stages of the response effort. The evacuation process begins at the outset of any disaster or major emergency, even if the need to evacuate is not apparent and no decision to evacuate has been made. The process may be divided into six logical steps:

1. Prepare an analysis of: a) Threats, b) Affected area, and c) Objectives. If time permits, prepare a detailed evacuation plan. Contingency preparation saves valuable time. The analysis and plan will serve as a needs assessment upon which the Incident Commander or Unified Command and Principal Executive Officer can base their decisions. Stay flexible. Your analysis and plan may actually provide the basis for a decision NOT to evacuate.

2. Obtain authorization.
 - a. If time does not permit advance completion of a written plan or decision by the principal executive officer, the Initial Attack Incident Commander will complete the *Emergency Evacuation Form* (Attachment A) and submit it to the person that will effect the evacuation. When possible this should be a law enforcement officer. The IC may use their delegated powers to make a unilateral decision to evacuate by signing the "Emergency Evacuation Form". The plan will be prepared at the earliest possible time.
 - b. When it appears time will permit the normal planning and authorization process, complete an *Incident Evacuation Plan* (Attachment B) and submit it to the incident command staff and principal executive officer. A decision may then be made to evacuate immediately or authorize the Incident Commander to implement each stage under conditions included in the plan.
3. Keep the populace affected by the threat continually informed of the incident status.
4. Monitor defined stages and activate resources.
5. Implement the plan.
6. Deactivate the evacuation. This step requires reversing all the actions you initiated. Make sure to include everyone such as the public, incident management team, local jurisdiction and other involved agencies such as the Red Cross.

EMERGENCY EVACUATION PLAN: (Attachment A)

This plan will be used by the Initial Attack Incident Commander to provide for immediate evacuation actions. It is intended to be used only in those situations where the incident is moving so fast that there is not enough time to complete the Incident Evacuation Plan. It should not be used as a replacement for the Incident Evacuation Plan when there is ample time to complete that document. It is also important to recognize that the Incident Evacuation Plan should be completed after the Emergency Evacuation Plan is used to effect an evacuation action. The Incident Evacuation Plan will provide backup documentation for the decision that was made by the Incident Commander in this situation.

The Incident Commander must enter his/her name at the top of the document. It should be clearly printed in this location. The incident commander will sign and date the form at the bottom.

Select the type of evacuation action being taken. The Incident Commander(s) may only select "Evacuation Warning" or "Evacuation Directive". The "Evacuation Order" refers to a case by case situation that is described below and is NOT available as an option to the incident management.

The Incident Commander(s) must describe the specific area that the evacuation action applies to. This should be as specific as possible and should include descriptors that are commonly known and understood by the local citizens.

The Incident Commander(s) must identify the staging areas and/or evacuation centers that the citizens should report to under an evacuation directive. These should be located well away from the incident to minimize the possibility of re-evacuation. While the Incident Commander(s) should identify these for the evacuation directive, it is strongly recommended that they also be identified for the evacuation warning in case citizens choose to evacuate early.

The Incident Commander(s) should describe what the citizens are to be told. The form list two general statements and provides for an optional statement. It is vitally important that all citizens be given similar instructions to avoid confusion.

The Incident Commander(s) should determine if perimeter controls are necessary and, if so, where and what type. It should be understood that neither a checkpoint nor a roadblock will completely stop non-incident traffic. While this is not ideal for the incident, it will provide the incident management with some control over traffic while causing minimum impact to the local citizens. A road closure will stop ALL non-incident traffic and should be used only where absolutely necessary. This is the reason that it is available only at the inner perimeter. ~~If only one perimeter is established, it will be understood that it is an "Outer Perimeter" and a road closure is not an option.~~

INCIDENT EVACUATION PLAN: (Attachment B)

The Incident Evacuation Plan is intended to provide the incident managers with a standard format to document a decision to conduct an evacuation. It can be used to collect information documenting an evacuation that was initiated under an emergency evacuation. It can also be used to collect information to be used for a potential evacuation. The Incident Evacuation Plan contains the following sections: a Coversheet, Evacuation Authorization, an analysis of the Threats, Area, and Objectives, Evacuation Stages, Perimeter and Access Control, the Implementation Plan, and a summary of the Anticipated Resource Requirements. Each of these sections are discussed below:

1. Coversheet:

The Coversheet provides important information to the reader that may not be located anywhere else in the document. It includes the name of the person that was responsible for the preparation of the document. It also includes the name of the agency that is responsible for the document. The date and time the document was completed, the person the document was submitted to (usually the Incident Commander, but it could be the Planning Section Chief or Operations Section Chief) and a checklist identifying the sections that were completed are also on the coversheet.

2. Authorization:

The authority to evacuate citizens and to restrict use of public byways varies according to jurisdiction. As a general rule, an evacuation may not be implemented without the express approval of local principal executive officer(s) unless the Incident Commander can demonstrate an immediate threat to life and safety precluding advance authorization. A Unified Command with local authorities is

recommended when the local authority has jurisdiction and an evacuation is anticipated or required. In such instances, formal authorization should be obtained as soon as possible.

Authorization for evacuations should be obtained in one of three processes. These are:

- A. When there are persons with clear statutory authority to initiate an evacuation at the incident and the IC is an employee of an agency without clear statutory authority for such actions, the IC should recommend that an evacuation be conducted. The official with clear statutory authority will authorize (or not authorize) the evacuation. The evacuation is conducted under the management authority of the incident. It is preferable that a Unified Command is placed in charge of the incident, with at least one commander having clear statutory authority for evacuations.
- B. When there is no one present at the incident with clear statutory authority to initiate an evacuation, the person with emergency expertise should authorize the evacuation.
- C. When there is no one present at the incident with clear statutory authority or with emergency expertise, anyone in authority can initiate the evacuation.

A civil authority such as highway department or municipal street department should generally approve restrictions on the use of public highways, roads and streets. Early liaison is recommended. Again, unilateral action by the Incident Commander should be immediately followed by formal notification and authorization.

The implementation of an evacuation is usually performed by law enforcement personnel, but that may vary according to jurisdiction. Early liaison is recommended to allow planning and mobilization of necessary resources.

3. Analysis of Threats, Area(s) and Objectives (Part I):

A. Threats:

A brief summary of the nature, scope and severity of the emergency at the time the plan was prepared should be included. Threats can be multiple and transitory. Consider secondary threats like downed power lines and ruptured gas pipes. Consider how the threat may actually increase during the period when residents are moving out of the area (traffic congestion, narrow roads, obstructions, etc.).

Are there special populations within the affected area? Schools, hospitals, nursing homes? Is the threat specific to a particular segment of the population such as persons with respiratory problems? Consider protection in place for short-term threats such as a fast moving vapor cloud in which mass movement may prove more hazardous than restricted movement. Also consider the potential dangers of moving people through the incident, lack of a safe shelter area, poor or no means of evacuating people.

B. Area:

Define area(s) affected using common boundaries such as roads, rivers, drainage's, subdivisions, etc. Should sub-areas be defined? Area "A" may need immediate evacuation while Area "B" is under a warning and Area "C" is safe but needs to be reassured it is not at risk. Describe all boundaries in terms easily recognizable by the public during broadcasts ("The area from South Avenue to the river and between Reserve and Russell streets").

C. Objectives:

The listed objectives apply to any emergency. Additional objectives may be set by specifically stating how each defined threat is to be mitigated for each defined area. Set clear objectives.

4. Evacuation Stages:

Evacuation planning does not necessarily mean an evacuation is imminent. Some situations allow sufficient time to obtain necessary approval and implement each stage. Proper planning allows the Incident Commander and principal executive officer(s) to review and approve or revise benchmarks at which stages will be implemented.

Part Two of the *Incident Evacuation Plan* identifies four distinct evacuation stages plus perimeter and access control. The stages should be seen as a process that may be entered at any stage depending on the immediacy of the incident. While there is an "Evacuation Order" described in this field guide, it is not included in the plan as an evacuation stage available to the incident managers. It should be very clearly understood that an "Evacuation Order" is an action that will take place only on a case by case basis. As such, it is not an available action for a broad area around the incident. Incident managers should begin with the lowest possible stage and work up as conditions warrant. As the emergency wanes, work back down to Stage A. Incident staff should clearly identify what conditions will mandate movement from one stage to another, up or down.

A. Pre-evacuation Briefing and Information:

Contact teams should go door-to-door whenever possible. Provide accurate information about the emergency and determine special needs of those contacted. Special health problems, latchkey kids, special transportation needs, etc. When appropriate, complete *Pre-evacuation Contact Sheets* for planning successive stages. If possible, have the documentation team develop an accurate census of potential evacuees and prepare a map for incident managers. At a minimum, contacts should provide the following information: (a) Current incident status, (b) Notification procedures to be used if evacuation become necessary, (c) Evacuation route(s), (d) Location of evacuation center(s), and (e) Method(s) to be used to keep the public informed of incident status.

PRE-EVACUATION CONTACT DATA SHEETS: (Attachment C). Some emergencies, most notably floods and wildland/urban fires may allow plenty of time for contact with the affected public during the pre-evacuation stage. When scope and timing permit, *Pre-Evacuation Contact Data Sheets* should be used. Contact teams should be able to obtain the necessary information in 5 to 7 minutes. *Pre-Evacuation Contact Data Sheets* are doubly useful; first, as an invaluable planning document and second as a reassurance to those contacted that incident managers are concerned about the safety and welfare of the affected public and actively

working to protect them. Information obtained during the contacts will help incident managers prepare safety and contingency plans. It will also help the Red Cross determine what assistance facilities are required.

B. Evacuation Warning: (NOTE: This stage must be authorized by the Incident or Unified Command.)

There is a good probability of the need to evacuate. This is the time for precautionary movement of persons with special needs or health problems, mobile property (including household items) selected and transported by the owner, and under certain conditions, pets and livestock. If property and livestock holding/security areas have been designated, this information needs to be relayed. Avoid any implied promises by responders to provide resources to move personal property. Incident staff should likewise carefully evaluate the wisdom of allowing volunteers inside the perimeter to help move property. Liability and security issues must be addressed.

Implementation conditions should allow plenty of time for coordination with those affected.

Post-evacuation conditions for this stage may include concerns about allowing persons with particular health conditions or other special needs to return prematurely, and safety or security considerations if people are allowed unrestricted movement within the incident perimeter.

C. Evacuation Directive: (NOTE: This stage must be authorized by the Incident or Unified Command.)

Evacuation directives should be issued only where a clear and immediate threat to the health and safety of the population or responders exists. Evacuation directives are designed to remove all occupants from a specific area, therefore the occupants of the affected area(s) are directed to leave within a specified time period by pre-designated route(s) and report to an evacuation center. Perimeter roadblocks are in place and access is restricted. If a person who appears capable of making a reasonable and informed decision decides to remain within the area covered by the evacuation directive, he/she may do so. The emergency responders will not use force to remove persons from areas covered by an evacuation directive. However, the emergency responders should clearly inform the person that failure to evacuate may result in serious physical injury or death and that future opportunities to evacuate may not exist.

An adult making an informed decision to remain in the immediate vicinity presents very real legal and liability issues to the incident staff. However, adults making such informed and reasoned decisions should be allowed to do so under the "Evacuation Directive". A specific warning of the dangers by responders, followed by documentation of the refusal, is appropriate.

Implementation conditions should be clearly relayed to occupants through personal contact, media broadcast, or both. Realistic timetables should be established.

Post-evacuation elements of this stage will recognize that certain occupants may re-enter AT THEIR OWN RISK to check on property. Vehicles should be flagged or otherwise identified at perimeter roadblocks and careful instructions provided concerning safety.

D. Return:

Evacuees are allowed to return according to conditions established for each stage. Hardship and special needs are evaluated by the incident staff. Close coordination with relief agencies is important during this stage if property has been damaged or destroyed. Continued exchange of information between incident staff and evacuees is vital.

Post-evacuation contacts and briefings: Follow-up contacts are necessary once evacuees have had the opportunity to survey any damage to their property. Again, timely and accurate information about mitigation efforts will ease fears and build cooperation.

E: Evacuation Order: (NOTE: This is NOT an option available to the incident management for use generally throughout the incident area, therefore it is not listed in the plan.)

THIS STEP MUST ONLY BE DONE ON A CASE BY CASE BASIS. An evacuation order may be issued only where conditions present a clear and immediate threat to the health and safety of occupants or responders and the person(s) ordered to evacuate appear to not be capable of making a reasonable and informed decision due to their physical or mental condition or their inability to self evacuate. This may be caused by the person(s) level of intoxication, dementia, senility, age, or other physical or mental conditions that could impair their judgement or by a lack of ability to evacuate due to transportation or similar problems. This phase of an evacuation must be limited to individuals or small groups of people.

All evacuation orders must be documented. Officials are encouraged to use the *Evacuation Order Report* (Attachment D). If this report is not completed, the official issuing an evacuation order must at a minimum document in writing the reason for the order, the name of the person(s) involved, the location from which the person(s) was evacuated and the location to which the person(s) was evacuated, and the date and time of the evacuation order. This written documentation must be submitted to the Incident Commander through the proper channels as soon as practicable after the evacuation order is carried out.

Incident managers should understand that persons refusing to evacuate after receiving an "Evacuation Order" will be removed by force if necessary. Arrest is the least desirable option unless the person is clearly endangering others by his or her refusal to cooperate, therefore it is preferable to use "Evacuation Directives" whenever possible. Evacuation Orders should only be used rarely and to resolve specific circumstances.

Implementation conditions should take into account responder and residents safety. Persons ordered to evacuate will not be permitted to return until the conditions that resulted in the evacuation order no longer exist.

F. Perimeter and Access Control:

While perimeter and access control may be important prior to initiating an evacuation, it is imperative that the incident management consider this when an evacuation is in effect. There are two levels of perimeter control that are available to the incident. These are:

- A. Outer Perimeter. The outer perimeter is a line of perimeter and access control that may be well away from the active portions of the

incident. The outer perimeter is usually used as a means of slowing access and informing the public rather than restricting or limiting access. Outer perimeters are typically controlled by checkpoints and/or roadblocks. They are never controlled by a road closure.

- B. **Inner Perimeter.** The inner perimeter is a line of perimeter and access control that should be as close as possible to the active portions of the incident. The inner perimeter can be used to slow access or to restrict access. Inner perimeters can be controlled by checkpoints, roadblocks or road closures.

When an incident establishes a perimeter without describing whether it is an outer or inner perimeter, it will be assumed to be an outer perimeter.

5. **Implementation Plan:**

Part Three of the *Incident Evacuation Plan* documents specific procedures to be followed and outlines certain evacuation management issues.

A. Emergency Implementation Procedure: Develop and disseminate a contingency plan to be used if conditions worsen so quickly that personal notification of a request or order cannot be made. Coordinate with area media. Assign a unique signal and make sure it is not used for any other part of the incident response. Residents should know that use of the signal is an immediate directive to evacuate by pre-designated route(s). One useful signal is the "high-low European style" siren.

B. Obstruction Response Procedure: Determine the response that evacuation branch personnel will provide to persons who decide to remain within the affected area when directed to evacuate and who refuse to evacuate when given an evacuation order. Typically persons who decide to remain when given an evacuation directive will be allowed to do so. They should be given a warning that they will face sever risk of personal injury or death, that their presence may impede work on the incident, that they could be held personally liable for injury or damages to another person or to other property due to their refusal to evacuate and that there may not be emergency personnel available to rescue them at a later time. If they understand these situations and appear to be capable of making an informed and rational decision, they should be allowed to remain.

C. Traffic Plan: Three main elements should be considered in the preparation of a traffic control plan for the evacuation: (1 Evacuation routes, (2 Perimeter control, and (3 Traffic coordination.

Selection of evacuation routes should take into account the volume of evacuee traffic (largely dependent upon the beginning stage of the evacuation effort) available selection of suitable roadways and volume of responder traffic in the area. Plan alternate routes whenever possible.

Perimeter control is established with checkpoints, roadblocks or road closures supplemented by mobile patrols. The Incident Commander should establish an inner and outer perimeter for the incident. The outer perimeter is used to provide information and to reduce sightseeing traffic. Local traffic and those with valid reasons will be allowed past

the outer perimeter. The inner perimeter is used to restrict traffic to emergency response vehicles only.

Checkpoints are staffed locations where vehicles are provided with information on the incident. They should be staffed by Public Information Officers and may use law enforcement officers if available. Vehicles may or may not be stopped at checkpoints.

Roadblocks are locations along a road, highway, street, trail or other location that blocks the passage of people or vehicles and where they are prevented from traveling into an area without providing a specific waiver or justifying their need to enter the area to a representative of the incident. At a minimum, they will be required to provide:

1. One piece of identification (drivers license, I.D. card, social security card, etc.) and the location to which they are traveling.
2. A reasonable explanation of their need to enter the area.
3. Affirm they understand their presence may hinder emergency workers/operations within the area they are entering.
4. Affirm they understand they may incur some personal liability by hindering emergency operations within the area.
5. Affirm they understand there may be personal risks of injury/death by entering the area.
6. Affirm they understand there may be limited or non-existent opportunities/resources to affect their rescue should they encounter life-threatening circumstances.

In order to ensure that the proper information is passed on to all motorists at roadblocks, all personnel are encouraged to use the *Roadblock Datasheet* (Attachment E).

Road closures may be staffed or unstaffed. These are points at which the road is closed to non-emergency traffic. The general public will not be allowed past these points. If road closure points are staffed, they should be staffed with law enforcement officers. Public information officers are not necessary at these locations since non-emergency vehicles will not be allowed past them. Road closures will be used only on the inner perimeters, therefore vehicles should have passed a roadblock before arriving at a road closure. Public information personnel should have been available at the roadblocks to provide information.

Traffic coordination may involve the use of pilot vehicles, designating traffic flow by time period (i.e. access during first half of each hour, and egress during the second half) or fixed traffic control points using radios to coordinate flow. DON'T ASSUME THAT PEOPLE WILL AUTOMATICALLY GIVE RESPONDER TRAFFIC THE RIGHT OF WAY. Consider buses or other mass transit methods for evacuee movement.

D. Evacuation Shelters: Determine the number, location and size of evacuation shelters that will be needed for the incident. Coordinate with the Alaska Division of Emergency Services and the Red Cross, Salvation Army and other similar agencies to staff and operate the shelters. The jurisdictional chapter of the Red Cross, or other voluntary organization, will designate a Shelter Manager and ensure that there is a reliable means to contact that person. Assign Incident Information Officers (IOFR) to each shelter. The IOFR will be responsible for informing the evacuees on the progress of the incident and the evacuation efforts.

E. Pre-Evacuation Activities: Determine the type and extent of pre-evacuation activities that will be completed. This includes determining whether or not evacuation teams will contact residents, what will be provided to the residents and where any datasheets or information collected during these activities will be taken.

F. Resource Locations:

Select sites to be used for each element of the evacuation. Sites should be selected that will not be subject to potential evacuation or threats from the incident. Public Information Officers should be assigned to each center or shelter. Command and staging areas for evacuation responders may be most useful away from the main incident base to avoid congestion and make movement more efficient. Shelters and Assistance centers are usually pre-designated by the Red Cross or other relief agencies. They may need time to open a shelter and begin receiving evacuees. Informing them well in advance will permit set-up time. Evacuation centers are usually a joint effort of incident staff and relief agencies to serve as a clearinghouse. They are used to re-unite families and respond to inquiries from anxious relatives. Evacuation centers should be located close to the evacuated area. EVACUEES SHOULD BE ENCOURAGED TO CHECK-IN AT AN EVACUATION CENTER IMMEDIATELY AFTER EVACUATING EVEN IF THEY WILL NOT BE STAYING THERE. By doing this, the evacuees can improve chances that friends and relatives can locate them during the early stages of an evacuation.

Remember to coordinate any evacuation with the Red Cross, ADES, or other responsible agency that will be assuming responsibility for the people.

Some emergencies will permit the time to select and staff secure areas for the temporary storage of personal property. Fenced compounds are preferable. Access and security are paramount considerations. If holding areas are used, evacuees should be encouraged to move property as early in the incident as possible. Liability considerations should be discussed with area legal officials during this planning stage. Restrictions should be made clearly known (no unloading of trucks or trailers, loads should be enclosed or tarped, etc.). The same considerations apply if arrangements are made for the temporary holding of pets or livestock.

G. Communications:

Public information is the single most important element of any evacuation plan. Plan for the most effective use of all resources: Briefing sheets for contact and traffic control teams, area emergency notification networks, regular media briefings, limited-range radio broadcast units and resident briefing sites are some of the available options.

Direct briefings with the evacuees and public should be done early on and be the first priority for providing public information. Remember that the media may not, and often will not provide the same level and quality of information as you can by meeting directly with the affected public. If available the Local Emergency Alert System can also be used to provide critical information in the early stages. Plan on holding community meetings at shelters early and often.

1. Radio frequencies used by evacuation teams should be established in advance and lists disseminated to incident staff. The agency responsible for evacuation and traffic control efforts may well utilize communication frequencies

completely separate from the incidents. Be certain to provide for networking between evacuation command and the other incident staff.

2. Public Information Officers are needed to conduct community briefings. Ensure that a public information officer is assigned responsibility to set up, coordinate and/or conduct community briefings as necessary. Since many of the community residents may be living in an evacuation center(s), consider having a PIO assigned to the evacuation center(s) on a continuing basis.

3. Designated markings, usually flagging and signs, are helpful in identifying completed contacts, locations requiring special consideration, perimeter boundaries, and vehicles or persons allowed access to restricted areas. For example, red flagging tied to a mailbox may indicate the resident has been personally contacted during Stage A and white flagging may indicate the occupant has a condition requiring extraordinary care.

6. Resource Requirements:

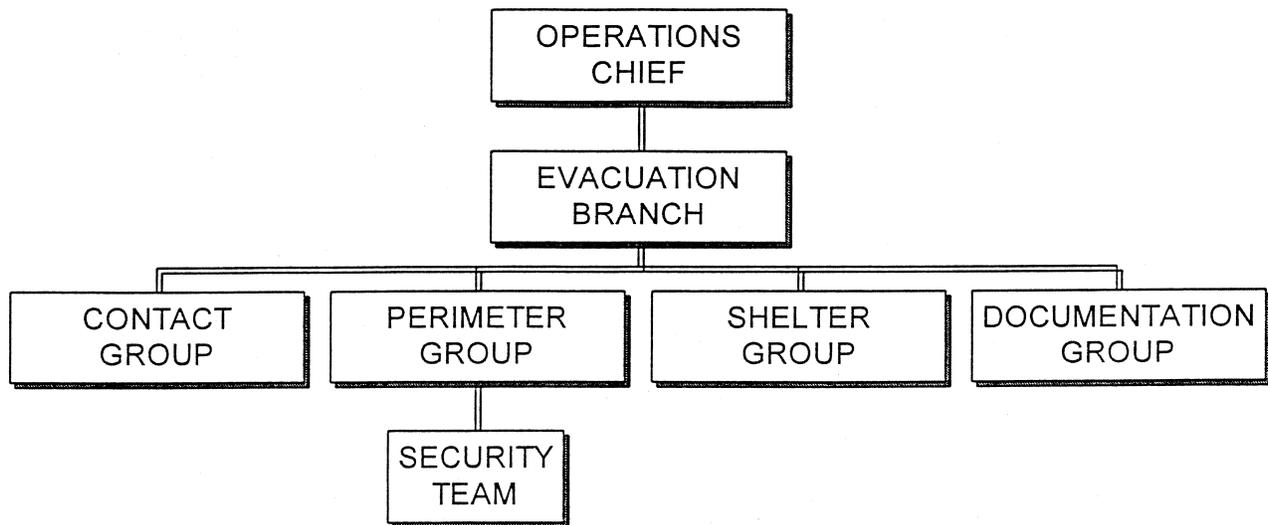
Part four of the plan describes the anticipated resource requirements needed the evacuation. It includes personnel, equipment, traffic control devices, other resources and who will cover the costs of the evacuation.

A. Personnel, Vehicles and Radios:

Available resources, especially in rural areas may limit the scope of an evacuation effort. Early planning allows the incident management team to identify and obtain needed resources through mutual aid requests or other means without having to draw from operational specialists on the incident (*Don't assign firemen to roadblocks if law enforcement officers are available.*).

It is important to remember, however, that when an evacuation is initiated it may very well become the primary responsibility of the incident. As such, it is likely that all incident resources will be diverted to the evacuation branch until it is apparent that all citizens in the affected area have been contacted.

A typical evacuation organization looks like this:



The Incident Management Team having evacuation responsibility should determine staffing requirements for each element and include those totals in Part Four, Section 1, of the *Plan*.

Specialized equipment such as vehicles (marked and private) and radios are included in the same table. Other necessary resources should be identified and listed. Special requirements such as personal protective equipment for persons inside the perimeter should be considered.

Position description summaries for the typical positions assigned to an Evacuation Branch are included as Attachment F.

7. Evacuation Expenses:

Do not delay or avoid a needed evacuation due to funding questions. Because evacuations can be expensive, it is imperative that the incident manages and tracks all cost carefully. Responsibility for the actual evacuation expenses will be determined later, considering all responsible parties.

FORMS ROUTING:

The various forms used in this evacuation procedure shall be routed as follows:

Form	Prepared By	Routed Through	To	Time Frame
Emergency Evacuation Form	Initial Attack Incident Commander	None	Law Enforcement or Incident Personnel	Prior to issuing public Evacuation Instructions
Incident Evacuation Plan	As assigned by IC, usually Operations Section-Evacuation Branch if available	Incident Commander(s)	Plans	Within first 72 hours of an incident.
Evacuation Order Report	Incident personnel issuing the order	Incident Commander(s)	Plans	As soon as possible after issuing the order.
Pre-Evacuation Contact Data Sheets	Pre-Evacuation Contact Teams	Plans	Documentation UL	Daily
Roadblock Datasheet	Roadblock Staff (Law Enforcement or IOFR)	Plans	Documentation UL	Daily